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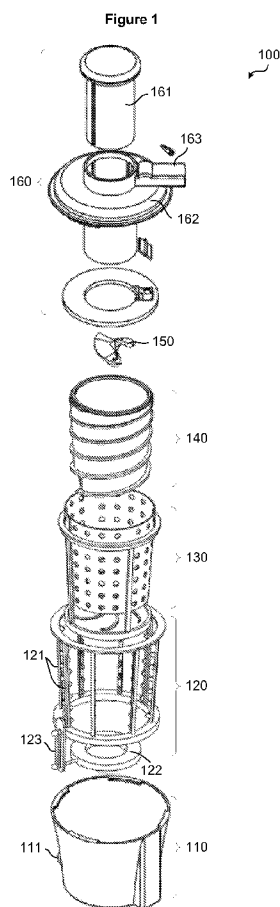
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(54) Title: JUICE EXTRACTION DEVICE

(57) Abstract: A juice extraction device (100) is provided. The juice extraction device (100) comprises: a screw (140), rotatable about a rotation axis; a mesh filter (130), encompassing the screw (140); at least one scraper (121, 221), provided around the mesh filter (130); and a housing (110), accommodating the screw (140), the mesh filter and the scraper (121, 221); the scraper is capable of revolving reciprocally around the rotation axis by starting to revolve in a first direction from a starting point, revolve backwardly in an opposite second direction after passing a predetermined angle, and start again to revolve in said first direction after returning to the starting point. The juice extraction device can remove the residuals adhered on the scrapers.





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JUICE EXTRACTION DEVICE

Field of the Invention

This invention relates to a juice extraction device, such as a slow juicer, a puree maker
5 and the like, for extracting juice from food material. In particular, this invention relates to a
juice extraction device comprising scraper(s) for scraping a mesh filter of the juice
extraction device.

Background of the Invention

10 Juice extraction device is a kind of home appliance for extracting juice from food
materials, such as fruit, herbs, leafy greens, vegetable and the like. For masticating or
trituration juicers, the speed is relatively slow in the region of lower hundreds RPM. Some
of these so called slow juicers are known. Typically, such slow juicers include a juice
extraction screw and a mesh filter encompassing the juice extraction screw, and a work
15 chamber is defined as the cavity spacing between the juice extraction screw and the mesh
filter. A housing is also provided to encompass the mesh filter. The juice extraction screw
typically has a juice extraction spiral rib running from the front to the end of the juice
extraction screw, and defines a plurality of spiral gaps along the length of the juice
extraction screw. Food material, from which juice is to be extracted, is crushed, pressed
20 and then pushed out of the work chamber, during which the food material is pressed
against the mesh filter to extract juice. The extracted juice flows through the filter openings,
and is finally discharged from a juice exit of the housing.

In particular, citrus fruits such as orange, lemon, lime and grape have a common
25 characteristic that the fruit juice is confined by pulp cells (membranous content of the fruit
endocarp, or technically called juice vesicles). In simple terms, the vesicles contain the
juice of the fruit. The pulp is usually removed from the juice by the use of citrus reamer or
citrus juicer with which the membranes are pressed against a ridged cone to release the
juice within. The citrus fruit juice will freely flow through arrays of slit openings or reams
30 where juice is allowed to flow through while the membranes are blocked by the slit filter
openings or by these reams. Citrus press or reamer may not be applicable to fruit such as
pears, apples or various fruits where the juice is fused with the fleshy hypanthium. In
contrast, slow juicers can work on such types of fruits relatively nicely because the
compression screw presses the fleshy hypanthium against a mesh filter where the juice is
35 separated from the fruit and flow through the filter openings while the fiber tissues are
removed by the helical compression screw from the inside wall of the mesh filter. Slow
juicer has different sizes filter openings to effectively allowing the juice to flow through

effectively while keeping the fiber tissues confined within the inside wall of the mesh filter. A similar scenario applies to extracting vegetable juice with which the juice is fused with the leaves fiber.

- 5 It is manifest that slow juicer can extract juice from a wide variety of fruits and vegetables, and therefore the mesh filter has to handle all types of juices that mix with a wide variety fiber tissues. Depending on the types of fruits or vegetables juice being extracted, general speaking the extracted juice flow out of the filter openings is viscous juice-containing fluid, fiber tissues and air bubbles entrained during the extraction process.
- 10 Fiber tissues with all sizes and shapes tend to adhere to the walls with the filter openings and block or limit the juice flow. In existing slow juicers like those described in CN10376399A and US8091473B2, sweepers such as brushes and cleaning blades are provided and rotated continuously along with the juice extraction screw to clean an outer surface of the mesh filter. Such continuous unidirectional sweeping is only able to clean the
- 15 outer surface of the mesh filter, but may not be able to effectively resolve the blockage of the juice flow within the filter openings, and may not be able to remove residuals that adhered on the outer surface of the mesh filter, in particular, those areas surrounding the openings.
- 20 Therefore, it is desirable to provide a juice extraction device in which both of the outer surface and the filter openings of the mesh filter could be effectively cleaned.

Summary of the Invention

- Accordingly, this invention provides a juice extraction device (100) that includes
- 25
- a screw (140) rotatable about a rotation axis;
 - a mesh filter encompassing the screw;
 - at least one scraper (121, 221) provided around the mesh filter; and
 - a housing (110) accommodating the screw, the mesh filter and the scraper,
- in which the scraper is capable of revolving reciprocally around the rotation axis by
- 30 starting to revolve in a first direction from a starting point, revolve backwardly in an opposite second direction after passing a predetermined angle, and start again to revolve in said first direction after returning to the starting point.

- Preferably, the mesh filter has a plurality of openings (132, 232) from which juice flows
- 35 out, the at least one scraper has a plurality of protrusions (126, 226), and as the scraper revolves, the protrusions of the scraper are respectively inserted into and drawn from the openings of the mesh filter so as to clean the openings. More preferably, the plurality of

openings are arranged in rows along the rotation axis. Even preferably, there are equal intervals between the rows, while a plurality of scrapers are provided along the rotation axis with the equal intervals between the scrapers. The plurality of openings could be arranged in M rows, and N scrapers are provided, and wherein M and N are integers, in which M is preferred to be an even integer, and M/N equals to an integer, or more specifically $M/N=2$. Alternatively, M could be an odd integer, and M/N equals to an integer, or more specifically $M/N=3$. In these specific embodiments in which the plurality of openings could be arranged in M rows, and N scrapers are provided, the predetermined angle equals to $360^\circ/N$.

Preferably, the scraper is a flat blade capable of scraping an outer circumference of the mesh filter.

Preferably, the scraper has a sweeping portion (227) capable of scraping an inner circumference of the housing.

Preferably, wherein the scraper is made of elastic material. More preferably, the elastic material includes plastic or metal.

Brief Description of the Drawings

Preferred embodiments of the present invention will now be explained by way of example and with reference to the accompanying drawings in which:

Figure 1 is an exploded view of an embodiment of the exemplary juice extraction device of this invention;

Figure 2 is an exploded partial side view of the exemplary juice extraction device of Figure 1;

Figure 3 is an exploded partial side view of the exemplary juice extraction device of Figure 1, showing the food material from which the juice is being extracted;

Figure 4 is a perspective view of the exemplary juice extraction device of Figure 1, in which a part of a mesh filter is cut off;

Figure 5 is an exploded view of another embodiment of the exemplary juice extraction device of this invention;

Figure 6A shows an assembled view of the exemplary juice extraction device in Figure 5, in which a part of the assembly is cut off for the purpose of clearer illustration;

Figure 6B shows an enlarged view of the portion in the circular region in Figure 6A;

Figures 7A to 7F show the process as to how the scrapers perform scraping;

Figure 8 is a side view of another embodiment of the exemplary juice extraction

device of this invention; and

Figure 9 schematically shows plan views of an embodiment of a driving mechanism of the scrapers.

5 **Detailed Description of the Preferred Embodiments**

The present invention is now described by way of examples with reference to the figures. Objects, features, and aspects of the present invention are disclosed in or are apparent from the following description. It is to be understood by an ordinary person skilled in the art that the present discussion is a description of exemplary embodiments only, and is not intended as limiting the broader aspects of the present invention, which broader aspects are embodied in the exemplary constructions. **List 1** shows the parts and corresponding reference numerals in the figures.

List 1

Reference numeral	Part name
100	Juice extraction device
110	Housing
111	Juice exit
120, 220, 420	Scraping assembly
121, 221	Scraper
122	Driving mechanism
123	Linkage
124	Lower frame
125	Upper frame
126, 226	Protrusion
130	Mesh filter
131, 231	Outer surface of the mesh filter
132, 232	Filter opening
140	Juice extraction screw
141	Spiral rib
142	Rotation axis of the juice extraction screw
150	Food material cutter
160	Upper assembly of the juice extraction device
161	Push rod
162	Housing lid
163	Residue exit
170	Food material from which the juice is being extracted
180	Juice
227	Scraping blade
232A, 232B, 232C	Row in which the filter openings are arranged
327	Handle
491	Driving gear

Reference numeral	Part name
492	Driven gear
493	Rocker
494	Guiding slot
495	Slider
R, R'	Direction of rotation

An embodiment of the exemplary juice extraction device of this invention is shown in **Figures 1 to 4.**

5 **Figure 1** shows an exploded view of the juice extraction device 100. The juice extraction device 100 is in the so-called vertical configuration, which comprises an upper assembly 160, a hollow juice extraction screw 140 rotatable about its rotation axis 142 (see **Figure 2**), a food material cutter 150 provided at the bottom of the juice extraction screw 140; a mesh filter 130 encompassing the juice extraction screw 140; a scraping assembly 120 for
10 scraping the mesh filter 130; and a housing 110 accommodating all of the above components. Scraping assembly rotates reciprocally about juice extraction screw 140 by starting to revolve in a first direction from a starting point, revolve backwardly in an opposite second direction after passing a predetermined angle, and start again to revolve in said first direction after returning to the starting point. The housing 110 has a juice exit
15 111 (more clearly shown in **Figures 5, 6A and 7A-7F**) at the bottom thereof from which juice extracted from the food material exits. The upper assembly 160 includes a push rod 161, a housing lid 162 and a residue exit 163. It should be noted that although a hollow juice extraction screw 140 is shown in this embodiment, the scraping mechanism of this invention would also work on non-hollow juice extraction screw.

20

As shown in **Figures 1 and 2**, the scraping assembly 120 comprises a plurality of scrapers 121, preferably provided in N rows along a direction of the rotation axis 142 of the juice extraction screw 140 with equal intervals between every two adjacent rows of scrapers 121. In this particular embodiment, 8 rows of scrapers 121 are mounted between
25 an upper circular frame 125 and a lower circular frame 124, i.e., $N=8$. The intervals between every two adjacent rows of scrapers 121 are preferably the same, each of which corresponds to 45° , that is, $360^\circ/N$ with respect to the rotation axis 142 of the juice extraction screw 140, but the angle can be any degree as desired. In other words, it is preferred that the predetermined angle mentioned above equals to $360^\circ/N$, where N is the
30 number of rows of scrapers 121. The scraping assembly 120 further comprises a driving mechanism 122 to provide a driving force (not completely shown); and a rigid linkage 123 that connects the driving mechanism 122 and the frame 124. Thus, rotation can be

transmitted from the driving mechanism 122 to the frame 124 so as to bring the scrapers 121 to revolve around the rotation axis 142 of the juice extraction screw 140. Each row of the scrapers 121 has a plurality of protrusions 126. As the scrapers 121 revolve, the protrusions 126 could be inserted and drawn from the filter openings 132 of the mesh filter 130, which will be described later), while the straight portions between the protrusions 126 of the scrapers 121 pressing against the outer surface 131 of the mesh filter 130. Accordingly, both of the outer surface 131 and the filter openings 132 of the mesh filter 130 could be scrapped.

As shown in **Figures 2 and 3**, the juice extraction screw 140 has a spiral rib 141 on the outer surface thereof and is rotatable about its rotation axis 142. As the juice extraction screw 140 rotates, food material 170 is pushed from a lower end towards an upper end of the juice extraction screw 140 along the spiral rib 141, crushed and pressed between the spiral gaps formed by the spiral rib 141 and the inner side of the mesh filter 130. Thus, juice is extracted from the food material 170.

As shown in **Figures 2 and 4**, the mesh filter 130 has a plurality of filter openings 132 to allow the extracted juice 180 to pass. The plurality of filter openings 132 are arranged in M rows along a direction of the rotation axis 142 of the juice extraction screw 140 preferably with equal intervals between the rows. In this particular embodiment, the plurality of filter openings 132 are arranged in 16 rows, i.e., $M=16$. The intervals between every two adjacent rows of filter opening 132 are preferably the same, each of which corresponds to a central angle of 22.5° (i.e., $360^\circ/M$) with respect to the rotation axis 142 of the juice extraction screw 140.

Although it is preferred that the juice extraction screw 140 is in general cylindrical shape due to simplicity, it is not necessarily so and other shapes can be used, such as wedge shape. Naturally, if the juice extraction screw 140 is of shape different from cylindrical shape, the shapes of the housing 110, the mesh filter 130, etc have to be adjusted accordingly. At the bottom of housing 110, an optional driver housing holding a driver (not shown in the figures) may be provided if desired, which can also be used to provide support to the housing 110 on a flat surface, like table top. The drivers of the scraping assembly 120 and the juice extraction screw 140 are optional, both of which can be motor driven or hand driven.

When extracting juice from food material 170, the food material 170 is put into a sleeve through the center of the housing lid 162, pressed downwardly by the push rod 161, cut by

the cutter 150 at the bottom of the juice extraction screw 140, crushed and pushed from a lower end towards an upper end of the juice extraction screw 140 along the spiral rib 141, and finally discharged from the residue exit 163. Meanwhile, the extracted juice 180 flows through the filter openings 132 and finally exits from the juice exit 111. The scrapers 121 are rotated by the driving mechanism 122 via the linkage 123 so that the outer surface 131 and the filter openings 132 of the mesh filter 130 could be scrapped.

This invention distinguishes from the prior art mainly in the following:

- (i) The scrapers 121 could revolve back and forth, that is, reciprocally or circumferentially oscillating, about the rotation axis 142 by starting to revolve in a first direction from a starting point, revolve backwardly in an opposite second direction after passing a predetermined angle, and start again to revolve in said first direction after returning to the starting point, instead of revolving continuously in one direction as the juice extraction screw 140 rotates; and
- (ii) The protrusions 126 may be inserted into and drawn from the filter openings 132.

By adopting the above aspect (i), alternative deformation and vibration are applied to the scrapers 121 as they revolving, so that it could help to remove the residuals adhered on the scrapers 121 themselves. By adopting the above aspect (ii), it could help to resolve the blockage of the juice flow within the filter openings 132. Hereinafter, the scraping assembly 120 and the mesh filter 130 will be described in detail.

In order to achieve the above aspect (i), the driving mechanism 122 may be a stepping motor, a swing motor or the like, for which the rotation speed and rotation amplitude can be controlled by a control unit (not shown in the figures). Besides, the linkage 123 may be substituted by a gear set. Further, the rotation speed and rotation amplitude of the scrapers 121 can be adjusted by adjusting the transmission ratio between the driving mechanism 122 and the lower frame 124 on which the scrapers 121 are mounted.

As an option of the driving mechanism 122, the plan views of a rocker-slider mechanism is shown in **Figure 9**. The rocker-slider mechanism includes a driving gear 491 mounted on the rotation axis 142 of the juice extraction screw 140; a driven gear 492 engaged with the driving gearing 491; a rocker 493, one end of which is pivotally positioned at the center of the driving gearing 491, while the other end of the rocker 493 is connected to a scraping assembly 420 on which the plurality of scrapers 121 are mounted; a guiding slot 494 provided in the rocker 493 and along the length of the rocker 493; and a slider 495 provided on the driven gear 492 and positioned apart from center of the driven

gear 492. The slider 495 is inserted in and slidable along the guiding slot 494.

The plan views (a)-(h) in **Figure 9** schematically show how the rocker-slider mechanism works. Specifically, as the driving gear 491 rotates, the rocker 493 oscillates
5 about the center of the driving gearing 491, and thus the scraping assembly 420 is rotated back and forth. The rotation speed of the scraping assembly 420 can be controlled by adjusting the transmission ratio between the driving gear 491 and the driven gear 492, while the rotation amplitude of the scraping assembly 420 can be controlled by adjusting the distance between the slider 495 and the center of the driven gear 492. Such a
10 rocker-slider mechanism is advantageous in that it does not require any additional driver (e.g., a stepping motor or a swing motor) to rotate the scraping assembly 420.

In order to achieve the above aspect (ii), the protrusions 126 should have elasticity so that they could be deformed as passing the region between two adjacent rows of the filter
15 openings 132, and they could restore their protruding shape when they reach the filter openings 132. For example, as shown in **Figures 1 and 2**, the protrusions 126 are configured in tongue-shaped pieces, picks or the like. Preferably, the protrusions 126 are made of elastic materials like elastic plastic or metal. Accordingly, as the protrusions 126 passing the region between two adjacent rows of the filter openings 132, the protrusions
20 126 are bent against the outer surface 131 of the mesh filter 130 toward a direction opposite to the direction in which the protrusions 126 are moving. When the protrusions 126 reach the filter openings 132, the protrusions 126 are unbent so as to insert into the filter openings 132.

Again referring to **Figures 1 and 2**, as mentioned above, 8 rows of scrapers 121 and
25 16 rows of filter openings 132 are provided, with equal intervals between every two adjacent rows of scrapers 121, and between every two adjacent rows of filter openings 132. When the mesh filter 130 requires scraping, for example, all the 8 rows of scrapers are rotated by the driving mechanism 122 to revolve in a first direction from a starting point,
30 revolve backwardly in an opposite second direction after passing a central angle of 45°, and start again to revolve in said first direction after returning to the starting point. In this way, it could be guaranteed that all of the filter openings 132 and the outer surface 131 of the mesh filter 130 are scrapped.

35 It is to be understood that there is no inherent relation or limitation between the amount M of the rows of the filter openings 132 and the amount N of the scrapers 121. However, it is preferred that M/N equals to an integer, such as 1, 2, 3 and the like. In a case

that M/N equals to an integer, each row of the scrapers 121 is assigned with the same amount of rows of filter openings 132 to clean. If M/N does not equals to an integer, it means that the amounts of rows of filter openings 132 to be scrapped by every row of scrapers 121 is different from one to the other, which may result in difficulties in installation, and/or different wear speed of the scrapers 121.

More preferably, $M/N=2$ when M is an even integer, and $M/N=3$ when M is an odd integer. For example, in the embodiment shown in **Figures 1 and 2**, $M=16$, $N=8$, $M/N=2$. Obviously, if $M=24$, N may also be 8, i.e., $M/N=3$. Moreover, if M is an odd integer 21, N may be 7, i.e., $M/N=3$. For example, in a case of $M=24$ and $N=6$, all of the 6 rows of scrapers 121 start to revolve in a first direction from a starting point, revolve backwardly in an opposite second direction after passing 60° , that is, $360^\circ/6$, and start again to revolve in said first direction after returning to the starting point. In this way, it could be guaranteed that all of the filter openings 132 and the outer surface 131 of the mesh filter 130 are scrapped. Also in this case, it can be realized that each row of the scrapers 121 cleans 4 rows of the filter openings 132.

Figure 5 is an exploded view of another embodiment of the exemplary juice extraction device of this invention. **Figure 6A** shows an assembled view of the exemplary juice extraction device in **Figure 5**, in which a part of the assembly is cut off. **Figure 6B** shows an enlarged view of the portion in the circular region in **Figure 6A**. The embodiment in **Figures 5 to Figure 6B** differs from the embodiment in **Figures 1 and 2** mainly in the configuration of the scraping assembly 220, in which 6 scrapers 221 are provided (i.e., $N=6$). Besides, a sweeping portion 227 is provided on an outer side of the scraping assembly 220 to clean the inner wall of the housing 110. The scrapers 221 and the mesh filter are respectively separated into an upper portion and a lower portion. Other configurations of this embodiment are similar to those in **Figures 1 and 2**. Thus, detailed descriptions about these configurations are omitted for simplicity.

Figures 7A to 7F show the process as to how the scrapers 221 perform scraping, in which a part of the juice extraction device is cut off for the purpose of clearer illustration. Although scrapers 221 are shown in **Figures 7A to 7F**, a skilled person could readily understand that the same mechanism is applicable to scrapers 121 in previous embodiment. Specifically, as shown in **Figure 7A**, the scraper 221 begins to revolve in a direction R towards a row 232B of the filter openings, and the protrusions 226 of the scraper 221 have inserted into the corresponding filter openings 232 in a row 232A. **Figure 7B** shows a state that the scraper 221 is passing a region between the row 232A and the

row 232B. **Figure 7C** shows a state that the scraper 221 has reached the row 232B, and the protrusions 226 have inserted into the corresponding filter openings. The scraper 221 keeps on revolving towards the next row 232C of filter openings, and **Figure 7D** shows a state that the scraper 221 is passing a region between the row 232B and the row 232C.

5 The scraper 221 stops until it has passed 60° , that is, $360^\circ/6$ in this embodiment, from its starting point. Then, the scraper 221 starts to revolve back towards its starting point in a direction R' opposite to the direction R . **Figures 7E and 7F** show the states of the scraper 221 during its returning. After the scraper 221 returning to its starting point, it starts to revolve in the direction R again. In this way, the scrapers 221 revolve reciprocally around
10 the rotation axis, and thus both of the outer surface 231 and the filter openings 232 of the mesh filter are effectively scrapped.

Figure 8 is a side view of another embodiment of the exemplary juice extraction device of this invention. As mentioned above, the scrapers 121 may be rotated by hand. As
15 schematically shown in **Figure 8**, a handle 327 of the bottom frame 124 is extended out of the housing 110, and could be rotated by hand. It can be expected that a guiding slot (not shown in **Figure 8**) is provided in the housing 110, through which the handle 327 passes. The rotation amplitude of the handle 327 could be limited by a central angle of the guiding slot with respect to the rotation axis 142, while the rotation speed is controlled by hand.
20 **Figure 8** shows a state that the handle 327 is provided at a lower part of the housing 110. Alternatively, the handle 327 may be provided at an upper part of the housing 110, in which the handle 327 is connected to the upper frame 125.

The present invention provides a reciprocating/oscillating fashion of motion whereby
25 section-wise rather than uni-directional continuous scraping process is possible. This section-wise motion option enables a variety of performance enhancement devices could be installed to the slow juicers, and in particular, those enhancement devices form an obstruction where continuous scraping is not possible.

30 While the preferred embodiment of the present invention has been described in detail by the examples, it is apparent that modifications and adaptations of the present invention will occur to those skilled in the art. Furthermore, the embodiments of the present invention shall not be interpreted to be restricted by the examples or figures only. For example, it is to be understood that "food material" herein may refer to fruit, herbs, leafy greens, vegetable
35 and the like, or their combination formed by more than one food material. It is to be expressly understood, however, that such modifications and adaptations are within the scope of the present invention, as set forth in the following claims. For instance, individual

features illustrated or described as part of one embodiment can be used on another embodiment in any combination desired to yield a still further embodiment. Thus, it is intended that the present invention cover such modifications and variations as come within the scope of the claims and their equivalents.

WHAT IS CLAIMED IS:

1. A juice extraction device (100) including:
a screw (140) rotatable about a rotation axis;
5 a mesh filter encompassing the screw;
at least one scraper(121, 221) provided around the mesh filter; and
a housing(110) accommodating the screw, the mesh filter and the scraper,
characterized in that the scraper is capable of revolving reciprocally around the
rotation axis by starting to revolve in a first direction from a starting point, revolve
10 backwardly in an opposite second direction after passing a predetermined angle, and start
again to revolve in said first direction after returning to the starting point.

2. The juice extraction device of claim 1,
wherein the mesh filter has a plurality of openings (132, 232) from which juice flows
15 out,
wherein the at least one scraper has a plurality of protrusions (126, 226), and
wherein, as the scraper revolves, the protrusions of the scraper are respectively
inserted into and drawn from the openings of the mesh filter so as to clean the openings.

20 3. The juice extraction device of claim 2,
wherein the plurality of openings are arranged in rows along the rotation axis.

4. The juice extraction device of claim 3, wherein there are equal intervals between the
rows, while a plurality of scrapers are provided along the rotation axis with the equal
25 intervals between the scrapers.

5. The juice extraction device of claim 4,
wherein the plurality of openings are arranged in M rows, and N scrapers are provided,
and wherein M and N are integers.

30 6. The juice extraction device of claim 5, wherein M is an even integer, and M/N equals
to an integer.

7. The juice extraction device of claim 6, wherein $M/N=2$.

35 8. The juice extraction device of claim 4,
wherein the plurality of openings are arranged in M rows, and N scrapers are provided,

and

wherein M is an odd integer, and M/N equals to an integer.

9. The juice extraction device of claim 8, wherein $M/N=3$.

5

10. The juice extraction device of any one of claims 4 to 9,
wherein the predetermined angle equals to $360^\circ/N$.

11. The juice extraction device of claim 1,

10 wherein the scraper is a flat blade capable of scraping an outer circumference of the
mesh filter.

12. The juice extraction device of claim 1,

15 wherein the scraper has a sweeping portion (227) capable of scraping an inner
circumference of the housing.

13. The juice extraction device of claim 1,

wherein the scraper is made of elastic material.

20 14. The juice extraction device of claim 13,

wherein the elastic material includes plastic or metal.

Figure 1

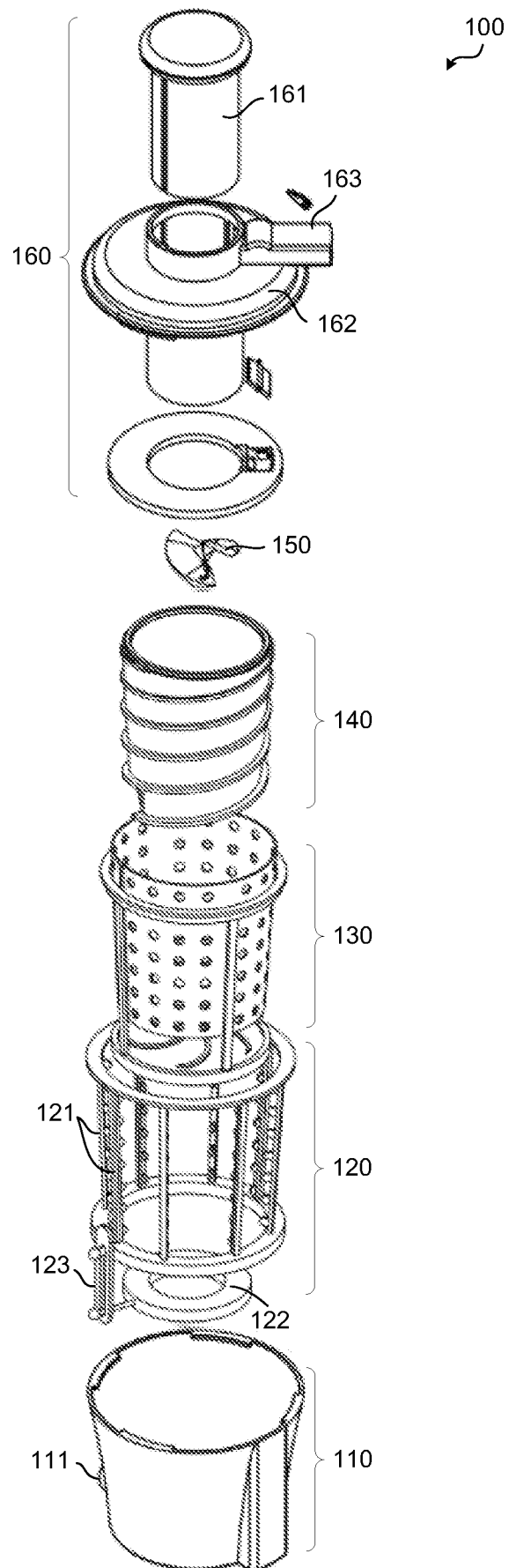


Figure 2

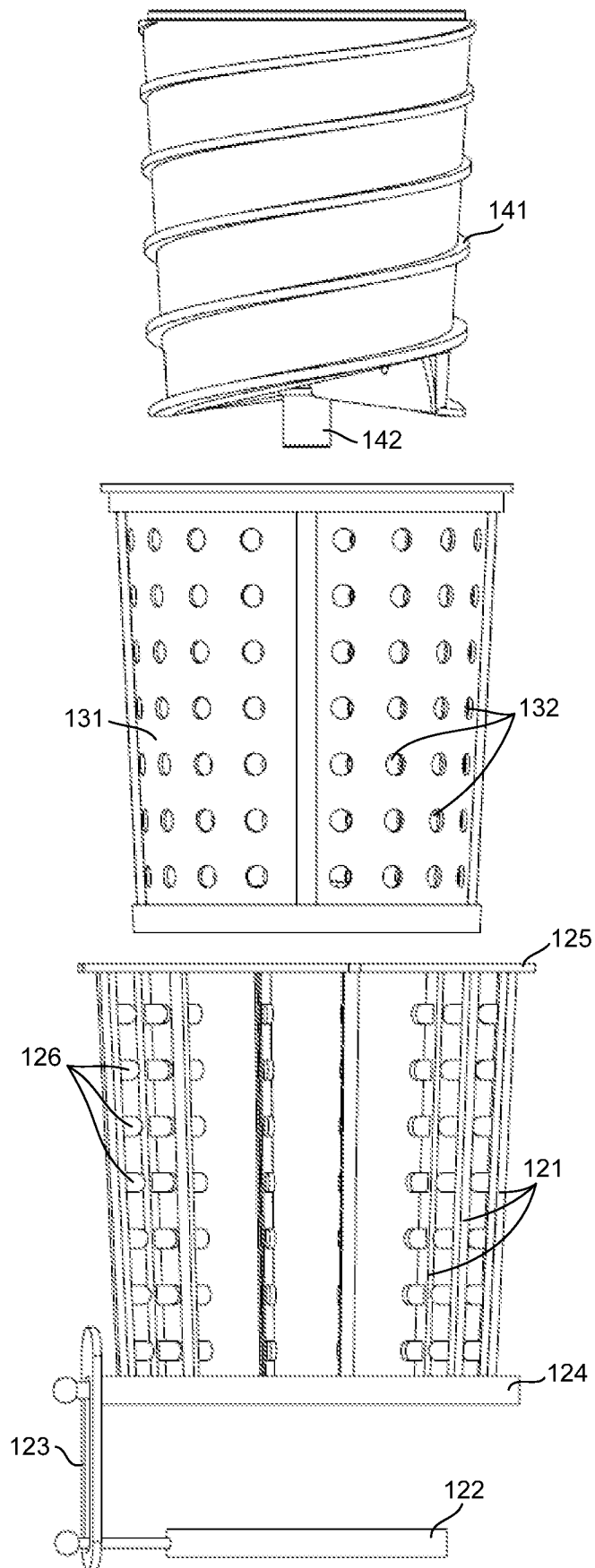


Figure 3

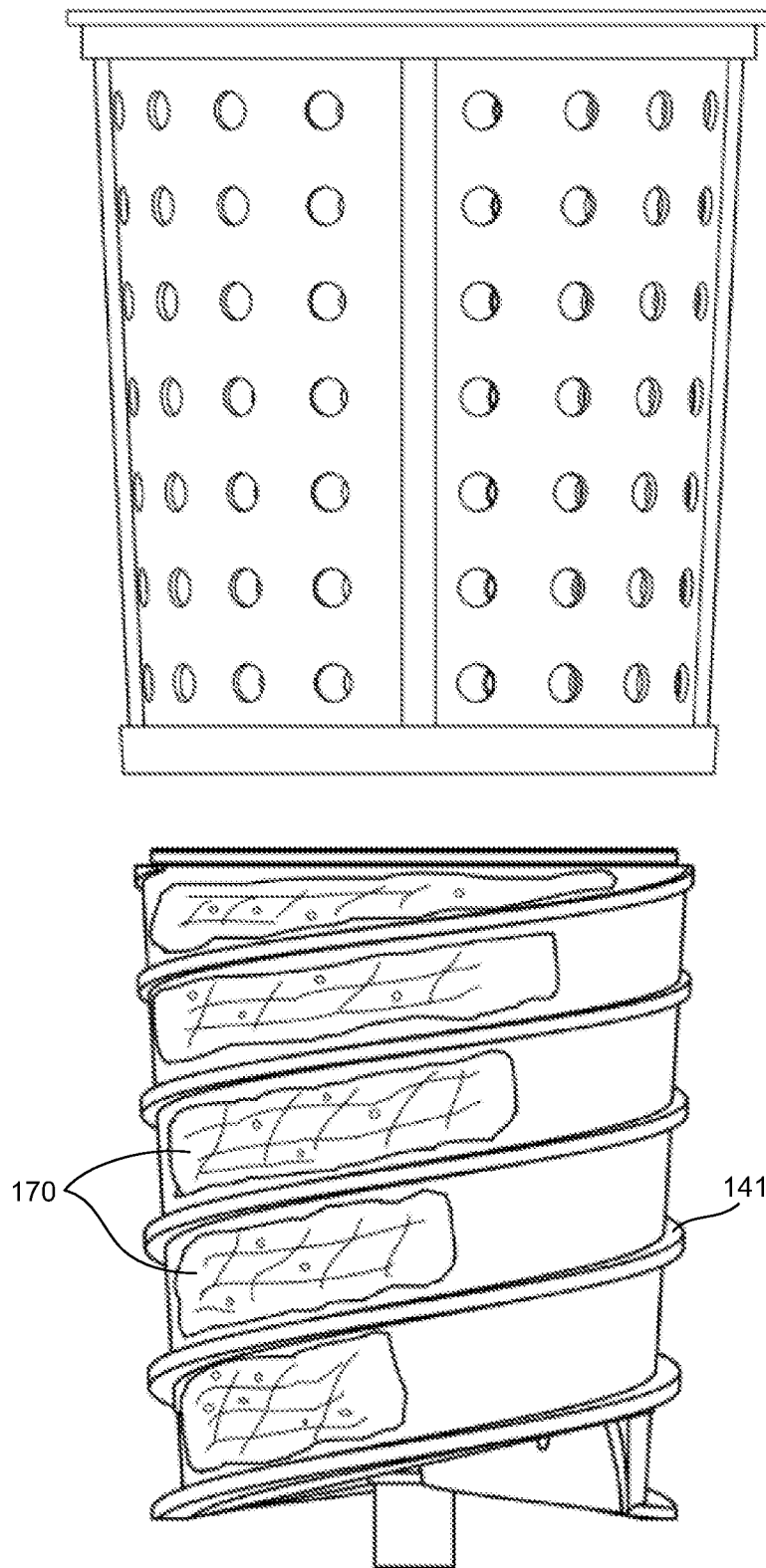


Figure 4

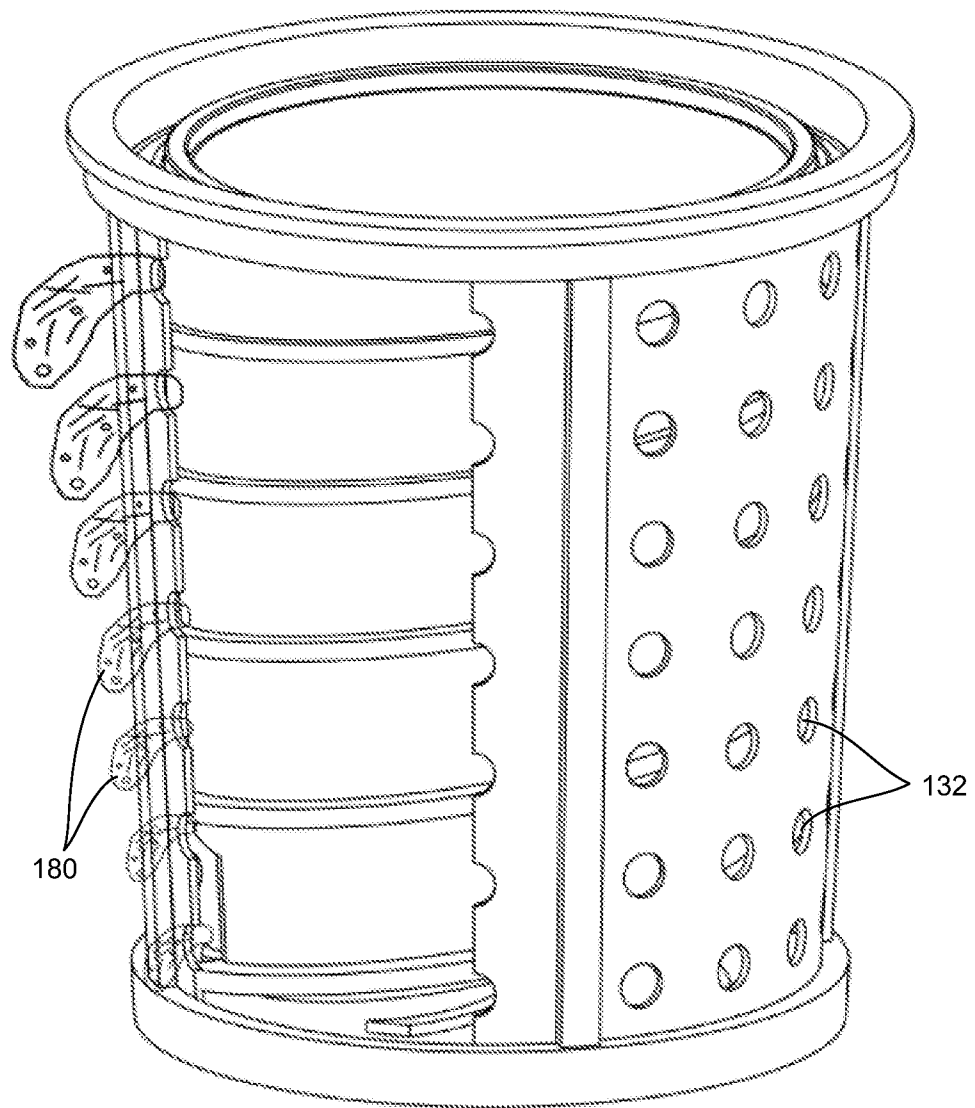


Figure 5

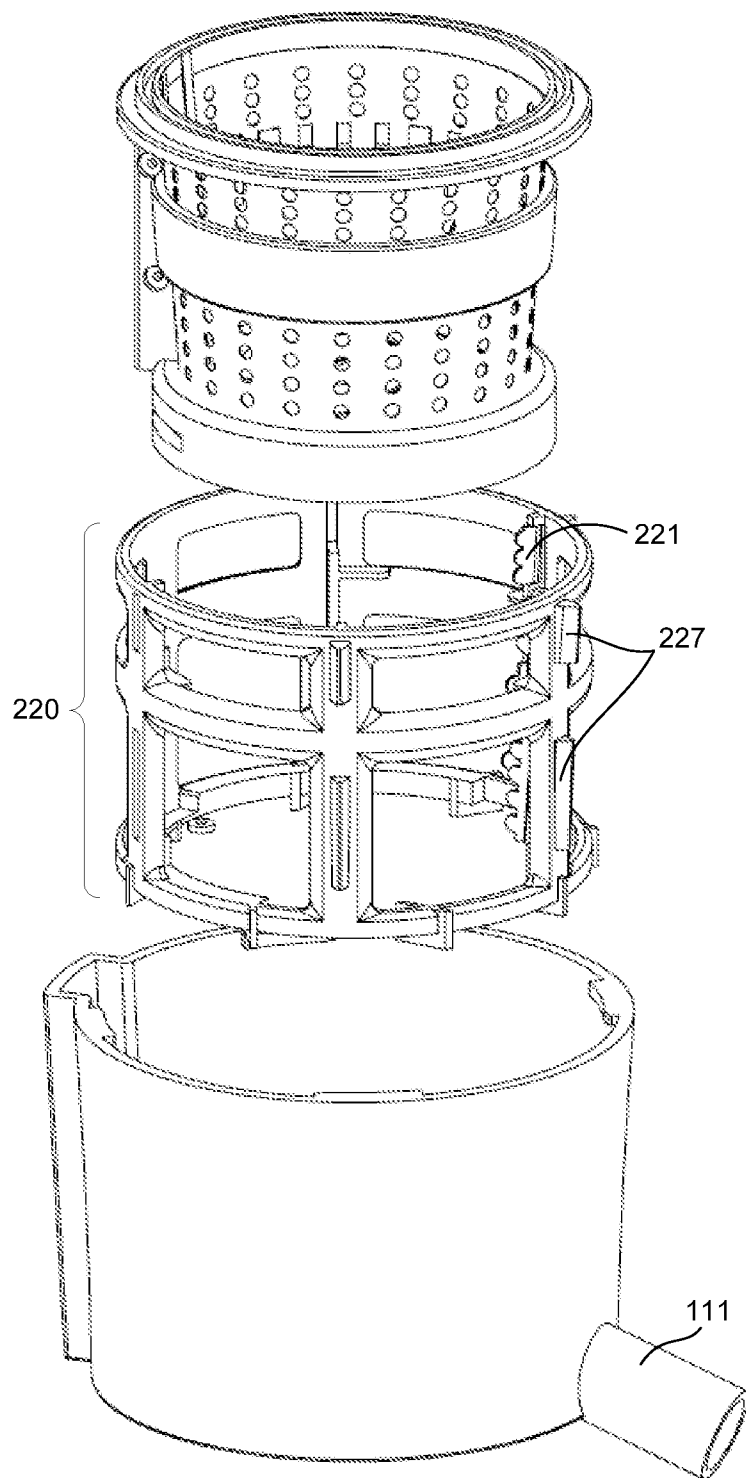


Figure 6A

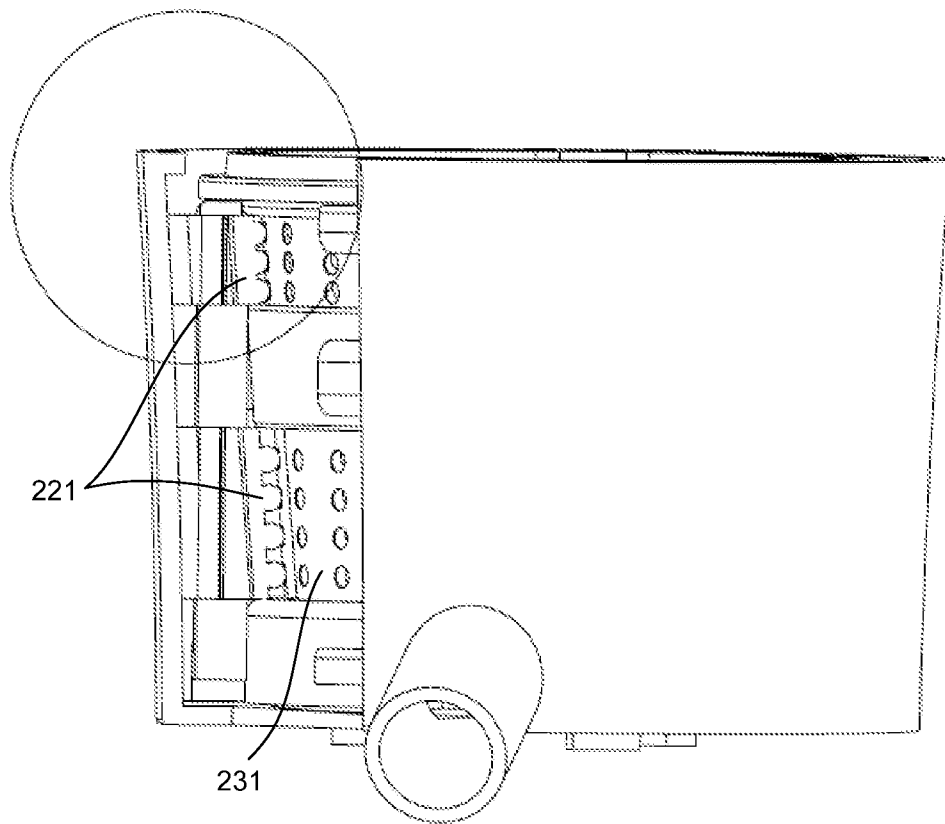


Figure 6B

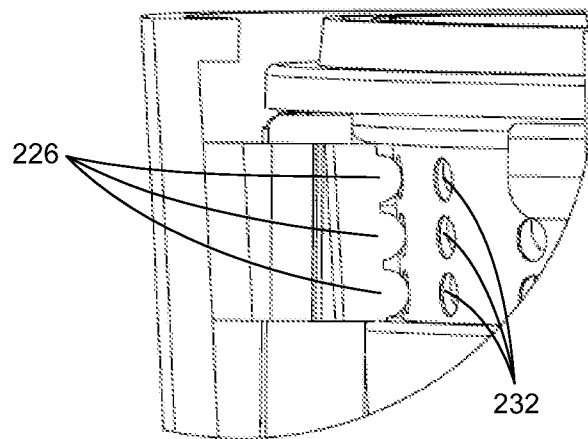


Figure 7A

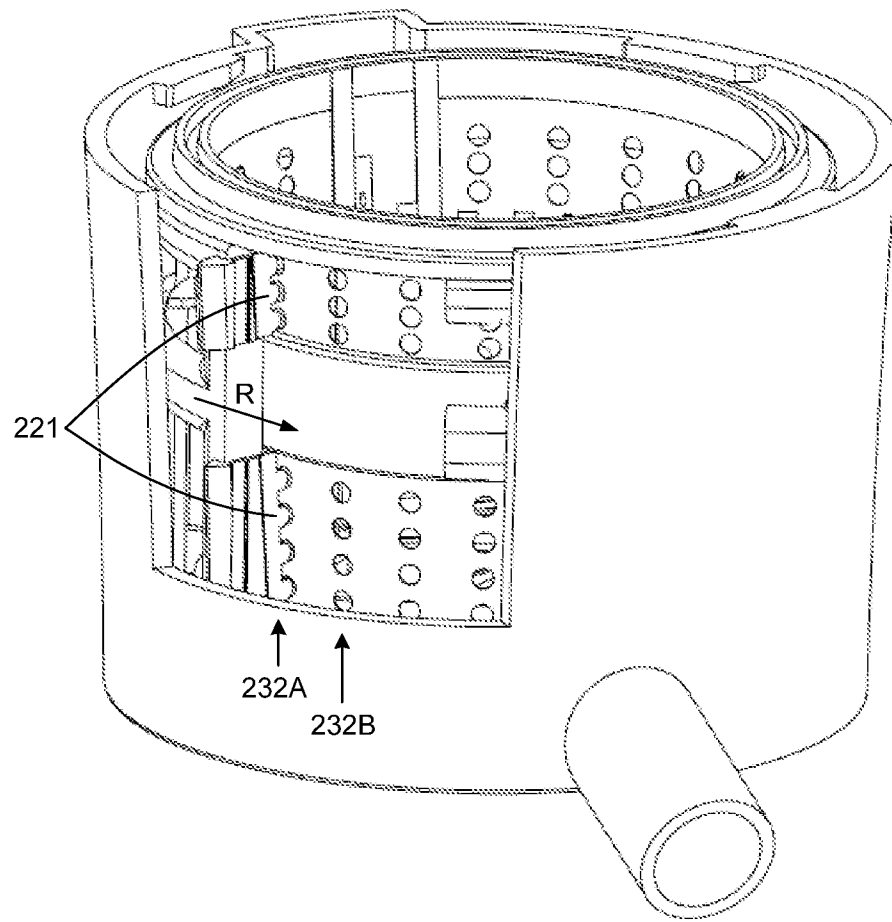


Figure 7B

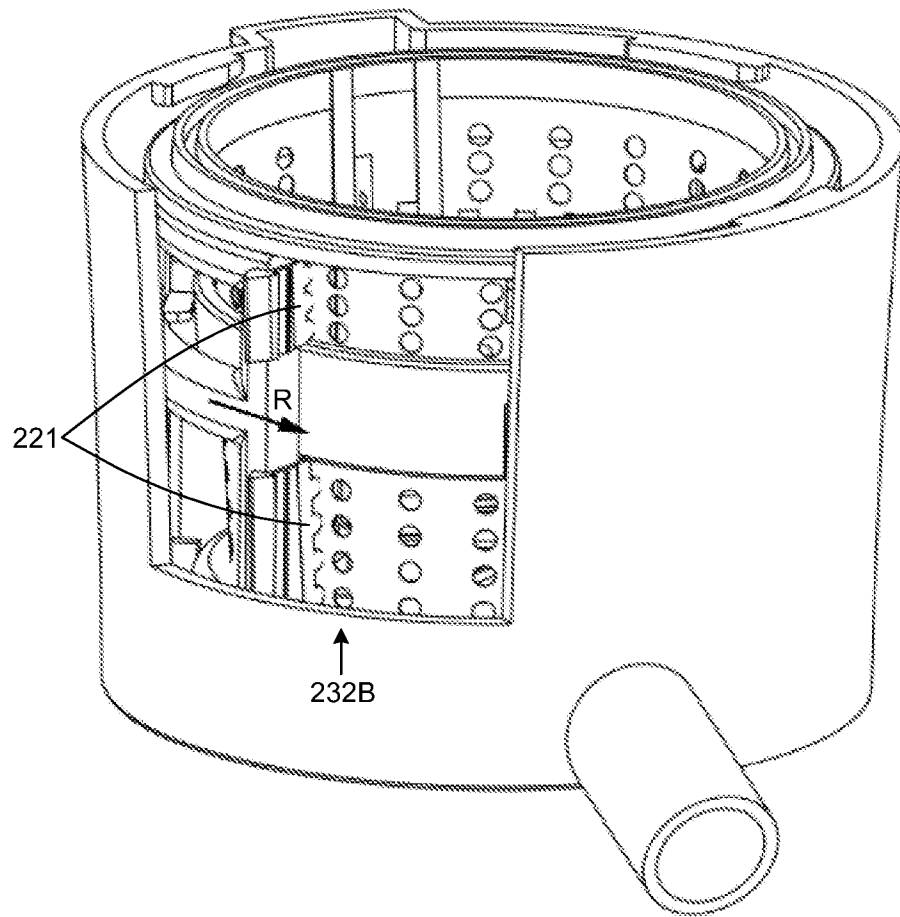


Figure 7C

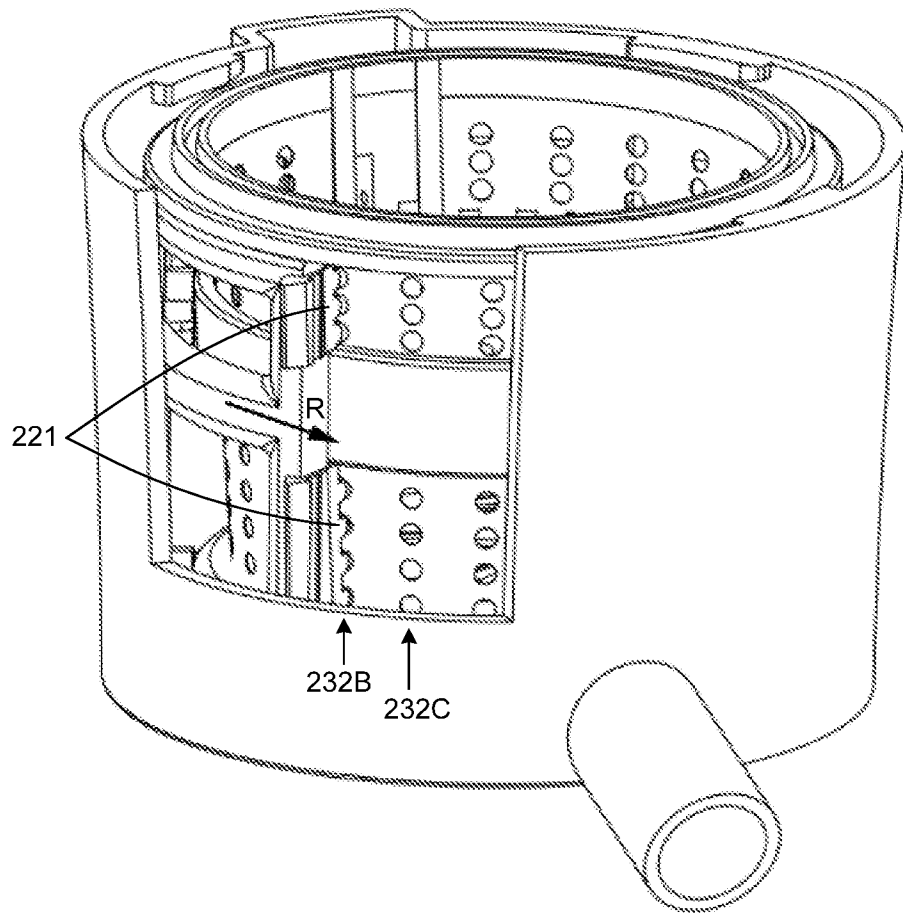


Figure 7D

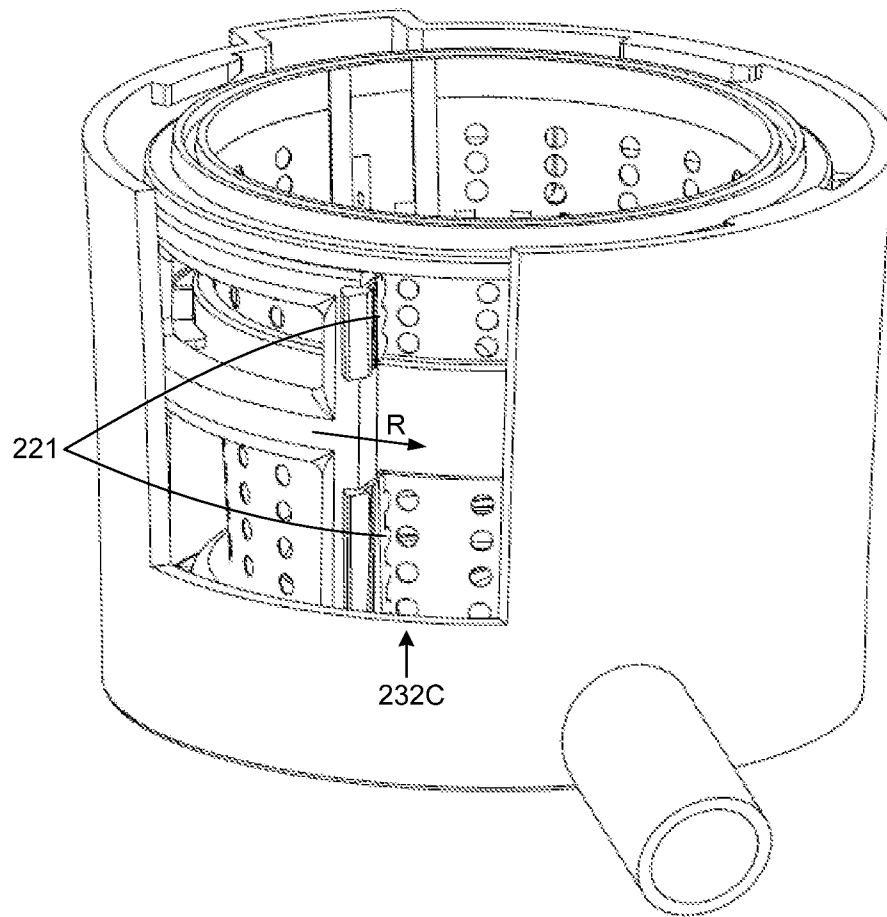


Figure 7E

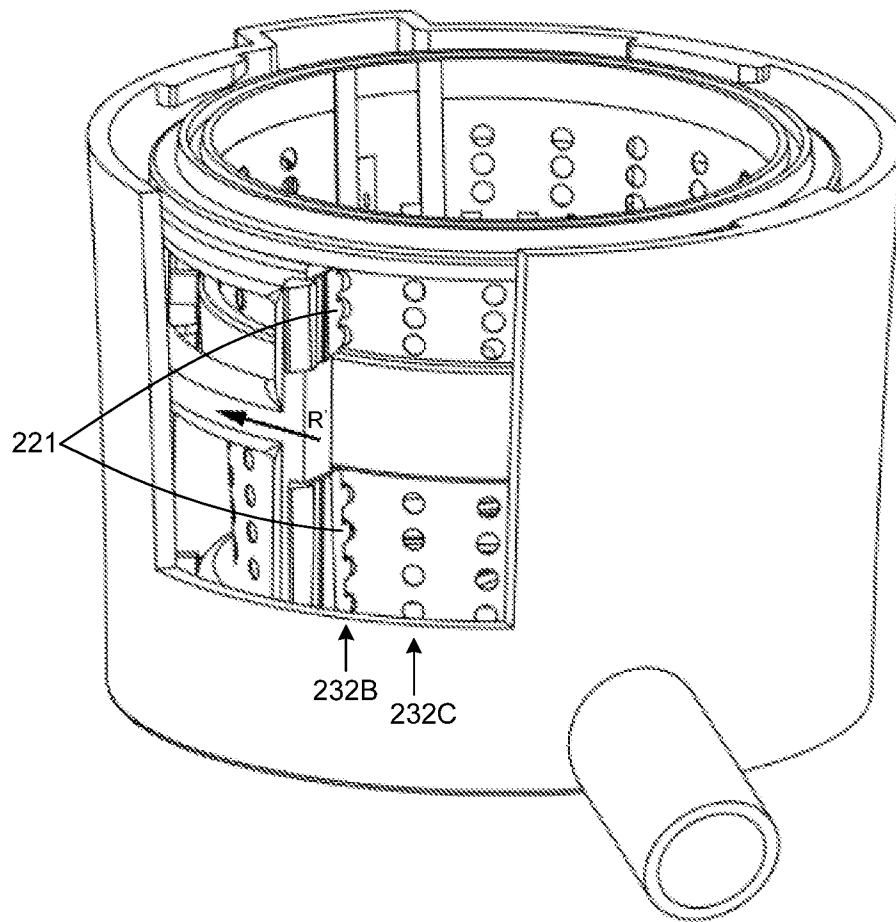


Figure 7F

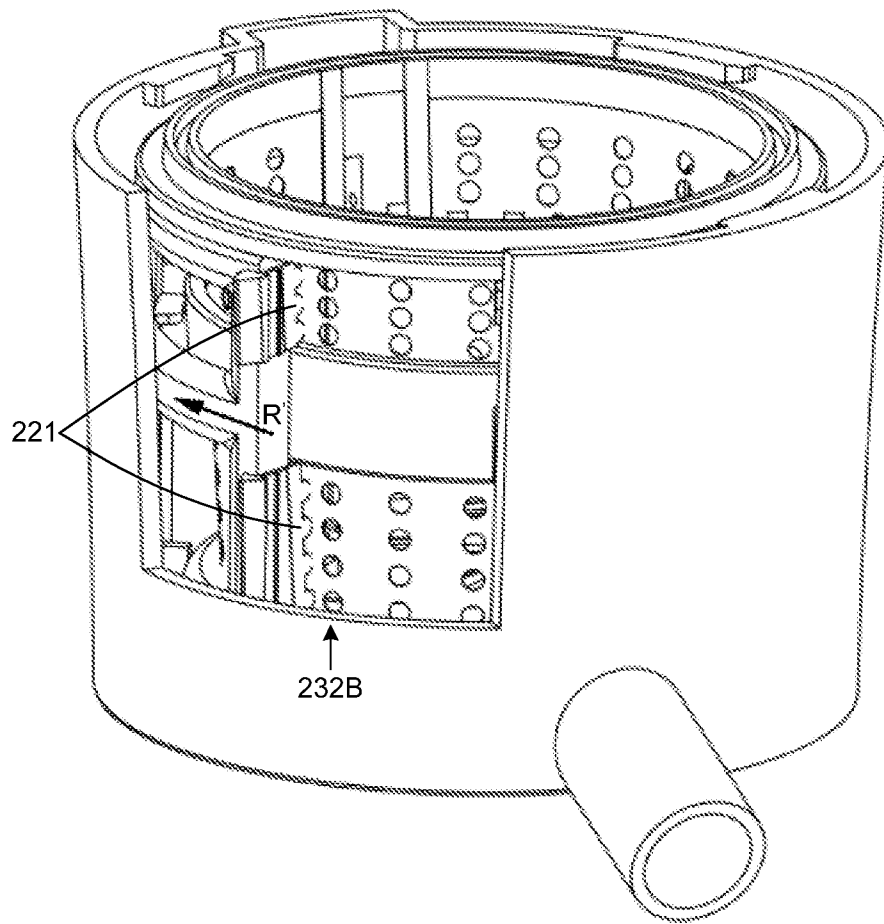


Figure 8

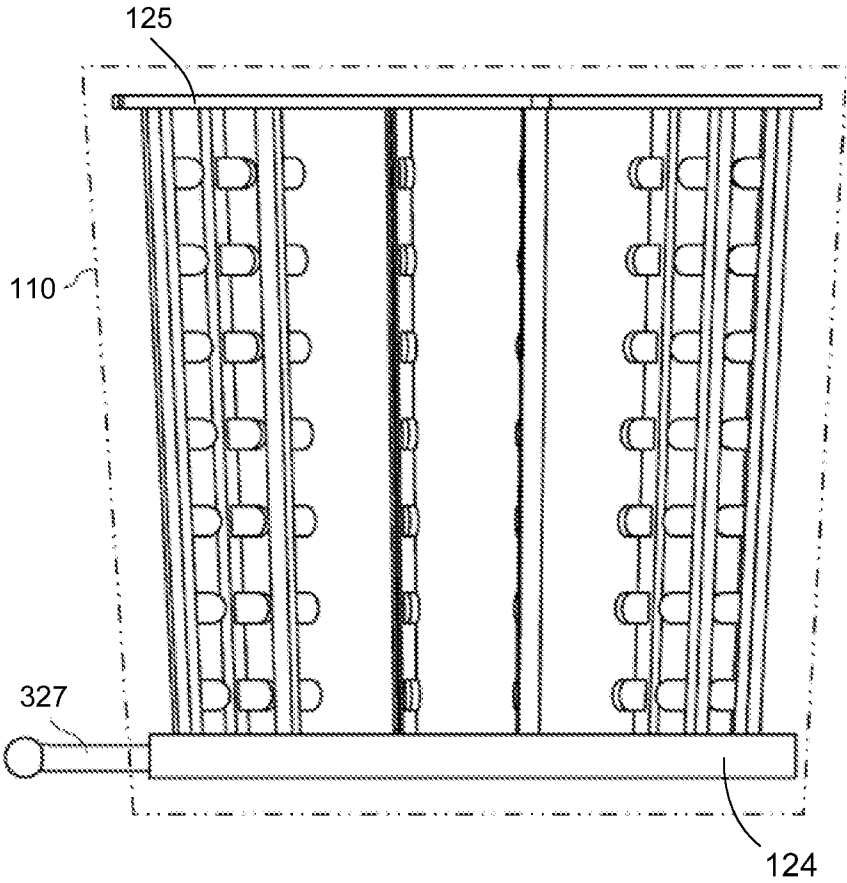
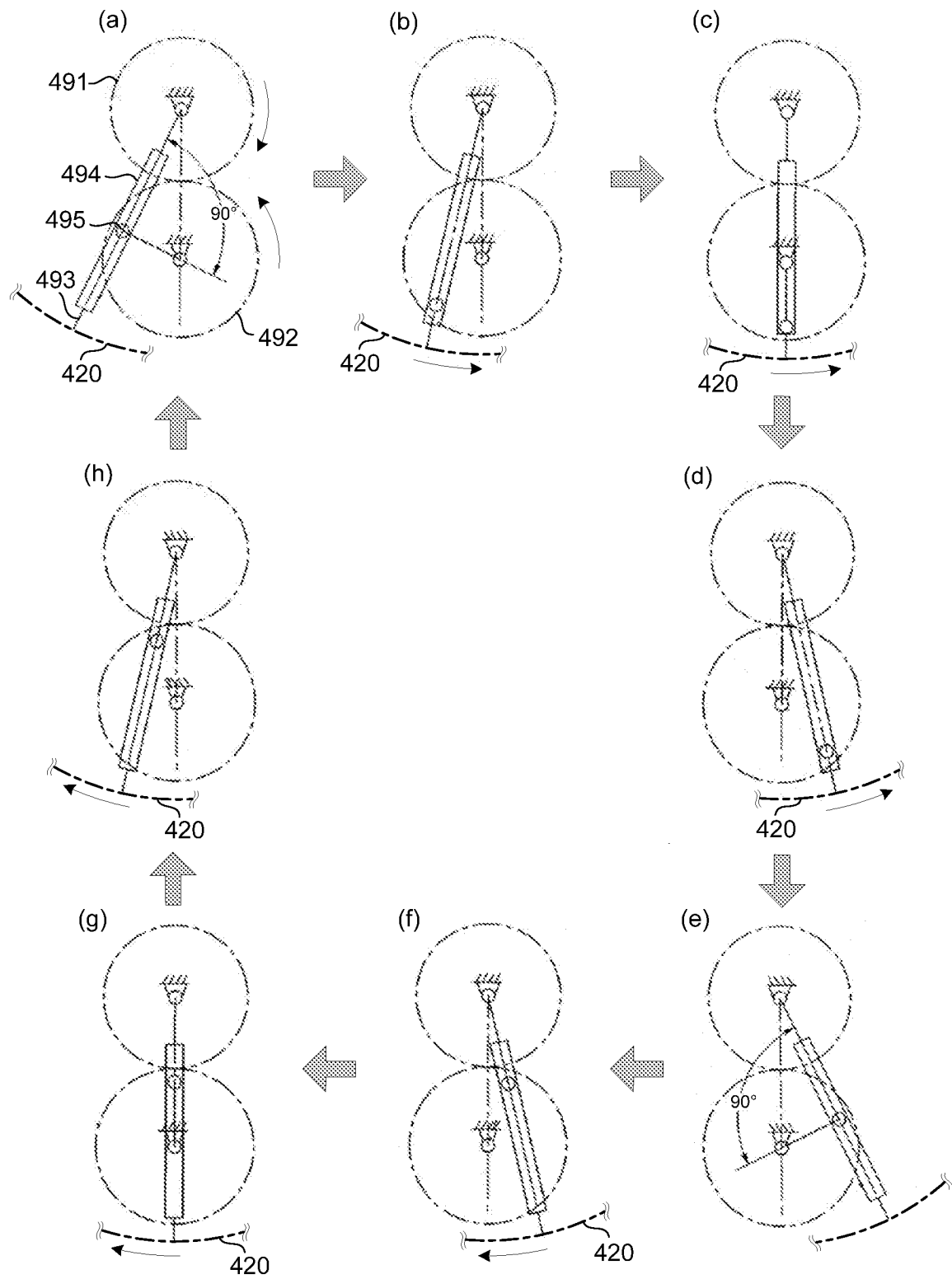


Figure 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/075959

A. CLASSIFICATION OF SUBJECT MATTER

A47J 19/02(2006.01)i; A47J 19/00(2006.01)i

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)

A47J; B30B; A23N; B01D

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)

WPI;EPODOC;CNKI;CNPAT: juice?, rotat+, revolv+, scrap+, screw, mesh, anticlockwise, mov+, clean, backward+, clockwise, brush, extract+, step, swing+, screen?, motor, residue

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 104739206 A (KIM, JAEWON) 01 July 2015 (2015-07-01) paragraphs 33-55 of description and figures 3-5	1-14
A	KR 101181103 B1 (JO JONG YON) 07 September 2012 (2012-09-07) the whole document	1-14
A	CN 202665184 U (JOYOUNG CO., LTD.) 16 January 2013 (2013-01-16) the whole document	1-14
A	KR 20130098700 A (HAPPYCALL CO., LTD.) 05 September 2013 (2013-09-05) the whole document	1-14
A	WO 2016004831 A1 (GOLDEN CHOICE PRODUCTS LTD.) 14 January 2016 (2016-01-14) the whole document	1-14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

18 May 2017

Date of mailing of the international search report

31 May 2017

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2017/075959

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	104739206	A	01 July 2015	WO	2015190745	A1	17 December 2015
				EP	3155936	A1	19 April 2017
				TW	201545688	A	16 December 2015
				TW	M506566	U	11 August 2015
				KR	20150143125	A	23 December 2015
				KR	101611553	B1	12 April 2016
KR	101181103	B1	07 September 2012	None			
CN	202665184	U	16 January 2013	None			
KR	20130098700	A	05 September 2013	None			
WO	2016004831	A1	14 January 2016	HK	1201673	A2	04 September 2015
				CN	205053703	U	02 March 2016
				CN	105310455	A	10 February 2016