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(54) Title: DRYING DEVICE WITH IMPROVED DRIVE MECHANISM

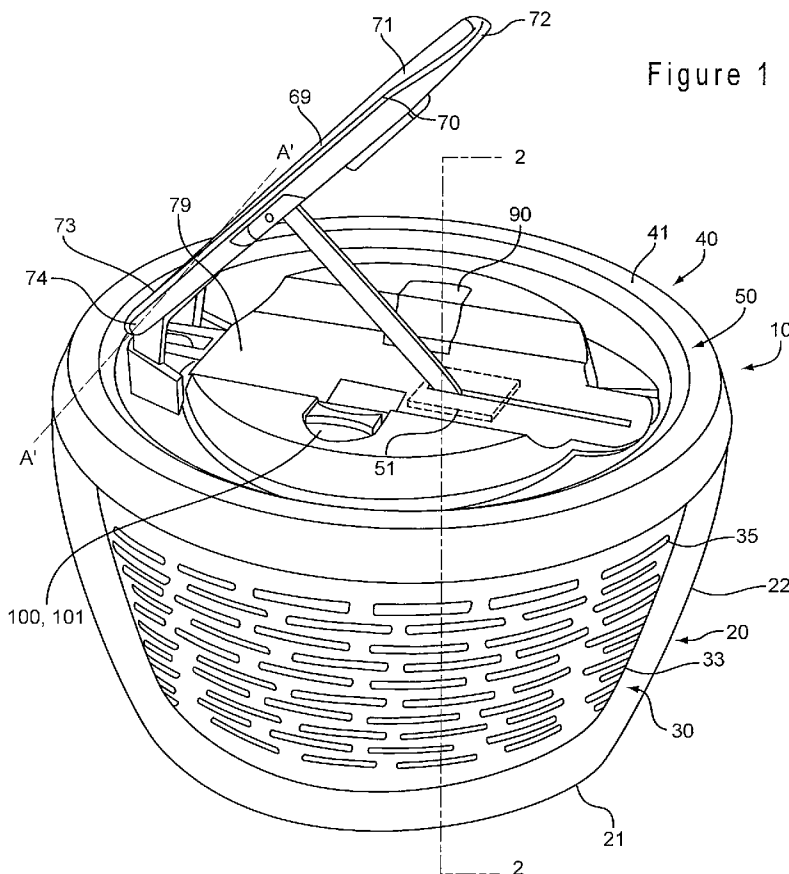


Figure 1

(57) Abstract: A drying device having a bowl, a basket with a plurality of perforations, a cover assembly, and a drive assembly. The drive assembly includes: a driving mechanism mechanically coupled to a rotatable lid that is configured to mate with a rotatable basket, and a handle pivotally attached to the cover assembly. The handle is configured to actuate the driving mechanism upon rotation of the handle about an axis from a first position to a second position. The drying device may also include a locking mechanism and/or a braking mechanism.

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DRYING DEVICE WITH IMPROVED DRIVE MECHANISM

CONTINUITY

The current application claims priority to the U.S. provisional application filed on November 2, 2007 entitled Salad Spinner with Improved Drive Mechanism, having the Serial No. 60/985,011, which is incorporated by reference.

BACKGROUND

Technical Field

[0001] The present invention generally relates to drying devices and, more particularly, to a spinner device configured to dry food and other items.

Background Information

[0002] It is often desirable to rinse items, such as food, to remove unwanted dirt, chemicals, or other debris. In doing so, however, the excess moisture that remains on the items can be undesirable. This is particularly the case with lettuce and other salad greens, which tend to retain moisture, and thus, may be difficult to coat with oil-based dressings when the leaves are wet.

[0003] To solve this problem, some manufacturers have developed vegetable drying devices, or "salad spinners." These drying devices typically use a rotating basket to remove moisture through centrifugal force. Rotation of the basket is generally accomplished through an electrical or mechanical driving mechanism. Such devices are unsatisfactory in a number of respects.

[0004] Some mechanical drying devices use a crank to rotate the basket. Such cranks tend to be slippery and require the user to continuously move within a single plane (*i.e.*, the plane defined by the crank), while holding the drying device to keep it steady. It is thus difficult and tiresome to grasp and move the crank repeatedly while stabilizing the drying device.

[0005] Other mechanical drying devices include a pull handle attached to the device by a cord. These devices require the user to use one hand to hold the cover of the device stationary and the other hand pulls the handle.

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[0006] Other known drying devices use a pumping actuator to rotate the basket. These drying devices require the user to push the handle directly downward. Such drive assemblies are restricting because they are configured to move along a vertical axis only, thereby requiring the user to be positioned directly over the device so that a downward axial force can be applied.

[0007] Further, some known drying devices, have awkwardly-placed pumping actuators, cranks, and the like. Because of this, such devices do not typically have a flat top surface. As a result, it is difficult to stack other kitchen items on top of such devices for storage purposes. This is a major drawback where kitchen space is a premium.

[0008] Accordingly, there is a need for a drying device that overcomes these and other limitations of the prior art.

BRIEF SUMMARY

[0009] In general, the present invention relates to a drying device configured to remove excess moisture from items, such as food, through centrifugal force caused by a spinning action. In one embodiment of the present invention, a drive assembly for a drying device includes: a driving mechanism mechanically coupled to a rotatable lid that is configured to mate with a rotatable basket, and a handle pivotally attached to a cover assembly and is configured to actuate the driving mechanism upon rotation of the handle about an axis from a first position to a second position. In some embodiments, a rod connects the handle to the driving mechanism. In other embodiments, a locking mechanism is positioned on a top side of the cover assembly and configured to prevent the handle from moving from the second position to the first position. In still other embodiments, the drive assembly comprises a rack and a pinion, where the rack is configured to slideably engage the pinion upon the rotation of the handle.

[0010] In certain embodiments of the present invention, a drying device includes: a bowl having a top edge; an opening defined by the top edge of the bowl; a basket having a plurality of apertures disposed within the bowl and configured to be rotatable about a first axis with respect to the bowl; a cover

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assembly removably configured to mate with the top edge of the bowl and including a top side and a bottom side; a rotatable lid attached to the bottom side of the cover assembly and configured to mate with the upper edge of the basket when the cover assembly is positioned on the top edge of the bowl; a drive assembly associated with the cover assembly and including a driving mechanism mechanically coupled to the lid and comprising a rack and a pinion; a handle pivotally attached to the cover assembly and configured to actuate the driving mechanism upon rotation of the handle about a second axis from a first position to a second position; and a rod connecting the handle and the driving mechanism. In some embodiments, a locking mechanism is positioned on the top side of the cover assembly and is configured to prevent the handle from moving from the second position to the first position. In still other embodiments, a brake button is positioned on the top side of the cover assembly and is configured to actuate a brake assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Figure 1 is a side view of a drying device in accordance with one embodiment of the present invention;

[0012] Figure 2 is a cross-sectional overview of the drying device shown in Figure 1, as taken along line 2-2 of Figure 1;

[0013] Figure 3 is an exploded view of a portion of the drying device shown in Figure 1;

[0014] Figure 4 is an exploded view of a driving mechanism in accordance with one embodiment of the present invention;

[0015] Figure 5 is an exploded view of a braking mechanism in accordance with one embodiment of the present invention;

[0016] Figure 6 is a top view illustration of a drying device of one embodiment of the present invention; and

[0017] Figure 7 is a side view illustration of the drying device shown in Figure 6.

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DETAILED DESCRIPTION OF THE DRAWINGS AND THE PRESENTLY PREFERRED EMBODIMENTS

[0018] Referring to Figure 1, one embodiment of a drying device **10** is provided. In this embodiment, the device **10** comprises a bowl **20**, a basket **30** having apertures **35**, a cover assembly **40** and a drive assembly **50** associated with the cover assembly **40**. The bowl **20** is generally circular in shape and has a generally circular base **21**. Referring now to Figure 2, a generally conical projection **24** is formed on the bottom of the circular base **21**. The device **10** has a vertical axis **A** that passes through the center of the bowl **20** and the generally conical projection **24**. As shown in Figure 3, the bowl **20** defines an opening **25**. The bowl **20** also has sidewalls **22** that end in a defined top edge **23**. The bowl **20** may be manufactured from synthetic, semi-synthetic, or other suitable materials. Examples of suitable materials include, but are not limited to, acetal plastic resin, acrylonitrile butadiene styrene, polycarbonate, styrene acrylonitrile, polypropylene and thermoplastic elastomer.

[0019] In the embodiment of Figure 1, a basket **30** is disposed within the bowl **20**. The basket **30** has a base **31** that is generally flat and circular. As shown in Figure 2, a generally conical indentation **32** is formed in the base **31** of the basket **30**, and is configured to be releasably coupled to the generally conical projection **24** of the bowl **20** when the basket **30** is placed within the bowl **20**. The basket **30** is configured to rotate about the vertical axis **A** with respect to the bowl **20**. The basket **30** also includes sidewalls **33** that define an upper edge **34**. Referring back to Figure 1, the basket **30** is configured to allow water to escape through a plurality of apertures **35** in the sidewalls **33** and the base **31**. In the embodiment of Figure 3, the upper edge **34** of the basket **30** includes a lip **36** having an inner surface **37** and an outer surface **38**. A plurality of ribs **39** may be distributed circumferentially about the upper edge **34** of the basket **30** to facilitate engagement of the basket **30** with an adjoining lid **44**. The basket **30** may be manufactured from synthetic, semi-synthetic materials, or other suitable materials. Examples of such materials are provided above.

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[0020] Referring to the embodiment of Figures 1, 2 and 3 the device **10** also comprises a drive assembly **50** and a cover assembly **40** that is removably configured to mate with the top edge **23** of the bowl **20**. As shown in Figure 3, the cover assembly **40** has a top side **41** and a bottom side **42**. In one embodiment, the cover assembly **40** includes a flange **43** configured to extend about the periphery of the cover assembly **40** and prevent substantial lateral movement of the cover assembly **40** when placed on the top edge **23** of the bowl **20**. A lid **44** is attached to the bottom side **42** of the cover assembly **40**. The lid **44** is rotatable about the vertical axis **A** when placed on the basket bowl and is configured to mate with the upper edge **37** of the basket **30** when the cover assembly **40** is placed upon the top edge of the bowl **20**. The lid **44** may include a flange **45** extending about the periphery of the lid **44**. The flange **45** includes a plurality of notches **46** configured to engage the inner surface **37** of the lip **36** of the basket **30**. The lid **44** may also be removable from the cover assembly **40** to facilitate cleaning. The cover assembly **40** may further include a cap **47** to conceal the interior parts of the cover assembly **40**. In one embodiment, a hub structure **48** is provided in the center of the cap **47** and engages a corresponding hub receiving component **49** of the lid **44**.

[0021] In the embodiment of Figure 1 and 2, the drive assembly **50** is associated with the cover assembly **40**. As shown in Figure 1, the drive assembly **50** includes a handle **69** and a driving mechanism **51** mechanically coupled to the lid **44**. In one embodiment, the driving mechanism **51** includes a rack **52** and a pinion **57**. Referring to Figure 4, the driving mechanism **51** also includes a frame **65** having a first end **66** and a second end **67**. The rack **52** and pinion **57** are placed within the frame **65**, and the rack **52** is configured to slide between the first end **66** and the second end **67** of the frame **65** upon actuation. The rack **52** may have a generally rectangular shape and an opening **53** defined through the middle of the rack **52**. In some embodiments, a slot **54** is provided in the rack **52** and is configured to receive a locking mechanism **100**, which will be discussed in further detail below. An end of the rack **52** may include a channel **55** to receive a pivot

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pin 68. A plurality of inner teeth 56 is provided within the opening 53 of the rack 52 to engage the pinion 57.

[0022] In the embodiment shown in Figure 4, the pinion 57 is generally circular in shape with a plurality of equally spaced external teeth 58 about its periphery. The pinion 57 is configured to fit within the opening 53 of the rack 52. The inner teeth 56 of the rack 52 are configured to engage and mesh with the external teeth 58 of the pinion 57 as the rack 52 slides from the first end 66 to the second end 67 of the frame 65. An opening 59, configured to receive a shaft 60, is provided in the center of the pinion 57. The drive assembly 50 may further include a sprag assembly 61 and a clutch assembly 64 coupled to the pinion 57 via the shaft 60. See, for example, the sprag assembly disclosed in PCT/US2004/043598 entitled METHODS AND APPARATUS FOR A SALAD SPINNER, filed December 22, 2004, which claims priority to U.S. Patent Application No. 10/845,997, filed May 14, 2004, both of which are hereby incorporated by reference herein. The sprag assembly 61 may include a number of deformable members 62 and cylindrical portions 63. The cylindrical portions 63 are configured to engage the clutch assembly 64 as the sprag assembly 61 rotates and the deformable members 62 are forced outward. It will be appreciated that many other sprag assembly and clutch assembly designs may be used in connection with the present invention.

[0023] The drive assembly 50 of Figures 1 and 2 further includes a handle 69 configured to actuate the driving mechanism 51. The handle 69 may have a generally rectangular configuration with a top side 70, a bottom side 71, a first end 72 and a second end 73. In certain embodiments, the second end 73 of the handle 69 is pivotally attached to the top side 41 of the cover assembly 40 by a first hinge pin 74 or any other suitable fastening mechanism. The first hinge pin 74 is configured to rotate about a horizontal axis A'. As shown by Figure 1, the handle 69 remains in a raised, first position until it is actuated by a user. Referring now to Figure 4, a spring assembly 76 may be placed about the first hinge pin 74. The spring assembly 76 is configured to compress and expand as the handle 69 rotates about the horizontal axis A' between the raised, first position to a lowered, second

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position. Figures 6 and 7 show top and side views, respectively, of the device **10** when the handle **69** is in the lowered, second position. In some embodiments, an opening **77** is provided on the bottom side **71** of the handle **69** and is configured to receive the locking mechanism **100** when the handle **69** is in the lowered, second position.

[0024] The locking mechanism **100** may be any suitable mechanism for retaining the handle **69** in the lowered position such as the slideable latch **101** shown in Figures 1 and 6. The locking mechanism **100** may be configured to move laterally with respect to the cover assembly **40** upon actuation of the locking mechanism **100** by a user. Such a slideable latch **101** releasably engages the opening **77** on the bottom side **71** of the handle **69**. Further, in some embodiments, the locking mechanism **100** engages a slot **54** in the rack **52** to prevent the rack **52** from moving from the second end **67** of the frame **65** to the first end **66**. Desirably, the locking mechanism **100** is also configured such that the locking mechanism **100** is prevented from moving laterally when the handle **69** is in the raised, first position, thereby preventing the locking mechanism **100** from interfering with the rotation of the handle **69** during use of the device **10**. When the handle **69** is locked in the lowered, second position by the locking mechanism **100**, the handle **69** lies contiguous with the cover assembly **40** and provides a substantially flat or planar top surface, as shown by Figures 6 and 7. This feature allows for the stacking of items on top of the device **10**. As shown in Figure 4, a bumper assembly **78** is attached to the bottom side **71** of the handle **69** that engages the top side **41** of the cover assembly **40** when the handle **69** is in the lowered, second position.

[0025] Referring back to Figure 1, in one embodiment, the drive assembly **50** includes a rod **79** to connect the handle **69** to the driving mechanism **50**. In the embodiment of Figure 4, the rod **79** has a first end **80** and a second end **81**. The rod **79** is attached to the rack **52** by positioning the pivot pin **68** through the first end **80** of the rod **79** and the channel **55** of the rack **52**. The second end **81** of the rod **79** is attached to the bottom side **71** of the handle **69** by a second hinge pin **75**, or other suitable fastening mechanism. When the handle **69** is in the lowered,

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second position, the rod 79 may be received in a groove (not shown) on the bottom side 71 of the handle 69.

[0026] In some embodiments of the present invention, a brake button 90 is provided on the top side 41 of the cover assembly 40, as shown by Figure 1. The brake button 90 is configured such that, when pressed, it actuates a brake assembly 91 configured to stop the rotational motion of the basket 30 and the lid 44. In the embodiment in Figure 5, the brake assembly 91 includes an upper brake pad 92, a lower brake pad 93, and a brake disc 94. The brake disc 94 is attached to the lid 44 via a hub structure 48 and a clutch assembly 64. When the brake assembly 91 is actuated, the brake disc 94 is squeezed between the upper brake pad 92 and the lower brake pad 93. The retarding force is then communicated to the lid 44 through the intermediate hub structure 48 and the corresponding hub receiving component 49, and the rotation of the lid 44 and basket 30 is stopped. The braking assembly 91 may be disposed completely within the cover assembly 40 and concealed by the cap 47. In other embodiments, the brake assembly can involve direct frictional engagement with the lid, for example.

[0027] In operation, the user of the device 10 places wet items, including, but not limited to, food, within the basket 30 and places the cover assembly 40 upon the top edge 23 of the bowl 20. The user then applies an external force to the first end 72 of the handle 69 in order to pivotally rotate the handle 69 in the direction of the cover assembly 40 about horizontal axis A'. In some embodiments, upon the application of the force to the handle 69, a spring assembly 76 compresses as the handle 69 rotates from the raised, first position to the lowered, second position. The first end 72 of the handle 69 travels in an arcuate motion as the external force is applied to the handle 69. The rotational motion of the handle 69 is translated to the rod 79, which displaces the rack 52. The internal teeth 56 of the rack 52 slideably engage the external teeth 58 of the pinion 57 as the rack 52 travels from the first end 66 to the second end 67 of the frame 65. The linear motion of the displaced rack 52 actuates the pinion 57, which in turn may actuate a sprag assembly 61 to engage a clutch assembly 64. This engagement of the sprag

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assembly **61** and the clutch assembly **64** causes rotation of the lid **44** and the basket **30** about vertical axis **A** with respect to the bowl **20**.

[0028] When the force is no longer applied, the spring assembly **76** expands and causes the handle **69** to rotate from the lowered, second position to the raised, first position. The sprag assembly **61** then disengages from the clutch assembly **64** as the rack **52** disengages from the pinion **57**. The lid **44** and basket **30** spin freely when the components of the driving mechanism **50** disengage. The rotation of the basket **30** causes any moisture attached to the wet items placed in the device **10** to be propelled by centrifugal force radially outward to collect within the bowl **20**. The user may repeatedly apply the external downward force to the handle **69** until the item is sufficiently dry. The user may actuate the brake assembly **91**, if present, by pressing the brake button **90**, which will retard the spinning of the basket **30** and the lid **44**. Further, in some embodiments, when the user is finished using the device **10**, the handle **69** may be rotated to the lowered, second position so that a locking mechanism **100**, such as a slidable latch **101**, can engage an opening **77** in the handle **69** and a slot **54** in the rack **52**.

[0029] It is therefore intended that the foregoing detailed description be regarded as illustrative rather than limiting, and that it be understood that it is the following claims, including all equivalents, that are intended to define the spirit and scope of this invention.

CLAIMS

1. A drive assembly for a drying device, said drive assembly comprising:
 - a driving mechanism mechanically coupled to a rotatable lid, wherein said lid is configured to mate with a rotatable basket having a plurality of apertures;
 - and
 - a handle pivotally attached to a cover assembly, said handle configured to actuate said driving mechanism upon rotation of said handle about an axis from a first position to a second position.
2. The drive assembly of claim 1, further comprising a rod connecting said driving mechanism to said handle.
3. The drive assembly of claim 1, wherein said driving mechanism comprises a rack and a pinion.
4. The drive assembly of claim 3, wherein said rack is configured to slideably engage said pinion upon rotation of said handle.
5. The drive assembly of claim 3, wherein said driving mechanism further comprises a clutch assembly coupled to said pinion and a sprag assembly configured such that said sprag assembly engages said clutch assembly when said handle rotates from said first position to said second position.
6. The drive assembly of claim 1, wherein a locking mechanism is positioned on a top side of said cover assembly and is configured to prevent said handle from moving from said second position to said first position.
7. The drive assembly of claim 6, wherein said locking mechanism releasably engages an opening in said handle when said handle is in said second position.
8. The drive assembly of claim 6, wherein said locking mechanism is configured to remain stationary when said handle is in said first position.
9. A drying device, comprising:
 - a bowl having a top edge and an opening defined by said top edge;

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a basket disposed within said bowl and rotatable about a first axis with respect to said bowl, said basket comprising an upper edge and a plurality of apertures;

a cover assembly removably configured to mate with said top edge of said bowl, said cover assembly comprising a top side, a bottom side, and a rotatable lid attached to said bottom side and configured to mate with said upper edge of said basket when said cover assembly is positioned upon said top edge of said bowl; and

a drive assembly associated with said cover assembly, said drive assembly comprising a driving mechanism mechanically coupled to said lid, said driving mechanism comprising a rack and a pinion engageable with said rack, and a handle pivotally attached to said cover assembly;

wherein said handle rotates about a second axis and moves said rack which rotates said pinion about said first axis imparting rotational energy to said lid and said basket.

10. The device of claim 9, wherein said driving assembly further comprises a rod connecting said handle to said driving mechanism.

11. The device of claim 9, wherein said driving mechanism further comprises a clutch assembly coupled to said pinion and a sprag assembly configured such that said sprag assembly engages said clutch assembly when said handle rotates from said first position to said second position.

12. The device of claim 9, wherein a locking mechanism is positioned on said top side of said cover assembly configured to prevent said handle from moving from said second position to said first position.

13. The device of claim 12, wherein said locking mechanism releasably engages an opening in said handle when said handle is in said second position;

14. The device of claim 12, wherein said locking mechanism is configured to remain stationary when said handle is in said first position.

15. A method for drying food, comprising the steps of:
providing a drying device, said device comprising:

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a container having a top edge and an opening defined by said top edge;

a basket disposed within said container, said basket having a plurality of apertures and an upper edge;

a cover assembly removably configured to mate with said top edge of said container, said cover assembly comprising a bottom side and a lid attached to said bottom side and configured to mate with said upper edge of said basket when said cover assembly is positioned upon said top edge of said container;

a drive assembly associated with said cover assembly, said drive assembly comprising a driving mechanism mechanically coupled to said rotatable lid, and a handle pivotally attached to said cover assembly;

placing food containing moisture within said basket;

positioning said cover assembly upon said top edge of said container such that said rotatable lid mates with said top edge of the basket;

actuating said handle to engage said driving mechanism to rotate said lid and said basket about an axis in order to remove said moisture from said food; and

removing said cover assembly such that said food may be removed from said basket.

16. The method of claim 15, wherein said driving assembly further comprises a rod connecting said handle to said driving mechanism.

17. The method of claim 15, wherein said driving mechanism further comprises a rack and a pinion engageable with said rack.

18. The method of claim 17, wherein the step of actuating comprises pivotally rotating said handle about a second axis in the direction of the cover assembly and moving said rack which rotates said pinion.

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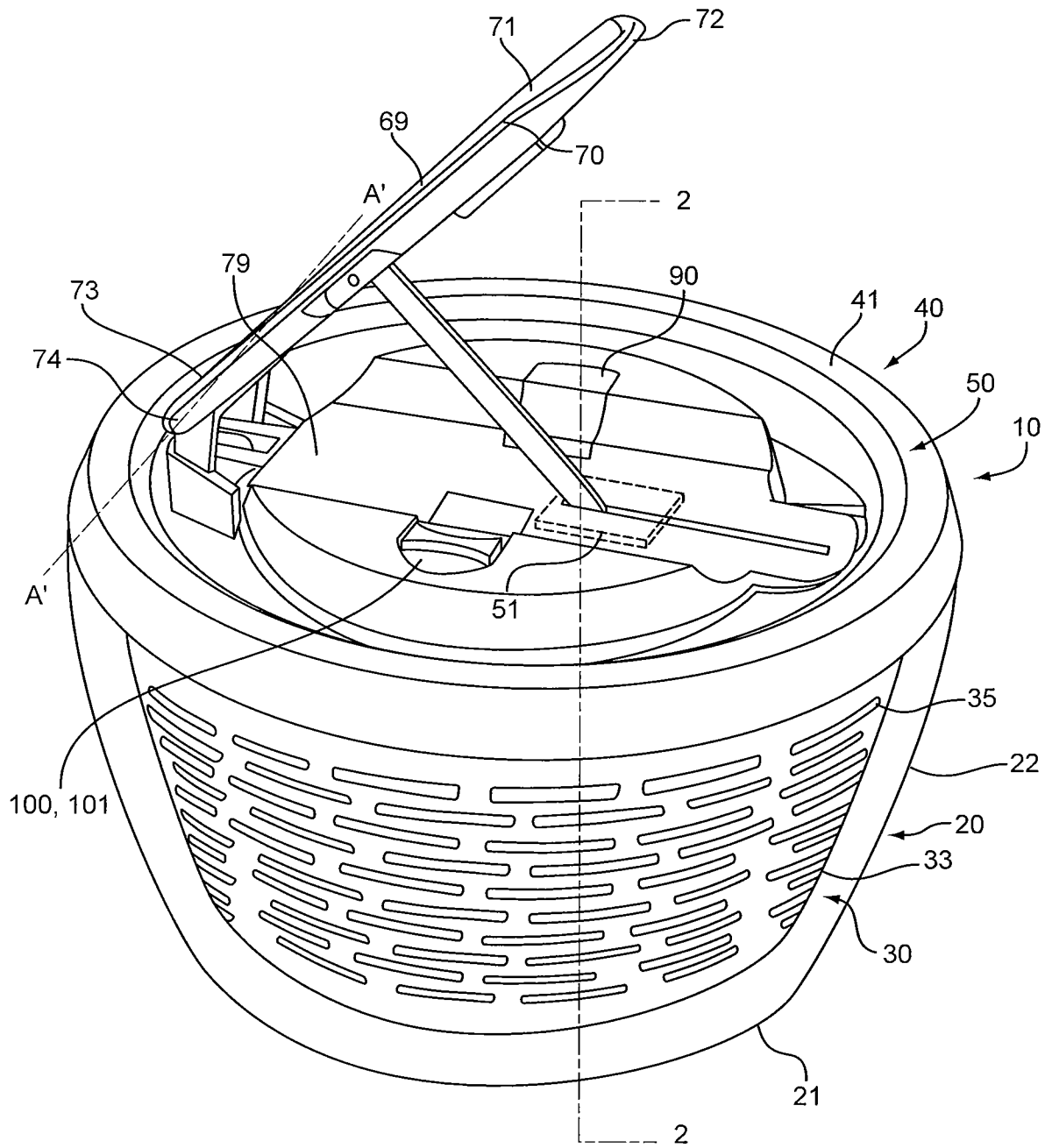


Figure 1

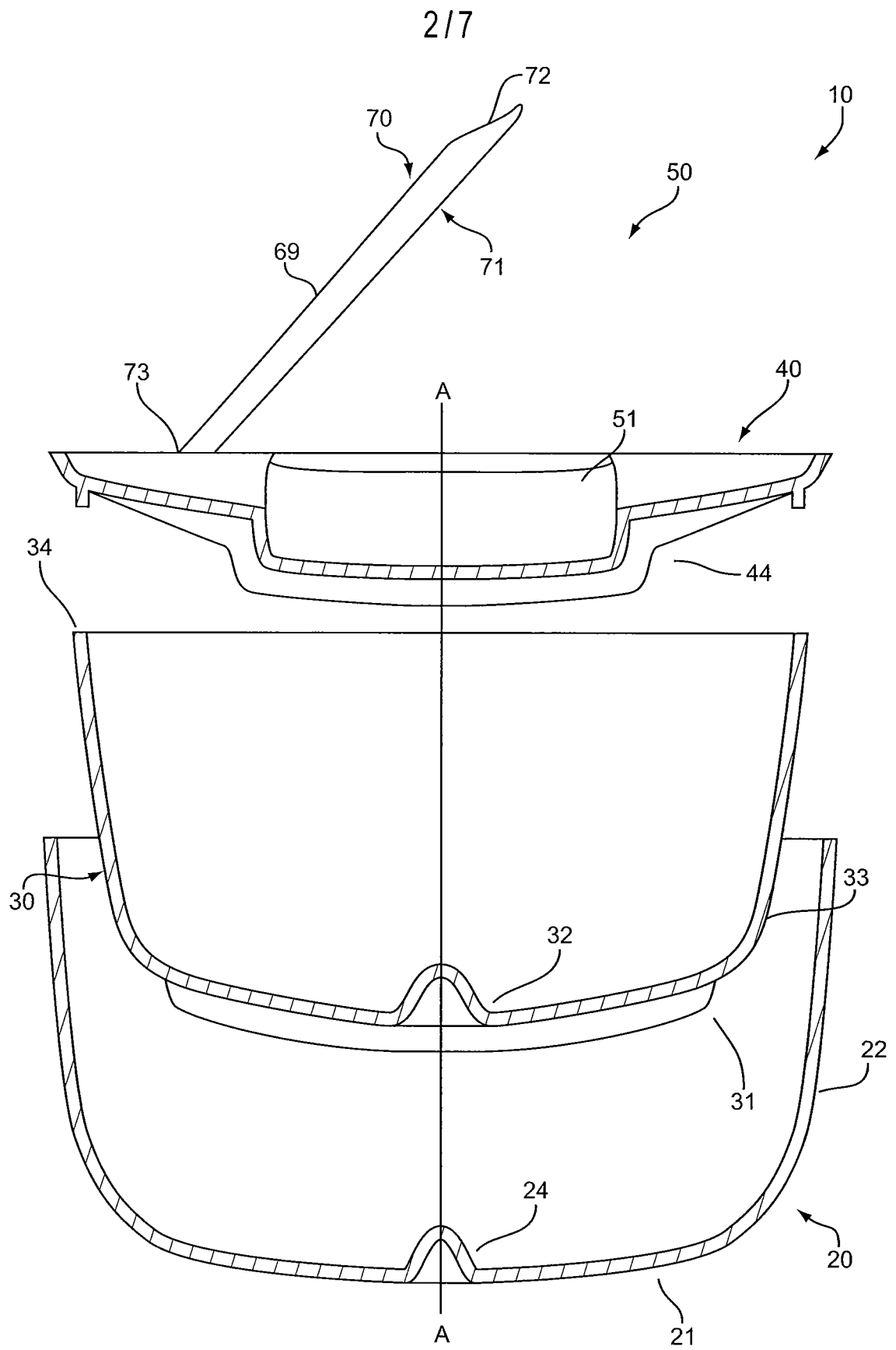


Figure 2

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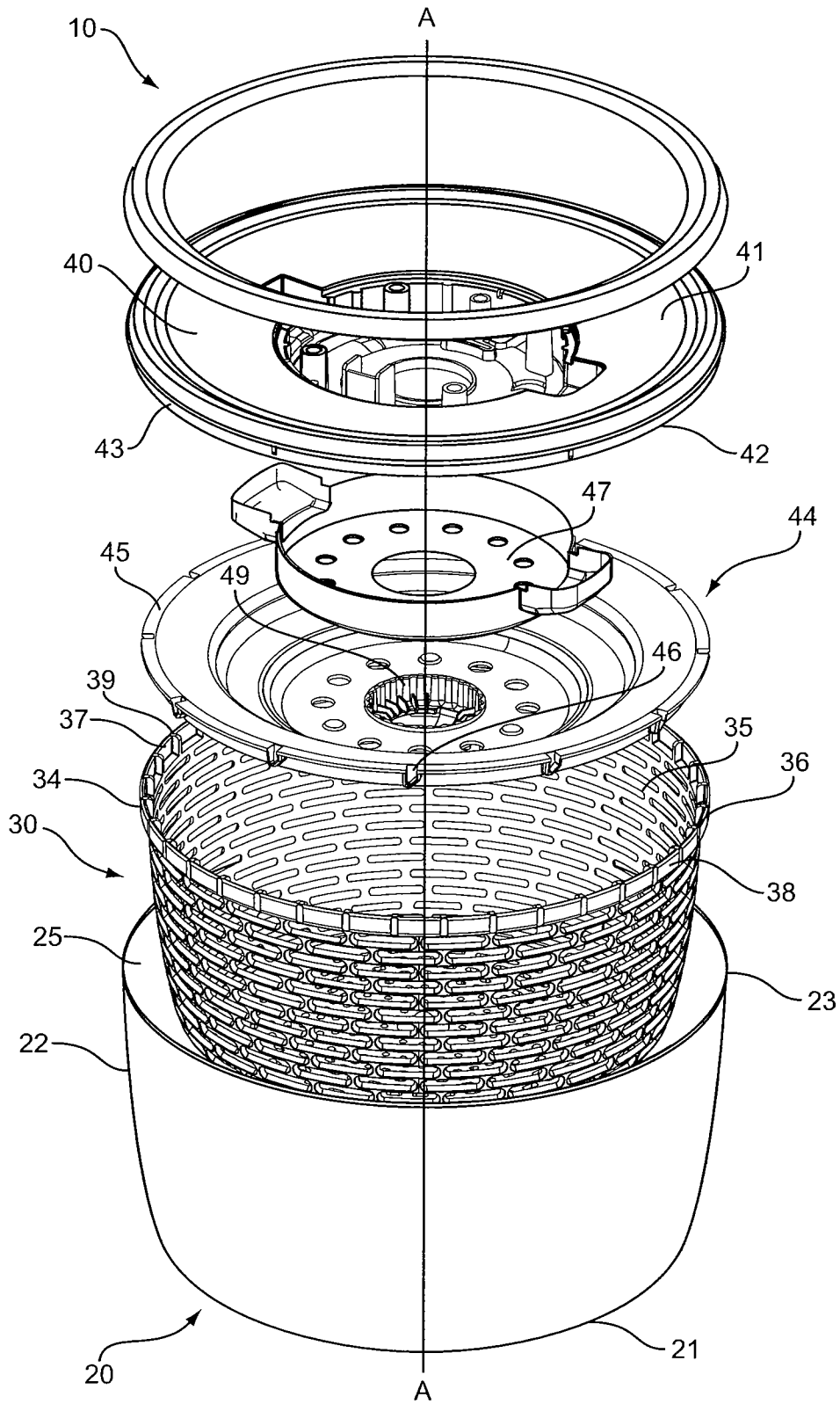


Figure 3

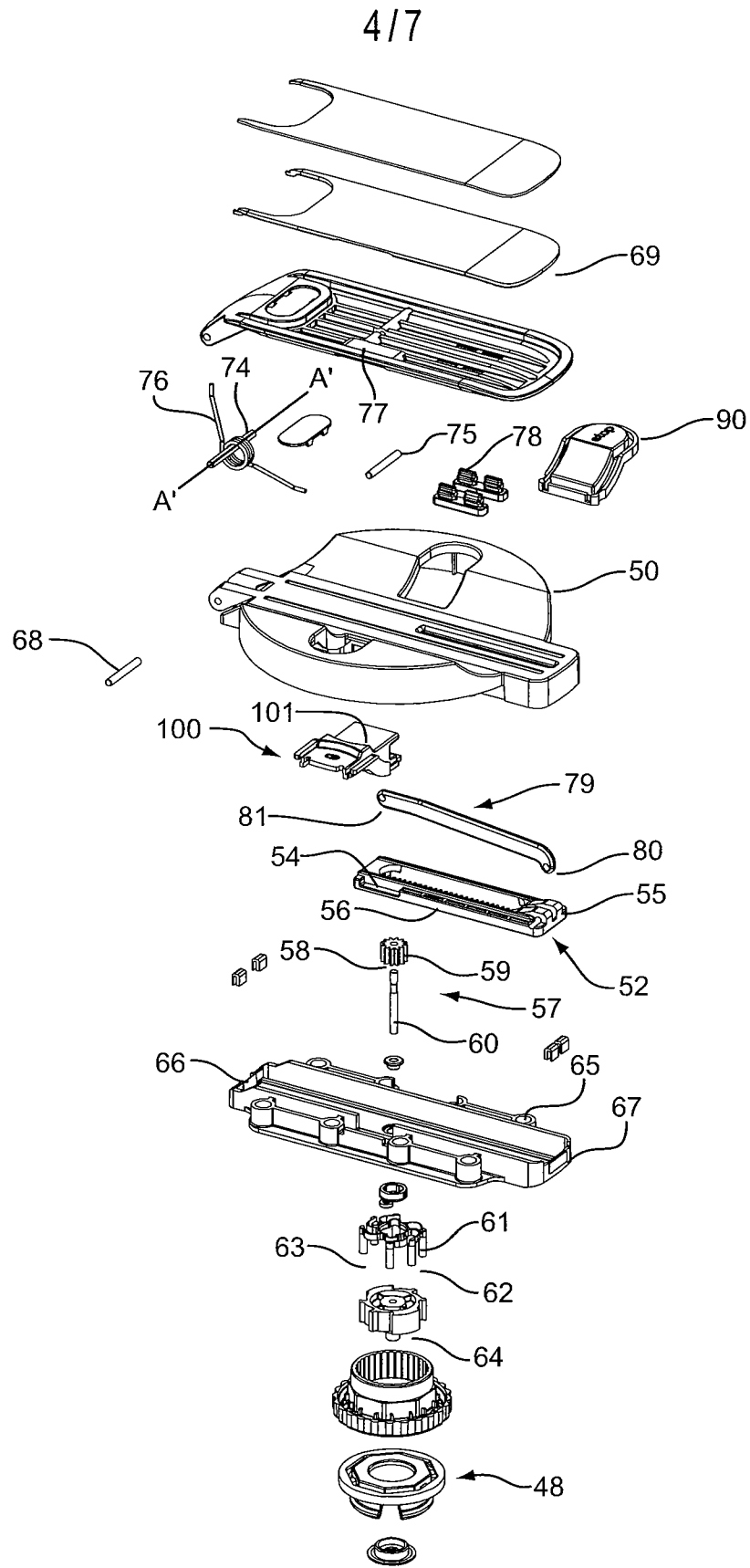


Figure 4

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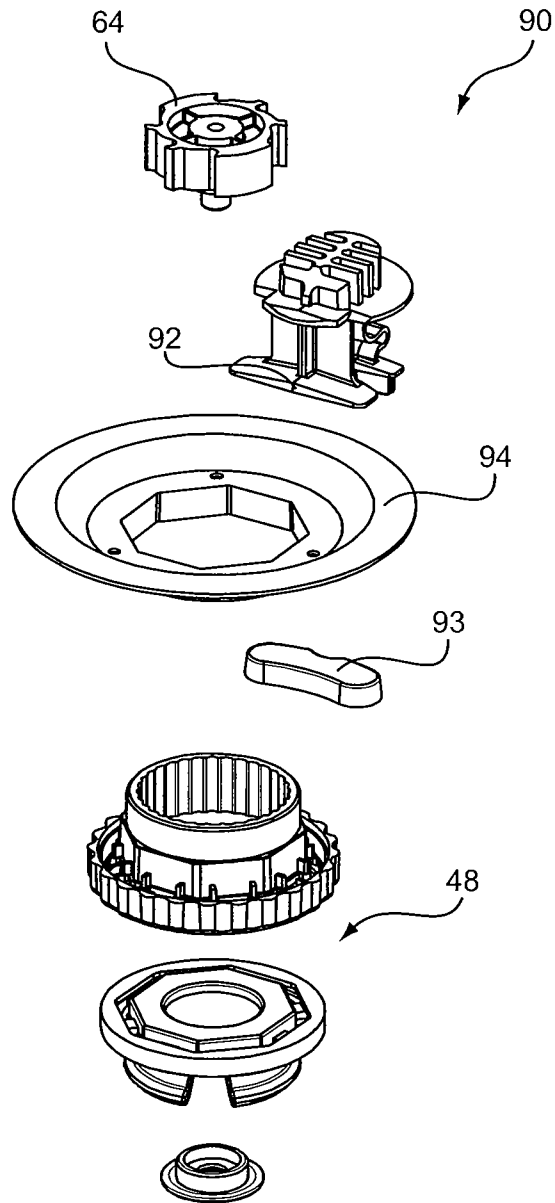


Figure 5

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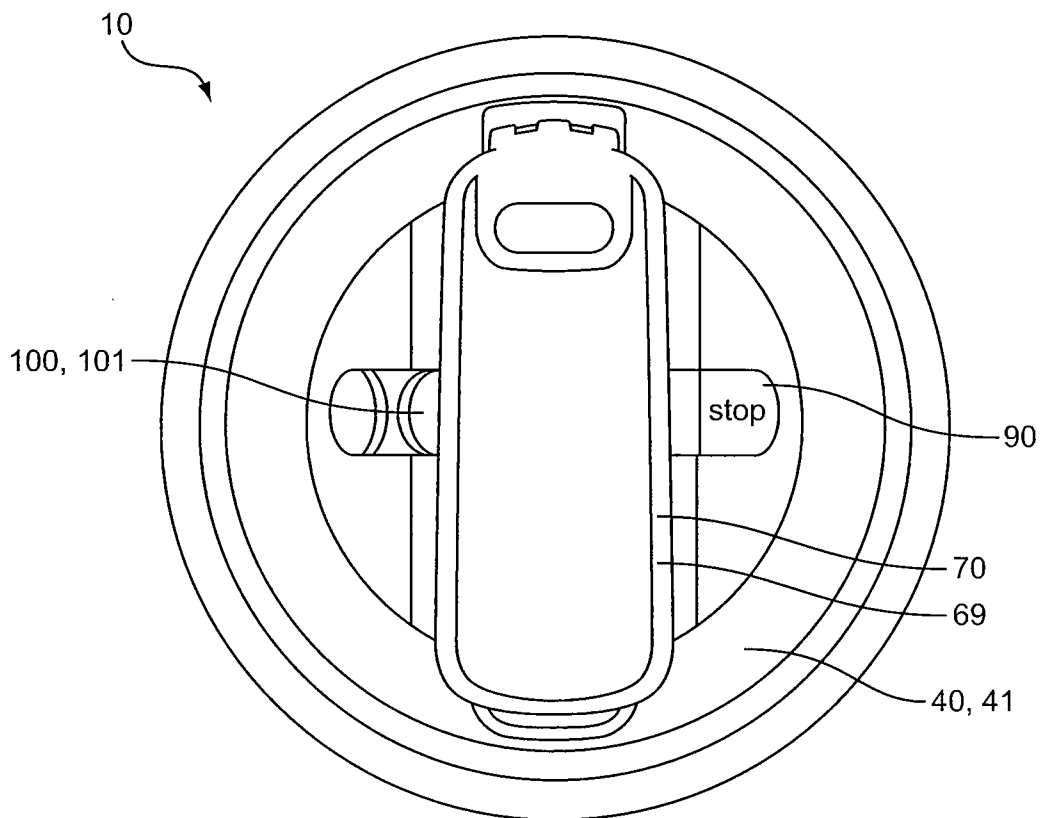


Figure 6

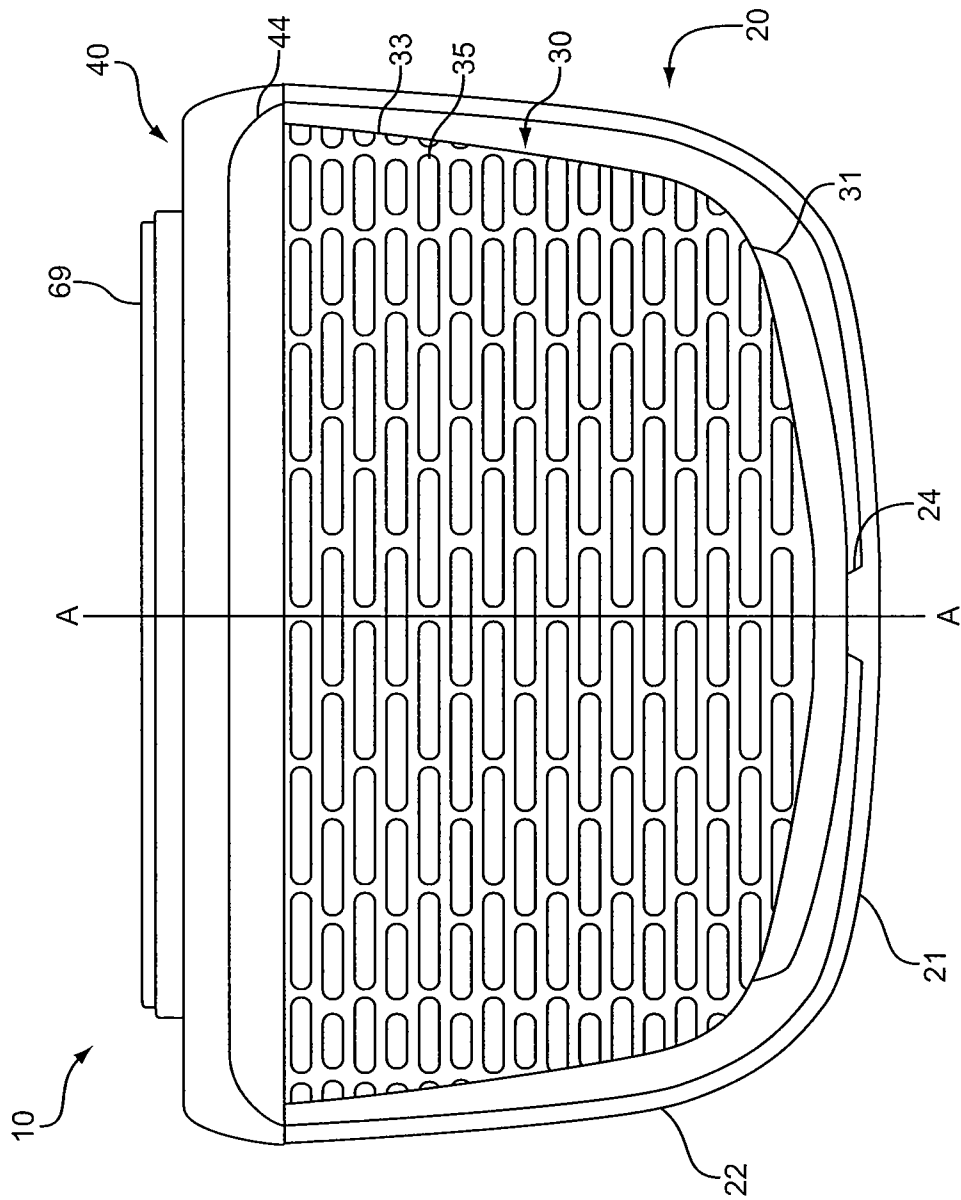


Figure 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/81765

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A23B 4/03 (2008.04)

USPC - 99/495

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)

USPC: 99/495

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

USPC: 477, 479, 511; 34/58, 312 (text search - see terms below)

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

PubWEST(USPT, PGPB, EPAB, JPAB); Google Patents; Google.

Search Terms: drying, spinning, rotating, device, assembly, system, food, salad, lettuce, vegetable, drive, mechanism, means, bowl, container, basket, lid, cover, handle, lever, arm, lock, pivot, folding, pumping.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ----- Y	US 5,865,109 A (BULL) 02 February 1999 (02.02.1999), FIG. 1-7, col 1, ln 9-19, 45-56, col 2, ln 33-67, col 3, ln 1-19, and abstract	1, 3-5, 9, 11, 15, 17 2, 6-8, 10, 12-14, 16, 18
Y	US 6,018,883 A (MULHAUSER) 01 February 2000 (01.02.2000), FIG. 2, 3, 5, 6, 11, 12, 13, and col 5, ln 45-57	6-8, 12-14
Y	US 2007/0137504 A1 (WAN et al.) 21 June 2007 (21.06.2007), FIG. 17, 18B, 21, 23C, and para [0105, 0108, 0112]	2, 10, 16, 18
Y	US 4,052,092 A (BERGEN) 04 October 1977 (04.10.1977), FIG. 1, 3, 5, 7, col 5, ln 28-36, 48-62, col 6, ln 41-64, col 7, ln 1-12, and col 8, ln 51-58	2, 10, 16, 18
A	US 2006/0144257 A1 (CHENG et al.) 06 July 2006 (06.07.2006), entire document	1, 9, 15

Further documents are listed in the continuation of Box C.

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