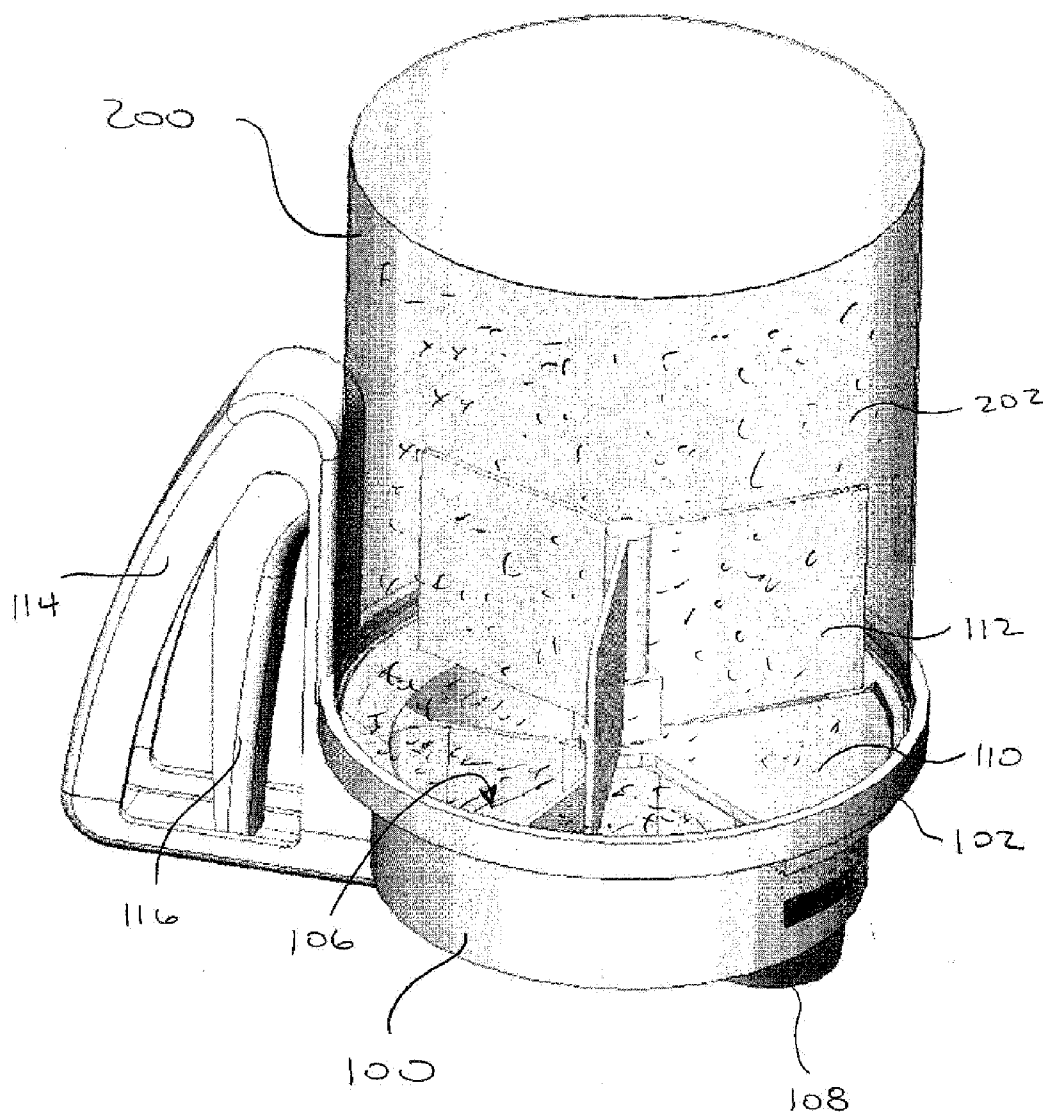


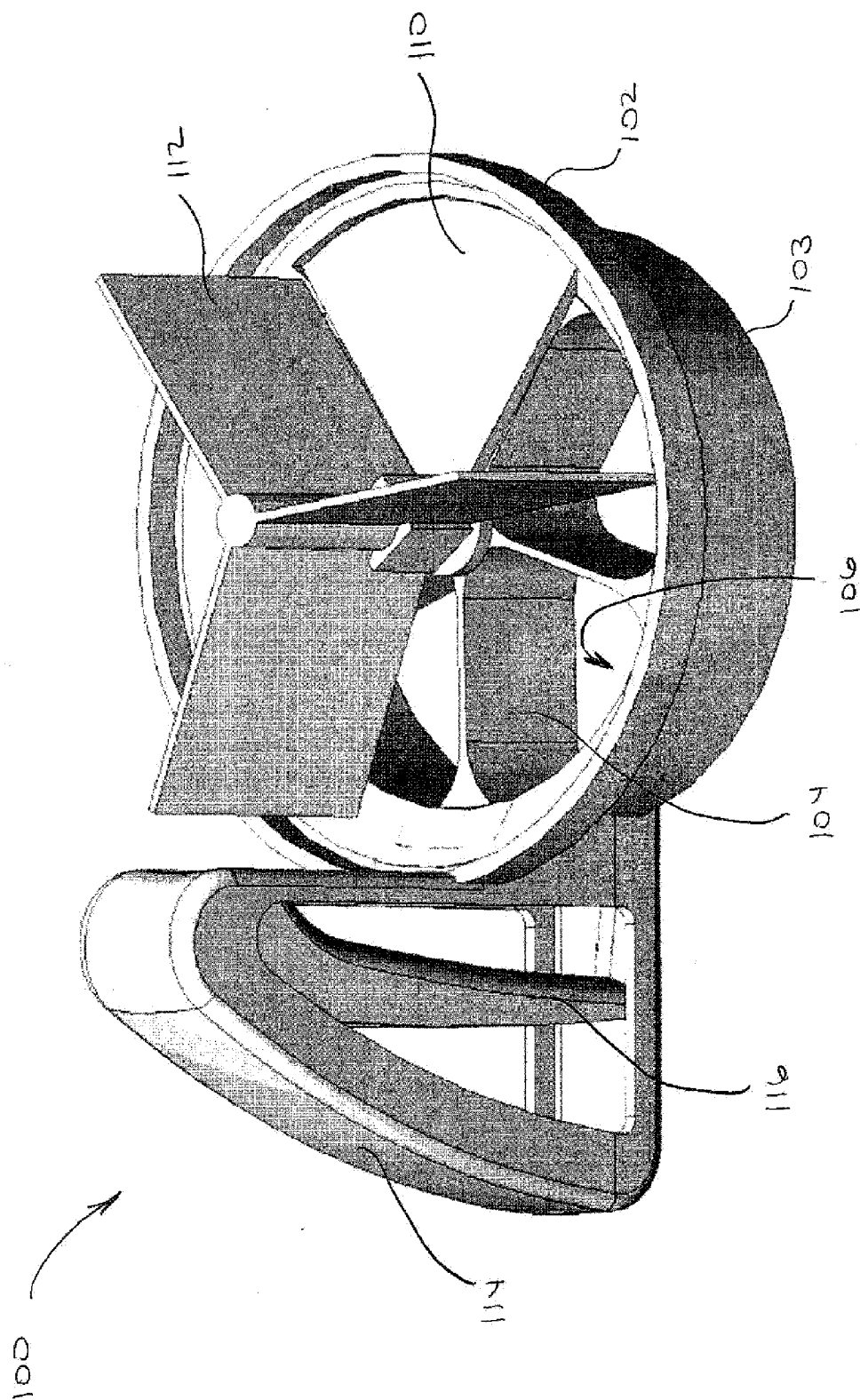


US 20140144926A1

(19) **United States**(12) **Patent Application Publication**
WOLF(10) **Pub. No.: US 2014/0144926 A1**(43) **Pub. Date: May 29, 2014**(54) **POWDER DISPENSER**(71) Applicant: **GILAD WOLF**, Kfar Maymon (IL)(72) Inventor: **GILAD WOLF**, Kfar Maymon (IL)(21) Appl. No.: **13/684,536**(22) Filed: **Nov. 25, 2012****Publication Classification**(51) **Int. Cl.**
B65D 83/06 (2006.01)(52) **U.S. Cl.**CPC **B65D 83/06** (2013.01)USPC **222/1; 222/441**(57) **ABSTRACT**

The instant invention, in some embodiments, provides for the accurate delivery of solid, oftentimes powdery, materials for use. Powders and solid materials like spices are declumped and then accurately delivered to an element with a predetermined size/weight receiving component prior to accurate delivery of the solid material for use. Embodiments include handheld as well as electrically-driven systems.





File 7

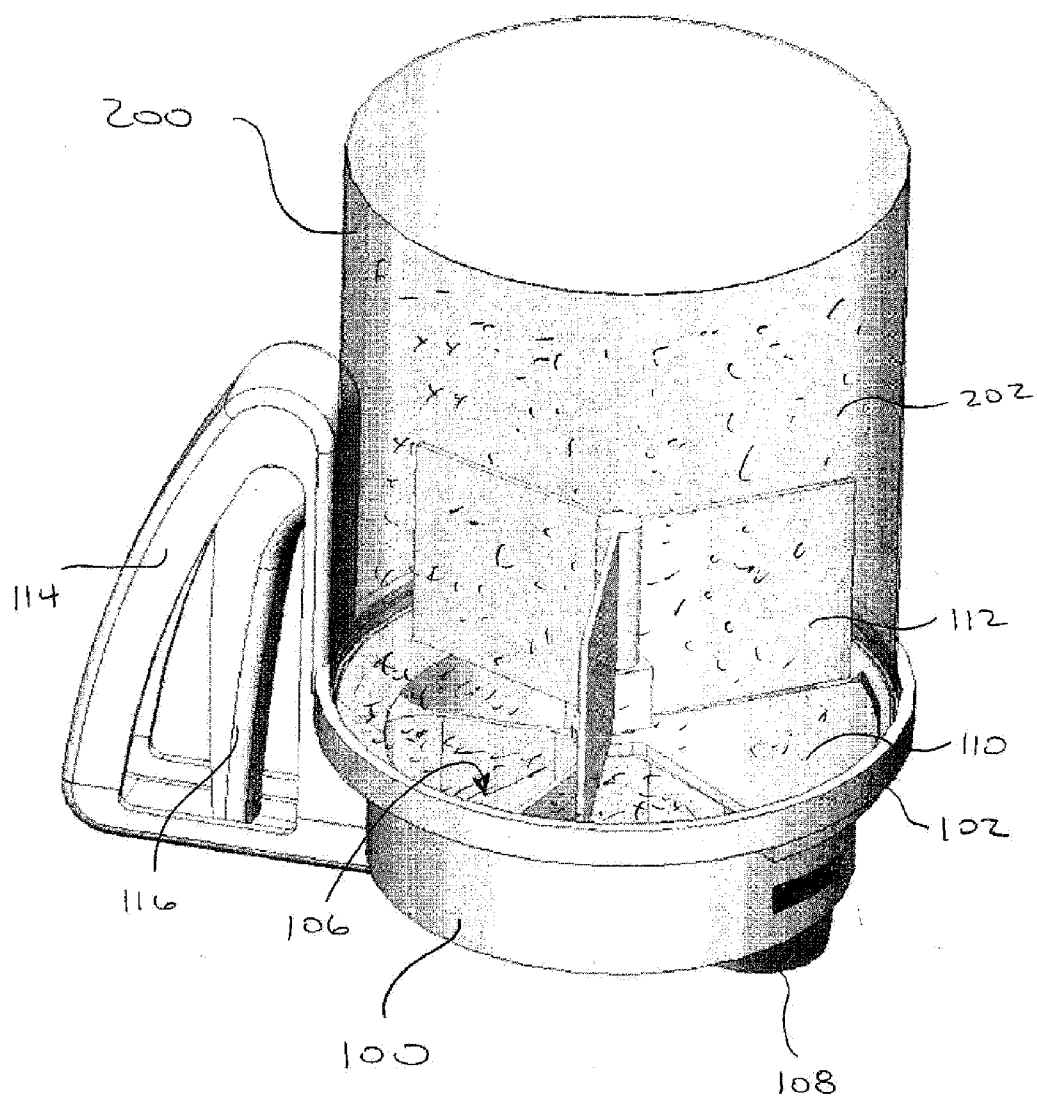


FIGURE 2

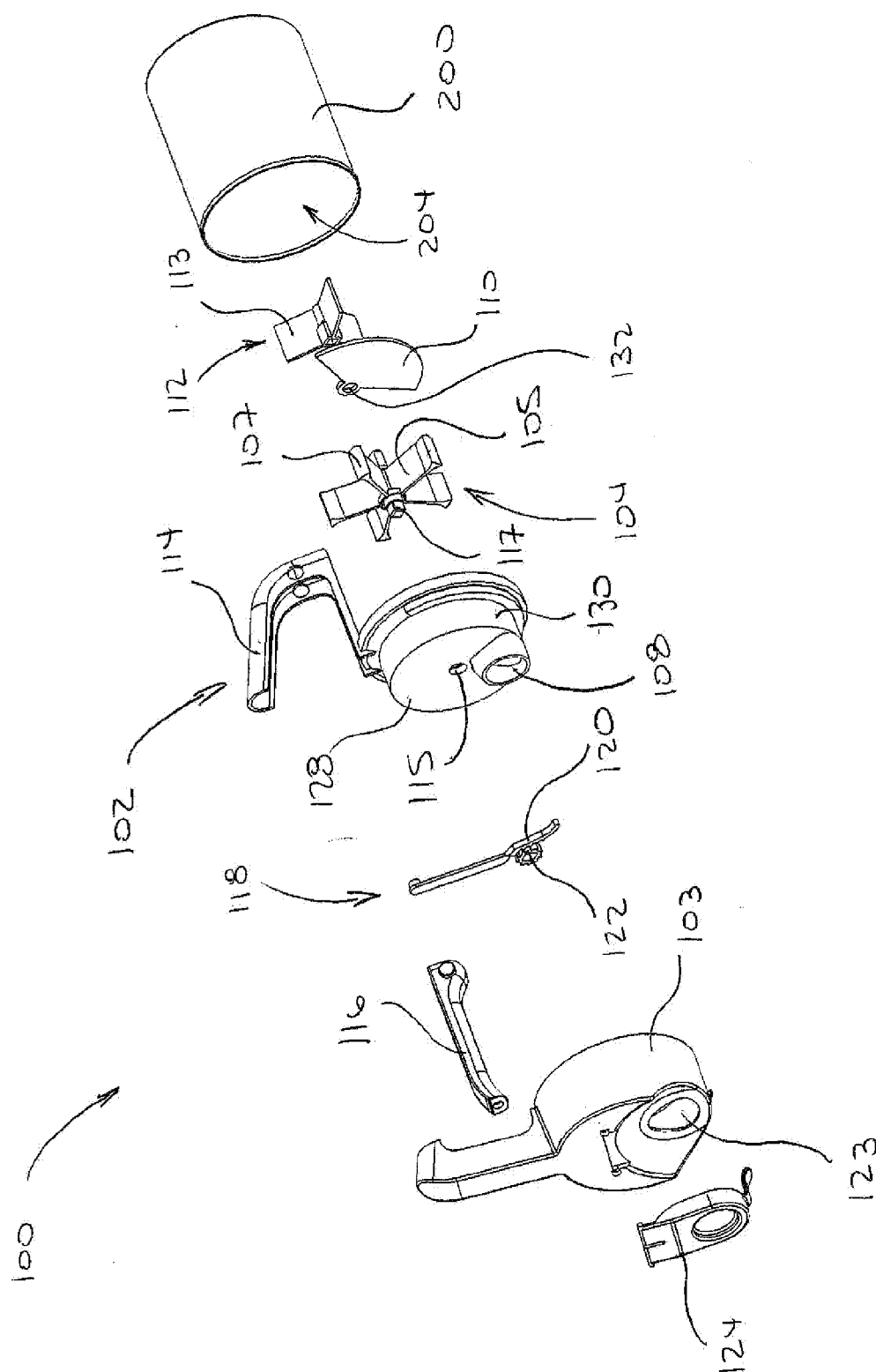


FIGURE 3

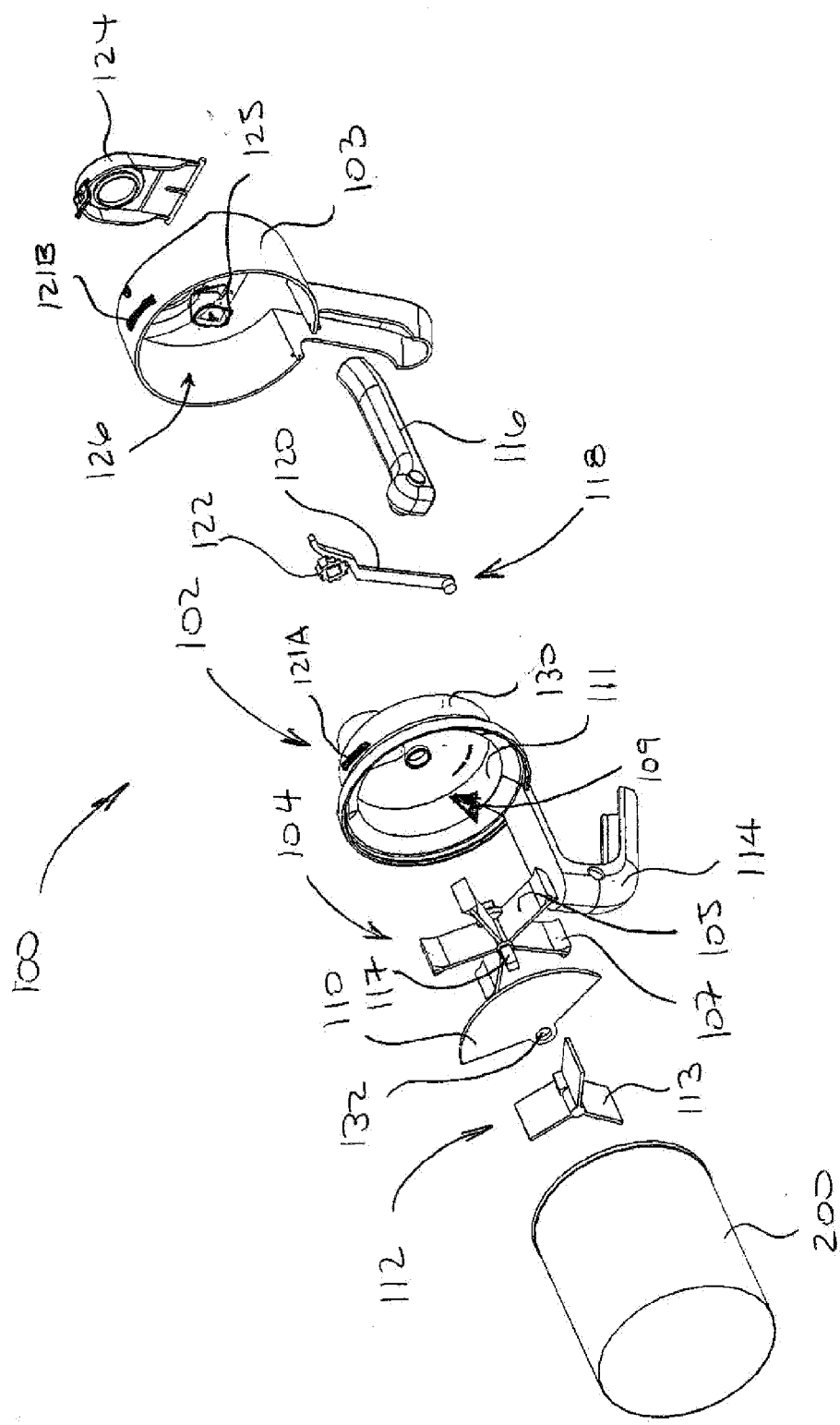


FIGURE 4

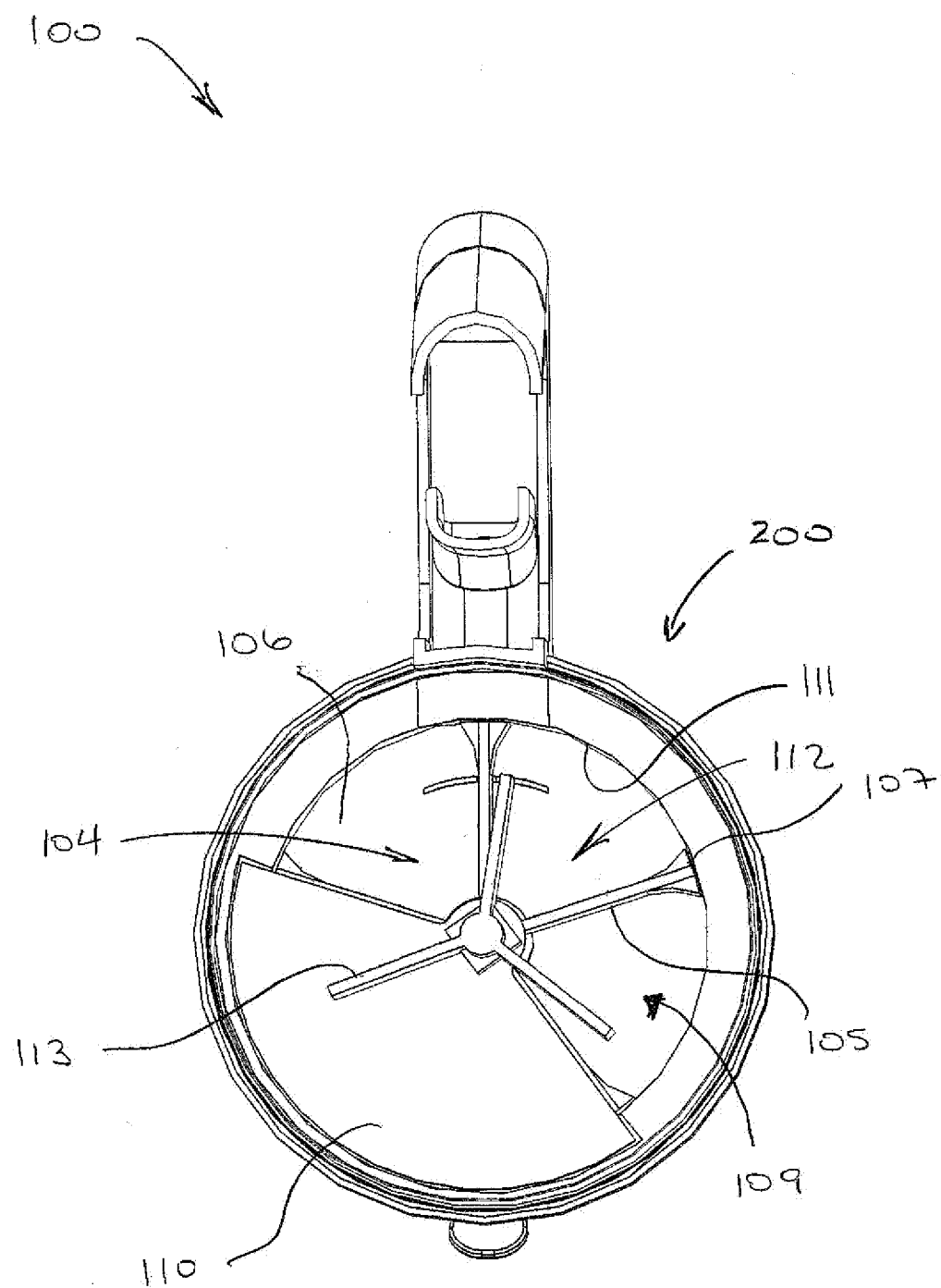


FIGURE 5

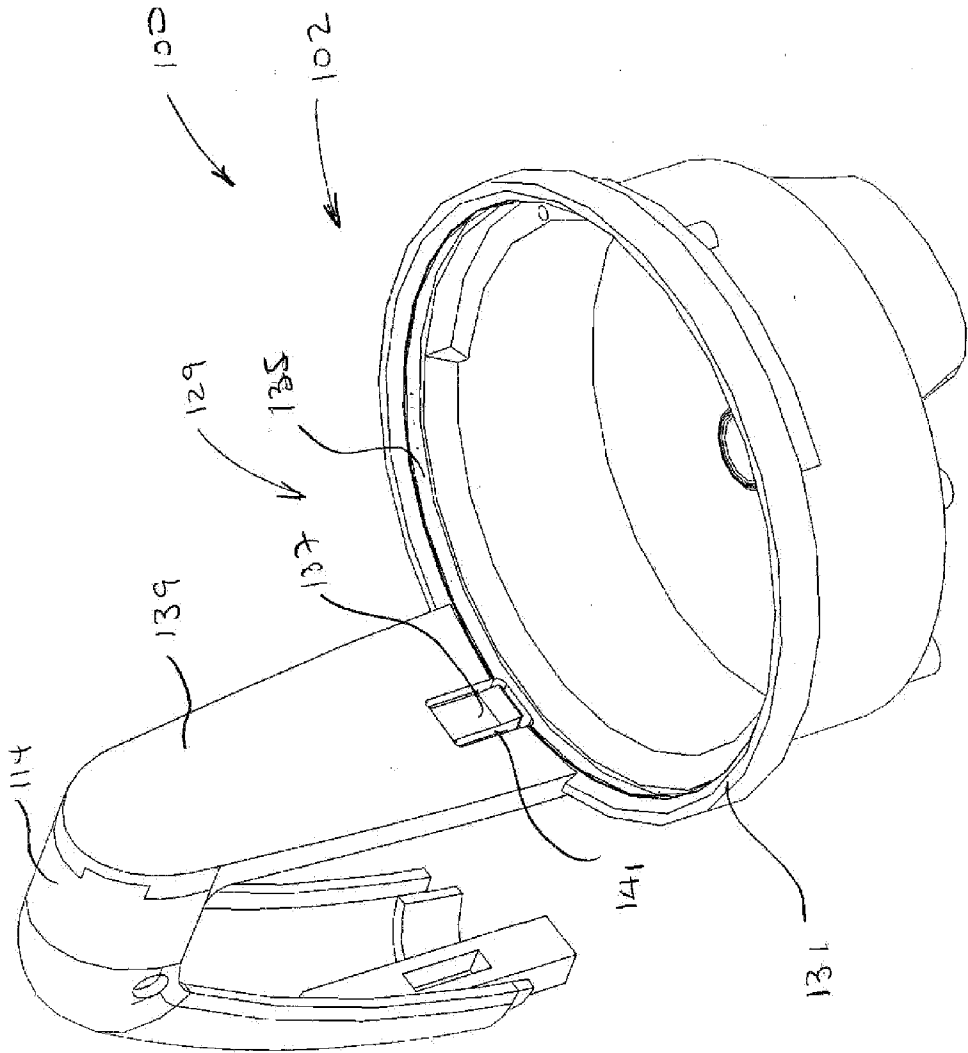


FIGURE 6

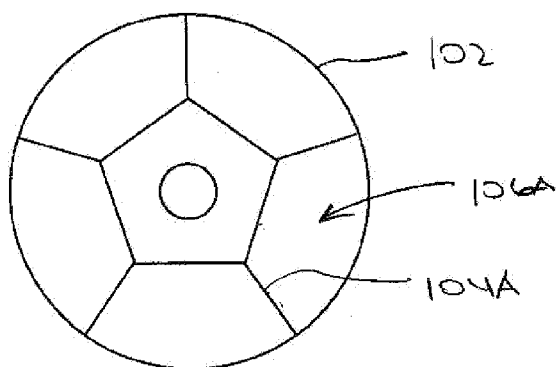


FIGURE 7A

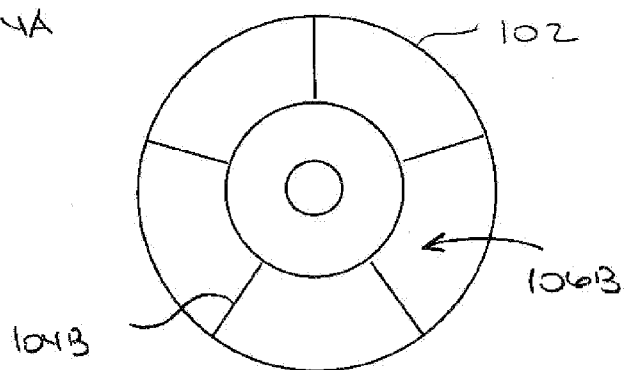


FIGURE 7B

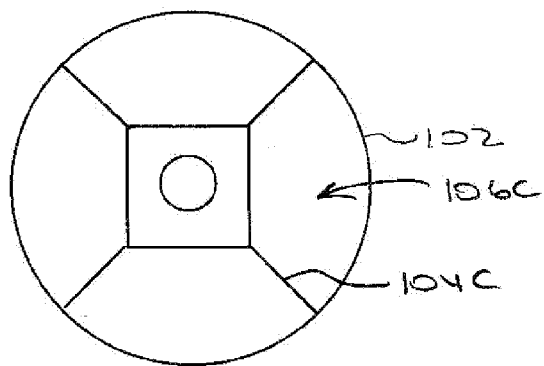


FIGURE 7C

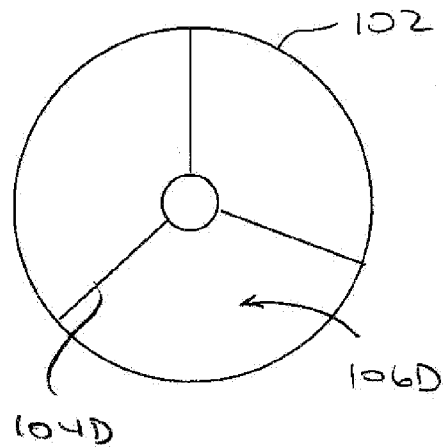


FIGURE 7D

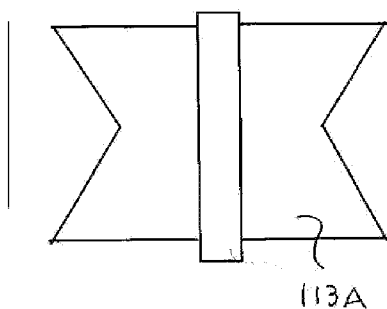


FIGURE 8A

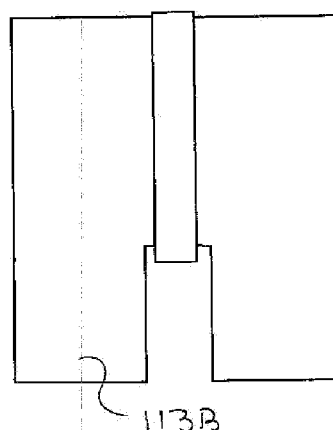


FIGURE 8B

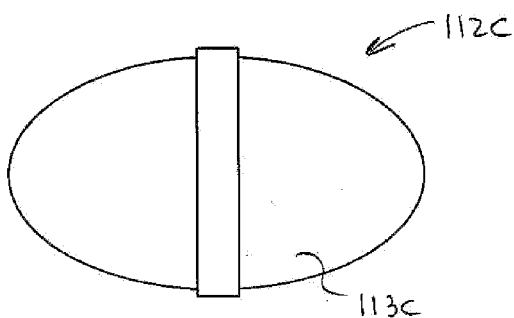


FIGURE 8C

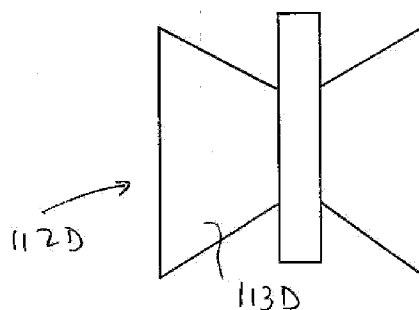


FIGURE 8D

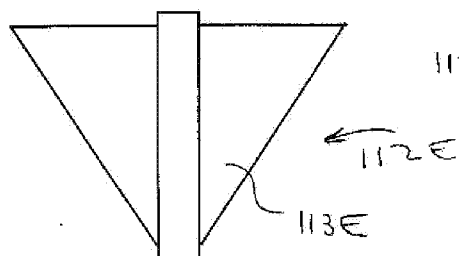


FIGURE 8E

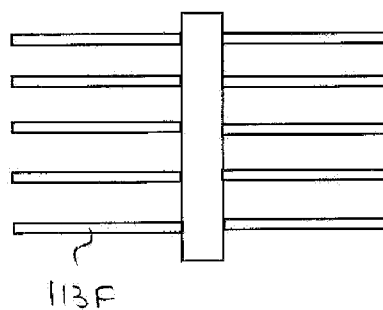


FIGURE 8F

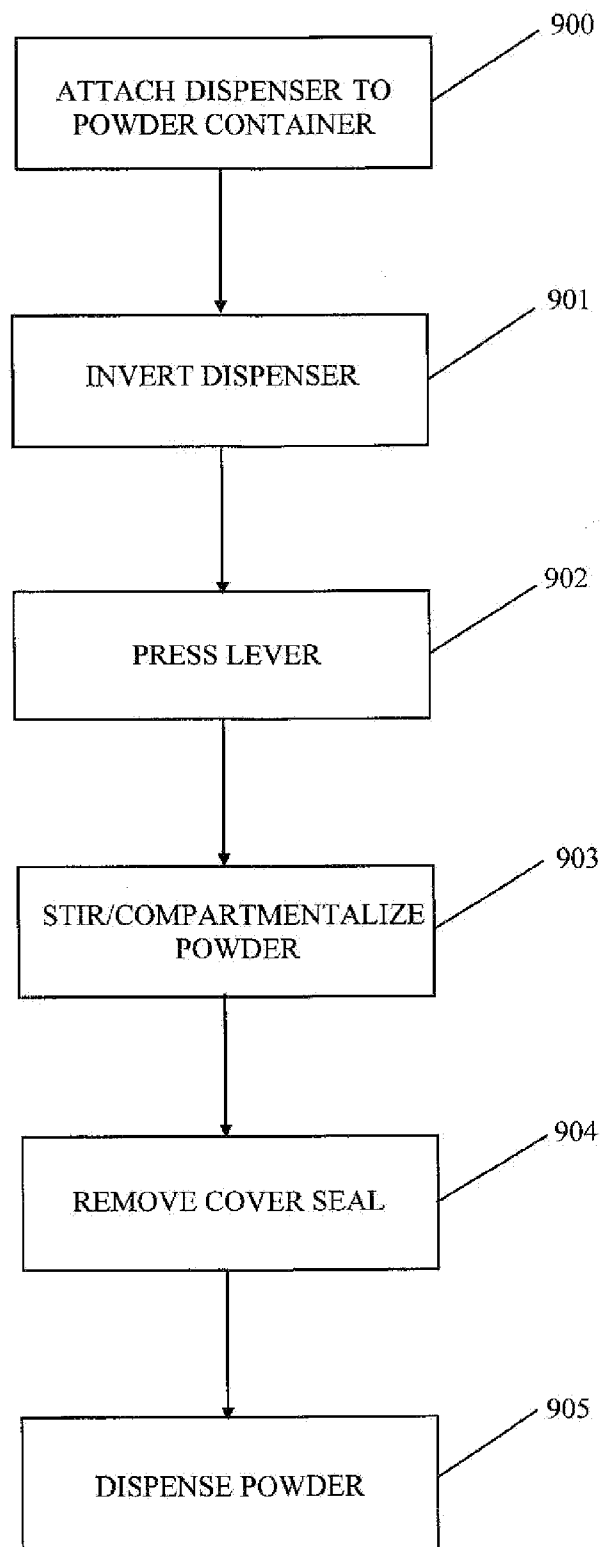


FIGURE 9

POWDER DISPENSER

FIELD AND BACKGROUND OF THE INVENTION

[0001] The present invention, in some embodiments thereof, relates to a dispenser for powder and other flowing solids, more particularly, but not exclusively, to a dispenser for dispensing powder and other flowing solids in measured units. The present application claims benefit of priority from U.S. Provisional Patent Application 61/569,834 filed 13 Dec. 2011 of common applicant.

[0002] Powders are generally composed of fine particles which tend to flow freely when subject to the force of gravity or when shaken. Examples of some powders include flour, ground coffee, powdered baby food, powder detergents, and powdered sugar. A common characteristic of powders is a tendency of the fine particles to clump together as a result of the molecular Van der Waals force, which causes the molecules to be attracted to one another. This in contrast with other types of flowing solids such as, for example, rice, oats, salt, non-powdered sugar, among others, whose relative large size and weight compared to the fine particles in powders overcome the molecular Van der Waals force and prevent their clumping. For convenience hereinafter, the term “powder” may also be used for referring to “flowing solids”.

[0003] Depending on the application, powders are frequently kept in dispensers designed for relatively comfortable lifting by a user of the dispenser. These dispensers tend to be relatively lightweight and frequently hold a predetermined maximum amount of powder for not exceeding a maximum lifting weight by the user. Occasionally, the dispensers may include means for dispensing a predetermined amount of powder, saving the user the added work of having to measure an amount of powder dispensed.

[0004] In the art, there are many types of powder dispensers, some include means for dispensing predetermined amounts while others do not.

[0005] U.S. Patent Application Publication No. 2007/0181613 describes “a dispensing device for conveying powders or other flowing materials such as, for example, sugar, flour, oats, or rice is provided. The device may include a stand holding a tube or other conveyor and a connection unit which may be connected to a container. The tube may include a handle and a screw conveyor and the flowing materials may flow through the tube to be dispensed.”

[0006] U.S. Patent Application Publication No. 2010/0012683 describes “a powder dispenser includes a substantially hollow open top housing. A first cover is engageable with such housing and includes a first aperture. A measuring member including a cavity is slidably connected to an interior of such first cover and moveable between a first position within such first cover and a second position substantially outside thereof. When such first aperture and such cavity are substantially aligned, and such housing inverted, such cavity receives powder from within such housing. A second cover fits over such first cover and has a second aperture for allowing such powder from within such cavity to pass there through and into a container when such cavity and second aperture are aligned and inverted. A sidewall extending downward from such second cover includes an opening for such measuring member to pass partially there through. Such second cover member is rotatable around such first cover member.” U.S. Pat. No. 6,484,905 describes “a powder dispensing system is disclosed which is formed from a top dispenser portion

coupled to bottom container portion. The top dispenser portion has a dispenser orifice with a cap that is preferably attached to the dispenser through strap element. The top dispenser portion and the bottom container portion are coupled through geometrically matched brim sections with snap features or complementary twisting threads that adjoin the top and the bottom to form a smooth interior dispensing surface. The smooth interior dispensing surface is angled less than 90 degrees relative to the inverted dispensing direction such that a powder is capable of being fully dispensed by inverting the dispenser and without significant collection or retention of the powder on interior surfaces. Preferably, the bottom container portion is substantially cylindrical, transparent and has graduated marks so that the quantity of powder within the dispenser is readily discerned. The interior wall of the dispenser top is preferably gradient with a gradient angle between 30 and 60 degrees so that the powder is funneled to the dispenser orifice with the dispenser in an inverted position. The dispenser is particularly useful for dispensing powdered milk and the orifice is preferably sized to fit into a baby bottle compartment.”

[0007] U.S. Pat. No. 614,646 describes “the object of the present invention is to improve the construction of measuring vessels and to provide a simple, inexpensive, and efficient one adapted for coffee, baking powder, tea, and other various materials or substances and capable of enabling the same to be accurately measured without employing a spoon or other separate measuring device.”

[0008] U.S. Pat. No. 1,684,313 describes “an object of the invention is to provide such a device which is adapted for use in connection with a receptacle containing sugar and the like, which may be used on the table, and which will permit the operator to dispense a teaspoonful or any other measure of sugar desired.”

[0009] U.S. Pat. No. 2,877,937 describes “this invention relates to a dispensing device for containers of finely comminuted and loose granular material, such as spices, sugar, flour, chemicals, and other materials to be dispensed, and particularly to a dispensing device which is adapted to meter and discharge accurately measured amounts of the material from the container during the dispensing operation.”

SUMMARY OF THE INVENTION

[0010] The invention in some embodiments therefore provides for a dispenser for accurate delivery of predetermined quantities of solid materials into a receiving element. In some embodiments of the invention, baby formula powder or dry spices are accurately portioned and delivered for use.

[0011] The invention provides for a dispenser for dispensing a powder from a container in measured unit amounts, comprising: a cap adapted to mount and seal the container, and having an opening defined therein; a handgrip mounted on said cap and having an activation mechanism; a powder declumping mechanism configured to be activated by said activation mechanism and positioned to declump powder in the container; a powder compartment divider having at least one powder compartment exposed to said opening; and at least one compartment cover configured to level powder in said compartment and to prevent entry of powder into said compartment when said compartment moves relative to said compartment cover by said activating of said activation mechanism.

[0012] In one aspect of the dispenser, the powder is selected from dry spices, coffee, flour, sugar, powdered baby food, and powder clothing detergent.

[0013] In another aspect of the dispenser, the declumping mechanism includes at least one blade for stirring said powder.

[0014] In another aspect of the dispenser, the cap includes a cavity for accommodating said compartment divider.

[0015] In another aspect of the dispenser, the compartment divider includes compartment walls for forming said at least one powder compartment.

[0016] In another aspect of the dispenser, the compartment walls includes distal ends contoured to fit a curvature of a wall of said cap cavity.

[0017] In another aspect of the dispenser, there is additionally a drive shaft for rotating said declumping mechanism.

[0018] In another aspect of the dispenser, the drive shaft rotates said compartment divider.

[0019] In another aspect of the dispenser, there is additionally a drive gear for rotating said drive shaft.

[0020] In another aspect of the dispenser, there is additionally a mechanical lever for driving said drive gear.

[0021] In another aspect of the dispenser, the mechanical lever is activated by said activation mechanism.

[0022] In another aspect of the dispenser, there is additionally a motor for driving said drive gear.

[0023] In another aspect of the dispenser, the motor is activated by said activation mechanism.

[0024] In another aspect of the dispenser, the activation mechanism is a lever.

[0025] In another aspect of the dispenser, there is additionally a cover for sealing said cap.

[0026] In another aspect of the dispenser, the cover includes a cover cap for sealing said opening.

[0027] The invention also provides for a method of dispensing a powder or dry spices, comprising: mounting a dispenser having an opening on a container; activating an activation mechanism; declumping the powder or dry spices at a point distanced from said opening as a result of said activating; and dispensing a unit of powder out of said dispenser as a result of said moving.

[0028] In one aspect of the method, there is additionally a step of filling one or more compartments in said dispenser with powder or dry spices from said container.

[0029] In another aspect of the method, there is additionally a step of moving said compartments towards an opening in said dispenser.

[0030] In another aspect of the method, there is additionally a step of activating said activation mechanism for moving said compartments.

[0031] Unless otherwise defined, all technical and/or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. "Declumping" may generally mean separating particles, components or elements of a powdery or granular or solid material one from another. Exemplary "spices" include but are not limited to pepper, salt, ginger, chili powder, curry, and paprika. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of embodiments of the invention, exemplary methods and/or materials are described below. In case of conflict, the patent specification, including

definitions, will control. In addition, the materials, methods, and examples are illustrative only and are not intended to be necessarily limiting.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] Some embodiments of the invention are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of embodiments of the invention. In this regard, the description taken with the drawings makes apparent to those skilled in the art how embodiments of the invention may be practiced.

[0033] In the drawings:

[0034] FIG. 1 schematically illustrates a perspective view of a powder dispenser, according to an exemplary embodiment of the present invention;

[0035] FIG. 2 schematically illustrates a perspective view of the dispenser of FIG. 1 attached to a container containing a powder, according to an exemplary embodiment of the present invention;

[0036] FIG. 3 schematically illustrates an exploded front view of the dispenser with the container of FIG. 2, according to an embodiment of the present invention;

[0037] FIG. 4 schematically illustrates an exploded rear view of the dispenser with the container, according to an embodiment of the present invention;

[0038] FIG. 5 schematically illustrates a view of the dispenser from a direction of the container, according to some exemplary embodiments of the invention;

[0039] FIG. 6 schematically illustrates a perspective view of the dispenser including an attachment mechanism for fitting the dispenser onto the container, according to an exemplary embodiment of the present invention;

[0040] FIGS. 7A to 7D schematically illustrate exemplary configurations of compartment dividers which may be used with the cap of the dispenser, according to some embodiments of the present invention;

[0041] FIGS. 8A to 8F schematically illustrate exemplary configurations of declumping mechanisms, according to some embodiments of the present invention; and,

[0042] FIG. 9 is a flow chart of a method of using a powder dispenser adapted to dispense measured units of a powder and having a declumping mechanism for substantially preventing clumps in the dispensed powder, according to an exemplary embodiment of the present invention.

DESCRIPTION OF SPECIFIC EMBODIMENTS OF THE INVENTION

[0043] The present invention, in some embodiments thereof, relates to a dispenser for powder and other flowing solids, more particularly, but not exclusively, to a dispenser for dispensing powder and other flowing solids in measured units. As previously stated, the term "powder and other flowing solids" may be replaced hereinafter by the term "powder".

[0044] An aspect of an embodiment of the present invention relates to a powder dispenser adapted to be fitted onto a powder container and to dispense measured units of a powder. The dispenser includes a declumping mechanism for substantially preventing clumps in the dispensed powder. In some embodiments, declumping, metering, and dispensing of the powder are done by a single action of a user acting on an activation mechanism, for example, by pressing on a movable

lever or on a button. Optionally, the single action activation also results in unsealing of the powder. In some embodiments, the dispenser is configured for being fitted onto a substantially rigid powder container. Optionally, the container is cylindrically shaped or box shaped. In some embodiments, the container may be a metal can containing powdered baby food. Alternatively, the container is a metal can containing other types of powders. Alternatively, the container is made of glass or carton. In general, a potential advantage of the dispenser is that the powder inside the container is substantially protected from contamination frequently caused by repeated opening and closing of the container and by introducing a dispensing utensil into the powder for dispensing purposes.

[0045] While embodiments of the instant invention can be used for masses of powdery material from milligrams to tons, in many applications, such as for spices, baby formulae and other household goods, measurements of 50 to 250 grams will be typical, with an accuracy of material delivery of better than 10%.

[0046] In some exemplary embodiments, the dispenser is sealingly fitted onto the powder container and includes an opening through which the powder is dispensed. Optionally, the dispenser is sized to fit onto containers of a same predetermined opening size. Alternatively, the dispenser includes flexible components, for example an elastic rim, for fitting onto containers having different opening sizes. In some embodiments, an outside diameter of the container ranges from 60 mm to 160 mm, for example, 65 mm, 70 mm, 80 mm, 90 mm, 100 mm, 110 mm, 120 mm, 113 mm, 140 mm, 150 mm, 155 mm. In some embodiments, the dispenser may be attached to the container by a clamping mechanism, or by a screwing mechanism, or by any other suitable attachment mechanism providing a sealing fit. In some embodiments, a sealing fit prevents powder from inadvertently leaking out of the container. Optionally, the sealing fit prevents humidity from entering the container. Additionally or alternatively, the sealing fit prevents inadvertent entry of liquids into the container. In some embodiments, the dispenser includes a cover with a cover cap which closes the opening.

[0047] In some exemplary embodiments, the dispenser includes one or more compartments having a predetermined volume conforming to the measured units of powder to be dispensed. For convenience hereinafter, the term "one or more compartments" may be replaced by the term "compartments". The compartments are filled with powder by orienting the dispenser and the attached container in a direction which causes the powder to flow from the container into the compartments. In some embodiments, the compartments are displaceable relative to the opening for dispensing the contents therein through the opening. A drive mechanism moves the compartments towards the opening responsive to the single action of the user acting on the activation mechanism. Alternatively, the compartments are stationary and the drive mechanism displaces the opening relative to the compartments for dispensing their contents therethrough.

[0048] In some embodiments, the one or more compartments may be replaced by a set of compartments having a greater or lesser volume for allowing dispensing of different volumes of powder as may be required from time to time. For example, in applications involving dispensing of powdered baby food, a growing baby requires greater amounts of food so that a set of replacement compartments of greater volume allow for a greater amount of powder to be dispensed in each portion. Optionally, the drive mechanism, or parts of the drive

mechanism, for example a drive gear, is replaced for moving larger volume compartments. An example of replacing the compartments by compartments of lesser volume may be when the dispenser is used for dispensing powder for several babies of different ages, where one baby consumes less food than a second baby, or when a baby has outgrown use of the dispenser (no longer uses powdered baby food) and the dispenser is used for a new baby. In some embodiments, the compartments are non-replaceable and the increased demand for food by the growing baby is provided by dispensing the contents of a plurality of compartments, for example, 2 compartments, 3 compartments, or more.

[0049] In some exemplary embodiments, the dispenser includes a powder regulating mechanism for limiting an amount of powder inside the compartments to the predetermined measured amount. Optionally, the powder regulating mechanism includes a compartment cover adapted to seal the powder-filled compartment facing the opening. By sealing the powder-filled compartment, only the measured amount of powder inside the compartment flows out the opening. Optionally, the compartment cover seals a plurality of powder-filled compartments. In some embodiments, the compartments are sealed off by the compartment cover as they are displaced by the drive mechanism towards the opening.

[0050] In some exemplary embodiments, the dispenser may include a sensor for indicating to the user that the amount of powder in the compartments is less than the measured units of powder to be dispensed. Optionally, the sensor may be an electrical sensor, a mechanical sensor, an optical sensor, a magnetic sensor, a weight sensor, or any combination thereof. In some embodiments, the sensor may be located on the compartment cover or inside the compartments, and detects if the amount of powder inside a compartment is below a certain level. Additionally or alternatively, the sensor detects if the amount of powder inside the compartment is above a certain level. Optionally, each compartment has a sensor. In some embodiments, the indication received by the user, responsive to the sensing, may be a visual alarm, an audible alarm, a tactile alarm for example through a vibration mechanism, or any combination thereof.

[0051] In some exemplary embodiments, the dispenser may include a counter for counting the number of portions of powder dispensed. Optionally, the counter is a mechanical counter. Additionally or alternatively, the counter is an electronic counter. In some embodiments, the number of portions dispensed is displayed on a display on the dispenser. Additionally or alternatively, a number of remaining portions is displayed.

[0052] In some exemplary embodiments, the declumping mechanism includes a mixer which is inserted into the powder in the container and stirs the powder for breaking up clumps. The mixer may include one or more blades which rotate inside the container. The blades may include a rectangular shape, a trapezoidal shape, a semi-circular shape, a semi-elliptical shape, on any other shape suitable for mixing and declumping the powder. Optionally, the blades extend to the wall of the container and contact the surface of the wall when rotating. Additionally or alternatively, the blades extend to a bottom of the container and contact the surface of the bottom. In some embodiments, the blades are rigid. Alternatively, the blades are semi-rigid, a portion of the bladed being flexible, for example, a portion next to the wall of the container. Optionally, the flexible portion is adapted to bend to adjust to the shape of the wall. Alternatively, the blades are

flexible. Alternatively, the blades include a brush-type material. Optionally, the brush-type material contacts the surface of the wall and/or the bottom of the container. In some embodiments, the mixer is driven by the drive mechanism responsive to the user acting on the activation mechanism. In some embodiments, the mixer may break up the clumps by transmitting vibratory motion to the powder.

[0053] In some exemplary embodiments, the activation and drive mechanisms are wholly mechanical with a user pressing on a movable lever for mechanically imparting a mechanical motion to the drive mechanism. Alternatively, the mechanisms are electric or electromagnetic and include a motor or other actuator for imparting a mechanical motion to the drive mechanism responsive to an electrical signal received from the user pressing on the movable lever or on a button (switch). Optionally, the motor is a DC motor and is powered by batteries. Optionally, the batteries are rechargeable batteries. Additionally or alternatively, the DC motor is powered by an AC-to-DC converter in the dispenser or externally connected to the dispenser. Activation of the motor is used for one of more of declumping, metering, and dispensing of the powder. Optionally, activation of the motor is used unsealing of the powder. In some embodiments, the activation mechanism and drive mechanism include the use of pneumatics including, for example a small pressurized gas container, for imparting mechanical motion to the drive mechanism. In some embodiments, the activation and drive mechanism include the use of a clock-type windup mechanism for imparting mechanical motion to the drive mechanism.

[0054] In some exemplary embodiment, the dispenser is manufactured from materials which may include plastic, metal, rubber, fiberglass, or any combination thereof. Optionally, the dispenser may be sterilized by exposure to heat from any one of steam, boiling water, microwave, or other sterilization means known in the art. Additionally or alternatively, the dispenser is washable with soap or other liquid detergents used for cooking utensils. Optionally, the dispenser may be taken apart for allowing individual piece-parts or piece-part assemblies to be washed. Optionally, the piece-parts and/or assemblies are disposable.

[0055] In some exemplary embodiments, the dispenser is removably attached to the container for repeated use on a different container or a same refilled container. Alternatively, the dispenser is configured for one-time use and is disposed of after use. In some embodiments, the dispenser is permanently attached to the container in a kit form and is disposed of together with the container. In some embodiments, some or optionally all of the components of the dispenser are replaceable, for example, the compartments, the declumping mechanism, the leveler, the sensor, and the like.

[0056] An aspect of an embodiment of the present invention relates to a powder dispenser adapted to be fitted onto a powder container for dispensing measured units of a powder while held by a user with one hand. The dispenser is held in the hand so that its opening is oriented in a downwards direction (towards the ground) and the container is positioned above the dispenser. An activation mechanism is included in a handgrip of the dispenser and is accessible to the user for operating and holding the dispenser with the same hand. Optionally, the user may use both hands. In some embodiments, a weight of the dispenser ranges from 50 milligrams in some embodiments to 5 tons in others. A combined weight of the dispenser with a full powder container depends on the specific application and powdery material being measured

and separated. In some embodiments, a height of the dispenser above the attached container is in a range from 20 mm-80 mm, for example, 25 mm, 30 mm, 35 mm, 40 mm, 45 mm, 50 mm, 55 mm, 60 mm 65 mm, 70 mm, 75 mm. In some embodiments, the dispenser with the attached container is stored on a horizontal surface with the opening oriented towards the ground. This allows the user to pick up the dispenser with one hand and dispense the powder without having to turn the dispenser upside-down. This is potentially advantageous as moments due to the weight of the container and/or the dispenser is turned upside-down are avoided contributing to increased user comfort using one hand (reduces the amount of strength required to manipulate the dispenser with one hand).

[0057] Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not necessarily limited in its application to the details of construction and the arrangement of the components and/or methods set forth in the following description and/or illustrated in the drawings and/or the Examples. The invention is capable of other embodiments or of being practiced or carried out in various ways.

[0058] Reference is now made to FIG. 1 which schematically illustrates a perspective view of a powder dispenser 100, and to FIG. 2 which schematically illustrates a perspective view of the dispenser attached to a container 200 containing a powder 202, according to an exemplary embodiment of the present invention. Dispenser 100 is configured for removing clumps in powder 202 and for dispensing measured units of the powder 202. In some embodiments, powder 202 is spices or powdered baby food, for example, infant formula, powdered milk, and cereal. Alternatively, powder 202 is any other type of edible or non-edible powder, including free-flowing solids, which may require dispensing in measured units.

[0059] Reference is now also made to FIGS. 3 and 4 which schematically illustrate an exploded front view and an exploded rear view, respectively, of dispenser 100 with container 200, according to an embodiment of the present invention.

[0060] In some exemplary embodiments, dispenser 100 includes a cap 102 which sealingly fits over a container opening 204 in container 200. Optionally, container opening 204 is circular. Alternatively, container opening 204 is rectangular-shaped. Optionally, container 200 is a standard-sized powdered baby food container such as that used for Similac® and Materna® powdered baby foods. In some embodiments, cap 102 seals container 200 for substantially preventing humidity from penetrating into the container and possibly affecting a quality of powder 202. Optionally, a cover 103 may be clamped onto cap 102 for sealing the cap and container 200.

[0061] In some exemplary embodiments, an underside of cap 102 includes a cavity 109 having relatively smooth cavity walls 111 into which a compartment divider 104 may be accommodated. Compartment divider 104 includes a plurality of compartment walls 105 radially extending from a drive shaft 117 for forming one or more compartments 106 in cavity 109, for example, 5 compartment walls as shown for forming 5 compartments. In some embodiments, compartment divider 104 may provide for 2, 3, 4, 5, 6, 7, 8, 9, 10 or more compartments 106 inside cavity 109. Each compartment 106 is of a predetermined volume and is adapted to be filled with powder 202. Filling is generally done by inverting dispenser 100 with attached container 200 so that powder 202 flows into compartments 106 due to the effect of gravity. In some embodiments, all compartments 106 have an equal

volume. Alternatively, the volume of one or more compartments 106 may differ from that of other compartment. Compartments 106 having different volumes may include some sort of identification marking, for example a color marking, which may be viewed through a window in dispenser 100 for allowing the user to distinguish between compartments, as described further on below.

[0062] In some exemplary embodiments, compartment divider 104 rotates inside cavity 109. Optionally, rotation is 360°. Rotation of compartment divider 104 allows each compartment 106 to be displaced over an opening 108 in cap 102 through which powder 202 in the compartments is dispensed. Optionally, compartment walls 105 include distal contoured edges 107 shaped to fit to a curvature of cavity wall 109. Contoured edges 107 are adapted to slide along cavity wall 109 for reducing resistance when compartment divider 104 is rotated. In some embodiments, compartment divider 104 includes a circumferential rim (not shown) interconnecting compartment walls 105. In some embodiments, compartment divider 104 is stationary inside cavity 109 and opening 108 may be rotatably displaced for aligning the opening with each compartment 106. Optionally, opening 108 is rotatably displaced by rotating a cap top 128 with opening 108 relative to a cap body 130.

[0063] In some embodiments, cap 102 may include a transparent window 121A for allowing a user to select a particular compartment 106 from which powder 202 is to be dispensed when one or more compartments have different volumes. For example, compartments 106 may be colored, the color representative of the volume of the compartment. Optionally, the user selects the compartment by viewing its color through the window. Additionally or alternatively, the window may serve to show the user the amount of powder 202 inside compartments 106. In some embodiments, cover 103 includes a transparent window 121B which aligns with transparent window 121A.

[0064] In some exemplary embodiments, cap 102 includes a compartment cover 110 positioned for sealing compartment 106 when the compartment is aligned over opening 108. By sealing compartment 106, compartment cover 110 substantially prevents entry of powder 202 into the compartment, thereby limiting the amount of powder dispensed to the predetermined amount according to the volume of the compartment (measured units of powder 202). Additionally or alternatively, compartment cover 110 levels the amount of powder 202 in compartment 106 as compartment divider 104 rotates and the compartment aligns over opening 108. In some embodiments, compartment cover 110 may seal a plurality of compartments 106 in addition to that aligned over opening 108. Optionally, compartment cover 110 seals off all compartments 106 but one for preventing a last portion in the container to be distributed among several uncovered compartments, thereby ensuring that the last portion is in one compartment. In some embodiments, compartment cover 110 is fan shaped and is attached at its narrow section to drive shaft 117, fanning out towards, and optionally abutting with, cavity wall 111. Optionally, compartment cover 110 includes a compartment cover attachment opening 132 through which drive shaft 117 is inserted, allowing rotation of the drive shaft while the compartment cover remains stationary. In some embodiments, compartment cover 110 rotates together with opening 108 when dispenser 100 includes a stationary compartment divider 104.

[0065] In some exemplary embodiments, dispenser 100 includes a declumping mechanism 112 attached at a distal end of drive shaft 117. Declumping mechanism 112 is adapted to be inserted through container opening 204 into powder 202, and to impart movement in the powder, optionally for breaking up any clumps which may form. Additionally, declumping mechanism 112 removes powder 202 which may be attached to a surface of the wall of container 200. Optionally, declumping mechanism removes powder 202 from a surface of a bottom of container 200. Additionally or alternatively, declumping mechanism 112 movements prevent formation of clumps in powder 202. In some embodiments, declumping mechanism 112 includes a mixer having three blades 113 radially extending from an axis of drive shaft 117 and configured for rotating inside container 200 and stir powder 202. Alternatively, mixer 112 may have only one blade 113, two blades, or more than 3 blades, for example, 4, 5, 6, 7 or more blades. In some embodiments, blades 113 have a relatively smooth planar surface. Optionally, blades 113 are placed at angle relative to the axis of drive shaft 117.

[0066] In some exemplary embodiments, blades 113 are flexible. Optionally, blades 113 follow the contour of the walls of container 200 and scrape any accumulated powder 202 attached to the walls for dispensing. Additionally or alternatively, blades 113 extend downwards along a length of container 200 to a bottom of the container for scraping any accumulated powder 202 attached to the bottom. In some embodiments, blades 113 may be one or more brushes used for declumping powder 202 and for scraping the wall of container 200, and optionally the bottom. In some embodiments, blades 113 may include a brush along one or more of its edges for scraping powder 202 from the wall of container 200, and optionally from the bottom of the container. Alternatively, blades 113 may be paddles, rods, or a combination of both. Examples of declumping mechanisms 112 are shown in FIGS. 8A through 8F and described further on below.

[0067] In some exemplary embodiments, dispenser 100 includes a drive mechanism 118 including a drive gear 122 and a mechanical lever 120. Drive mechanism 118 is configured for rotating drive shaft 117 for imparting rotational motion to compartment divider 104 and to mixer 112. In some embodiments, drive shaft 117 extends through a drive shaft opening 115 on cap top 128 and connects to drive gear 122. Optionally, drive gear 122 is driven by mechanical drive lever 120 which connects to an activation mechanism 116 on a dispenser handgrip 114. Optionally, activation mechanism 116 is manually operated by the user. In some embodiments, drive shaft 117 and/or drive gear 122 are automatically driven by an electric motor 125. Additionally or alternatively, motor 125 moves mechanical drive lever 120 for moving drive gear 122. In some embodiments, automatic operation is initiated by the user activating activation mechanism 116. Optionally, motor 125 is located inside a cover cavity 126 in cover 103. Alternatively, motor 125 is directly attached to drive gear 122 on cap top 128.

[0068] In some exemplary embodiments, driver shaft 117 rotates mixer 112 and compartment divider 104 together over a same angular distance. Alternatively, driver shaft 117 rotates mixer 112 and compartment divider 104 independently one of the other. For example, drive shaft 117 may have two rotating shafts, a first shaft to which compartment divider 104 is attached and a second shaft to which mixer 112 is attached. In this double-shaft configuration, compartment divider 104 may be rotated by the first shaft over an angular

distance, for example, of 72° for moving from one compartment 106 to another, while mixer 112 may be rotated by the second shaft over an angular distance greater than 72°, such as 150°, 220°, 270°, 300°, 360°, 540°, or greater. Alternatively, for example, mixer 112 may be rotated by the second shaft over an angular distance less than 72°, such as 60°, 50°, 40°, 30°, 20°, or less.

[0069] In some exemplary embodiments, handgrip 114 is configured for holding dispenser 100 and attached container 200 with a single hand while dispensing powder 202. Optionally, activation of the activation mechanism 116, which may be for example a lever which is manually pulled, is done while holding dispenser 100 and using the same hand. In some embodiments, activation mechanism 116 may include a button which is pressed for electrically initiating drive mechanism 118. Additionally or alternatively, pressing the button may serve to initiate a pneumatic drive mechanism 118.

[0070] In some exemplary embodiments, cover 103 is adapted to cover cap 102 by sealingly accommodating the cap inside a cavity 126 in the cover. Optionally, cap 102 is attached to cover 103 by clamping, or by screwing, or by any other suitable mating mechanism which may provide a sealing fit. Cover 103 includes a cover opening 123 which aligns with cap opening 108 and through which the cap opening is inserted. A cover cap 124 removably attachable to cover 103 may be inserted into cap opening 108 for sealing the opening.

[0071] Reference is also now made to FIG. 5 which schematically illustrates a view of dispenser 100 from a direction of container 200 according to some exemplary embodiments of the invention. Shown in the figure is mixer 112 with blades 113; compartment cover 110 positioned at an entrance to cap cavity 109 between the mixer and compartment divider 104 and covering several compartments 106 in the compartment divider; the compartment divider inside the cap cavity with compartment walls 105 having contoured ends 107 conforming to the curvature of cavity wall 111.

[0072] In some exemplary embodiments, in a typical mode of operation, dispenser 100 is placed on a table top, or other flat top, with container 200 positioned on top of the dispenser. Optionally, compartments 106 are filled by powder 202 flowing into the compartments due to the inverted position. Additionally, powder 202 does not flow into compartments 106 under compartment cover 110, which are filled with powder. Optionally, compartments 106 are filled with the measured units of powder.

[0073] Reference is now also made to FIG. 6 which schematically illustrates a perspective view of dispenser 100 including an attachment mechanism 129 for fitting the dispenser onto container 200, according to an exemplary embodiment of the present invention. Attachment mechanism 129 includes an internal beveled rim 135 located within a circumferential external rim 131 of dispenser 100. Internal beveled rim 135 is adapted to accommodate a rim around opening 204 in container 200. Attachment mechanism 129 additionally includes a container support 139 having a surface shaped to accommodate a contour of container 200 and a clasp 137. Optionally, clasp 137 is a spring-loaded clasp 137 adapted to be pressed into a slot 141 in container support 139 as dispenser 100 is fitted onto container 200, and is further adapted to press against the exterior of the container once the container is fitted in place. Pressing of spring-loaded clasp 137 maintains container 200 attached to dispenser 100. Alternatively, clasp 137 locks onto the rim around opening 204 in

container 200. Optionally, dispenser 100 is removed from container 200 by pulling the dispenser away from the container.

[0074] Reference is now made to FIGS. 7A to 7D which schematically illustrate exemplary configurations of compartment dividers which may be used with cap 102, according to some embodiments of the present invention. An ordinary person skilled in the art will appreciate that there are many other possible configurations for the compartment dividers.

[0075] In FIG. 7A is shown a compartment divider 104A having five trapezoidal shaped compartments 106A with a curved larger base. In FIG. 7B is shown a compartment divider 104B having 5 trapezoidal shaped compartments 106B with the larger and the smaller bases having curved portions. In FIG. 7C is shown a compartment divider 104C having four trapezoidal shaped compartments 106C. In FIG. 7D is shown a compartment divider 104D having 3 triangular shaped compartments 106D with the base and the apex having curved portions.

[0076] Reference is now made to FIGS. 8A to 8F which schematically illustrate exemplary configurations of declumping mechanisms, according to some embodiments of the present invention. The blades in the declumping mechanisms may be rigid, semi-rigid, or flexible, or any combination thereof. An ordinary person skilled in the art will appreciate that there are many other possible configurations for the declumping mechanisms.

[0077] In FIG. 8A is shown declumping mechanism 112A having blades 113A which are rectangular shaped with a triangular cutout along the edges. In FIG. 8B is shown declumping mechanism 112B having elongated blades 113B which are rectangular shaped and extend to a bottom of the container. In FIG. 8C is shown declumping mechanism 112C having blades 113C which are semi-elliptically shaped. In FIG. 8D is shown declumping mechanism 112D having blades 113D which are trapezoidally shaped. In FIG. 8E is shown declumping mechanism 112E having blades 113C which are triangularly shaped. In FIG. 8F is shown declumping mechanism 112C having rods 113F.

[0078] Reference is now made to FIG. 9 which is a flow chart of a method of using a powder dispenser adapted to dispense measured units of a powder and having a declumping mechanism for substantially preventing clumps in the dispensed powder, according to an exemplary embodiment of the present invention. For exemplary purposes, reference is made to dispenser 100 and container 200 in FIGS. 1-5.

[0079] At 900, a user removes a cover from a container 200 and attaches dispenser 100 to the container. Optionally, container 200 is a can containing powdered baby food. In some embodiments, dispenser 100 is attached to container 200 by clamping the dispenser onto the container. Optionally, clamping includes applying pressure for sealingly fitting the dispenser over container opening 240. Alternatively, dispenser 100 is screwed onto container 200. Alternatively, dispenser 100 includes an elastic rim which is fitted over container opening 240.

[0080] At 901, once dispenser 100 is fitted onto container 200, the dispenser together with the container is inverted so that the container is positioned above the dispenser, and the powder contained therein is drawn downwardly due to gravitational forces, thereby filling compartments 106 which are not covered by compartment cover 110. Optionally, the user uses only one hand to hold the attached dispenser/container and to invert them. Additionally or alternatively, the com-

bined dispenser/container is placed on a table top, or other flap top, so that dispenser **100** rests on the flat surface (container **200** is above the dispenser) and the uncovered compartments **106** are filled with powder **202**. Additionally, covered compartments **106** are filled with the predetermined measured units of powder.

[0081] At **902**, the user presses on activation mechanism **116**. Optionally, activation mechanism **116** is on handgrip **114**. In some embodiments, activation mechanism **116** manually activates drive mechanism **118**. Alternatively, activation mechanism electrically activates drive mechanism **118**. Alternatively, activation mechanism **116** pneumatically activates drive mechanism **118**. Alternatively, activation mechanism initiates a clock-work wind up mechanism in drive mechanism **118**.

[0082] At **903**, drive mechanism **118** is activated. Drive gear **122** rotates causing rotation of declumping mechanism **112** and stirring of powder **202** in container **200**. Drive gear **122** also rotates compartment divider **104** having compartments **106** filled with powder **202**. One or more of compartments **106** with rotation pass under compartment cover **110** sealing the compartment from entry of powder **202** for preventing there being more than the measured unit of powder inside the compartment. Drive gear **122** additionally aligns a compartment **106** filled with the measured units of powder **202** with cap opening **108**. Additionally, drive gear **122** displaces an empty compartment **106** from cap opening **108**, optionally for refilling with powder **202**. Additionally or alternatively, drive mechanism **118** induces vibrations in declumping mechanism **112** for moving powder **202**. In some embodiments, rotation of declumping mechanism **112** and compartment divider **104** may be simultaneous. Alternatively, rotation of compartment divider **104** follows rotation of declumping mechanism **112**.

[0083] At **904**, the user removes cover seal **124** on cover **103** from opening **108**.

[0084] At **905**, the user dispenses a measured amount of powder **202** in compartment **106** through opening **108**. Following dispensing, the user closes cover seal **124**. Optionally, the user repeats steps **902-905** as many times as required to dispense a total amount of powder **202** required.

[0085] The terms “comprises”, “comprising”, “includes”, “including”, “having” and their conjugates mean “including but not limited to”.

[0086] The term “consisting of means “including and limited to”.

[0087] The term “consisting essentially of” means that the composition, method or structure may include additional ingredients, steps and/or parts, but only if the additional ingredients, steps and/or parts do not materially alter the basic and novel characteristics of the claimed composition, method or structure.

[0088] As used herein, the singular form “a”, “an” and “the” include plural references unless the context clearly dictates otherwise.

[0089] Throughout this application, various embodiments of this invention may be presented in a range format. It should be understood that the description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the invention. Accordingly, the description of a range should be considered to have specifically disclosed all the possible subranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be consid-

ered to have specifically disclosed subranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 3, 4, 5, and 6. This applies regardless of the breadth of the range.

[0090] Whenever a numerical range is indicated herein, it is meant to include any cited numeral (fractional or integral) within the indicated range. The phrases “ranging/ranges between” a first indicate number and a second indicate number and “ranging/ranges from” a first indicate number “to” a second indicate number are used herein interchangeably and are meant to include the first and second indicated numbers and all the fractional and integral numerals therebetween

[0091] It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable subcombination or as suitable in any other described embodiment of the invention. Certain features described in the context of various embodiments are not to be considered essential features of those embodiments, unless the embodiment is inoperative without those elements.

[0092] Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

[0093] All publications, patents and patent applications mentioned in this specification are herein incorporated in their entirety by reference into the specification, to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated herein by reference. In addition, citation or identification of any reference in this application shall not be construed as an admission that such reference is available as prior art to the present invention. To the extent that section headings are used, they should not be construed as necessarily limiting.

What is claimed is:

1. A dispenser for dispensing a powder from a container in measured unit amounts, comprising:

- a cap adapted to mount and seal the container, and having an opening defined therein;
- a handgrip mounted on said cap and having an activation mechanism;
- a powder declumping mechanism configured to be activated by said activation mechanism and positioned to declump powder in the container;
- a powder compartment divider having at least one powder compartment exposed to said opening; and
- at least one compartment cover configured to level powder in said compartment and to prevent entry of powder into said compartment when said compartment moves relative to said compartment cover by said activating of said activation mechanism.

2. A dispenser according to claim 1 wherein the powder is selected from dry spices, coffee, flour, sugar, powdered baby food and powder clothing detergent.

3. A dispenser according to claim 1, wherein said declumping mechanism includes at least one blade for stirring said powder.

4. A dispenser according claim 1, wherein said cap includes a cavity for accommodating said compartment divider.

5. A dispenser according to claim 1, wherein said compartment divider includes compartment walls for forming said at least one powder compartment.

6. A dispenser according to claim 5, wherein said compartment walls includes distal ends contoured to fit a curvature of a wall of said cap cavity.

7. A dispenser according to claim 1, including a drive shaft for rotating said declumping mechanism.

8. A dispenser according to claim 7 wherein said drive shaft rotates said compartment divider.

9. A dispenser according to claim 8 including a drive gear for rotating said drive shaft.

10. A dispenser according to claim 9 including a mechanical lever for driving said drive gear.

11. A dispenser according to claim 10 wherein said mechanical lever is activated by said activation mechanism.

12. A dispenser according to claim 9 including a motor for driving said drive gear.

13. A dispenser according to claim 12 wherein said motor is activated by said activation mechanism.

14. A dispenser according to claim 1, wherein said activation mechanism is a lever.

15. A dispenser according to claim 1, including a cover for sealing said cap.

16. A dispenser according to claim 1, wherein said cover includes a cover cap for sealing said opening.

17. A method of dispensing a powder or dry spices, comprising:

mounting a dispenser having an opening on a container;
activating an activation mechanism;

declumping the powder or dry spices at a point distanced from said opening as a result of said activating; and
dispensing a unit of powder out of said dispenser as a result of said moving.

18. The method of dispensing a powder according to claim 17, including filling one or more compartments in said dispenser with powder or dry spices from said container.

19. A method of dispensing a powder according to claim 17, including moving said compartments towards an opening in said dispenser.

20. A method of dispensing a powder according to claim 17, including activating said activation mechanism for moving said compartments.

* * * * *