

(51) International Patent Classification:
B65G 17/46 (2006.01)

(21) International Application Number:

PCT/EP2017/054947

(22) International Filing Date:

2 March 2017 (02.03.2017)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/308396 15 March 2016 (15.03.2016) US

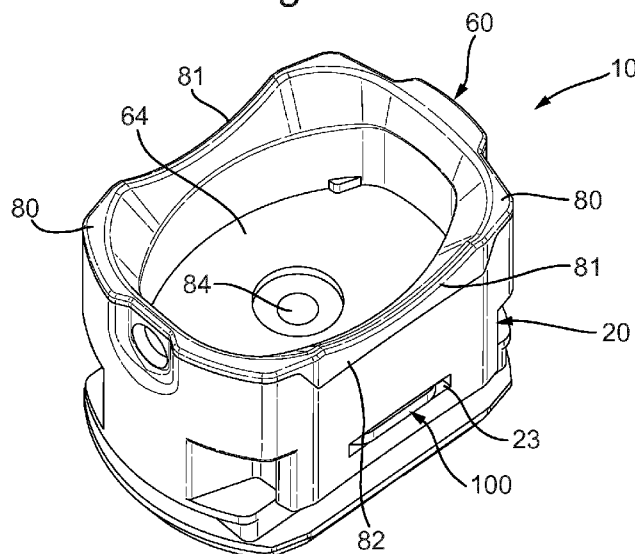
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY,

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(54) Title: PUCK FOR HOLDING A PRODUCT CONTAINER

Fig. 1



(57) Abstract: A carrier puck (10) that includes: a removable insert (60) that includes an insert sidewall (62), an insert bottom wall (64), and a shaft (66) that extends downward from the insert bottom wall; a base (20) that includes a base bottom wall (26), a base sidewall (22), and an interior platform (24) that includes a platform aperture (50); and a retaining clip (100) that includes a spring grip (102) and a release tab (104) accessible through a port (23) in the base sidewall; wherein the shaft extends into the platform aperture and the spring grips extends beneath the platform and engages with the shaft to fasten the removable insert to the base.



TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC,
VN, ZA, ZM, ZW.

- (84) Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))

PUCK FOR HOLDING A PRODUCT CONTAINER

Technical Field

5 The present disclosure relates to a puck for holding a product container in an orientation for product filling, capping, labeling, and/or other processing as the container moves along an automated line and, in particular, to a puck that includes a removable insert in which a product container is received and held.

10 Background

 Pucks for holding product containers, herein alternatively referred to as “carrier pucks” or “pucks” are used, typically in automated production lines, to hold containers in a desired orientation, e.g., an upright position. Use of a puck simplifies movement of a
15 container along a production line and is of assistance in regulating line operations.

 In automated operations, a container is commonly inserted in a puck in an inbound staging area. The container-bearing puck then moves through one or more processing stations where different operations are performed, among others, one or more of the
20 following: the container may be filled with one or more materials, the container may be subjected to pre- and/or post-filling procedures or treatments, for example, heating and/or cooling, the container may have a tamper-resistant seal and/or a cap affixed thereto, one or more labels or other container indicia may be applied, and/or the container may undergo
25 one or more quality control operations, for example, weight and/or label verification, and the like. When processing is complete, the puck and container are moved to an outbound staging area, the container is removed from the puck and the puck is rerouted back to the inbound staging area, or other designated station. It is not uncommon for an automated production line to have hundreds of pucks in use at a single time.

30 Many of the pucks used commercially are designed for containers of a particular configuration, i.e., they are container specific. In instances where a production line employs

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different container configurations for different production runs, having a puck that is adaptable for use with containers of a variety of different shapes and sizes can help reduce production costs, including downtime for puck changeovers.

5 Among the various approaches suggested with respect to providing pucks that may be adapted for use with containers of a variety of different sizes and/or shapes, is the use of separate container-holding and base components. US Pat. No. 8,695,791, for example, discloses a carrier puck that includes a circular lower body on which is mounted an upper
10 body. As therein illustrated, the upper body is mounted to the lower body via a pair of opposing bayonet side mountings. JP5659780 discloses a carrier puck having inner and outer holder components. As illustrated, the inner holder includes a moveable interior wall that can be adjusted to brace a container within the inner holder.

 The use of pucks having a base and a separate component for holding a container,
15 more particularly a removable insert, is limited by several real-world considerations. The environment created by automated production can be hard on pucks. In use, there is a tendency for pucks to collide with one another. These collisions can occur with considerable force given the speed at which many automated production operations are run, with collision force being increased when containers are filled and the weight of the container-bearing
20 pucks increased.

 A puck having a removable insert should withstand the rigors of automated processing without premature release or displacement of the insert. Conversely, to accommodate container changeover, the puck should facilitate engagement and
25 disengagement of the removable insert. There remains a need for pucks that provide a balance between these competing requirements.

 One aspect of this invention is to provide a carrier puck for use in an automated production line, the carrier puck having a removable insert for receiving and holding a
30 product container. Another aspect of this invention is to provide a carrier puck that provides robust engagement of a removable insert. Another aspect of this invention is to provide a

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carrier puck that resists premature release of a removable insert. A further aspect of this invention is to provide a carrier puck that provides engagement of a removable insert that withstands the vertical pull forces of container removal. Another aspect of this invention is to provide a carrier puck that allows for expeditious engagement and disengagement of a removable insert.

One or more of these and other aspects of this invention may be achieved by providing a puck as hereinafter more particularly described.

Summary of the invention

In one embodiment there is provided a carrier puck that comprises:

A) a removable insert comprising:

- I) an insert sidewall,
- II) an insert bottom wall, and
- III) a shaft that extends downward from the insert bottom wall; and

B) a base that holds the removable insert, the base comprising:

- I) a base sidewall,
- II) a base bottom wall, and
- III) a platform that includes a platform aperture; and

C) a retaining clip that engages with the shaft, the retaining clip comprising:

- I) a spring grip and
- II) a release tab,

wherein:

- a) the shaft extends into the platform aperture,
- b) the spring grip extends beneath the platform and engages with the shaft, and
- c) the base sidewall includes a port that provides access to the release tab.

Brief description of the drawings

The foregoing and other features and advantages of the present invention will become apparent upon consideration of the following description with reference to the accompanying drawings. Drawings are representative only; the present invention is not
5 limited to the embodiments exemplified therein. Unless otherwise indicated, throughout the drawings, like reference numerals refer to like parts.

FIG. 1 a perspective view from above of one embodiment of a puck of the present invention;

FIG. 2 is a simplified sectional view of the puck of FIG. 1;

10 FIG. 3 is perspective view from above of the puck of FIG.1 without the insert;

FIG. 4 is a perspective view from below of the puck of FIG. 1;

FIG. 5a is a close-up view of the locking mechanism of the puck of FIG. 1, with the retaining clip in a locked position; and

15 FIG. 5b is close-up view of the locking mechanism of the puck of FIG. 1, with the retaining clip in an unlocked position.

Detailed description

Except as otherwise indicated or evident from a description or illustration, throughout
20 this specification, terms of reference are used as follows in relation to the instant carrier puck or its components or features. The terms "upper" and "lower" as applied to the puck, or a component or feature thereof, are used in relation to an orientation in which the upper end of the carrier puck is at the top and the lower end of the carrier puck is at the bottom; such an orientation is shown, for example, in FIG. 1. Other terms of reference such as "above"
25 and "below" are also applied in relation to the above described orientation. The terms "downward" and "downwardly" are used interchangeably in relation to the above described orientation, in reference to a direction that generally extends away from a puck feature or component, or away from a position of a puck feature or component, toward a lower point or position. The terms "upward" and "upwardly" are used interchangeably in relation to the
30 above described orientation, in reference to a direction that generally extends away from a puck feature or component, or away from a position of a puck feature or component, toward

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a higher point or position. Except as otherwise indicated, in relation to the description of components or other features that define an interior space, the term "interior surface" is used in relation to a surface that generally faces into the interior space.

5 All numerical ranges employed in this description ought to be understood as modified by the word "about". Where the puck of the subject invention or components or other features thereof are described as "including" or "comprising" specific elements, narrower embodiments that "consist essentially of" or "consist of" the recited elements are also contemplated.

10

The puck of the subject invention combines a number of elements that together enable the production of a container-holding/transport device having a removable insert and a separate base. By changing out the removable insert, the puck is adaptable for use with containers of different configuration.

15

The subject puck comprises, a removable insert (alternatively referred to as "insert"), a base and a retaining clip that fastens the insert to the base.

20

The insert comprises a sidewall and bottom wall that together generally define a cavity, the insert cavity, for holding a container. In one embodiment, to help standardize production operations, it may be desirable to configure the cavity of different sets of inserts to provide consistent fill heights for the containers that the inserts are designed to hold.

25

The removable insert includes a shaft that extends downward from the insert bottom wall. The shaft is configured to align with the platform aperture. Depending upon the position of the platform aperture, the shaft may extend downward from what is generally the center of the insert bottom wall or may extend downward from the insert bottom wall from a position offset from center. In one embodiment, the shaft includes at least one locking member, for example, a locking ridge, notch or channel. In one embodiment, the shaft is of a generally tubular shape and is proximate to an aperture (the "insert aperture") in the bottom wall of the insert.

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Optionally, the insert bottom wall further includes an insert recess. The insert recess may, for example, be provided as a depression concavity, hollow, or sink in the insert bottom wall. In one embodiment, the insert recess includes an insert aperture. In one embodiment,
5 the shaft is in the form of an insert collar that extends downward from the insert bottom wall proximate to the insert aperture.

The insert may also include an upper rim (alternatively referred to as "insert rim" or "rim") that extends outward from the insert. In one embodiment, the rim generally defines
10 the perimeter of the upper end of the insert. In one embodiment, the rim extends outward from the insert sidewall. The rim may be continuous or may include one or more gaps or regions of discontinuity, i.e., the rim may be discontinuous. Optionally, the rim includes one or more container easement areas to assist in maneuvering a container into the insert. Container easement areas may take the form of concavities or indentations in the rim that
15 reduce the clearance height of the puck.

Optionally, the rim includes a downwardly extending skirt (alternatively referred to as "rim skirt"). When present, the rim skirt may extend downward from the rim as a full skirt; alternatively, the rim skirt may extend downward from one or more portions of the rim.

20 Optionally, one or more container support arms (alternatively referred to as "support arms") may extend upward from the insert rim and/or insert sidewall. In one embodiment, the insert is provided with first and second support arms positioned on opposing sections of the insert rim and/or insert sidewall.

25 To reduce the space needed to store the inserts when not in use on pucks, it may be desirable to taper or otherwise configure the insert sidewall and, when present, features such as support arms, to enable the inserts to be stacked or nested one within the other. Providing inserts that are able to be stacked or nested aids in their organization and handling.

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Optionally, the insert includes one or more projections that extend outward from the insert sidewall and engage with an interior surface of the base side wall and/or an interior structure of the base. The inclusion of such projections may help to stabilize and/or support the removable insert in the base.

5

Optionally, the insert includes one or more spacers that extend downward from the insert bottom wall and engage with the platform. The spacers allow for a gap between the insert bottom wall and the platform; such gap may be of assistance in separating the removable insert from the base.

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The base comprises a sidewall and a bottom wall that together generally define a cavity, the base cavity, for holding the removable insert. The base has a perimeter (the "base perimeter") that, in one embodiment, is generally defined by the base sidewall. In an orientation where the upper end of the base is at the top and the lower end of the base is at the bottom, the base sidewall is, in one embodiment, generally parallel to the central vertical axis (CVA) of the base. In one embodiment, the base sidewall is of varying height; i.e., the sidewall is higher in some places and lower in other places. Excluding appendages that extend above and generally do not define the base cavity, the height of the base sidewall at a given location is commonly the vertical distance between the top of the base sidewall and the bottom of the base sidewall. In one embodiment, the base sidewall may have a stepped or castellated appearance.

20

In one embodiment, the insert includes an insert rim and the base sidewall includes an upper end (in one embodiment such upper end is an upper edge) that engages with the insert rim. When an insert rim is present, the configuration of the upper end of the base sidewall and the insert rim may be such that these components fit together in complementary fashion, i.e., the insert rim mates with the upper end, in one embodiment the upper edge, of the base sidewall. Providing a base sidewall of varying height and a mating insert rim, particularly a rim, at least a portion of which includes a downwardly extending skirt, may aid in interlocking the insert to the base and/or distributing load to the base sidewall. Additionally, a mating configuration of the insert rim and base sidewall may assist in aligning

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the removable insert with the base and, particularly when the base sidewall is of varying height, may contribute to a robust base/insert attachment.

5 The base further includes a platform. The platform may extend upward from the base bottom wall and/or inward from the base sidewall. The platform includes a platform aperture and, optionally, a platform recess in which the platform aperture is located. The platform recess may be provided, for example, as a depression, concavity, hollow or sink in the platform. In one embodiment, the interior platform comprises a platform top wall and a platform sidewall. In one embodiment, the platform comprises a platform top wall and a platform sidewall, with the platform aperture located in the platform top wall, and the platform
10 top wall optionally comprising a platform recess in which the platform aperture is located.

In one embodiment, the platform is positioned interior to the base sidewall and below the upper end thereof. In one embodiment, the platform is positioned in what is generally
15 the center of the base perimeter. In one embodiment, the platform may be formed as a ledge that projects inward from the base sidewall. In one embodiment, the platform is closer to the base bottom wall than to the upper end of the base sidewall. In one embodiment, the platform defines a space that opens into the bottom of the base. In one embodiment, the platform forms a portion of the base bottom wall

20

Optionally, the platform further comprises a downwardly extending platform collar proximate to the platform aperture. The inclusion of a platform collar may help to stabilize the insert in the base. In one embodiment, the platform collar includes at least one reveal section that provides the spring grip with access to the shaft.

25

When the insert and base are assembled, the shaft extends into the platform aperture and, when present, the platform collar. In one embodiment, the insert bottom wall includes an insert recess, the platform includes a platform recess and the insert recess extends into the platform recess. Configuring the puck with an insert recess that extends
30 into a platform recess may contribute to robust engagement of the insert and base.

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The puck further comprises a retaining clip that fastens the removable insert to the base. The retaining clip comprises a spring grip that extends beneath the platform and engages with the shaft. In one embodiment the spring grip engages with the shaft at or proximate to a locking member of the shaft. In one embodiment, the spring grip engages
5 with the shaft above a locking ridge. The retaining clip further comprises a release tab. The release tab is accessible from a port in the base sidewall. Pushing the release tab inward forces the spring grip open and releases the retaining clip from the insert, allowing the insert to be removed from the base. When a platform collar is present, the shaft is accessed by the spring grip through one or more reveal sections in the platform collar.

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In one embodiment, the spring grip comprises opposing locking arms. Optionally, the base further comprises a spreader that extends beneath the platform and with which opposing locking arms of the spring grip engage when the release tab is pushed inward. In one embodiment, the spreader is configured as a ridge or ledge that extends downward from
15 the platform.

In one embodiment, the spring grip and release tab are fabricated as a single component. In one embodiment, the retaining clip is fabricated from metal.

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It may be desirable to design the puck with one or more features that minimize the potential for premature engagement of the release tab. For example, the retaining clip may be positioned such that the release tab is away from regions most likely to bear the force of puck collisions, for example, leading and trailing ends of the puck; the tab may be recessed inward from the access port and/or protected by one or more guards; and/or the release
25 force of the retaining clip may be engineered to be relatively high.

25

In one embodiment, the retaining clip may be engaged in synchronous manner with insert placement or removal. More particularly, as the retaining clip is being accessed from the insert sidewall, a suitable tool for lifting the insert onto or off the base may be in place
30 and engaged with the insert. This is of assistance in reducing insert changeover times, particularly in systems where insert changeover is frequent. In one embodiment, the

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inclusion of an insert recess and/or the configuration the shaft as a generally tubular structure provides a site of access for a lifting tool to engage with the insert.

Pneumatic grippers, vacuum grippers, and mechanical grippers are examples of tools for lifting the insert onto or off the base. Pneumatic grippers include, but are not limited to, pneumatic picking heads. A pneumatic picking head includes a bellows that that can be inserted into and expanded in the insert such that the expanded bellows conforms to an interior surface of the insert, enabling the insert to be lifted and otherwise moved. Mechanical grippers include, but are not limited to, tools with mechanically expandable fingers or other picker configurations.

The puck includes components that may be molded from plastic materials. Plastic materials that may be considered for molding puck components include, for example, polyacetal, polyamide, polyarylate, polyarylsulfone, polyolefin, polyester, butadiene-styrene and acrylonitrile-styrene-butadiene copolymers, and the like. Moldable components include the base, removable insert and, in some instances, the retaining clip. Material selection depends on factors that include configuration of a component and the mechanical and/or physical requirements thereof, e.g., hardness, impact strength, modulus, flexural strength, dimensional stability, chemical and/or heat resistance and the like, as well as requirements related to mold design and/or mold fill. For example, while the material employed in the base of the puck will typically need to provide sufficient toughness and impact strength to withstand the collision forces and other requirements of an automated production line, it may be desirable that the material from which the insert is fabricated is more elastic and flexible, with tactile characteristics that enable it to better grip a container. In one embodiment the use of thermoplastic resins is of particular interest. In one embodiment, it is desirable that the insert and/or base are fabricated from a polyolefin such as, for example, polyethylene or polypropylene.

The puck may be configured for use with containers for a variety of consumer, commercial, industrial and institutional products. Non-limiting examples of such products are personal care products, household care products, beverages and other foodstuffs,

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pharmaceuticals, nutraceuticals, automotive products, marine products, veterinary products, industrial products, and the like.

5 The puck is adaptable to many different sizes and configurations, depending upon factors that include, for example: the dimensions, configuration and weight of the container the puck is intended to hold; the material the container is intended to hold and the fill volume thereof; the center of gravity of the container and its contents; and production line considerations, including, for example, line bends, curves, gradients, drops, discontinuities, speeds, collision forces, guide rail dimensions, and the like, as well as puck positioning,
10 transport and handling requirements related thereto.

In one embodiment, the puck comprises a base having a length of from 50mm to 300mm and a width of from 50mm to 300mm. In another embodiment, the puck comprises a base having a length of from 70 to 200 mm and a width of from 50 to 200mm. In yet
15 another embodiment, the puck comprises a base having a length of from 80 to 150mm and a width of from 50 to 120mm. In yet another embodiment the puck comprises a base having a length of from 90 to 150mm and a width of from 70 to 110mm. Larger or smaller base dimensions are possible, depending upon the containers with which the pucks are to be used. In one embodiment, the base has a generally rectangular perimeter.

20

Non-limiting embodiments of the subject puck and components thereof are described in further detail with reference to the appended drawings which are furnished by way of illustration only and should not be construed as limiting the invention to the embodiments so depicted.

25

One exemplary embodiment of a puck **10** of the present invention is shown in FIGS. 1 and 2. As illustrated, puck **10** includes base **20**, removable insert **60**, and retaining clip **100**.

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As shown in one or more of FIGS. 1 to 3, base **20** includes base sidewall **22**, platform **24** and base bottom wall **26**. Base sidewall **22** includes upper end **40** which includes upper

edge **42**. Base sidewall **22** forms what is generally the perimeter of base **20**. The perimeter of base **20** is generally rectangular in shape, with eased corners. In the illustrated embodiment, the base sidewall comprises a pair of opposing short walls and a pair of opposing long walls. Base sidewall **22** includes access port **23**.

5

As illustrated in one or more of the Figures, platform **24** extends upward from base bottom wall **26** and includes platform sidewall **27**, platform top wall **28**, platform recess **30** and platform aperture **50**. Platform **24** further includes platform collar **56** that extends downward from platform top wall **28** proximate to platform aperture **50**. Platform collar **56** includes reveal sections **58**.

10

As shown in FIG. 4, bottom wall collar **25** extends downward from base bottom wall **26**. The inclusion of a bottom wall collar may be helpful in holding, positioning and/or orienting a puck, as it is not uncommon for a production line to include orientation tools that can be extended upward from a conveyor surface or production station to engage with the base of a puck. The perimeter of bottom wall collar **25** shown in FIG. 4 is of similar shape to the perimeter of platform **24** shown in FIG. 3. Having the perimeter of the bottom wall collar generally correspond to the perimeter of the platform may simplify mold design; it should be appreciated that the perimeters of such components are not required to so correspond.

15

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As illustrated, base sidewall **22** includes grip ports **86**, guides ridges **92** and orientation slots **94**. Grip ports provide a site of access for an automated claw or similar implement to engage with and lift or otherwise move the puck from one location to another. The presence of guide ridges is of particular interest when the production line includes guide rails in one or more regions thereof. Typically, guide rails are a pair of opposing rails or bars that the puck fits between. Orientation slots provide additional sites for gripping, holding and/or positioning the puck.

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The base optionally includes one or more bumpers. The bumpers may function as end-pieces of the base and may be integral with or extensions of the base sidewall. In one

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embodiment, bumpers are positioned on opposing sections of the base sidewall as a leading bumper and trailing bumper; in such a configuration, the bumpers may be aligned such that when a plurality of pucks are facing end-to-end on a production line, the trailing bumper of a leading puck engages with the leading bumper of a trailing puck. In one embodiment, the
5 bumpers are fabricated of a shock absorbing material such as an elastomeric resin or rubber. The inclusion of bumpers, particularly when fabricated of a shock absorbing material, may help to reduce line noise. In FIG 3, base sidewall **22** is shown as including bumpers **88**.

10 Optionally, the base includes a holder (not shown) for a radio-frequency identification detection (RFID) chip. The RFID chip can be used to incorporate information about a container that a puck holds. In use, it may serve as an identifying or tracking tag that allows for the wireless identification or monitoring of a container/puck in a production line.

15 In FIG.2, removable insert **60** is shown to include insert sidewall **62**, insert bottom wall **64** and shaft **66**. Removable insert **60** includes insert cavity **74** for holding a container (not shown). Insert bottom wall **64** includes insert recess **83**, shown as including insert aperture **84**. Shaft **66** is shown as an insert collar that extends downward from insert bottom
20 wall **64** proximate to insert aperture **84**. As illustrated in FIG. 5a, shaft **66** includes first and second locking ridges **67**, respectively shown as **67a** and **67b**. Shaft **66** extends into platform aperture **50** and platform collar **56**. As illustrated, platform aperture **50** includes passage area **51** for locking ridges **67**.

25 Insert **60** includes rim **80** which extends outward of insert sidewall **62**. To assist in directing a container into the insert, the rim may angle into the insert cavity. As shown in FIG. 1, rim **80** includes container easement areas **81**.

30 In FIG. 1, rim skirt **82** extends downward from rim **80**. When removable insert **60** is fastened to base **20**, rim **80** engages with upper end **40** and, more particularly, upper edge

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42 of base sidewall **22**. The uneven height of base sidewall **22** and the mating configuration of rim **80**, including rim skirt **82**, aids in securing insert **60** to base **20**.

5 Optionally, a detection post (not shown) may extend upward from the insert sidewall and/or rim. Alternatively, a detection post may be included on the base. A production line may be equipped with optical scanners to detect the post and monitor puck position, for example, the arrival at the puck at a processing station.

10 Optionally the insert bottom wall includes one or more drainage holes, not shown. Drainage holes may assist in removing product that misses or overflows from the container during filling or other processing. Where periodic washing or rinsing is part of a puck's maintenance regimen, drainage holes may be an aid to drying. When drainage holes are present, the bottom wall may be tapered to channel overflow to such holes.

15 Puck **10** further includes retaining clip **100** that fastens removable insert **60** to base **20**. In FIGS. 5a and 5b, retaining clip **100** is shown to include release tab **104** and spring grip **102**; as illustrated, spring grip **102** is configured as generally opposing locking arms shown as first locking arm **102a** and second locking arm **102b**. Spring grip **102** is shown to extend through platform sidewall **27** and to engage with shaft **66** above locking ridge **67**.
20 Release tab **104** is accessible from port **23** in base sidewall **22**. Reveal sections **58**, shown in FIG.4, provide spring grip **102** with access to shaft **66**. As shown in FIGS. 5a and 5b, locking arms **102a** and **102b** each include a gripping section **105**, respectively shown as **105a** and **105b**. In the locked position shown in FIG. 5a, spring grip **102**, more particularly gripping section **105** engages with insert shaft **66**. In the unlocked position shown in FIG.
25 5b, release tab **104** has been moved inward, forcing spring grip **102** open and gripping section **105** away from shaft **66**, allowing for the removal of insert **60** from base **20**.

30 Base **20** further includes spreader **70**, shown as a ledge that extends downward from platform **24**. As shown in FIG. 5a, moving release tab **104** inward, engages locking arms **102a** and **102b** with spreader **70**, moving the locking arms apart and disengaging gripping sections **105a** and **105b** from shaft **66**. Disengaging release tab **104** returns

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retaining clip **100** to a position as shown in FIG 5a. In an automated line, a tool such as mechanized release peg may be used to apply a force that pushes release tab **104** inward, opening spring grip **102** for assembly or disassembly of insert **60** with base **20**.

5 **Example**

10 A puck as generally shown by the embodiment illustrated in FIG. 1 was produced. The puck was tested for bottle stability using a swinging pendulum test rig that mimicked collision impact. Robustness and function of the puck were tested using a single head robotic test bed that was run over tens of thousands of cycles to replicate insert insertion and removal. The puck was found to perform effectively in such testing.

Claims

1. A carrier puck that comprises:
 - A) a removable insert comprising:
 - I) an insert sidewall,
 - II) an insert bottom wall, and
 - III) a shaft that extends downward from the insert bottom wall; and
 - B) a base that holds the removable insert, the base comprising:
 - I) a base sidewall,
 - II) a base bottom wall, and
 - III) a platform that includes a platform aperture; and
 - C) a retaining clip that engages with the shaft, the retaining clip comprising:
 - I) a spring grip and
 - II) a release tab,wherein:
 - a) the shaft extends into the platform aperture,
 - b) the spring grip extends beneath the platform and engages with the shaft, and
 - c) the base sidewall includes a port that provides access to the release tab.
2. The carrier puck of claim 1 wherein the shaft includes at least one locking member.
3. The carrier puck of claim 2 wherein the locking member comprises a locking ridge.
4. The carrier puck of claim 1 wherein the removable insert includes an upper rim that extends outward from the insert sidewall, and the base sidewall includes an upper end that engages with the upper rim of the insert.
5. The carrier puck of claim 1 wherein to unlock the removable insert from the base, the release tab is pushed inward, releasing the spring grip from the shaft.

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6. The carrier puck of claim 1 wherein the insert bottom wall includes an insert aperture, and wherein the shaft is in the form of an insert collar that extends downward from the insert bottom wall proximate to the insert aperture.
7. The carrier puck of claim 1 wherein the platform further comprises a platform sidewall that extends upward from the base bottom wall, and a platform top wall in which the platform aperture is located.
8. The carrier puck of claim 3 wherein the shaft includes a first locking ridge and a second locking ridge, and the spring grip includes a first locking arm and a second locking arm that generally opposes the first locking arm, and wherein the first locking arm engages with the shaft above the first locking ridge and the second locking arm engages the shaft above the second locking ridge.
9. The carrier puck of claim 4 wherein the base sidewall is of varying height.
10. The carrier puck of claim 9 wherein the upper rim includes a downwardly extending skirt.
11. The carrier puck of claim 1 wherein the platform further comprises a downwardly extending collar proximate to the platform aperture, and wherein the shaft extends into the platform collar.
12. The carrier puck of claim 11 wherein the platform collar includes at least one reveal section that provides the spring grip with access to the shaft.
13. The carrier puck of claim 8 wherein the base further comprises a spreader that extends beneath the platform, and wherein the first locking arm and second locking arm engage when the spreader when the release tab is pushed inward.
14. The carrier puck of claim 1 wherein the shaft is generally tubular.

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15. The carrier puck of claim 1, wherein the platform further includes a platform recess in which the platform aperture is located.

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Fig. 1

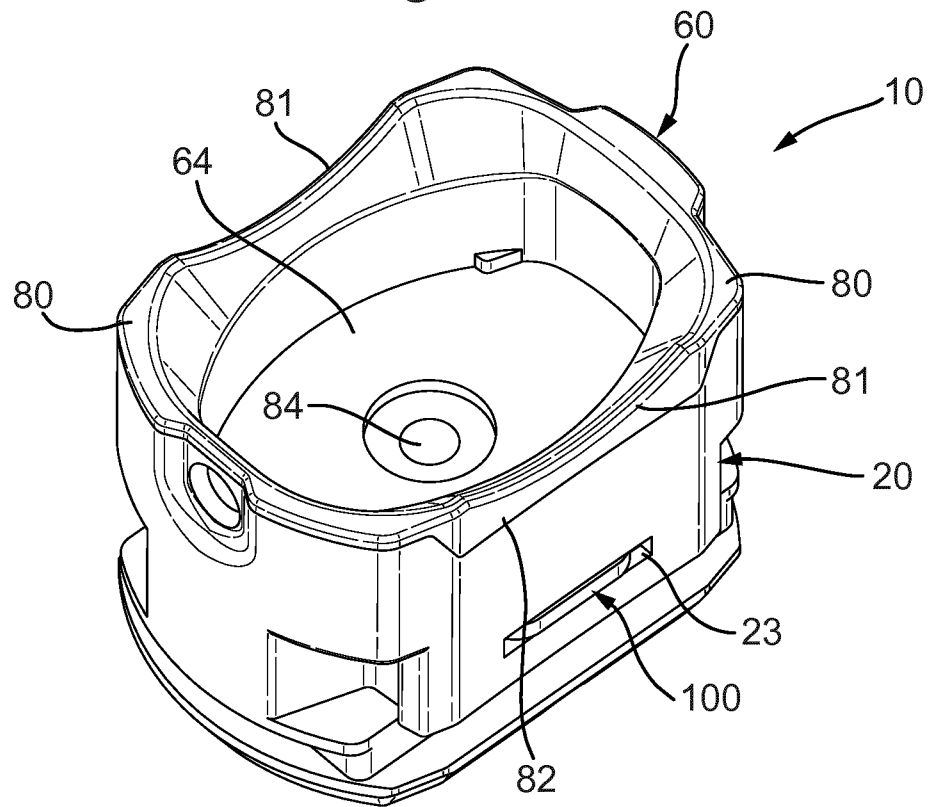
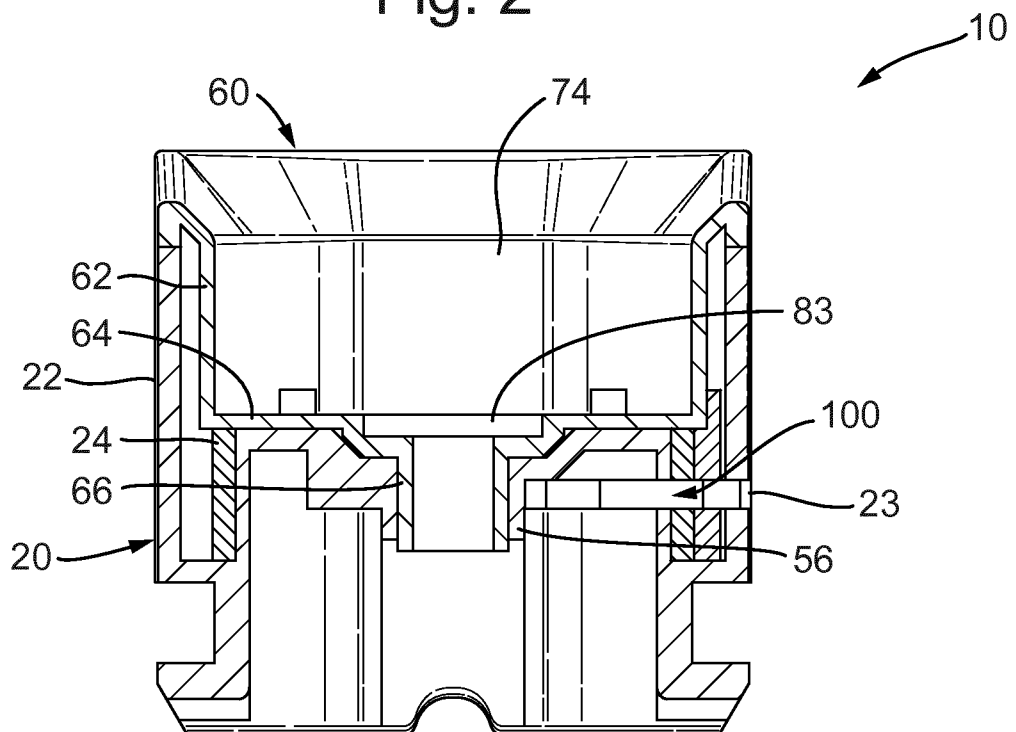


Fig. 2



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Fig. 3

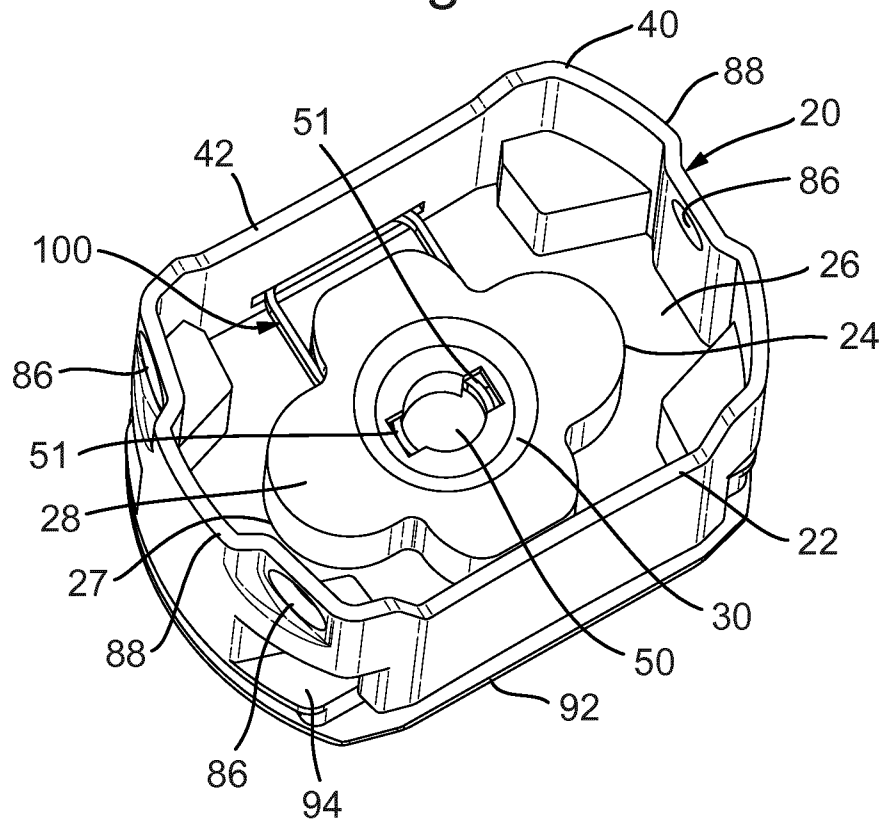
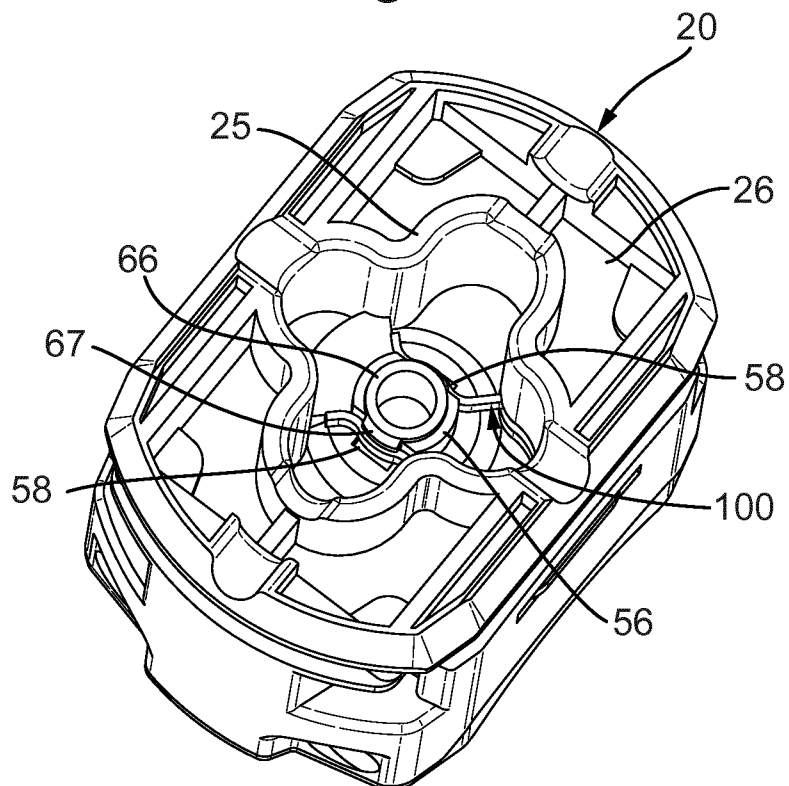


Fig. 4



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Fig. 5a

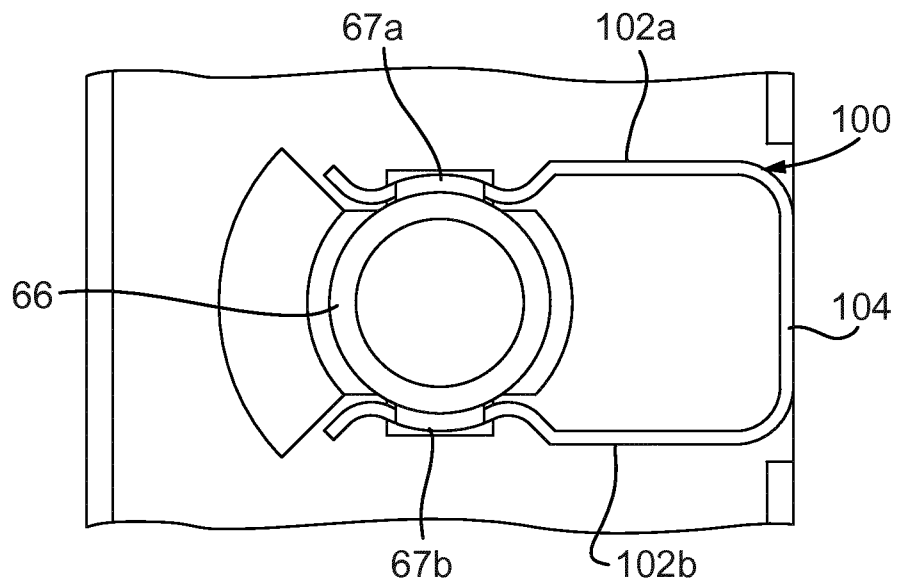
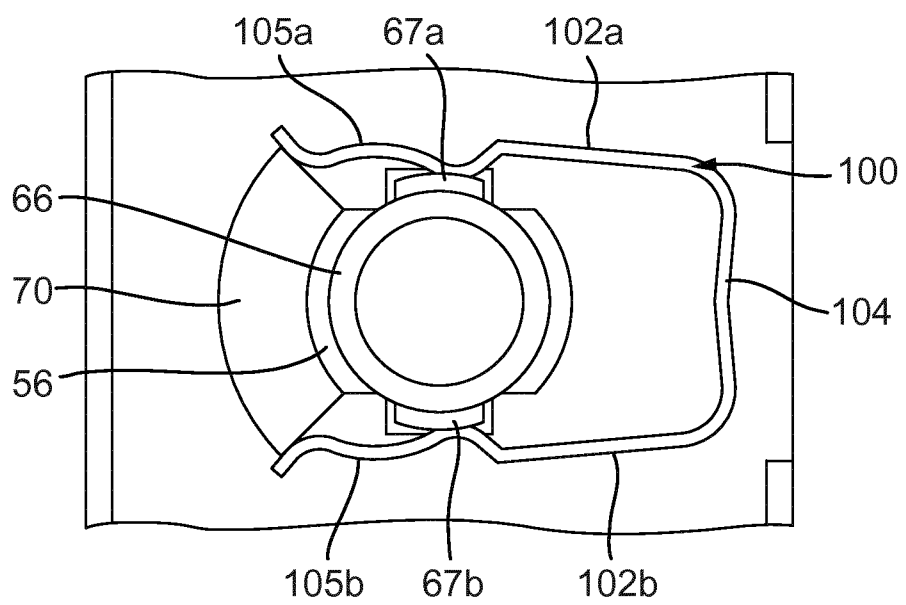


Fig. 5b



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/054947

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65G17/46
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65G B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2013/214469 A1 (TERZINI ROBERT [US]) 22 August 2013 (2013-08-22) page 3, paragraph 0039 - page 4, paragraph 0047 figures 1-12	1-15
A	----- US 8 695 791 B2 (OEHRMAN MICHAEL [SE]) 15 April 2014 (2014-04-15) cited in the application column 3, line 61 - column 6, line 39 figures 1,2 -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

11 May 2017

Date of mailing of the international search report

22/05/2017

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/054947

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