

P-2021/22701

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

DIRECCIÓN DE NUEVAS CREACIONES

E. S. D.

Re: Expediente No. **NC2021/0010393**

Solicitud de patente a nombre de **AMCOR RIGID PACKAGING USA, LLC**

Yo, CAROLINA DAZA MONTALVO identificada como aparece al pie de mi firma, domiciliada en la Carrera 11 No. 86-53, obrando como apoderada de la sociedad AMCOR RIGID PACKAGING USA, LLC, domiciliada en Michigan, Estados Unidos de América, solicitante de la patente de la referencia, en respuesta al oficio No. **21448** notificado electrónicamente el 2 de enero de 2024, relacionado con los requerimientos de fondo de la solicitud, atentamente me permito presentar la siguiente información:

1. Modificaciones a las Reivindicaciones y Claridad

Con fundamento en la facultad que confiere el artículo 34 de la Decisión 486 al solicitante para modificar la solicitud de patente en cualquier momento del trámite, presento junto con este memorial nuevo capítulo reivindicatorio, el cual consta de cinco (5) reivindicaciones y reemplaza completamente el capítulo presentado anteriormente. Las modificaciones realizadas se presentan a continuación:

1.1 Se eliminaron las reivindicaciones 1 a 4, 9 a 12 y 14 a 16.

1.2 Se modificó la antigua reivindicación 5 (nueva reivindicación 1), incluyendo las características de la antigua reivindicación 12, con el fin de definir claramente la materia a proteger y superar las objeciones del examinador. Esta modificación

se soporta en la solicitud tal como se presentó, y en las reivindicaciones originalmente presentadas.

1.3 Se modificó la antigua reivindicación 13 (nueva reivindicación 5), de acuerdo con la modificación realizada en la reivindicación independiente.

Al respecto me permito manifestar que las modificaciones realizadas en esta oportunidad se realizan sin que por ello deba interpretarse que el solicitante acepta alguna de las objeciones establecidas en el oficio de la providencia y sin perjuicio o renuncia de los derechos del solicitante de buscar la protección de la materia allí contenida en etapas posteriores del trámite.

Además, se hace notar que estas modificaciones no amplían de ninguna manera la materia objeto de la presente solicitud, y se realizan con el fin de definir la materia reclamada de forma clara y superar las objeciones planteadas por el examinador en su concepto técnico.

Asimismo, el solicitante quisiera respetuosamente resaltar que las reivindicaciones presentadas junto al presente memorial corresponden a las de la solicitud europea correspondiente (EP3 917 753), que fue concedida por parte de la Oficina Europea (EPO) el 18 de agosto de 2032. Una copia de la patente europea emitida por dicha oficina se anexa a esta respuesta para su mejor referencia.

2. Pago de tasas

En relación con el número de reivindicaciones, atentamente nos permitimos decir que no se adjunta tasa por concepto de reivindicaciones adicionales, toda vez que el nuevo capítulo reivindicatorio tiene un menor número de reivindicaciones a las presentadas previamente, y en esencia es el mismo objeto, pero definido con mayor claridad.

Por otra parte, me permito adjuntar recibo por concepto de pago de tasa de modificación a las reivindicaciones, según lo establecido en la **Resolución No. 59669 de 2020**.

3. Claridad y concisión de las reivindicaciones

El solicitante manifiesta que mediante la presentación del nuevo capítulo reivindicatorio quedan subsanadas la totalidad de las objeciones presentadas por el examinador en su concepto técnico, de modo tal que las nuevas reivindicaciones reclaman de manera clara y concisa la invención descrita. Con respecto a las objeciones específicas del examinador, me permito manifestar lo siguiente:

- 3.1** El examinador señala que las reivindicaciones 16 a 18 hacen mención a un método, pero este no se define mediante una secuencia lógica de etapas y/o mediante sus condiciones técnicas esenciales, sino por medio de elementos de un dispositivo.

Frente a lo anterior, amablemente me permito señalar que las reivindicaciones objetadas fueron eliminadas del pliego reivindicatorio. De esta manera, la objeción a este respecto ha quedado superada.

En vista de lo anterior, las objeciones relacionadas con la claridad, la concisión y el soporte en la descripción del capítulo reivindicatorio, han quedado completamente superadas.

4. Nivel inventivo

El examinador establece en su concepto técnico que las reivindicaciones 1 a 12 y 14 actualmente presentadas no cumplirían con el requisito de nivel inventivo a la luz de las enseñanzas del documento D1: WO2015031726.

Con respecto a lo anterior, me permito resaltar las disposiciones del artículo 18 de la Decisión 486 de la Comisión de la Comunidad Andina, que establecen que *"se considerará que la invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica"*.

Lo anterior significa que el análisis de nivel inventivo **NO** es una comparación de los objetos de las anterioridades y la solicitud en estudio. Por el contrario, el análisis de nivel inventivo **debe demostrar** la obviedad de la invención y establecer cómo ésta no contiene un salto cualitativo, que demuestre su altura inventiva, teniendo en cuenta que se hace **necesario demostrar** que la invención analizada carece de nivel inventivo y hubiese sido obvia para una persona versada en la materia.

Ahora bien, dichas condiciones no se cumplen para el caso en cuestión, pues, tal como se mostrará más adelante, las características técnicas mencionadas en las nuevas reivindicaciones no pueden derivarse de manera obvia o evidente a partir de las enseñanzas del estado de la técnica representadas en los documentos D1 y D2, y, por lo tanto, la materia reclamada es inventiva a la luz del arte previo.

De acuerdo con lo anterior, el solicitante desea manifestar respetuosamente su desacuerdo, ya que teniendo en cuenta las modificaciones presentadas en el nuevo capítulo reivindicatorio, se superan las objeciones realizadas, por cuanto las características técnicas descritas no se divulgan ni se sugieren en los documentos D1 y D2 citados por el examinador, ya sean solos o en combinación. Por lo tanto, las nuevas reivindicaciones son novedosas e inventivas a la luz del estado del arte.

Además, el solicitante sostiene que las características mencionadas en la nueva reivindicación independiente tienen el efecto técnico que el émbolo (112) y así el collar del soporte (130) se pueden mover detrás en la posición retraída sin la necesidad de un actuador bidireccional, simplificando de este modo el impulso para el collar del soporte (130).

Por lo tanto, la presente solicitud presenta uno de los indicios de la existencia de nivel inventivo mencionados en el numeral 2.13.5.3.1, pues la invención proporciona una manera de simplificar los dispositivos conocidos en el estado de la técnica (por ejemplo, cualquiera de los enseñados en los documentos D1 o D2).

Además, ninguno de dichos documentos proporciona una sugerencia clara para llegar al objeto de las reivindicaciones, pues ninguno de ellos proporciona una sugerencia que permita realizar las modificaciones necesarias.

Alternativamente, cuando el resorte (150) aplica una fuerza de compresión al recipiente, el efecto técnico conseguido es una reducción de la altura del recipiente que provoca un cambio de presión dentro del recipiente que, a su vez, sirve para aumentar la resistencia y rigidez del recipiente antes del desplazamiento del cono truncado (como se describe en el párrafo [0039] de la presente solicitud).

En este caso, el problema técnico objetivo sería ¿cómo aumentar la resistencia y rigidez del recipiente antes del desplazamiento del cono truncado?

No obstante, ninguno de los documentos proporciona una sugerencia para que la persona normalmente versada en la materia pueda llegar al objeto de la reivindicación 1 cuando se trata de resolver el problema anterior.

Por lo tanto, el objeto de la nueva reivindicación 1 no resulta obvio a la luz del arte previo citado.

Teniendo en cuenta lo anteriormente expuesto, queda claro que las características técnicas de la materia definida en el capítulo reivindicatorio presentado junto al presente memorial no se derivan de manera obvia o evidente de las enseñanzas de D1 y D2. Por lo tanto, el objeto reclamado cumple con el requisito de Nivel inventivo establecido en el Art. 18 de la Decisión 486.

5. Conclusión

Con las modificaciones introducidas y los argumentos presentados puede concluirse que:

- i) La presente solicitud es clara, concisa y está debidamente soportada en la descripción, cumpliendo con los requerimientos del Artículo 30 de la Decisión 486; y
- ii) La invención de la presente solicitud no resulta obvia ni se derivada de manera evidente del estado de la técnica, cumpliendo así con los requerimientos del Artículo 18 de la Decisión 486.

Por tanto, atentamente me permito solicitar a ese Despacho otorgar el privilegio de patente solicitado a la solicitud en estudio, toda vez que cumple a cabalidad con los requerimientos de la Decisión 486/00.

En consecuencia, solicitamos a ese Despacho pronunciarse en relación con todos los argumentos presentados en este memorial dando estricta aplicación al principio del debido proceso consagrado en el artículo 29 de la Constitución Nacional.

6. Anexos

- Nuevo capítulo reivindicatorio conformado por 5 reivindicaciones.
- Recibo de pago correspondiente a la Tasa de modificación a las reivindicaciones.
- Copia de la Patente Europea EP3 917 753.

Señora Directora,

CAROLINA DAZA MONTALVO

C.C. 66.783.790 de Palmira Valle

TP-141563 CSJ

notificaciones@clarkemodet.com.co

REIVINDICACIONES MODIFICADAS

1. Un dispositivo de desplazamiento (110) para mover mecánicamente un cono truncado (62) en un centro de una base (60) de un contenedor (10) termoplástico desde una posición de soplado a una posición desplazada posterior al llenado en caliente y tapado del contenedor (10) para reducir un volumen interno (48) del contenedor (10), en la posición desplazada el cono truncado (62) está más cerca de una abertura (22) del contenedor (10) que en la posición de soplado, la base (60) incluye un anillo de base profundo (64) entre una superficie de apoyo (66) y el cono truncado (62), el dispositivo de desplazamiento (110) comprende:

un collar de soporte (130) que define un receptáculo (136), una primera abertura (132) y una segunda abertura (134), el collar de soporte (130) tiene un tamaño y forma adecuado para ser recibido dentro del anillo de base profundo (64); y

un émbolo (112) que incluye un cabezal (116) en un extremo de un eje (114) que se extiende a través de la primera abertura (132), el cabezal (116) tiene un tamaño y forma adecuado para ser recibida dentro del receptáculo (136) del collar de soporte (130);

en donde el émbolo (112) puede moverse desde una posición retraída en la cual el cabezal (116) está soportado dentro del receptáculo (136), a una posición extendida en la cual el cabezal (116) se extiende hacia afuera desde dentro del receptáculo (136) para permitir que el cabezal (116) haga contacto con el cono truncado (62) y mueva el cono truncado (62) desde la posición de soplado hasta la posición desplazada;

caracterizado porque el dispositivo de desplazamiento (110) comprende además un resorte de precarga (150) configurado para aplicar una fuerza de compresión al contenedor (10) o para empujar el émbolo (112) en la posición retraída, en donde el resorte de precarga (150) está asentado en el émbolo (112), el émbolo (112) incluye además un reborde (118) a lo largo del eje (114) contra el que se apoya el resorte (150), y en donde un extremo (154) del resorte (150) opuesto al reborde (118) está retenido en el collar de soporte (130).

2. El dispositivo de desplazamiento (110) de acuerdo con la reivindicación 1, en donde el collar de soporte (130) tiene un tamaño y forma adecuado para apoyarse en un vértice del anillo de base profundo (64).

3. El dispositivo de desplazamiento (110) de acuerdo con la reivindicación 1, comprende además un actuador (160) configurado para mover el émbolo (112) desde la posición retraída hasta la posición extendida.

4. El dispositivo de desplazamiento (110) de acuerdo con la reivindicación 1, en donde el actuador (160) es un cilindro neumático o un servo.

5. El dispositivo de desplazamiento (110) de acuerdo con la reivindicación 1, en donde el extremo (154) del resorte (150) opuesto al reborde (118) está retenido en el collar de soporte (130) con al menos uno de un clip o tuerca.



(11) **EP 3 917 753 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
13.09.2023 Bulletin 2023/37

(21) Application number: **19913047.7**

(22) Date of filing: **29.01.2019**

(51) International Patent Classification (IPC):

B29C 49/54 ^(2006.01) **B29C 49/42** ^(2006.01)
B29C 49/28 ^(2006.01) **B29C 49/12** ^(2006.01)
B29C 67/00 ^(2017.01) **B65D 79/00** ^(2006.01)
B65D 1/02 ^(2006.01) **B29L 31/00** ^(2006.01)
B29C 49/48 ^(2006.01)

(52) Cooperative Patent Classification (CPC):

B29C 49/4273; B29C 49/4802; B29C 49/541;
B29C 67/0029; B29C 67/0048; B29C 49/06;
B29C 49/249; B29C 49/42802; B29C 49/4281;
B29C 49/4283; B29C 49/42832; B29C 49/6605;
B29C 2049/4807; B29C 2049/4892;
B29C 2949/0715;

(Cont.)

(86) International application number:

PCT/US2019/015676

(87) International publication number:

WO 2020/159482 (06.08.2020 Gazette 2020/32)

(54) **VERTICAL DISPLACEMENT DEVICES AND METHODS FOR MECHANICALLY INVERTING A THERMOPLASTIC CONTAINER BASE**

VERTIKALE VERSCHIEBEVORRICHTUNGEN UND VERFAHREN ZUM MECHANISCHEN
INVERTIEREN EINER THERMOPLASTISCHEN BEHÄLTERBASIS

DISPOSITIFS DE DÉPLACEMENT VERTICAL ET PROCÉDÉS D'INVERSION MÉCANIQUE D'UNE
BASE DE CONTENANT THERMOPLASTIQUE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR

(43) Date of publication of application:
08.12.2021 Bulletin 2021/49

(73) Proprietor: **Amtcor Rigid Packaging USA, LLC**
Ann Arbor, MI 48108 (US)

(72) Inventor: **STELZER, James**
South Lyon, Michigan 48178 (US)

(74) Representative: **Witte, Weller & Partner**
Patentanwälte mbB
Postfach 10 54 62
70047 Stuttgart (DE)

(56) References cited:
EP-B1- 1 868 790 **JP-A- 2007 216 981**
JP-A- 2007 216 981 **JP-B2- 5 127 243**
US-A1- 2009 202 766 **US-A1- 2010 170 199**
US-A1- 2010 301 058 **US-A1- 2013 068 779**
US-A1- 2014 166 676 **US-A1- 2015 328 825**
US-A1- 2016 152 457 **US-B1- 6 422 259**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 3 917 753 B1

(52) Cooperative Patent Classification (CPC): (Cont.)
B29K 2023/065; B29K 2023/12; B29K 2023/14;
B29K 2025/06; B29K 2067/003; B29L 2031/7158;
B65D 1/0261

Description

FIELD

[0001] The present disclosure relates to vertical displacement devices and methods for mechanically inverting a thermoplastic container base.

BACKGROUND

[0002] This section provides background information related to the present disclosure, which is not necessarily prior art.

[0003] Containers that are blow molded from various thermoplastics, such as polyethylene terephthalate, are used in the packaging industry to distribute food and beverages to consumers. In order to sterilize the internal product and ensure freshness, a process of hot-filling is used, which requires that the product be heated to temperatures from 180°F to 205°F [82.22°C to 96.11 °C] prior to filling the container. After filling, the container is capped to integrally seal the container with a closure. After sealing, the container begins to cool resulting in an internal vacuum within the container.

[0004] Various methods have been devised to address the internal container vacuum created by the hot-fill process, such as vacuum panels, nitrogen dosing, compressible ribs and the like. One such method of controlling vacuum is by creating container base designs that move inward to reduce the internal container volume thereby lowering internal vacuum. These base designs can be passive or active. A passive base design allows the internal force of the vacuum to create the inward movement of the base panel. Active base designs require the use of an external mechanical force to reposition or displace the base inwardly. Examples of passive and active base designs can be found in the following U.S. patent documents, each of which is assigned to Amcor: U.S. Patent No. 6,942,116 titled "Container Base Structure Responsive to Vacuum Related Forces" (issued on September 13, 2005); U.S. Pat. Application No. 15/350,558 filed on November 14, 2016 (Publication No. 2017-0096249 published on April 6, 2017) titled "Lightweight Container Base;" and U.S. Pat. Application No. 15/505,525 filed on February 21, 2017 titled "Container Base Including Hemispherical Actuating Diaphragm."

[0005] The present disclosure advantageously includes improved vertical displacement devices and methods for mechanically inverting a thermoplastic container base and in particular containers comprising a base including a deep base ring between a standing surface and the truncated cone. One skilled in the art will appreciate that the present disclosure includes numerous additional advantages and unexpected results as well.

[0006] JP 5 127 243 B2 discloses a manufacturing method for a bottle filled with contents, according to which a recessed portion on the bottom of the bottle is bulged

from the under surface of the bottom using fluid pressure when contents are filled into the bottle to simplify an apparatus configuration and reduce manufacturing cost.

[0007] EP 1 868 790 B1 discloses a method for forming a blow molded container with a base having a movable region and a bearing surface. The method comprises receiving a parison, and closing said parison with the mold that includes a cavity, inflating said parison in said mold to form said blow molded container with said movable region at said cavity, and repositioning said movable region before filling said blow molded container, wherein, before said repositioning, at least the first portion of said movable region of said blow molded container is arranged outwardly below said bearing surface, and at least a second portion of said movable region of said blow molded container is arranged inwardly above said bearing surface. The second portion of said movable region arranged inwardly above said bearing surface is located at the center of the movable region of said blow molded container, and the first portion of said movable region arranged outwardly below said bearing surface surrounds the second portion of said movable region.

[0008] US 2016/0152457 A1 discloses a machine for processing containers including a base having a high standing ring and a central invertible diaphragm, wherein the machine includes a container supporting frame including a hollow support ring for engaging a container base, a pusher movable with respect to the container supporting frame, capable of coming into abutment with the container base through the supporting frame, an actuator for slidingly moving the pusher frontwards towards the container base through the supporting frame, and backwards, a strain gauge coupled to the actuator for gauging a strain applied by the actuator to the pusher, a control unit including a processor connected to the strain gauge and programmed for comparing a gauged strain value to a memorized strain reference value.

[0009] JP 2007 216981 A discloses a manufacturing method for a bottle filled with contents according to which a recessed portion on the bottom of the bottle is bulged from the under surface of the bottom using fluid pressure when contents are filled into the bottle to simplify an apparatus configuration and reduce manufacturing cost.

[0010] Patent publications JP5127243B2 and EP1868790B1 discussed above essentially disclose displacement devices corresponding to the preamble of claim 1.

SUMMARY

[0011] The claimed invention is set forth in the appended set of claims.

[0012] This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features.

[0013] The present disclosure includes a displacement device for moving a truncated cone at a base of a container from an as-blown position to a displaced position.

The base includes a deep base ring between a standing surface and the truncated cone. The displacement device includes a collar sized and shaped to be received within the deep base ring. A plunger includes a head at an end of a shaft extending through the collar. The head is sized and shaped to be received within the receptacle of the collar. The plunger is movable from a retracted position, at which the head is seated within the receptacle, to an extended position at which the head extends out from within the receptacle to allow the head to contact the truncated cone and move the truncated cone from the as-blown position to the displaced position.

[0014] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

DRAWINGS

[0015] The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.

Figure 1 is a side view of a container in accordance with the present disclosure;

Figure 2 is a perspective view of a base of the container of Figure 1, the base including a truncated cone portion in an as-blown position;

Figure 3 is a cross-sectional view of the base of the container of Figure 1, with solid lines illustrating the truncated cone portion in the as-blown position and phantom lines illustrating the truncated cone in a displaced position subsequent to hot-filling and mechanical displacement of the truncated cone;

Figure 4 is another cross-sectional view of the base of the container of Figure 1, with solid lines illustrating the truncated cone portion in the as-blown position and phantom lines illustrating the truncated cone in the displaced position subsequent to hot-filling and mechanical displacement of the truncated cone;

Figure 5 is a cross-sectional view of a deep base ring of the container of Figure 1, the deep base ring at least partially defined by the truncated cone portion in the as-blown position;

Figure 6 illustrates a displacement device for moving the base of the container of Figure 1 from the as-blown position to the displaced position;

Figure 7 illustrates the displacement device of Figure 4 in cooperation with the base of the container, and a plunger of the displacement device in a retracted position; and

Figure 8 illustrates the plunger of the displacement device in an extended position to move the base of the container from the as-blown position to the displaced position.

[0016] Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0017] Example embodiments will now be described more fully with reference to the accompanying drawings.

[0018] Figure 1 illustrates an exemplary polymeric container in accordance with the present disclosure at reference numeral 10. The container 10 is blow-molded from any suitable preform. The polymeric container 10 may be made of any suitable polymeric material, such as polyethylene terephthalate (PET), low-density polypropylene (LDPP), high-density polyethylene (HDPE), polypropylene, and polystyrene, for example. The material of the container 10 has an average material thickness of 0.011 inches or less. The material of the container 10 has an intrinsic viscosity (IV) of 0.68 deciliters per gram (dL/g) - 0.78 dL/g for polyethylene terephthalate.

[0019] The container 10 is configured to store any suitable hot-fill material, such as any suitable beverage and/or food product. The container 10 may be of any suitable size, such as, but not limited to, 6, 8, 10, 12, 16, 20 ounces [0.177L; 0.2366L; 0.296L; 0.355L; 0.473L; 0.5912L], etc., for example. The container 10 may have any suitable shape, such as, but not limited to, the shape illustrated throughout the figures. The container 10 includes an overall diameter of $\varnothing^{\circ}$.

[0020] The exemplary container 10 generally has a first end 12 and a second end 14, which is opposite to the first end 12. A longitudinal axis A extends along a length/height of the container 10 along an axial center of the container 10, which is generally cylindrical. At the first end 12 is a finish 20, which defines an opening 22 of the container 10. The finish 20 includes threads 24, or any other suitable configuration suitable for coupling a closure (e.g., cap) to the finish 20 to seal the opening 22 closed. For example, the threads 24 may be external threads as illustrated, or internal threads in some applications.

[0021] Below the finish 20 is a flange 26, which is suitable for holding the preform in a blow-molding machine as the container 10 is formed from the preform. The flange 26 is between the finish 20 and a neck 30. A shoulder 32 extends downward from the neck 30, and outward from the longitudinal axis A. The shoulder 32 extends to a body 40 of the container 10. The body 40 includes a cylindrical sidewall 42, which generally extends to a base 60 of the container 10. The sidewall 42 may include one or more ribs 44A. The body 40 defines a majority of an internal volume 48 of the container 10 in which the commodity is stored.

[0022] With continued reference to Figure 1 and additional reference to Figures 2-5, the base 60 will now be described in further detail. The base 60 generally includes a truncated cone 62 at an axial center of the base 60. The longitudinal axis A extends through a center of

the truncated cone 62. Surrounding the truncated cone 62, and partially defining the truncated cone 62, is a deep base ring 64. The cone 62 and the ring 64 have a diameter $\varnothing^R$. The deep base ring 64 extends into the base 60 a distance of B^R (see Figure 4) from the standing surface 66.

[0023] The deep base ring 64 is between the truncated cone 62 and a standing surface 66. The truncated cone 62 is inset from the standing surface 66 (see Figure 4, for example). The standing surface 66 provides a surface configured to support the container 10 upright when seated on a flat surface. With particular reference to Figures 3-5, the deep base ring 64 includes a hinge 70 from which extends an inner sidewall 72 and an outer sidewall 74. The inner sidewall 72 is also part of the truncated cone 62.

[0024] The truncated cone 62 is formed in any suitable manner, such as with any suitable blow-mold with a moveable base insert ring, which is used to create the deep base ring 64 surrounding the truncated cone 62. During blow-molding of the container 10 from the preform, a base insert ring component of a blow mold is in a retracted position relative to the rest of the base tooling, which allows plastic material from the preform to flow into the cavity that is created. The base ring component is then moved into the extended position, which stretches and forms the plastic into the final shape of the deep base ring 64 (see the following U.S. patent, which is assigned to Amcor: U.S. Pat. No. 8,313,686 titled "Flex Ring Base," issued on February 6, 2009).

[0025] Figure 3 illustrates an as-blown position of the truncated cone 62 at reference letter A. In the as-blown position A, the inner sidewall 72 is opposite to the outer sidewall 74. With reference to Figure 5, the inner and outer sidewalls 72 and 74 extend from the hinge 70 at an acute angle A^a . The acute angle A^a may be any suitable acute angle, such as 16° - 43° , and particularly about 25° . The inner sidewall 72 is oriented at an angle A^{1w} from the truncated cone 62 at any suitable obtuse angle, such as 91° - 130° as measured from a plane that is generally parallel to the standing surface 66. The outer sidewall 74 is arranged at an angle A^{0w} of 91° - 130° as measured from the plane that is generally parallel to the standing surface 66. The angles and depth of the deep base ring 64 can be modified to control material thickness, inversion force, reversion force, and volume displaced of the truncated cone 62.

[0026] After the container 10 is hot-filled and the opening 22 is sealed with any suitable closure, the truncated cone 62 is displaced from the as-blown position A to the retracted position B. The truncated cone 62 is displaced to the retracted position B mechanically using any suitable inversion tool, such as a displacement device 110 in accordance with the present disclosure (see Figures 6-8 and further described herein). In the displaced, retracted position B, the angle between the inner sidewall 72 and the outer sidewall 74 is any suitable obtuse angle A^0 of 143° - 184° , such as 163° for example (see Figure 4). Thus the angle between the inner sidewall 72 and the

outer sidewall 74 increases from the as-blown position A to the retracted position B a factor of about 3.3-11.5 times, such as about 6.5 times. The truncated cone 62 moves a distance d^1 from the as-blown position A to the retracted position B. Mechanical displacement of the truncated cone 62 from the as-blown position A to the retracted position B advantageously reduces the internal volume 48, thereby decreasing vacuum or increasing pressure within the container 10.

[0027] The base 60 advantageously has a low cone diameter $\varnothing^r$ to displacement distance d^1 of 2:1 or less. For example, the cone diameter $\varnothing^r$ to displacement distance d^1 can be in the range of 0.2:1 to 2:1, such as about 1:1. The overall container diameter $\varnothing^c$ to deep base ring diameter $\varnothing^r$ is about 3:1, such as in the range of 2:1-4:1. The container diameter $\varnothing^c$ is about three times greater than the displacement distance (or activated depth) d^1 .

[0028] The present disclosure provides numerous advantages over the art. For example, the container 10 having the dimensions and configurations set forth above enables the sidewall 42 and overall material of the container to be made thinner, particularly at the base area 60 (the material of the container 10 has an average material thickness of less than 0.010 inches [0.254 mm]). This increases the stretch induced crystallinity at the base 60, which is usually an amorphous area due to lower material stretching. The present disclosure allows for more precise control of container volume displacement to create a specific vacuum or pressure level in the container 10, and prevents over pressurization and spilling when the container 10 is opened. Furthermore, the disclosed configuration of the base 60 advantageously increases the force required to revert the truncated cone 62 from the retracted position B to the as-blown position A.

[0029] The container 10 advantageously utilizes the centrally located truncated cone 62 that is displaced a relatively long distance d^1 compared to the small diameter $\varnothing^r$ of the truncated cone 62. Thus the container 10 advantageously accomplishes volume reduction of the internal volume 48 using vertically oriented displacement versus transversely oriented inversion.

[0030] An advantage of the small diameter of the truncated cone 62 is that there is a large surface area between the deep base ring 64 and the heel/outer diameter of the container 10. The overall container diameter $\varnothing^c$ to the diameter $\varnothing^r$ of the deep base ring 64 is about 3:1. This area serves to support the truncated cone 62 when it is in the retracted position (activated/displaced) B so that the truncated cone 62 will not revert if a plurality of the containers are stacked or dropped. The truncated cone is mechanically displaced to the retracted position B after the container has been filled and capped. As the container 10 cools, it may be displaced at various points during cooling depending on requirements of the filling line and the amount of pressure or vacuum that is desired in the container 10 at any given point in the process. This repositioning of the base 60 may occur for example in a

labeling machine at the same time an external label is applied to the label or at a dedicated station anywhere within the filling and conveying line.

[0031] With reference to Figures 6-8, the displacement device 110 will now be described, along with a method of using the displacement device 110. The displacement device 110 includes a plunger 112 having a shaft 114 and a head 116 at an end of the shaft 114. Arranged along the shaft 114 is a flange 118.

[0032] The displacement device 110 further includes a support collar 130. The collar 130 defines a first aperture 132 and a second aperture 134, which is opposite to the first aperture 132. The support collar 130 defines a receptacle 136. The plunger 112 is arranged such that the shaft 114 extends through the first aperture 132. When the plunger 112 is in the retracted position of Figure 6, the head 116 is seated within the receptacle 136.

[0033] The displacement device 110 further includes a preload spring 150. The preload spring 150 has a first end 152 and a second end 154. The preload spring 150 is seated on the shaft 114. The first end 152 is secured to the flange 118, and the second end 154 is secured at the support collar 130 with any suitable attachment device 156. The attachment device 156 may be a clip or nut, for example, or any other suitable attachment device.

[0034] The plunger 112 is moved from the retracted position of Figure 6 to an extended position (see Figure 8) by any suitable actuator 160. The actuator 160 may be, for example, a servo, an air cylinder, a pneumatic actuation member, etc. The preload spring 150 is biased to apply a vertical load force to the support collar 130 and to return the plunger 112 to the retracted position of Figures 6 and 7 after the actuator 160 moves the plunger 112 to the extended position of Figure 8.

[0035] A method of using the displacement device 110 to mechanically move the truncated cone 62 from the as-blown position A to the displaced position B subsequent to hot-filling and capping of the container 10 to reduce an internal volume of the container 10 will now be described. Prior to displacing the truncated cone 62, the container 10 is supported at a top thereof to resist the force applied by the displacement device 110. This may be accomplished in any suitable manner, such as by holding or supporting the container support flange 26, the shoulder 32, or a closure/cap for the container 10. The container 10 is also supported at the base 60, such as at a heel of the container at the outside diameter and standing surface 66.

[0036] Once the container 10 has been properly supported, the displacement device 110 is arranged such that the support collar 130 is seated in the deep base ring 64. Specifically, the support collar 130 is arranged such that it abuts an apex of the deep base ring 64 at the hinge 70 thereby aligning and centering the device 110 with the container 10. The support collar 130 is arranged in the deep base ring 64 by the actuator 160, or any other suitable actuation device. The support collar 130 and plunger 112 can be activated by separate air cylinders,

servos, or any other actuator. Bearings may be included to keep the support collar 130 and the plunger 112 aligned with the container 10. The support collar 130 advantageously provides alignment to reinforce material of the deep base ring 64, the truncated cone 62, and the surrounding portions of the base 60 to advantageously prevent any possible deformation.

[0037] After the support collar 130 is arranged within the deep base ring 64, the actuator 160 moves the plunger 112 from the retracted position of Figures 6 and 7, to the extended position of Figure 8. As the plunger 112 moves to the extended position of Figure 8, the flange 118 applies force to the preload spring 150, which applies force to the collar 130. The force of the collar 130 acting against the deep base ring 64 causes the container 10 to compress vertically thereby reducing the height of the container 10 and causing a change in pressure within the container 10. The change in pressure can be in the form of a decrease in vacuum or an increase in pressure within the container 10. The change in pressure within the container 10 serves to increase the strength and rigidity of the container 10 prior to displacement of the truncated cone 62. Once the preload force of preload spring 150 has been achieved, the head 116 of plunger 112 contacts and pushes the truncated cone 62 from the as-blown position A to the displaced position B to reduce the internal volume of the container 10. After the truncated cone 62 has been moved to the displaced position B, the preload spring 150 returns the plunger 112 to the retracted position of Figures 6 and 7, and the actuator 160 or any other suitable actuator moves the entire displacement device 110 away from the container 10. The displacement device 110 thus advantageously provides for a mechanical displacement device that mechanically moves the truncated cone 62 from the as-blown position A to the displaced position B.

[0038] The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. The same may also be varied in many ways.

Claims

1. A displacement device (110) for mechanically moving a truncated cone (62) at a center of a base (60) of a thermoplastic container (10) from an as-blown position to a displaced position subsequent to hot-filling and capping the container (10) to reduce an internal volume (48) of the container (10), in the displaced position the truncated cone (62) is closer to an opening (22) of the container (10) than in the as-blown position,
the displacement device (110) comprising:

a support collar (130) defining a receptacle (136), a first aperture (132), and a second aperture (134), and

a plunger (112) including a head (116) at an end of a shaft (114) extending through the first aperture (132),
 wherein the head (116) is sized and shaped to be received within the receptacle (136) of the support collar (130);
 wherein the plunger (112) is movable from a retracted position at which the head (116) is seated within the receptacle (136), to an extended position at which the head (116) extends out from within the receptacle (136) to allow the head (116) to contact the truncated cone (62) and move the truncated cone (62) from the as-blown position to the displaced position,
 wherein the displacement device (110) further comprises: a preload spring (150) configured to apply a compressive force to the container (10) or to bias the plunger (112) in the retracted position,
 wherein the preload spring (150) is seated on the plunger (112),
 the plunger (112) further including a flange (118) along the shaft (114) against which the spring (150) is seated, and
 wherein an end (154) of the spring (150) opposite to the flange (118) is retained at the support collar (130),
 the displacement device (110) being **characterized in that**
 the displacement device (110) is adapted for containers (10) comprising a base (60) including a deep base ring (64) between a standing surface (66) and the truncated cone (62), by that the support collar (130) is sized and shaped to be received within the deep base ring (64).

2. The displacement device of Claim 1, wherein the support collar (130) is sized and shaped to abut an apex of the deep base ring (64).
3. The displacement device of Claim 1, further comprising an actuator (160) configured to move the plunger (112) from the retracted position to the extended position.
4. The displacement device of Claim 3, wherein the actuator (160) is an air cylinder or a servo.
5. The displacement device of Claim 1, wherein the end (154) of the spring (150) opposite to the flange (118) is retained at the support collar (130) with at least one of a clip or nut.

Patentansprüche

1. Verschiebevorrichtung (110) zum mechanischen Bewegen eines Kegelstumpfes (62) an einer Mitte

einer Basis (60) eines thermoplastischen Behälters (10) aus einer Position wie geblasen in eine verschobene Position im Anschluss an ein Heißfüllen und Verkappen des Behälters (10), um ein Innenvolumen (48) des Behälters (10) zu verringern, wobei der Kegelstumpf (62) in der verschobenen Position näher zu einer Öffnung (22) des Behälters (10) als in der Position wie geblasen ist,
 wobei die Verschiebevorrichtung (110) aufweist:

einen Stützkragen (130), der ein Gefäß (136), eine erste Apertur (132) und eine zweite Apertur (134) definiert, und
 einen Kolben (112), der einen Kopf (116) an einem Ende eines Schaftes (114) aufweist, der sich durch die erste Apertur (132) erstreckt, wobei der Kopf (116) so groß und so geformt ist, dass er in dem Gefäß (136) des Stützkragens (130) aufgenommen werden kann;
 wobei der Kolben (112) aus einer zurückgezogenen Position, in der der Kopf (116) in dem Gefäß (136) sitzt, in eine erstreckte Position beweglich ist, in der der Kopf (116) sich aus dem Gefäß (136) heraus erstreckt, so dass der Kopf (116) den Kegelstumpf (62) berühren und den Kegelstumpf (62) aus der Position wie geblasen in die verschobene Position bewegen kann,
 wobei die Verschiebevorrichtung (110) weiterhin aufweist: eine Vorspannfeder (150), die dazu ausgebildet ist, eine Druckkraft auf den Behälter (10) auszuüben oder den Kolben (112) in die zurückgezogene Position vorzuspannen, wobei die Vorspannfeder (150) an dem Kolben (112) sitzt,
 wobei der Kolben (112) weiterhin einen Flansch (118) entlang des Schaftes (114) aufweist, gegen den die Feder (150) sitzt, und
 wobei ein Ende (154) der Feder (150) gegenüber dem Flansch (118) an dem Stützkragen (130) zurückgehalten ist,
 wobei die Verschiebevorrichtung (110) **dadurch gekennzeichnet ist, dass**
 die Verschiebevorrichtung (110) für Behälter (10) angepasst ist, die eine Basis (60) einschließlich eines tiefen Basisrings (64) zwischen einer Standfläche (66) und dem Kegelstumpf (62) aufweisen, indem der Stützkragen (130) so groß und so geformt ist, dass er in dem tiefen Basisring (64) aufgenommen werden kann.

2. Verschiebevorrichtung nach Anspruch 1, wobei der Stützkragen (130) so groß und so geformt ist, dass er an einem Scheitel des tiefen Basisrings (64) anliegen kann.
3. Verschiebevorrichtung nach Anspruch 1, weiterhin mit einem Aktuator (160), der dazu ausgebildet ist,

den Kolben (112) aus der zurückgezogenen Position in die erstreckte Position zu bewegen.

4. Verschiebevorrichtung nach Anspruch 3, wobei der Aktuator (160) ein Luftzylinder oder ein Servoantrieb ist. 5
5. Verschiebevorrichtung nach Anspruch 1, wobei das Ende (154) der Feder (150), das zu dem Flansch (118) entgegengesetzt ist, an dem Stützkragen (130) mit zumindest einem Clip oder einer Mutter zurückgehalten ist. 10

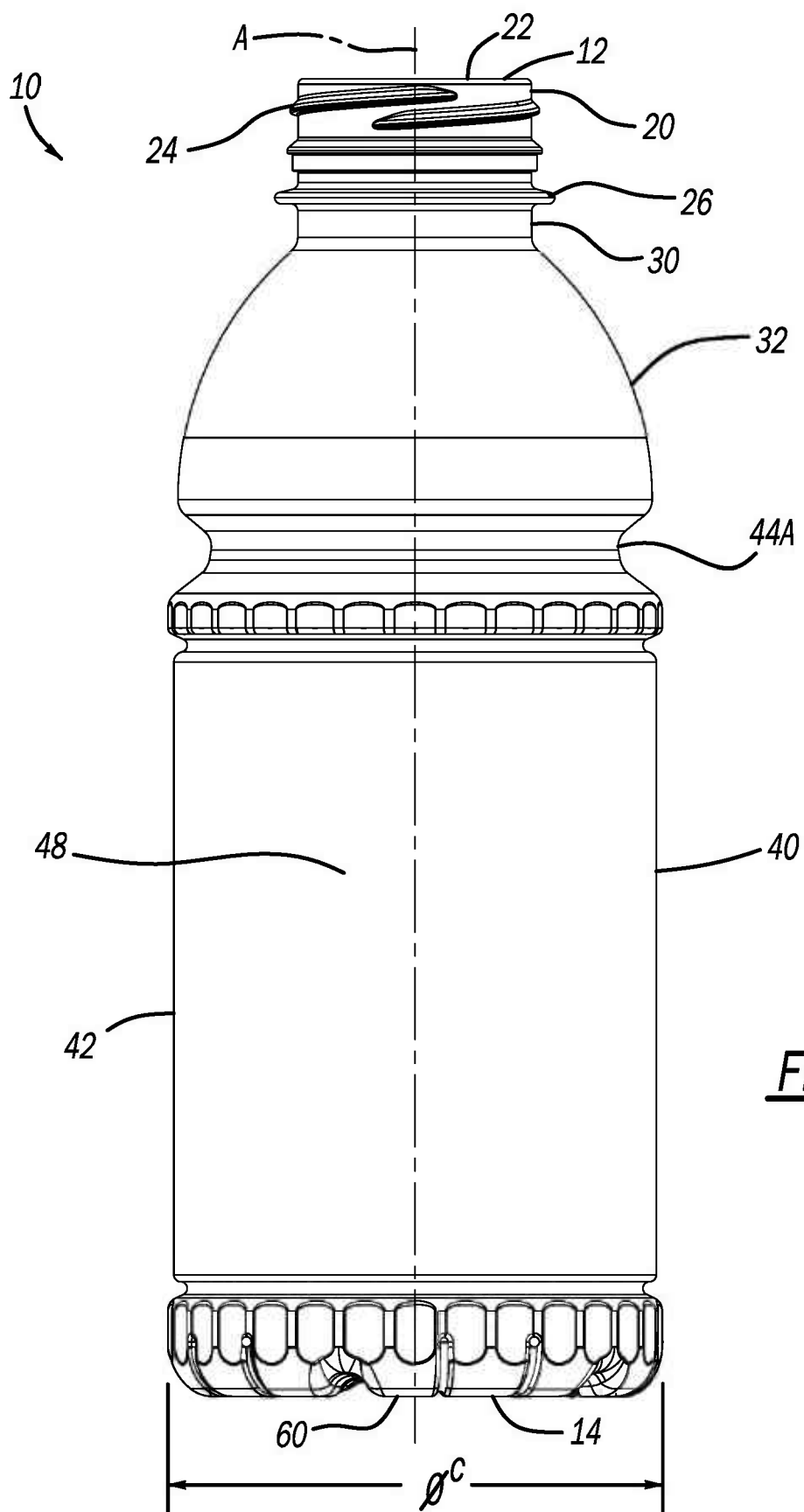
Revendications 15

1. Dispositif de déplacement (110) pour déplacer mécaniquement un cône tronqué (62) au centre d'une base (60) d'un récipient thermoplastique (10) d'une position de soufflage à une position déplacée après le remplissage à chaud et le capsulage du récipient (10) pour réduire un volume interne (48) du récipient (10), dans la position déplacée le cône tronqué (62) est plus proche d'une ouverture (22) du récipient (10) que dans la position de soufflage, le dispositif de déplacement (110) comprenant : 20
 - un collier de support (130) définissant un réceptacle (136), une première ouverture (132) et une deuxième ouverture (134), et 30
 - un piston (112) comprenant une tête (116) à une extrémité d'une tige (114) s'étendant à travers la première ouverture (132), 35
 - dans lequel la tête (116) est dimensionnée et conformée pour être reçue à l'intérieur du réceptacle (136) du collier de support (130) ;
 - dans lequel le piston (112) est mobile d'une position rétractée à laquelle la tête (116) est placée à l'intérieur du réceptacle (136), à une position étendue à laquelle la tête (116) s'étend hors de l'intérieur du réceptacle (136) pour permettre à la tête (116) d'entrer en contact avec le cône tronqué (62) et de déplacer le cône tronqué (62) de la position de soufflage à la position déplacée, 40
 - dans lequel le dispositif de déplacement (110) comprend en outre : un ressort de précontrainte (150) configuré pour appliquer une force de compression au récipient (10) ou pour solliciter le piston (112) dans la position rétractée, 45
 - dans lequel le ressort de précontrainte (150) est placé sur le piston (112), 50
 - le piston (112) comprenant en outre une bride (118) le long de la tige (114) contre laquelle le ressort (150) est placé, et 55
 - dans lequel une extrémité (154) du ressort (150) opposée à la bride (118) est retenue au niveau du collier de support (130),

le dispositif de déplacement (110) étant **caractérisé en ce que**

le dispositif de déplacement (110) est adapté à des récipients (10) comprenant une base (60) ayant un anneau de base profond (64) entre une surface d'appui (66) et le cône tronqué (62), **en ce que** le collier de support (130) est dimensionné et conformé pour être reçu à l'intérieur de l'anneau de base profond (64).

2. Dispositif de déplacement de la revendication 1, dans lequel le collier de support (130) est dimensionné et conformé pour venir en butée contre un sommet de l'anneau de base profond (64).
3. Dispositif de déplacement de la revendication 1, comprenant en outre un actionneur (160) configuré pour déplacer le piston (112) de la position rétractée à la position étendue.
4. Dispositif de déplacement de la revendication 3, dans lequel l'actionneur (160) est un vérin pneumatique ou un servo.
5. Dispositif de déplacement de la revendication 1, dans lequel l'extrémité (154) du ressort (150) opposée à la bride de fixation (118) est retenue au niveau du collier de support (130) avec au moins l'un d'un clip ou d'un écrou.



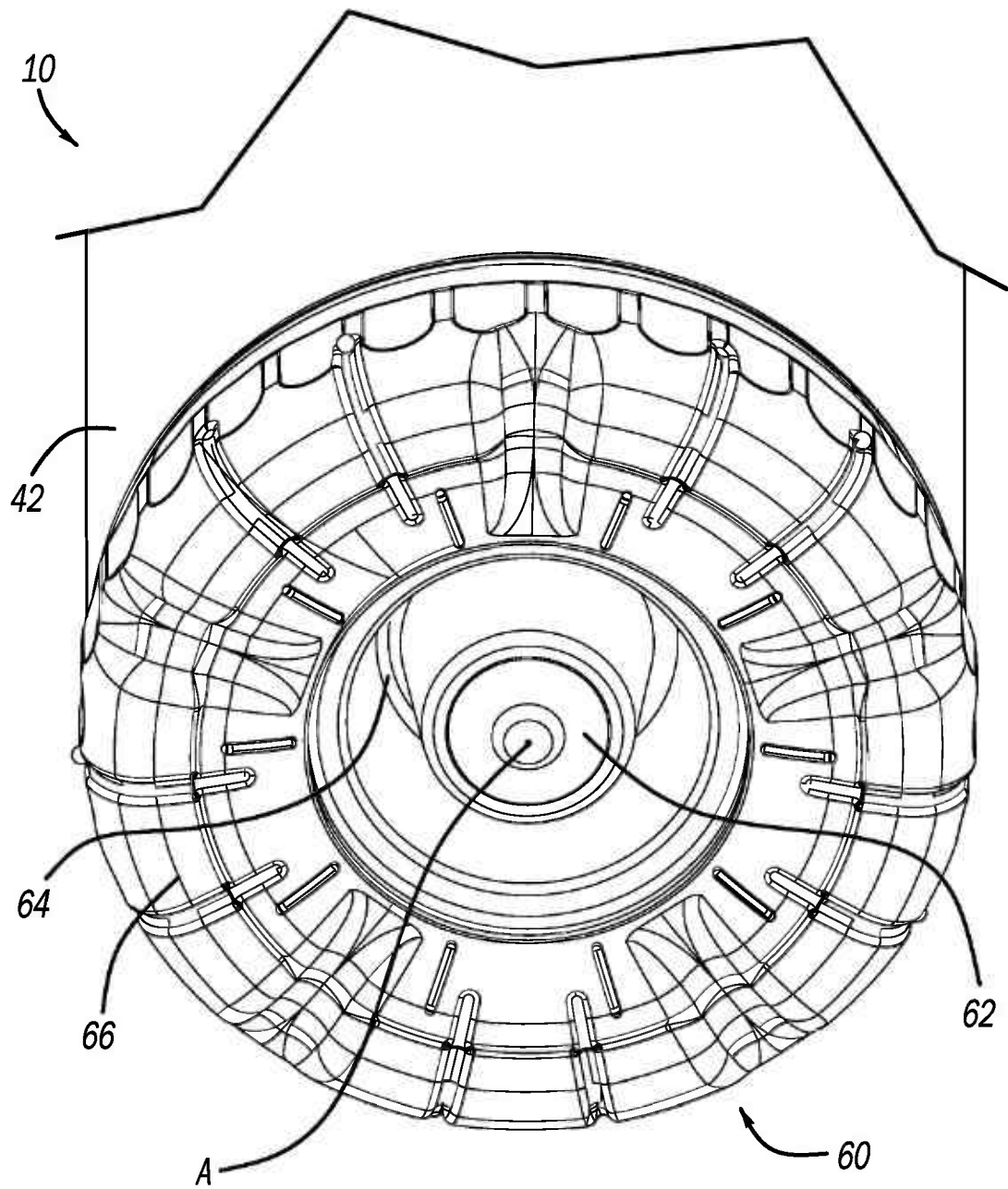
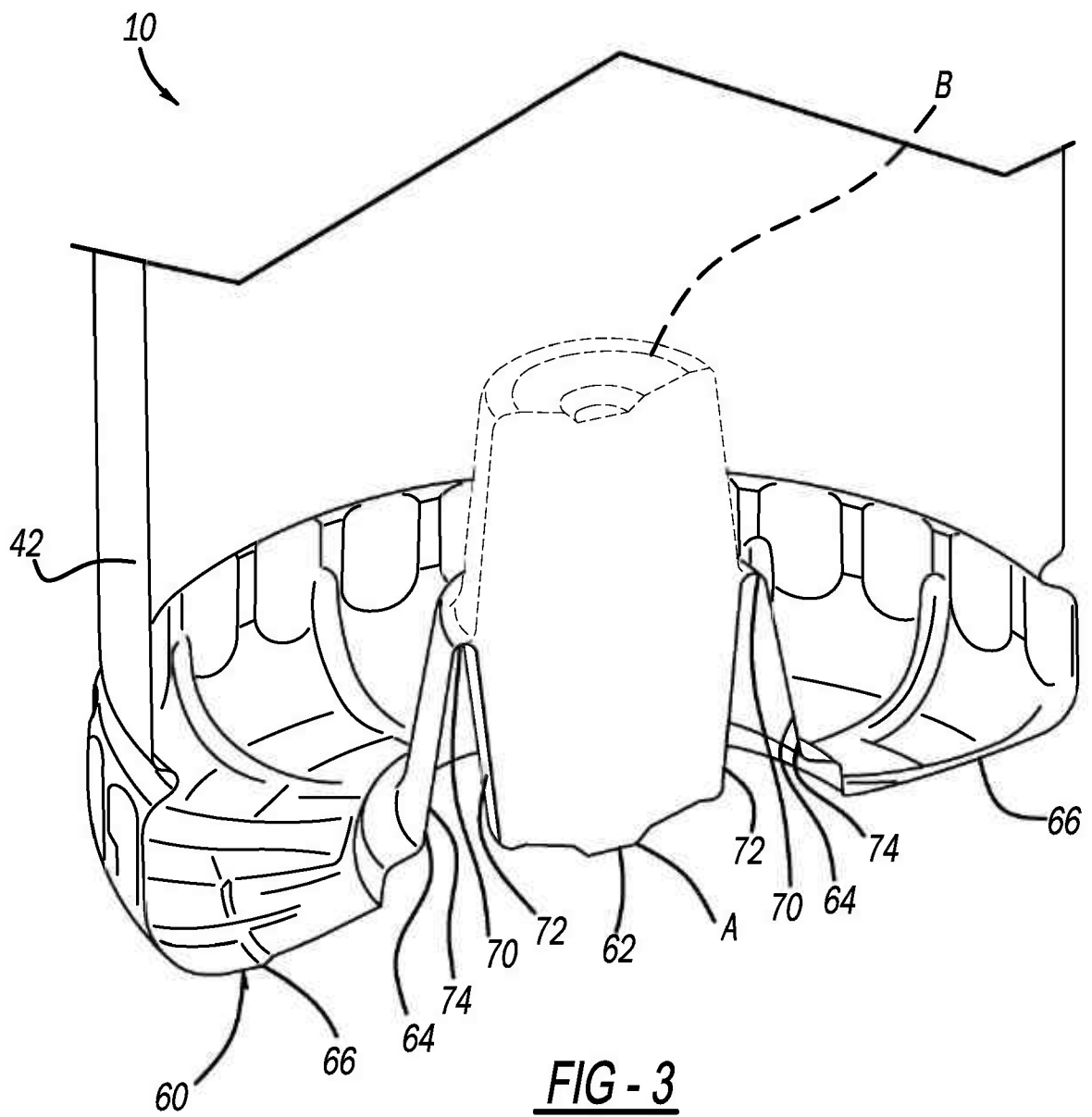


FIG - 2



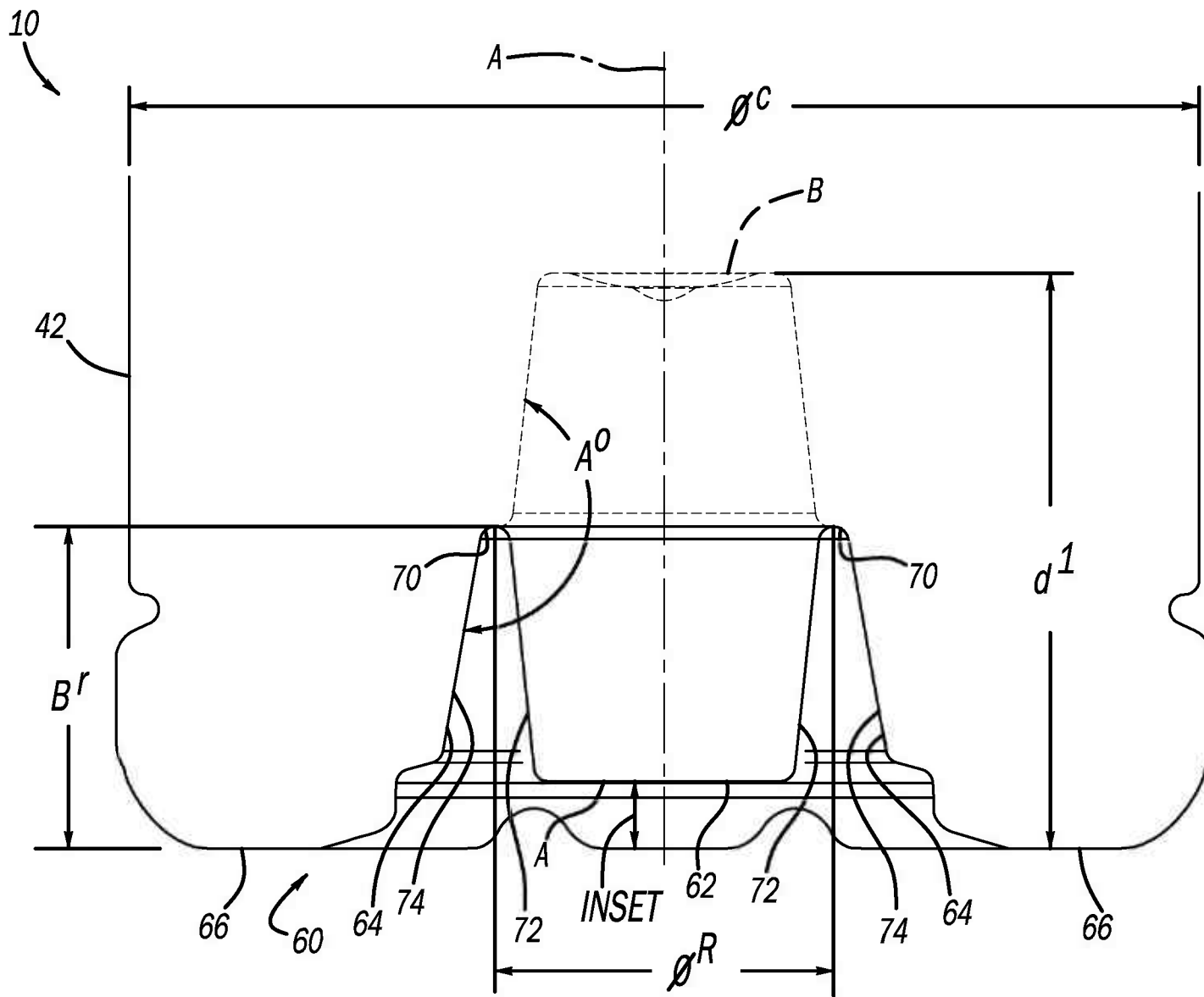
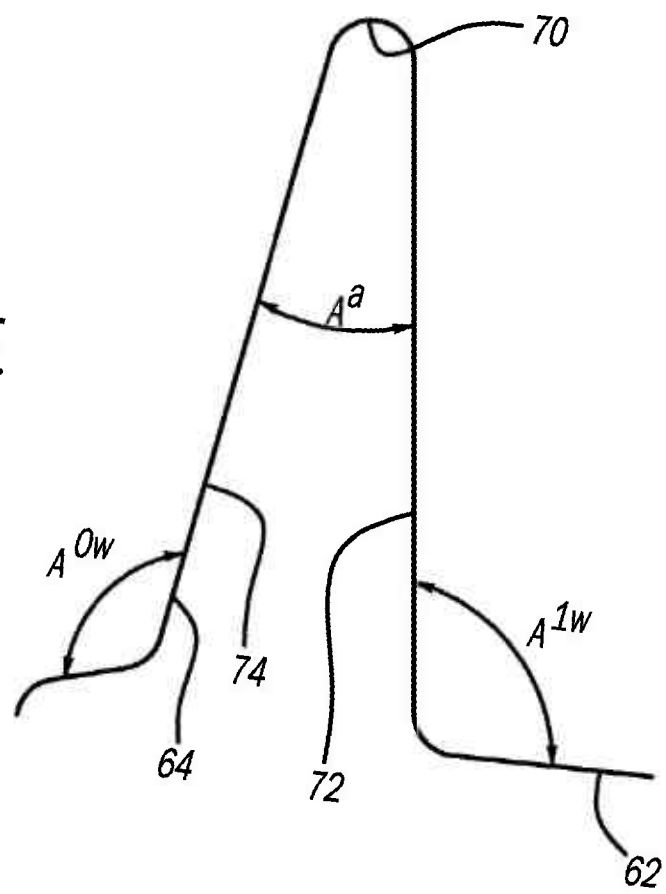
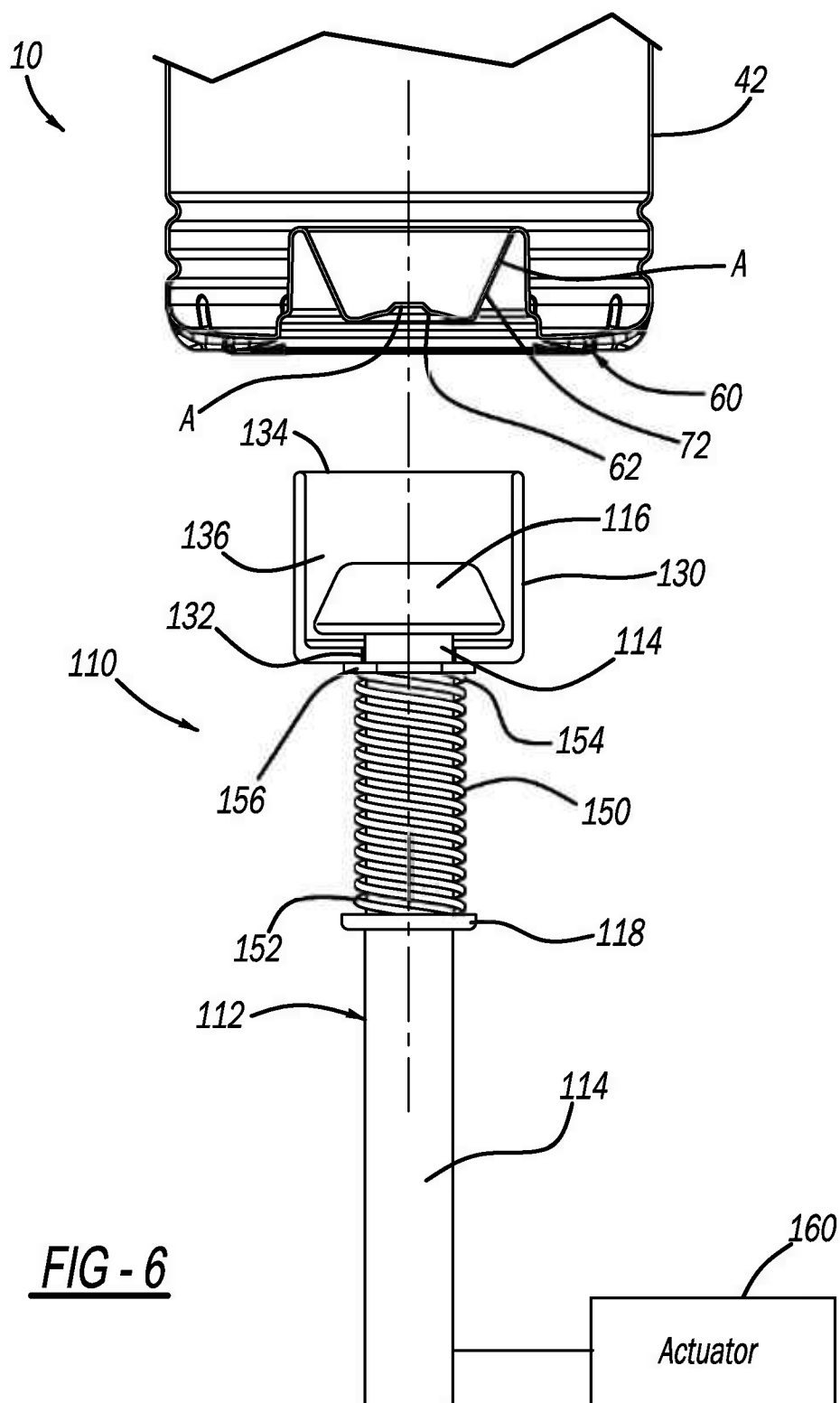
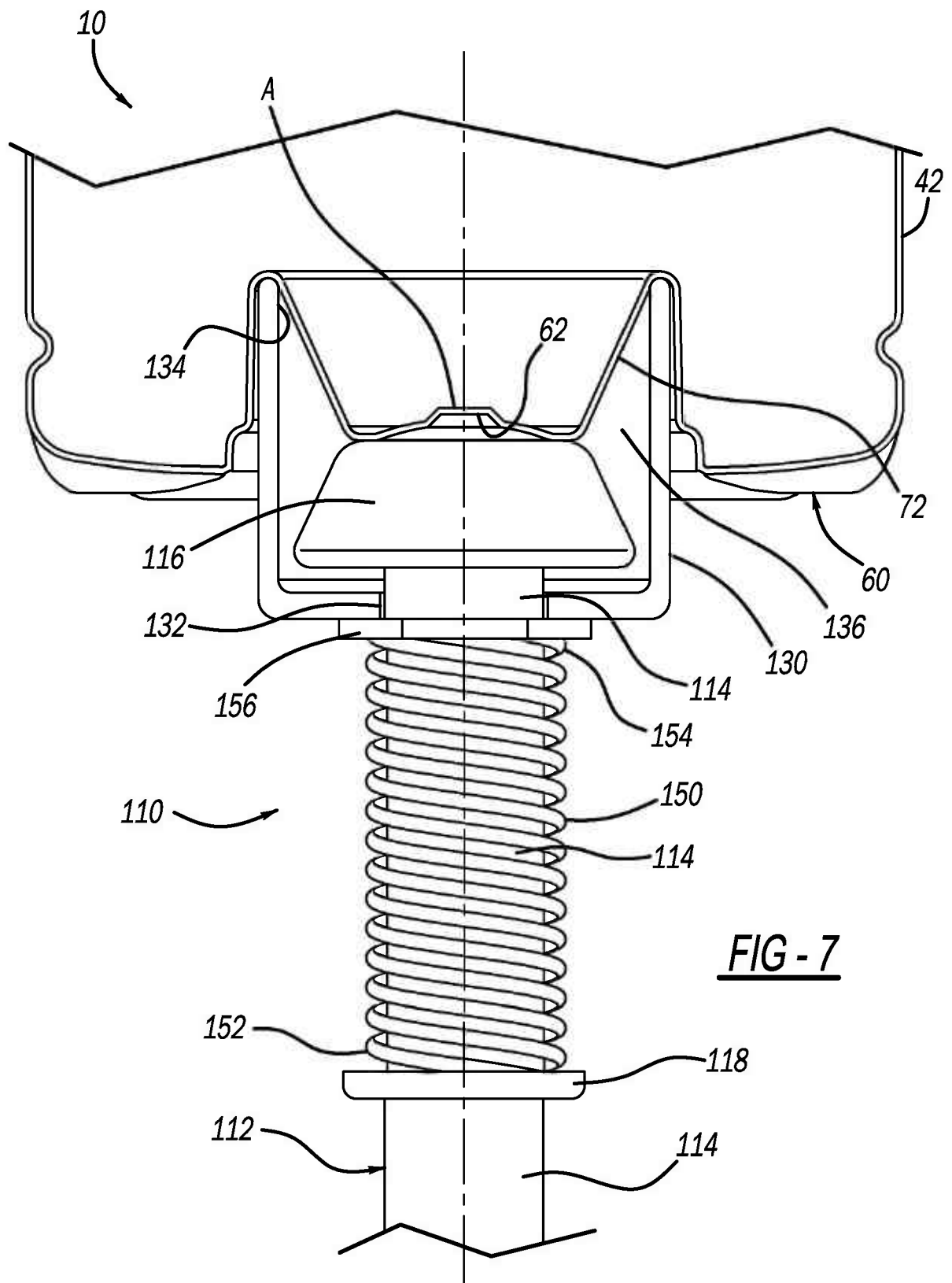
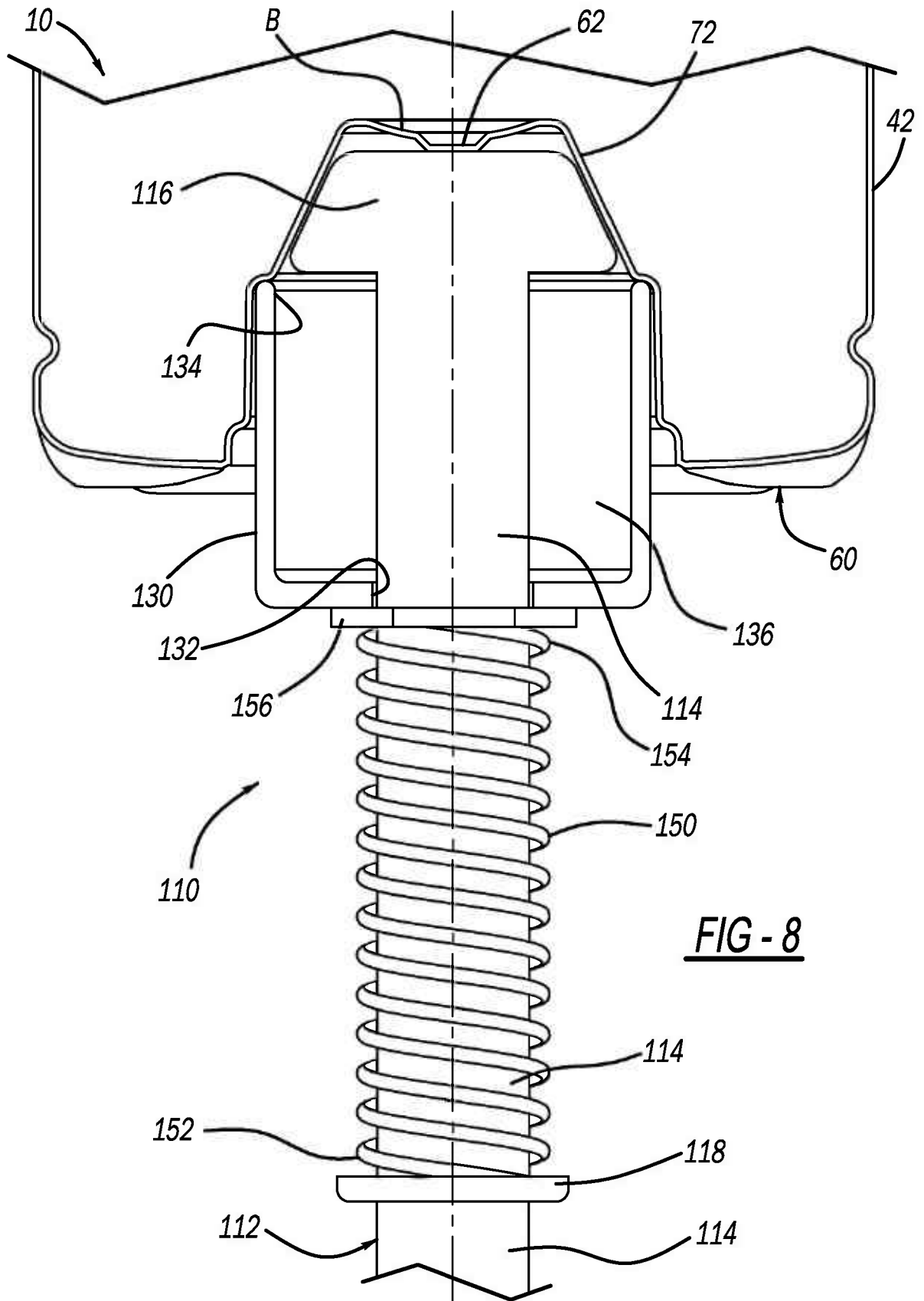


FIG - 5









REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 6942116 B [0004]
- US 35055816 [0004]
- US 20170096249 A [0004]
- US 50552517 [0004]
- JP 5127243 B [0006] [0010]
- EP 1868790 B1 [0007] [0010]
- US 20160152457 A1 [0008]
- JP 2007216981 A [0009]
- US 8313686 B [0024]



SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

NIT: 800.176.089-2

COMPROBANTE DE RECAUDO SISTEMA SIPI

Radicado: NC2021/0010393

Recibo: 24-22939

Fecha: 27/03/2024

CAROLINA MERCEDES DAZA MONTALVO

CC: 66.783.790

Pago PSE No: 947282

CUS: 539597084

Patente PCT

DISPOSITIVOS DE DESPLAZAMIENTO VERTICAL Y MÉTODOS PARA INVERTIR MECÁNICAMENTE UNA BASE DE CONTENEDOR TERMOPLÁSTICO

Detalle del pago

Id.	Rentístico	Concepto y Servicio	Cant.	Val. Unit.	Subtotal
1	50005-01-03	Modificaciones / Correcciones al registro Patente PCT (DESCUENTO INTERNET)	1	\$ 214,000	\$ 214,000
TOTAL					\$ 214,000