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(54) Title: COFFEE BEVERAGE SYSTEM, COFFEE BREWING APPARATUS, COFFEE BEAN PACKAGING CARTRIDGE AND METHOD FOR PREPARING A COFFEE BEVERAGE

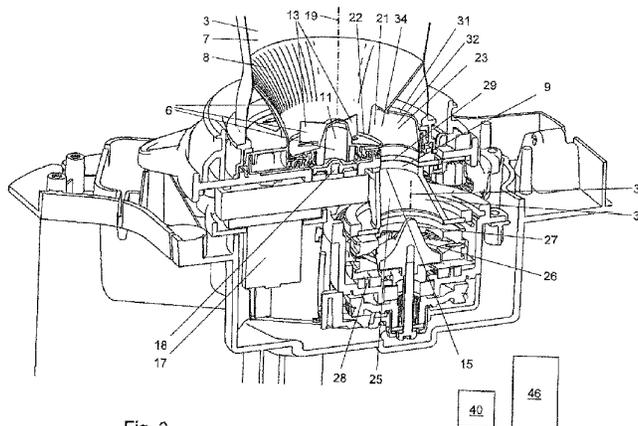


Fig. 3

(57) Abstract: A coffee beverage system is described including a coffee bean packaging cartridge and a coffee brewing apparatus. The coffee beans packaging cartridge includes a container holding coffee beans and transportation means adapted for enabling transportation of the coffee beans towards an exit opening of the cartridge. The coffee apparatus comprises a grinder for grinding the coffee beans from the cartridge and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder. The system is further provided with a metering chamber for receiving coffee beans which are transported with the aid of the transportation means into the metering chamber. In use the metering chamber will hold a predetermined amount of coffee beans. The metering chamber comprises a bottom portion which forms a part of the grinder, said bottom portion being arranged in the coffee apparatus for rotating around an axis extending in a vertical direction.

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inexpensively.

Unless stated otherwise, in the description and claims coffee beans are understood to be burnt/roasted coffee beans. Coffee beans in the description and claims may be understood to cover also fragmented coffee beans, that is, coffee bean fragments, which coffee bean
5 fragments are still to be ground for extracting desired coffee beverage. The coffee beans are for instance broken, before they are packaged. In an embodiment, at least a part of the coffee beans in the coffee bean package is divided into about thirty or less, in particular about fifteen or less, more particularly about ten fragments or less. One coffee bean fragment then comprises for instance one-thirtieth part, in particular one-fifteenth part, more particularly one-
10 tenth part or more of a coffee bean. For instance, the coffee bean fragments comprise a half or a quarter of a coffee bean. An advantage of the use of coffee bean fragments compared with whole coffee beans can be that coffee bean fragments can be supplied to the grinder relatively simply and/or that the package can be closed off relatively simply. This is because the coffee bean fragments are relatively small and hence can slide relatively easily through openings in
15 the package and the apparatus and/or will block the coffee bean outlet and/or closing means less easily. As the coffee beans may beforehand have been divided into fragments, though not ground, in the meantime comparatively more bean surface can come into contact with any ambient air than would be case with whole coffee beans. On the other hand, less bean surface will come into contact with air than would be the case with ground coffee, so that coffee bean
20 fragments can be preserved better than ground coffee beans. Only just before preparation of the coffee beverage are the coffee bean fragments ground for obtaining coffee beverage. In this description, therefore, coffee bean may also be understood to include a fragmented coffee bean, that is, which is still to be ground for preparing the desired coffee beverage.

A first aspect of the invention provides a coffee beverage system, including a coffee bean
25 packaging cartridge and a coffee brewing apparatus wherein the coffee bean packaging cartridge is removably connected to the coffee brewing apparatus, the coffee bean packaging cartridge being arranged for holding and supplying multiple servings of coffee beans, the coffee beans packaging cartridge including:

a container comprising an interior volume and at least one exit opening defining a
30 coffee bean outlet, the interior volume holding coffee beans;

transportation means adapted for enabling transportation of the coffee beans from the interior volume towards the exit opening of the cartridge;

wherein the coffee brewing apparatus comprises an entrance opening for receiving coffee beans which are transported with the aid of the transportation means towards the exit opening,

5 a grinder for grinding coffee beans which have entered the coffee apparatus via the entrance opening and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder, wherein the system is further provided with a metering chamber for receiving coffee beans which are transported with the aid of the transportation means into the metering chamber, said metering chamber being arranged for receiving a portion of coffee

10 beans corresponding to a dosed amount of coffee beans, wherein the metering chamber comprises a bottom portion which forms a part of the grinder, said bottom portion being arranged in the coffee brewing apparatus for rotating around a first axis extending in a vertical direction wherein the system is arranged such that upon activation of the grinder the bottom portion is rotating around the vertical axis for transporting the coffee beans from the metering

15 chamber into the grinder and for grinding the coffee beans.

According to one preferred aspect of the invention there is provided a coffee beverage system, including a coffee bean packaging cartridge and a coffee brewing apparatus. The coffee bean packaging cartridge is removably connected to the coffee brewing apparatus and it

20 is arranged for holding and supplying multiple servings of coffee beans. It includes a container comprising an interior volume and at least one exit opening defining a coffee bean outlet, the interior volume holding coffee beans and transportation means adapted for enabling transportation of the coffee beans from the interior volume towards the exit opening of the cartridge. The coffee apparatus comprises an entrance opening for receiving coffee beans

25 which are transported with the aid of the transportation means towards the exit opening, a grinder for grinding coffee beans which have entered the coffee apparatus via the entrance opening and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder. The system is further provided with a metering chamber for receiving coffee beans which are transported with the aid of the transportation means into the metering

30 chamber. Preferably after being filled the metering chamber will hold a dosed amount of coffee beans. The metering chamber comprises a bottom portion which forms a part of the

grinder. The bottom portion is arranged in the coffee apparatus for rotating around an axis extending in a vertical direction. The system is arranged such that upon activation of the grinder the bottom portion is rotating around the vertical axis for transporting the coffee beans from the metering chamber into the grinder and for grinding the coffee beans. The use of a bottom portion of the metering chamber, which is part of the grinder and which rotates for emptying the metering chamber also results in a decreased height of the system compared to the alternative option of providing a separate bottom plate of the metering chamber and a separate grinder.

The metering chamber may be divided in a first chamber portion which is part of the cartridge and a second chamber portion which is part of the coffee brewing apparatus. The division of the metering chamber over the cartridge and the brewing apparatus enables to provide an even more compact coffee beverage system.

In this regard it can be advantageous for emptying the metering chamber that the bottom portion has a conical shape such that the bottom portion extends downwardly in a direction extending perpendicular to and away from the vertical axis.

It is further advantageous for the coffee beverage system that the first chamber portion comprises the exit opening and the second chamber portion comprises the entrance opening and that the exit opening extends above the entrance opening. This provides a metering chamber which can be made relatively inexpensive.

The metering chamber may be arranged for receiving a portion of coffee beans corresponding to a dosed amount of coffee beans which is preferably necessary for preparing a single serving of coffee beverage. The transportation means may comprise a part which is movable relative to the metering chamber for effectively transporting the coffee beans towards the metering chamber upon driving of said transportation means. The coffee brewing apparatus may be provided with a motor and a vertically extending drive shaft wherein said drive shaft may be releasably connected with the transportation means of the cartridge for driving and thereby moving the transportation means upon rotation of the drive shaft by means of the motor means. The movable part may comprise a bottom and/or a plurality of vanes, which rotates around a further vertical axis upon driving the transportation means.

2011216590 05 Sep 2016

Furthermore, the transportation means may comprise a downwardly extending bottom wall for transporting the coffee beans towards the metering chamber under the influence of gravity. Alternatively, the transportation means may comprise a downwardly extending bottom wall for transporting the coffee beans towards the metering chamber under the influence of gravity only.

The first chamber portion may be provided with a top wall which limits the volume of the metering chamber in an upwardly vertical direction wherein the bottom portion of the second chamber portion limits the volume of the metering chamber in a downwardly vertical direction.

Alternatively or additionally, the first chamber portion may be provided with an upstanding side wall comprising an inlet opening for entering the coffee beans by means of the transportation means into the metering chamber.

It is further advantageous for the coffee beverage system, when the transportation means are arranged for transporting the coffee beans at least in a horizontal direction for transporting the coffee beans into the metering chamber and/or towards the inlet opening of the metering chamber.

The grinder may be positioned centrally with respect to the second chamber portion. It may comprise a conical part lying in the direction of the vertical axis, wherein the conical part rotates around the vertical axis upon driving the grinder. The grinder may be driven by a motor. The drive shaft and the grinder may be driven by different motors.

The coffee brewing apparatus may comprise connection means for the removable connection to the coffee bean packaging cartridge. The connection means may comprise a recess at an upper side of the coffee brewing apparatus, the recess being surrounded by a side wall and being configured for receiving a corresponding part protruding from a lower side of the coffee bean packaging cartridge. The side wall may protrude from the upper side of the coffee brewing apparatus and be covered by a housing.

According to an embodiment of the present invention, the side wall comprises openings for receiving bayonet elements of the coffee bean

packaging cartridge. The coffee bean packaging cartridge should be inserted into the recess such that the bayonet elements are inserted in the openings and then rotated in order to be connected to the coffee brewing apparatus. The side wall may comprise blocking elements for impeding a further rotation of the coffee bean packaging cartridge, when it has reached its final position. In this way, the user can easily and reliably mount the cartridge on the coffee brewing apparatus. Preferably, the coffee bean packaging cartridge should be rotated approximately 50 degrees in order to reach its final position. The connection between the cartridge and the coffee brewing apparatus may be a snap connection.

Furthermore, the recess may comprise rotatable protruding edges at its center, which are fixed at the end of the driving shaft.

The vertical axis around which the bottom portion of the second chamber portion is rotatable may run centrally through the bottom portion of the second chamber portion. The bottom portion may extend downwardly in a direction extending perpendicular to and away from the vertical axis all around the vertical axis.

The coffee bean packaging cartridge may comprise closing means for closing the coffee bean outlet when the coffee bean packaging cartridge is not connected to the coffee brewing apparatus. In this way it is avoided that coffee beans fall out of the coffee bean packaging cartridge when it is not connected to the coffee brewing apparatus.

The closing means may be configured for opening the coffee bean outlet when the coffee bean packaging cartridge is connected to the coffee brewing apparatus.

The closing means comprises a closure member at the bottom side of the container comprising the coffee bean outlet and a rotatable closing disk having an opening. In order to connect the coffee bean packaging cartridge to the coffee brewing apparatus the opening of the rotatable closing disk may be brought in a position aligned with the coffee bean outlet.

The closure member may comprise a pair of fletching arms and the closure disk comprises a detent, which in the closed position is caught behind the fletching arms.

5 The exit opening may be associated with a removable sealing element sealing the interior volume prior to activation of the cartridge wherein preferably said sealing element prevents gasses to escape from the cartridge. The beverage system may comprise means for disrupting and displacing the sealing element, preferably when the cartridge is connected to the brewing apparatus for the first time. The sealing element may be a sealing membrane.

10 The system may be arranged such that, in use, the grinding device is activated for emptying the metering chamber and for grinding the coffee beans collected and/or held in the metering chamber. The grinding device may be activated longer than is required for emptying or at least substantially completely emptying the metering chamber and for grinding all
15 the coffee beans collected in the metering chamber. In this way, the emptying of the metering chamber is reliably performed. Previous to the emptying of the metering chamber and the grinding of the coffee beans, in a first step the transportation means may be driven for filling the metering chamber with coffee beans. The transportation means may be driven longer than is required
20 for completely filling or at least substantially completely filling the metering chamber with coffee beans. In this way, the dosing of the metering chamber with coffee beans is reliably performed.

The coffee brewing apparatus may be provided with a control device for controlling the first motor and/or the grinder for performing these
25 steps. The control device may control the brewing device wherein the control device may be arranged such that, in use, in a step which follows after that the emptying and grinding step is completed the brewing device is brewing coffee based on the ground coffee and heated water heated by a heating device of the coffee brewing apparatus. The volume of the metering chamber may be such
30 that if it is completely filled with coffee beans the amount of beans corresponds

2011216590 05 Sep 2016

with one dose of coffee beans for preparing a cup of coffee. The one dose of coffee beans may comprise 5-11, preferably 6-8 grams of coffee beans.

The coffee bean packaging cartridge can also be designed to be (re)fillable with coffee beans by the consumer. Preferably the coffee bean packaging cartridge is filled with coffee beans and is not designed to be refillable with coffee beans. In that case the cartridge is a packaging for the coffee beans to be sold in a shop.

According to a further embodiment, the system further comprises a sensor arranged for detecting if the coffee bean packaging cartridge is connected to the coffee brewing apparatus. The sensor is configured to signal a result of the detection to the controller. The sensor may be a switch, for example a micro switch. The coffee bean packaging cartridge comprises a protruding part for activating the switch when it is connected to the coffee brewing apparatus. The protruding part may be located below or above one of the bayonet elements and may activate the switch when the coffee bean packaging cartridge reaches its final position. The switch may be located in an opening in the sidewall surrounding the recess at the upper side of the coffee brewing apparatus, the protruding part activating the switch through the opening. The switch may be hidden behind horizontal wall segments in the side wall and the opening may be a slit between the horizontal wall segments, the protruding part fitting in the slit. The controller may be arranged for controlling the first motor and the grinder so that they can be activated only if it has been detected that the coffee bean packaging cartridge is present. In this way, it is ensured that the system works with coffee bean packaging cartridges especially designed thereto. These cartridges may be sold by the manufacturer of the system filled with coffee beans of an elevated quality, thereby guaranteeing the end consumer a good flavor coffee beverage.

The system may further comprise an insert piece that is removable connectable to the coffee brewing apparatus *in lieu* of the coffee bean packaging cartridge, preferably in a same or similar way as the coffee

bean packaging cartridge by using means for connecting the insert piece to the coffee brewing apparatus, which are the same or similar as the means used for connecting the coffee bean packaging cartridge to the coffee brewing apparatus. In this case, the insert piece comprises bayonet elements and a protruding part, preferably located below or above one of the bayonet elements, for activating the switch when the insert piece is connected to the coffee brewing apparatus. Since the detection of the connected coffee bean packaging cartridge and the insert piece is executed in the same way, the controller of the coffee brewing apparatus does not see any difference between these two situations. This means that the functionality of the coffee brewing apparatus is also the same.

The purpose of connecting an insert piece to the coffee brewing apparatus may be twofold. It is usable for unlocking the coffee brewing apparatus, so that the motor and the grinder(s) may be activated, also if no coffee bean packaging cartridge is connected thereto. This is useful for service and maintenance.

Alternatively, the insert piece may be used for supplying the coffee brewing apparatus with coffee beans, because the coffee bean packaging cartridges are designed not to be refillable. A favorable embodiment of an insert device for this purpose comprises a cavity having an interior volume and at least one exit opening defining a coffee bean outlet, the interior volume being arranged for receiving coffee beans. The insert piece further comprises closing means for closing the coffee bean outlet when the insert piece is not connected to the coffee brewing apparatus or not connected to the coffee brewing apparatus in its final position. The closing means are configured for opening the coffee bean outlet when the insert piece is connected to the coffee brewing apparatus in its final position. A user fills the cavity with coffee beans when the insert piece is connected to the coffee brewing apparatus in an entry position and then rotates the insert piece to its final position, resulting in the coffee beans to enter the coffee brewing apparatus to be ground.

Advantageously, the system may be arranged such that upon activation of the grinder the bottom portion is rotating around the vertical axis for transporting the dose of coffee beans from the metering chamber into the grinder and for grinding the coffee beans. The bottom part with the conical shape may lie in the direction of the first vertical axis, wherein the conical part rotates around the first vertical axis upon driving the grinder. The grinder may comprise a lower grinding disk extending around the bottom portion and an upper grinding disk extending above the lower grinding disk. The grinder may be rotationally driven by a second motor, resulting in the rotation of the bottom part with the conical shape and the lower grinding disk. Upon driving the bottom portion and lower grinding disk coffee beans are moved in an outwardly extending radial direction between the lower grinding disk and the upper grinding disk and in that the coffee beans are crunched and cut into ground coffee, because a vertical distance between the lower grinding disk and the upper grinding disk decreases in the outwardly extending radial direction.

The grinder may be a no contamination grinder, wherein after grinding the coffee beans and supplying the ground coffee to the coffee brewing device, substantially no ground coffee remains. As a result, when the cartridge is replaced by one with a different blend, the coffee of the new blend is not contaminated by the previously used blend.

The second chamber portion may comprise about 100- X% of the volume of the metering chamber and the first chamber portion may comprise about X% of the volume of the metering chamber wherein X is in the range of 2-50, preferably in the range of 5-40, more preferably in the range of 15-30. By placing a larger part of the metering chamber in the brewing apparatus a further decrease in the height of the beverage system may be obtained. This may be an issue, for example in case that the beverage system is to be placed on a kitchen sink under a cupboard.

Disclosed herein is a method for preparing a beverage by means of a coffee brewing apparatus as described herein above. The method comprises the following steps: In a filling step the metering chamber may be filled with coffee beans for collecting coffee beans in the metering chamber. The metering chamber may be completely filled with coffee beans or at least substantially completely filled with coffee beans. In an emptying and grinding step the

grinding device is activated for emptying the metering chamber and for grinding coffee beans collected in the metering chamber. The grinding device may be activated longer than is required for emptying or at least substantially completely emptying the metering chamber and for grinding all the coffee beans collected in the metering chamber.

5 A second aspect of the invention provides a coffee brewing apparatus preferably for use in a coffee beverage system according to any one of the preceding claims, comprising an entrance opening for receiving coffee beans, a grinder for grinding coffee beans which have entered the coffee apparatus via the entrance opening and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder, wherein the coffee brewing
10 apparatus is further provided with at least a lower portion of a metering chamber for receiving coffee beans via the entrance opening, wherein the metering chamber is arranged for receiving a portion of coffee beans corresponding to a dosed amount of coffee beans and comprises a bottom portion which forms a part of the grinder, said bottom portion being arranged in the coffee brewing apparatus for rotating around a first axis extending in a vertical direction
15 wherein the coffee brewing apparatus is arranged such that upon activation of the grinder the bottom portion is rotating around the vertical axis for transporting the coffee beans from the metering chamber into the grinder and for grinding the coffee beans.

Disclosed herein is a coffee brewing apparatus, preferably for use in a coffee beverage system as disclosed herein, comprising an entrance opening for receiving coffee beans, a
20 grinder for grinding coffee beans which have entered the coffee apparatus via the entrance opening and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder, wherein the coffee brewing apparatus is further provided with a metering chamber for receiving coffee beans via the entrance opening, wherein the metering chamber comprises a bottom portion which forms a part of the grinder, said bottom portion being
25 arranged in the coffee brewing apparatus for rotating around a first axis extending in a vertical direction wherein the coffee brewing apparatus is arranged such that upon activation of the grinder the bottom portion is rotating around the vertical axis for transporting the coffee beans from the metering chamber into the grinder and for grinding the coffee beans. Preferably the grinder is positioned centrally with respect to the metering chamber. Preferably, the coffee
30 brewing apparatus is provided with a control device, which advantageously is arranged for

2011216590 05 Sep 2016

controlling the first motor and/or the grinder. Said the control device can be arranged such that, in use, in a first step the metering chamber is filled with coffee beans and that in a second step which follows after the completion of the first step the grinding device is activated for emptying the metering chamber and for grinding coffee beans which were collected in the metering chamber during the first step.

Disclosed herein is a cartridge of a coffee beverage system further including a coffee brewing apparatus wherein the coffee bean packaging cartridge can be removable connected to the coffee brewing apparatus, the coffee bean packaging cartridge being arranged for holding and supplying multiple servings of coffee beans, the coffee beans packaging cartridge including:

a container comprising an interior volume and at least one exit opening defining a coffee bean outlet, the interior volume holding coffee beans;

transportation means adapted for enabling transportation of the coffee beans from the interior volume towards the exit opening of the cartridge;

wherein the coffee brewing apparatus comprises an entrance opening for receiving coffee beans which are transported with the aid of the transportation means towards the exit opening, a grinder for grinding coffee beans which have entered the coffee apparatus via the entrance opening and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder, wherein the system is further provided with a metering chamber for receiving coffee beans which are transported with the aid of the transportation means into the metering chamber. Preferably the metering chamber is divided in a first chamber portion which is part of the cartridge and a second chamber portion which is part of the coffee brewing apparatus. Preferably, when the system is in use the metering chamber will hold a dosed amount of coffee beans. Preferably the transportation means comprise a part which is movable relative to the metering chamber for transporting the coffee beans towards the metering chamber upon driving of said transportation means. After the grinding, the brewing device may be activated for brewing coffee based on the ground coffee and on heated water.

A third aspect of the invention provides a coffee beverage system according to the first aspect, comprising a coffee brewing apparatus according to the second aspect and an insert

2011216590 05 Sep 2016

piece of the system disclosed herein.

The present invention will now be described, by way of non-limiting example only, with reference to the accompanying drawings as briefly described below:

Figure 1 shows a perspective view of an embodiment of the coffee brewing system with the coffee bean packaging cartridge mounted to the coffee brewing apparatus;

Figure 2 shows a perspective view of an embodiment of the coffee brewing system without the coffee bean packaging cartridge mounted to the coffee brewing apparatus;

Figure 3 shows a cross sectional view of a part of the coffee brewing system according to figure 1 in perspective;

Figure 3B shows a cross sectional view of the grinder used in the coffee brewing system according to figure 1 in perspective;

Figure 3C shows a cross sectional view of the grinder used in the coffee brewing system according to figure 1;

Figure 4 shows a perspective detail view of the upper part of the coffee brewing apparatus of figure 2;

Figure 4B shows a perspective detail view of the upper part of the coffee brewing apparatus of figure 2 with a closing plate in open position;

Figure 4C shows a further perspective detail view of the upper part of the coffee brewing apparatus of figure 2;

Figure 5A and 5B are two isometric exploded views of an impellor used in the coffee bean packaging cartridge together with a drive shaft coupling end;

Figure 6 is an exploded isometric view of a coffee bean packaging cartridge according to an embodiment of the invention;

Figures 6B, 6C and 6D show two different perspective views of the coffee bean packaging cartridge shown in figure 6

Figure 7A is a detailed exploded isometric view of the bottom part of the coffee bean packaging cartridge of Figure 6;

Figure 7B is a detailed exploded view of the bottom part of Figure 7A as seen in an opposite direction;

5 Figure 7C is a perspective view of a closing plate of the bottom part shown in figures 7A and 7B;

Figure 8 is a cross-sectional detail of the assembled bottom part; Figure 9 is a bottom perspective detail of the bottom part of Figure 7B with a delatching protrusion of the coffee brewing apparatus;

10 Figure 10 shows a cross sectional view of the coffee bean packaging cartridge connected to the coffee brewing apparatus;

Figure 11A shows an insert piece of a first type;

Figure 11B shows the insert piece of figure 11A connected to the coffee brewing apparatus;

15 Figure 12A shows an insert piece of a second type;

Figure 12B shows the insert piece of figure 12A connected to the coffee brewing apparatus in an entry position; and

Figure 12C shows the insert piece of figure 12A connected to the coffee brewing apparatus in a final position.

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In Figure 1 a system 1 for preparing coffee beverages is shown. The system 1 includes a coffee bean packaging cartridge 3 and a coffee brewing apparatus 4. The coffee bean packaging cartridge 3 is removably connected to the coffee brewing apparatus 4. Figure 2 shows the coffee brewing apparatus
25 without the coffee bean packaging cartridge 3 mounted thereon. The coffee bean packaging cartridge 3 comprises a container 7 comprising an interior volume for containing coffee beans and an exit opening. These coffee beans are roasted and include generally roasted half beans. Preferably the coffee beans packaging cartridge 3 is closed airtight and/or under vacuum before it is placed
30 on the coffee brewing apparatus 4. Also the coffee bean packaging cartridge 3

can be in the form of a disposable packaging, so that it can be thrown away after it has been emptied.

Referring now to figure 3, the coffee beverage system 1 will be described in more detail. The cartridge comprises transportation means 6 for enabling transportation of the coffee beans from the interior volume of the container 7 (only partially visible in figure 3) towards the exit opening 29 of the cartridge 3. The coffee apparatus is provided with an entrance opening 9 for receiving coffee beans which are transported by means of the transportation means towards the exit opening 29. The exit opening 29 extends above the coffee bean entrance opening 9 of the coffee brewing apparatus 4.

A lower part of the container 7 comprises a funnel 8 which forms part of the transportation means 6. The beans of the coffee bean packaging cartridge 3 are guided by means of the funnel 8 towards the exit opening 29 of the cartridge. The transportation means further comprise an impellor 11 having several flexible vanes 13. Upon driving the transportation means, in this example by rotating the impellor around a second axes 19 extending in a vertical direction the coffee beans are transported towards the exit opening 29.

The system further comprises a metering chamber 15. The metering chamber is divided in a first chamber portion 23 which is part of the cartridge and a second chamber portion 25 which is part of the coffee brewing apparatus. The first chamber portion is located above the second chamber portion. The first chamber portion comprises the exit opening 29 of the cartridge and the second chamber portion comprises the entrance opening of the coffee apparatus. The first chamber portion is provided with an upstanding side wall 32 comprising an inlet opening 21 for letting pass coffee beans into the metering chamber which coffee beans are transported by means of the transportations means towards the exit opening of the cartridge. The transportation means are thus configured for transporting the coffee beans towards and into the metering chamber 15 of the coffee beverage system 1

upon driving of the transportation means. This driving is performed by means of a first motor 17 of the coffee apparatus, driving a drive shaft 18 of the coffee apparatus extending along a vertical axis 19. Due to the driving, the impeller 11 and the vanes 13 rotate around the second vertical axis 19. In this way, the coffee beans are driven in a horizontal direction to the inlet opening 21 of the metering chamber 15. The cartridge comprises a small trickle through edge 22 to avoid the uncontrolled entering of coffee beans in the metering chamber 15 when the impeller 11 is not rotating. The metering chamber 15 comprises the first chamber portion 23 in the cartridge 3 (upper portion of the metering chamber) and the second chamber portion 25 (lower portion of the metering chamber) in the brewing apparatus 4. The bottom 26 of the metering chamber at least comprises a bottom portion 27 which is part of a grinder 28 for grinding coffee beans. The coffee beans leave the first chamber portion 23 and thereby the cartridge 3 via the exit opening 29 of the cartridge 3 and enter the second chamber portion 25 and thereby the coffee brewing apparatus via the entrance opening 9. The size of the metering chamber is limited by a top wall 31, the bottom 26 and an upstanding side wall 32. The upstanding side wall 32 comprises the upstanding side wall 34 of the first chamber portion and an upstanding side wall 33 of the second chamber portion. The second chamber portion comprises about 100- X% of the volume of the metering chamber and the first chamber portion comprises about X% of the volume of the metering chamber wherein X is in the range of 2-50, preferably in the range of 5-40, more preferably in the range of 15-30.

The bottom part 27 of the metering chamber has a conical shape such that the bottom portion extends downwardly in a direction extending perpendicular to and away from a vertical axis 35. The grinder 28 in this embodiment is positioned centrally with respect to the second chamber portion 25. Referring now to figures 3B and 3C, the grinder will be described in more detail. The grinder comprises a second motor (grinder drive motor) 101 and an upper grinding disk/wheel 102, which may be ceramic or steel. The

upper grinding disk/wheel is rotationally fixed in its position. Furthermore, the second chamber 103 of the metering chamber is shown (referred to by reference 25 in figure 3), which works as dosing funnel. The grinder furthermore comprises a manual adjustment lock 104 to adjust the grind
5 fineness setting by the consumer. The upper grinding disk 102 is moved up or down in respect to the lower grinding disk/wheel 109 when this key is turned. When the adjustment lock is operated, the upper grinding disk moves up and down and the lower grinding disk stays in place. In this way the size of the grind at the exit of the grinding disks, i.e. where they almost touch the outside
10 of the grinder, is determined. The grinder furthermore comprises an exit location 105 for ground coffee out of the circular transport channel 110 into the ground coffee chute 106. The ground coffee chute is a funnel pointing downwards into the brewing device 46 of the coffee brewing apparatus, which is open on the top and placed exactly below this chute when grinding. A
15 rotating drive cone 107 (referred to as bottom part with conical shape 27 of the metering chamber in figure 3) is fixed on the main drive shaft 108. This cone ensures the movement and guidance of the beans out of the metering chamber into the grinding section consisting of the upper grinding disk 102 and the lower grinding disk 109, which may be ceramic or steel. The upper grinding
20 disk 102 and the lower grinding disk 109 have a suitable milled shape for grinding the coffee beans, as is well known in the art. The main drive shaft drives the lower grinding disk 109 and the rotating drive cone 107. There is formed a circular transport channel 110, which transports the ground coffee exiting out of the slit between upper and lower grinding disk to the exit
25 location 105. The shape of the channel results in a “no contamination” grinder, wherein virtually no coffee beans/ground coffee remains after finishing the grinding. Furthermore, the grinder comprises a motor transmission/gear 111 and a cone protrusion 112 to force the beans between the grinder disks.

The lower grinding disk 109 extends around rotating drive cone 107
30 and the upper grinding disk 102 extends above the lower grinder disk 109. The

grinder is rotationally driven by motor 101 resulting in the rotation of the drive cone 107 and the lower grinding disk 109. Due to the shape of the cone protrusion 112 upon driving the drive cone 107 and the lower grinding disk coffee beans are moved in an outwardly extending radial direction between the
5 lower grinding disk 109 and the upper grinding disk 102. Because a vertical distance between the lower grinding disk 109 and the upper grinding disk 102 decreases in the outwardly extending radial direction the beans are crunched and cut into ground coffee.

As explained, grinder 28 supplies ground coffee to a coffee brewing
10 device 46 (schematically shown in figure 3) of the coffee apparatus. The coffee brewing device is arranged to receive a supply of water to extract a coffee beverage from the ground coffee. The coffee beverage is discharged from a coffee beverage exit 37 from the coffee brewing apparatus into a cup or like household receptacle. A water supply can be arranged to supply water to the
15 coffee brewing device under pressure for espresso type coffee beverages or may provide a drip feed to the extraction system formed by coffee brewing device.

Before operating the coffee beverage system, the user has to connect the coffee bean package cartridge 3 to the coffee brewing apparatus 4. Figures 4-9 show an embodiment of the connection means of the coffee beverage
20 system, which are used for this purpose.

Referring now to figure 4, the connection means comprise a recess 50 at an upper side 52 of the coffee brewing apparatus 4. The recess 50 is surrounded by a side wall 54 protruding from the upper side of the coffee brewing apparatus 4. The user should place the corresponding part, shown in
25 figures 5A, 5B, 6, 6B, 6C, 7A, 7B, 7C, 8 and 9, at a lower side of the coffee bean packaging cartridge into the recess. The bayonet elements to be described later of the coffee bean packaging cartridge should be placed in the corresponding openings 58 in the side wall 54 of the recess 50. The user should then rotate the cartridge over 50 degrees until reaching the blocking elements 56 for
30 impeding a further rotation of the coffee bean packaging cartridge. At this

position the exit opening 29 of the first chamber portion 23 is aligned with the coffee inlet 9 of the second chamber portion 25. When the cartridge 3 is removed from the coffee brewing apparatus, the second chamber portion 25 in the appliance is closed by means of an appliance closing plate 51 (figure 4B)

5 The appliance closing plate is being driven by a protrusion 1686 (figure 6C) on the neck of the cartridge which slots into a keyhole 53 on the appliance closing plate as the cartridge is being placed into the openings 58 in the side wall 54 of the recess 50. As the user rotates the cartridge over a 50 degrees angle during placement the closing disk in the consumable and the closing plate in the

10 appliance are opened, simultaneously.

One suitable form of impellor 11 is shown in somewhat more detail in Figures 5A and 5B. To prevent the impellor 11 to get jammed by coffee beans that become locked between the perimeter aperture and radially extending vanes 13, such vanes 13 are preferably made from a resilient

15 material. It is also possible to make the entire impellor 11 from a yieldable resilient material. The impellor 11 has a hollow hub portion engageable by a drive shaft end 1573 of a coffee preparing appliance. The drive shaft end 1573 may have a number of keys 1575 (preferably 4, 6 or 8) for engagement with corresponding protrusions, or keys in the interior of hollow hub 1571. To

20 facilitate engagement of the impeller 11 and the drive shaft end upon placing of the cartridge on the appliance the number of keys may differ between the drive shaft end 1573 and the hollow hub 1571. As illustrated in Figure 5A the vanes 13 do not extend to the perimeter edge of the impeller 11, which may prevent beans from becoming jammed between the vanes 13 and the perimeter

25 aperture. As indicated hereinabove the vanes may also be of a flexible material and to provide more flexibility to the vanes the vanes are conveniently also unattached to the impellor base 1577, by leaving a gap 1579. To fill the metering chamber some fifteen revolutions of the impeller 11 will normally suffice. However, to ensure filling under even adverse conditions, it may be

30 convenient to allow for some extra revolution such as thirty or twenty-five in

total. For filling of the dosing volume the conveying impeller 11 including both the impellor base 1577 (bottom) and the vanes 13 is rotated with a rotational speed in the range of 100 to 500 rpm, and preferably between 250 and 300 rpm. Due to the centrifugal force created by the rotation of the impellor base 5 1577 and the rotation of the vanes the coffee beans are driven in an outward direction towards the inlet opening 21 of the metering chamber. Once the filling of the dosing volume has been accomplished, the appliance will switch from driving the impeller 11 to driving its grinder. With the impeller 11 immobilised the metering chamber will gradually empty into the grinder. 10 Because the impeller 11 is inactive, no beans will escape from container 7, also because of the presence of the trickle through edge 22.

Referring to Figures 6, 6B and 6C an embodiment of the coffee bean packaging cartridge 3 is shown in an exploded arrangement and perspective views. This packaging cartridge includes the container 7 defining an interior 15 volume for coffee beans. The container 7 is preferably made from a transparent material so that its contents can be seen. Optionally, the container 7 may be partially covered by an outer sleeve 1632 which may be printed with a description of the kind of coffee beans inside and may also be apertured to reveal a translucent portion of the container 7. The container 7 is also provided 20 at a lower end thereof with bayonet formation 1683, 1685 for coupling with the openings 56 in the side wall 54 of the recess 50 of the coffee brewing apparatus 3. Inserted into an open bottom end of container 7 is a closure member 1633. The closure member 1633 has the ribbed funnel 8 for guiding coffee beans towards the impellor 11 and a base flange 1636. A rotatable closure disk 1635 25 is rotatably connectable with respect to the base flange 1636 of the closure member 1633. The closure member 1633 and the rotatable closure disk together form an interface between the cartridge and a coffee brewing apparatus. The assemble cartridge can be sealed against deterioration from the ambient air by a sealing membrane 1681 that attaches to the perimeter 30 edge of the container 7. The sealing membrane and barrier foil 1681 may again

be equipped with a conventional one-way pressure relief valve for venting excess pressure from gases emanated from freshly roasted beans to the exterior of the packaging cartridge. Preferably such a venting valve should open at a pressure of between 0.1 bar and 0.5 bar to prevent deformation of the container by inflation. To facilitate removal of the sealing membrane 1681
5 before placing the cartridge on a brewing apparatus, a pulling tab 1682 may be provided.

The interface forming bottom parts of the cartridge are separately shown in more detail in Figures 7A, 7B and 7C. The ribbing on funnel 8 as
10 further seen in the exploded view of Figure 7A is useful in preventing sticking of coffee beans to the surface of the funnel 8.

By appropriate spacing between the successive ribs on funnel 8 it is possible to minimise the contact surface between the beans and the funnel surface. As the skilled person will recognise, such ribbing is merely one of
15 various ways to reduce the contact surface and protruding bulges may be equally effective. Also the inclination given to the funnel may be subject to variation, but an angle in excess of 30 degrees, up to 90 degrees has been found effective.

The rotatable closing disk 1635 has an aperture 1612, which upon
20 appropriate rotation can register with exit opening 29 of the closure member 1633 (see Figure 7B). The closing disk 1635 on its upper surface has protruding therefrom a first detent 1701 and a second detent 1703 (see Figure 7C). The first abutment is bordered by semi-circular slots 1705 and 1707, respectively. Additionally, protruding from the upper surface of the rotatable
25 closing disk 1635 is a first abutment 1709 and a second abutment 1711 for limiting rotational movement in respect of the exit opening 29. Further provided on a bottom face of the base flange 1636 of the closure member 1633 is a first pair of latching arms 1713 and a second pair of latching arms (not shown). The first pair of flexible latching arms 1713 is positioned to cooperate
30 with the first detent 1701 in the closed position of the rotatable closure disk

1635. The second detent 1703 and the second pair of flexible latching arms also cooperate together in the closed position of the closure disk 1635 and are optional.

In reference to Figure 8 it is shown how the first detent 1701 has
5 been caught behind the converging flexible arms 1713A and 1713B of the first part of flexible arms. The position of the detent 1701, as shown in Figure 8, has resulted from rotation of the closure disk 1635 in respect of the closure member 1633 in the direction of arrow 1717. Rotation in the opposite direction of arrow 1719 is effectively prevented by the flexible arms 1713A and 1713B
10 engaging the first detent 1701. Accordingly when the cartridge is in the closed position as determined in the partial cross-section of Figure 8 it may be removed from the apparatus without any risk of spilling beans. Also this latching arrangement ensures that the cartridge is not accidentally opened by rotation of the closure disk 1635.

15 As shown in Figure 9 an unlocking element 1721, which is part of a coffee brewing appliance, can engage through the semi-circular slot 1705 in the direction of arrow 1723 when the cartridge is placed on the appliance. The unlocking element 1721 has a V-shaped upper contour that forces apart the flexible arms 1713A and 1713B of the first pair of flexible arms 1713. This will
20 then allow rotation of the closure disk 1635 in the direction of arrow 1719 by allowing the first detent 1701 to pass between the spread apart flexible arms 1713A and 1713B. This rotating movement is obtained by manually rotating the cartridge with respect to the appliance to engage the bayonet means 1683, 1685 on the container 7 with the counter bayonet formations 56 on the brewing
25 apparatus.

The operation of the second detent 1703 in respect of the second pair of flexible latching arms is identical and when optionally provided will give additional protection against accidental opening, when not engaged on a coffee brewing apparatus.

Referring to figure 4 again, the recess 52 comprises rotatable protruding edges 59 at its center, which are positioned at the end of the driving shaft 18 which is driven by the first motor 17. On these edges the corresponding openings 1716 at the bottom side of the cartridge 3 should be placed. These openings 1716 are formed by a series of protrusions 12 (see figure 5B) on the bottom side of the impeller 11. The openings 1716 receive the edges 59 if the cartridge is connected with the coffee brewing apparatus. Thus by rotating the edges 59 the impellor 11 is rotating too.

The upstanding side wall 54 of the recess 52 may be surrounded by a housing 55, as shown in figures 1-2.

The coffee brewing apparatus comprises a control device unit 40 schematically shown in figure 3, preferably a microprocessor for controlling the dosing, grinding and brewing process. Thereto, the controller may be connected to a sensor acting as a detection means for detecting an identification element such as a barcode or a RFID label of the coffee bean packaging cartridge 3. Thereby the control device unit cannot only detect the presence or removal of the coffee bean cartridge 3, but also receive information about its contents and/or an identifier which identifies the cartridge 3. Preferably the control unit controls the dosing, the grinding and the brewing (including water supply) in dependence on the identifier that was is read by means of the sensor. It thus becomes possible for the control device unit to adjust the dosing, grinding and brewing process in accordance with the particular coffee bean product offered by the cartridge 3. Such information can be supplied to the control unit by the identification element on the cartridge.

Alternatively, as shown in figures 4C, 6D and 10, the sensor is arranged to merely detect the presence and removal of a coffee bean packaging cartridge to the coffee brewing apparatus. The sensor used for this purpose may be a micro switch 60 hidden behind a first horizontal segment 62 and a second horizontal segment 64 in the side wall 54 protruding from the upper side of the coffee brewing apparatus 4. This is to prevent the activation of the

micro switch with finger or other object. A protruding part 1687 (see figure 4C) below the large bayonet element 1683 of the cartridge 3 activates the micro switch, when the cartridge is connected to the coffee brewing apparatus by rotating it to its final position. The protruding part 1687 exactly fits in the slit
5 between the horizontal wall segments 62, 64. This signals the controller that a cartridge is correctly connected to the coffee brewing apparatus. The controller may activate the dosing, grinding and brewing processes only when it has been detected that the cartridge 3 has correctly been connected to the coffee brewing apparatus 4.

10 According to an embodiment, the controller controls these processes as follows. In a first step the metering chamber is completely filled with coffee beans. Thereto, the controller controls the first motor 17 to drive the transportation means. The transportation means is driven longer than is required for filling the metering chamber with coffee beans. In this example in
15 the first step the transportation means is driven longer than is required for completely filling or at least substantially completely filling the metering chamber (in this application at least substantially means for example for more than 90%). This is possible, because of the use of the flexible vanes 13. The metering chamber is arranged for receiving a portion of coffee beans
20 corresponding to a dosed amount of coffee beans which is preferably necessary for preparing a single serving of coffee beverage, such as a single cup coffee comprising 80-160 ml of coffee. A filled metering chamber comprises in this example one dose of coffee beans. One dose of coffee beans comprises 5-11, preferably 6-8 grams of coffee beans.

25 Then, in a second step which follows after the completion of the first step, the controller activates the grinder by activating the second motor 101. The grinder is activated longer than is required for emptying the metering chamber and for grinding all the coffee beans which were collected in the metering chamber during the first step. In this example in the second step the
30 grinder is activated longer than required for completely emptying or at least

substantially completely emptying the metering chamber (in this application at least substantially completely emptying means for example for more than 90%).

Finally, in a third step which follows after that the second step is
5 completed the controller controls the brewing device to brew coffee based on the ground coffee and on heated water.

The system may further be provided with one or more insert pieces that can be connected to the coffee brewing apparatus *in lieu* of a coffee bean packaging cartridge. A first type of insert piece 1100 is depicted in figure 11A.
10 It is a ring shaped element with at its outer surface the bayonet elements 1683, 1685 as well as the protruding part 1687 for activating the micro switch. It may be connected to the coffee brewing apparatus in the same way as a coffee bean packaging cartridge, i.e. by placing the bayonet elements in the corresponding openings 58 in the side wall 54 of the recess 50 in a initial
15 position and then rotate the insert piece over 50 degrees until reaching the final position. When the insert piece is connected to the coffee brewing apparatus, the corresponding activation of the micro switch by the protruding part 1687 signals to the controller that a device is connected to the coffee brewing apparatus. The controller does not know if the activation of the micro
20 switch is caused by a cartridge or by an insert piece. Therefore, when the insert piece 1100 is connected to the coffee brewing apparatus in the final position, as shown in figure 11B, the controller will activate the dosing, grinding and brewing processes, as if there were a coffee bean packaging cartridge connected to the brewing apparatus. So, the insert piece of the first
25 type 1100 may be used to 'unlock' the coffee brewing apparatus.

In an alternative embodiment the insert piece may be a ring shaped element as described above which is integrally provided with a funnel which, when the insert piece is connected to the brewing apparatus, allows a user to manually feed coffee beans or ground coffee into the funnel.

2011216590 05 Sep 2016

inclusive sense. Expressions such as: "means for ..." should be read as: "component configured for ..." or "member constructed to ..." and should be construed to include equivalents for the structures disclosed. The use of expressions like: "critical", "preferred", "especially preferred" etc. is not intended to limit the invention. Features which are not specifically or explicitly
5 described or claimed may be additionally included in the structure according to the present invention without deviating from its scope.

While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example only, and not by way of limitation. It will be apparent to a person skilled in the relevant art that various changes in
10 form and detail can be made therein without departing from the spirit and scope of the invention. Thus, the present invention should not be limited by any of the above described exemplary embodiments.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be
15 understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that that prior publication (or
20 information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

2011216590 05 Sep 2016

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. Coffee beverage system, including a coffee bean packaging cartridge and a coffee brewing apparatus wherein the coffee bean packaging cartridge is removable connected to the coffee brewing apparatus, the coffee bean packaging cartridge being arranged for holding and supplying multiple servings of coffee beans, the coffee beans packaging cartridge including:
 - 5 a container comprising an interior volume and at least one exit opening defining a coffee bean outlet, the interior volume holding coffee beans;
transportation means adapted for enabling transportation of the coffee beans from the interior volume towards the exit opening of the cartridge;
 - 10 wherein the coffee brewing apparatus comprises an entrance opening for receiving coffee beans which are transported with the aid of the transportation means towards the exit opening, a grinder for grinding coffee beans which have entered the coffee apparatus via the entrance opening and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder, wherein the system is further provided with a metering chamber for receiving coffee beans which are transported with the aid of the transportation means into the metering chamber, said metering chamber being arranged for receiving a portion of coffee beans corresponding to a dosed amount of coffee beans, wherein the metering chamber comprises a bottom portion which forms a part of the grinder, said bottom portion being arranged in the coffee brewing apparatus for rotating around a first axis extending in a vertical direction wherein the system is arranged such that upon activation of the grinder the bottom portion is rotating around the vertical axis for transporting the coffee beans from the metering chamber into the grinder and for grinding the coffee beans.
 - 20
2. System according to claim 1, wherein the bottom portion has a conical shape such that
25 the bottom portion extends downwardly in a direction extending perpendicular to and away from the first vertical axis.
3. System according to claim 1 or 2, wherein the metering chamber is divided in a first chamber portion which is part of the cartridge and a second chamber portion which is part of
30 the coffee brewing apparatus wherein the second chamber portion comprises the bottom

portion which forms a part of the grinder, said bottom portion being arranged in the coffee brewing apparatus for rotating around a first axis extending in a vertical direction.

4. System according to claim 3, wherein the first chamber portion comprises the exit opening and the second chamber portion comprises the entrance opening wherein preferably the first chamber portion is located above the second chamber portion wherein the exit opening extends above the entrance opening.

5. System according to any one of the preceding claims, wherein the dosed amount of coffee beans which is preferably necessary for preparing a single serving of coffee beverage, such as a single cup coffee comprising 80-160 ml of coffee.

6. System according to any one of the preceding claims, wherein the transportation means comprise a part which is movable relative to the metering chamber for transporting the coffee beans towards and into the metering chamber upon driving of said transportation means.

7. System according to claim 6, wherein the coffee brewing apparatus is provided with a first motor and a vertically extending drive shaft wherein said drive shaft is releasably connected with the transportation means of the cartridge for driving and thereby moving the transportation means upon rotation of the drive shaft by means of the motor means.

8. System according to claim 6 or 7, wherein the movable part comprises a bottom and/or a plurality of vanes which rotate around a second vertical axis upon driving the transportation means.

9. System according to any one of the preceding claims, wherein the transportation means comprise a downwardly extending bottom wall such as a funnel of the container for transporting the coffee beans towards the metering chamber under the influence of gravity.

10. A system according to claims 6 and 9 wherein the transportation means comprise the funnel of the container and the part which is movable relative to the metering chamber.

2011216590 05 Sep 2016

11. System according to any one of the claims 1-5, wherein the transportation means comprise a downwardly extending bottom wall for transporting the coffee beans towards the metering chamber under the influence of gravity only.

5

12. System according to claim 3 or any one of the claims 4 to 11 when dependent on claim 3, wherein the first chamber portion is provided with a top wall which limits the volume of the metering chamber in an upwardly vertical direction wherein the bottom portion of the second chamber portion limits the volume of the metering chamber in a downwardly vertical direction.

10

13. System according to claim 3 or any one of the claims 4 to 11 when dependent on claim 3, wherein the first chamber portion and the second chamber portion are each provided with at least one upstanding side wall limiting the volume of the metering chamber.

15

14. System according to claim 3 or any one of the claims 4 to 11 when dependent on claim 3, wherein the first chamber portion is provided with an upstanding side wall comprising an inlet opening for entering the coffee beans by means of the transportation means into the metering chamber.

20

15. System according to any one of the preceding claims, wherein the transportation means are arranged for transporting the coffee beans at least in a horizontal direction for transporting the coffee beans into the metering chamber.

25

16. System according to claims 14 and 15, wherein the transportation means are arranged for transporting the coffee beans at least in a horizontal direction towards the inlet opening of the metering chamber.

30

17. System according to claim 16 and any one of the claims 6-8, wherein the movable part of the transportation means are arranged for transporting the coffee beans at least in a horizontal direction.

18. System according to any one of the preceding claims, wherein the coffee bean packaging cartridge comprises closing means for closing the coffee bean outlet when the coffee bean packaging cartridge is not connected to the coffee brewing apparatus.

5

19. System according to claim 18, wherein the closing means are configured for opening the coffee bean outlet when the coffee bean packaging cartridge is connected to the coffee brewing apparatus.

10 20. System according to claim 18 or 19, wherein the closing means comprises a closure member at the bottom side of the container comprising the coffee bean outlet and a rotatable closing disk having an opening.

15 21. System according to claim 19 and 20, wherein in order to connect the coffee bean packaging cartridge to the coffee brewing apparatus the opening of the rotatable closing disk is brought in a position aligned with the coffee bean outlet.

20 22. System according to claim 21, wherein the closure member comprises a pair of fletching arms and the closure disk comprises a detent, which in the closed position is caught behind the fletching arms.

25 23. System according to any preceding claim, wherein the exit opening is associated with a removable sealing element sealing the interior volume prior to activation of the cartridge wherein preferably said sealing element prevents gasses to escape from the cartridge.

24. System according to claim 23, further including means for disrupting and displacing the sealing element.

30 25. System according to claim 23 or 24, wherein the sealing element is a sealing membrane.

2011216590 05 Sep 2016

26. System according to claim 24, wherein the means for disrupting and displacing is a pull tab.

27. System according to any one of the preceding claims, wherein the grinder is positioned
5 centrically with respect to the metering chamber and/or in that the grinder is positioned centrically with respect to the second chamber portion of claim 3.

28. System according to claim 2, wherein the bottom part with the conical shape lies in the direction of the first vertical axis, wherein the conical part rotates around the first vertical axis
10 upon driving the grinder.

29. System according to claim 28, wherein the grinder comprises the bottom portion, a lower grinding disk extending around the bottom portion and an upper grinding disk extending above the lower grinding disk.
15

30. System according to claim 29, wherein the grinder is rotationally driven by a second motor, resulting in the rotation of the bottom part with the conical shape and the lower grinding disk.

20 31. System according to claim 30, wherein upon driving the bottom portion and lower grinding disk coffee beans are moved in an outwardly extending radial direction between the lower grinding disk and the upper grinding disk and in that the coffee beans are crunched and cut into ground coffee, because a vertical distance between the lower grinding disk and the upper grinding disk decreases in the outwardly extending radial direction.

25 32. System according to any preceding claim, wherein the grinder is a no contamination grinder, comprising an exit location for ground coffee out into a ground coffee chute, which is a funnel pointing downwards into the brewing device of the coffee brewing apparatus.

30 33. System according to any one of the preceding claims, wherein the coffee brewing apparatus comprises connection means for the removable connection to the coffee bean

2011216590 05 Sep 2016

packaging cartridge, the connection means comprising a recess at an upper side of the coffee brewing apparatus, the recess being surrounded by a side wall and being configured for receiving a corresponding part protruding from a lower side of the coffee bean packaging cartridge.

5

34. System according to claim 33, wherein the side wall protrudes from the upper side of the coffee brewing apparatus.

35. System according to claim 33 or 34, wherein the side wall comprises openings for receiving bayonet elements of the coffee bean packaging cartridge.

10

36. System according to claim 35, wherein the coffee bean packaging cartridge comprises the bayonet elements.

37. System according to claim 35 or 36, wherein the coffee bean packaging cartridge should be inserted into the recess such that the bayonet elements are inserted in the openings and then rotated in order to be connected to the coffee brewing apparatus, wherein the side wall comprises blocking elements for impeding a further rotation of the coffee bean packaging cartridge, when it has reached its final position.

20

38. System according to claim 37, wherein the coffee bean packaging cartridge should be rotated approximately 50 degrees in order to reach its final position.

39. System according to any one of the claims 33-38 and claim 7, wherein the recess comprises rotatable protruding edges at its center, which are fixed at the driving shaft wherein the transportation means of the cartridge is provided with recesses for receiving the protruding edges such that upon rotation of the drive shaft the rotating protruding edges drive the transportation means.

25

40. System according to claim 34 or any one of the claims 35 to 39 when dependent on claim 34, wherein the coffee brewing apparatus comprises a housing surrounding the protruding side wall.

5 41. System according to claim 2 or any one of the claims 3 to 40 when dependent on claim 2, wherein the first vertical axis runs centrally through the bottom portion of the metering chamber and in that the bottom portion extends downwardly in a direction extending perpendicular to and away from the vertical axis all around the vertical axis and/or in that the first vertical axis runs centrally through the bottom portion of the second chamber portion and
10 in that the bottom portion extends downwardly in a direction extending perpendicular to and away from the vertical axis all around the vertical axis.

42. System according to any one of the preceding claims, wherein the coffee brewing apparatus is provided with a control device.

15

43. System according to claim 7 and 42, wherein the control device is arranged for controlling the first motor and/or the grinder.

44. System according to claim 43, wherein the control device is arranged such that, in use,
20 in a first step the transportation means is driven for filling the metering chamber with coffee beans and that in a second step which follows after the completion of the first step the grinding device is activated for emptying the metering chamber and for grinding coffee beans which were collected in the metering chamber during the first step.

25 45. System according to claim 44, wherein the control device is arranged such that, in use, in the first step the transportation means is driven longer than is required for filling the metering chamber with coffee beans and/or that in the second step the grinding device is activated longer than is required for emptying or at least substantially completely emptying the metering chamber and for grinding all the coffee beans which were collected in the metering
30 chamber during the first step.

2011216590 05 Sep 2016

46. System according to claim 45, wherein in the first step the transportation means is driven longer than is required for completely filling or at least substantially completely filling the metering chamber with coffee beans.

5 47. System according to any preceding claims 45 or 46, wherein the volume of the metering chamber is such that if it is filled with coffee beans in the first step the amount of beans corresponds with one dose of coffee beans for preparing a cup of coffee.

48. System according to claim 44, 45, 46 or 47, wherein the coffee brewing apparatus is
10 arranged such that the control device controls the brewing device wherein the control device is arranged such that, in use, in a third step which follows after that the second step is completed the brewing device is brewing coffee based on the ground coffee and heated water heated by a heating device of the coffee brewing apparatus.

15 49. System according to any one of the preceding claims, wherein it further comprises a sensor arranged for detecting if the coffee bean packaging cartridge is connected to the coffee brewing apparatus.

50. System according to claim 42 and 49, wherein the sensor is configured to signal a
20 result of the detection to the control device.

51. System according to claim 49 or 50, wherein the sensor is a switch.

52. System according to claim 49 or 50, wherein the switch is a micro switch.
25

53. System according to claim 51 or 52, wherein the coffee bean packaging cartridge comprises a protruding part for activating the switch when it is connected to the coffee brewing apparatus.

30 54. System according to claim 36 and 53, wherein the protruding part is located below or above one of the bayonet elements.

2011216590 05 Sep 2016

- 36-

55. System according to claim 53 or 54 and claim 37, wherein the protruding part activates the switch when the coffee bean packaging cartridge reaches its final position.

5 56. System according to any of the claims 53-55 and claim 35, wherein the switch is located in an opening in the sidewall surrounding the recess at the upper side of the coffee brewing apparatus, the protruding part activating the switch through the opening.

10 57. System according to claim 56, wherein the switch is hidden behind horizontal wall segments in the side wall and in that the opening is a slit between the horizontal wall segments, the protruding part fitting in the slit.

15 58. System according to any of the claims 49-57 and claim 43, wherein the controller is arranged for controlling the first motor and the grinder so that they can be activated only if it has been detected that the coffee bean packaging cartridge is connected to the coffee brewing apparatus.

20 59. System according to any one of the preceding claims, wherein it further comprises an insert piece that is removable connectable to the coffee brewing apparatus *in lieu* of the coffee bean packaging cartridge.

60. System according claim 59, wherein the insert piece is connectable to the coffee brewing apparatus in a same or similar way as the coffee bean packaging cartridge.

25 61. System according to claims 35 and 60, wherein the insert piece comprises bayonet elements.

30 62. System according to any one of the claims 59-61 when dependent on claim 51 or 52, wherein the insert piece comprises a protruding part for activating the switch when it is connected to the coffee brewing apparatus.

2011216590 05 Sep 2016

- 37-

63. System according to claim 61 and 62 when dependent on claim 51 or 52, wherein the protruding part is located below or above one of the bayonet elements.

64. System according to claim 62 or 63 and claim 37, wherein the protruding part activates
5 the switch when the insert piece reaches its final position.

65. System according to any of the claims 59-64, wherein the insert piece comprises a cavity having an interior volume and at least one exit opening defining a coffee bean outlet, the interior volume being arranged for receiving coffee beans, the insert piece further
10 comprising closing means for closing the coffee bean outlet when the insert piece is not connected to the coffee brewing apparatus or not connected to the coffee brewing apparatus in its final position.

66. System according to claim 65, wherein the closing means are configured for opening
15 the coffee bean outlet when the insert piece is connected to the coffee brewing apparatus in its final position.

67. System according to claim 65 or 66, wherein the closing means comprises a closure member at the bottom side of the cavity comprising the coffee bean outlet and in that the
20 closing means furthermore comprises a rotatable closing disk having an opening.

68. System according to claim 67, wherein when the insert piece is connected to the coffee brewing apparatus in its final position, the opening of the rotatable closing disk is in a position aligned with the coffee bean outlet.
25

69. System according to any one of the preceding claims, wherein the system is arranged such that upon activation of the grinder the bottom portion is rotating around the first vertical axis for transporting the dose of coffee beans from the metering chamber into the grinder and for grinding the coffee beans.
30

2011216590 05 Sep 2016

- 38-

70. System according to claim 69, wherein the one dose of coffee beans comprises 5-11, preferably 6-8 grams of coffee beans.

71. System according to claim 3 or any one of the claims 4 to 70 when dependent on claim 3, wherein the second chamber portion comprises about 100- X% of the volume of the metering chamber and the first chamber portion comprises about X% of the volume of the metering chamber wherein X is in the range of 2-50, preferably in the range of 5-40, more preferably in the range of 15-30.

72. System according to any of the preceding claims, wherein the system is arranged such that, in use, the grinding device is activated for emptying the metering chamber and for grinding the coffee beans collected in the metering chamber.

73. System according to claim 72, wherein the system is arranged such that in use the grinding device is activated longer than is required for emptying or at least substantially completely emptying the metering chamber and for grinding all the coffee beans collected in the metering chamber.

74. System according to claim 72 or 73, wherein previous to the emptying of the metering chamber and the grinding of the coffee beans, in a first step the transportation means is driven for filling the metering chamber with coffee beans.

75. System according to claim 74, wherein the transportation means is driven longer than is required for completely filling or at least substantially completely filling the metering chamber with coffee beans.

76. System according to any one of the preceding claims, wherein the coffee bean packaging cartridge is filled with coffee beans.

77. System according to claim 76, wherein the container is filled with one dose of coffee beans.

2011216590 05 Sep 2016

78. System according to claim 76, wherein the coffee bean packaging is filled with multiple servings of coffee beans.

5 79. System according to any one of the preceding claims, wherein the coffee brewing apparatus comprises closing means which are configured for opening and/or closing the entrance opening of the coffee brewing apparatus, said closing means preferably being configured to be controlled by the coffee brewing apparatus and/or the (dis)connection of the packaging cartridge (from) to the coffee brewing apparatus.

10

80. System according to any one of the preceding claims, wherein at least a lower portion of the metering chamber is part of a dosing device.

15 81. Coffee brewing apparatus, preferably for use in a coffee beverage system according to any one of the preceding claims, comprising an entrance opening for receiving coffee beans, a grinder for grinding coffee beans which have entered the coffee apparatus via the entrance opening and a brewing device for brewing coffee on the basis of ground coffee obtained by means of the grinder, wherein the coffee brewing apparatus is further provided with at least a lower portion of a metering chamber for receiving coffee beans via the entrance opening,
20 wherein the metering chamber is arranged for receiving a portion of coffee beans corresponding to a dosed amount of coffee beans and comprises a bottom portion which forms a part of the grinder, said bottom portion being arranged in the coffee brewing apparatus for rotating around a first axis extending in a vertical direction wherein the coffee brewing apparatus is arranged such that upon activation of the grinder the bottom portion is rotating
25 around the vertical axis for transporting the coffee beans from the metering chamber into the grinder and for grinding the coffee beans.

82. Apparatus according to claim 81, wherein the bottom portion has a conical shape such that the bottom portion extends downwardly in a direction extending perpendicular to and
30 away from the first vertical axis.

2011216590 05 Sep 2016

- 40-

83. Apparatus according to claim 81 or 82, wherein the metering chamber comprises the entrance opening and/or wherein the apparatus comprises only the lower portion of the metering chamber and wherein the cartridge comprises an upper portion of the metering chamber said lower portion and said upper portion forming the metering chamber and
5 wherein the first chamber portion comprises an inlet opening for coffee beans.

84. Apparatus according to any one of the claims 81-83, wherein the dosed amount of coffee beans which is preferably necessary for preparing a single serving of coffee beverage, such as a single cup coffee comprising 80-160 ml of coffee.
10

85. Apparatus according to any one of the claims 81-84, wherein the coffee brewing apparatus is provided with a first motor and a vertically extending drive shaft.

86. Apparatus according to any one of the claims 81-85, wherein the bottom portion of the
15 metering chamber limits the volume of the metering chamber in a downwardly vertical direction.

87. Apparatus according to any one of the claims 81-86, wherein the metering chamber is provided with at least one upstanding side wall limiting the volume of the metering chamber.
20

88. Apparatus according to any one of the claims 81-87, wherein the coffee brewing apparatus comprises closing means which are configured for opening and/or closing the entrance opening of the coffee brewing apparatus.

25 89. Apparatus according to claim 88, wherein the closing means comprises a rotatable closing disk having an opening.

90. Apparatus according to any one of the claims 81-89, wherein the grinder is positioned centrally with respect to the metering chamber.
30

91. Apparatus according to claim 82 or any one of the claims 83-90 when dependent on claim 81, wherein the bottom part with the conical shape lies in the direction of the first vertical axis, wherein the conical part rotates around the first vertical axis upon driving the grinder.

5

92. Apparatus according to claim 91, wherein the grinder comprises the bottom portion, a lower grinding disk extending around the bottom portion and an upper grinding disk extending above the lower grinding disk.

10 93. Apparatus according to claim 92, wherein the grinder is rotationally driven by a second motor, resulting in the rotation of the bottom part with the conical shape and the lower grinding disk.

15 94. Apparatus according to claim 93, wherein upon driving the bottom portion and lower grinding disk coffee beans are moved in an outwardly extending radial direction between the lower grinding disk and the upper grinding disk and in that the coffee beans are crunched and cut into ground coffee, because a vertical distance between the lower grinding disk and the upper grinding disk decreases in the outwardly extending radial direction.

20 95. Apparatus according to any one of the claims 81-94, wherein the grinder is a no contamination grinder, comprising an exit location for ground coffee out into a ground coffee chute, which is a funnel pointing downwards into the brewing device of the coffee brewing apparatus.

25 96. Apparatus according to any one of the claims 81-95, wherein the coffee brewing apparatus comprises connection means, the connection means comprising a recess at an upper side of the coffee brewing apparatus, the recess being surrounded by a side wall.

30 97. Apparatus according to claim 96, wherein the side wall protrudes from the upper side of the coffee brewing apparatus.

2011216590 05 Sep 2016

98. Apparatus according to claim 96 or 97, wherein the side wall comprises openings for receiving bayonet elements.
99. Apparatus according to claim 96, 97 or 98, wherein the recess comprises rotatable protruding edges at its center, which are fixed at the driving shaft.
100. Apparatus according to any one of the claims 96-99, wherein the coffee brewing apparatus comprises a housing surrounding the protruding side wall.
101. Apparatus according to any one of the claims 81-100, wherein the first vertical axis runs centrally through the bottom portion of the metering chamber and in that the bottom portion extends downwardly in a direction extending perpendicular to and away from the vertical axis all around the vertical axis.
102. Apparatus according to any one of the claims 81-101, wherein the coffee brewing apparatus is provided with a control device.
103. Apparatus according to claim 85 and 102, wherein the control device is arranged for controlling the first motor and/or the grinder.
104. Apparatus according to claim 103, wherein the control device is arranged such that, in use, in a first step the metering chamber is filled with coffee beans and that in a second step which follows after the completion of the first step the grinding device is activated for emptying the metering chamber and for grinding coffee beans which were collected in the metering chamber during the first step.
105. Apparatus according to claim 104, wherein the control device is arranged such that, in use, in the second step the grinding device is activated longer than is required for emptying or at least substantially completely emptying the metering chamber and for grinding all the coffee beans which were collected in the metering chamber during the first step.

2011216590 05 Sep 2016

106. Apparatus according to claim 104 or 105, wherein the volume of the metering chamber is such that if it is filled with coffee beans in the first step the amount of beans corresponds with one dose of coffee beans for preparing a cup of coffee.
- 5 107. Apparatus according to claim 103, 104, 105 or 106, wherein the coffee brewing apparatus is arranged such that the control device controls the brewing device, wherein the control device is arranged such that, in use, in a third step which follows after that the second step is completed the brewing device is brewing coffee based on the ground coffee and heated water heated by a heating device of the coffee brewing apparatus.
- 10 108. Apparatus according to any one of the claims 81-107, wherein it further comprises a sensor arranged for detecting if a coffee bean packaging cartridge is connected to the coffee brewing apparatus.
- 15 109. Apparatus according to claim 102 and 108, wherein the sensor is configured to signal a result of the detection to the control device.
110. Apparatus according to claim 108 or 109, wherein the sensor is a switch.
- 20 111. Apparatus according to claim 109 or 110, wherein the switch is a micro switch.
112. Apparatus according to any of the claims 109-111 and claim 96, wherein the switch is located in an opening in the sidewall surrounding the recess at the upper side of the coffee brewing apparatus.
- 25 113. Apparatus according to claim 112, wherein the switch is hidden behind horizontal wall segments in the side wall and in that the opening is a slit between the horizontal wall segments.
- 30 114. Apparatus according to any one of the claims 102-113 and claim 85, wherein the control device is arranged for controlling the first motor and the grinder so that they can be

2011216590 05 Sep 2016

activated only if it has been detected that a coffee bean packaging cartridge is connected to the coffee brewing apparatus.

115. Apparatus according to any one of the claims 81-114, wherein the apparatus is arranged such that upon activation of the grinder the bottom portion is rotating around the first vertical axis for transporting the dose of coffee beans from the metering chamber into the grinder and for grinding the coffee beans.

116. Apparatus according to any of the claims 81-115, wherein the apparatus is arranged such that, in use, the grinding device is activated for emptying the metering chamber and for grinding the coffee beans collected in the metering chamber.

117. Apparatus according to claim 115, wherein the apparatus is arranged such that in use the grinding device is activated longer than is required for emptying or at least substantially completely emptying the metering chamber and for grinding all the coffee beans collected in the metering chamber.

118. Apparatus according to claim 116 or 117, wherein previous to the emptying of the metering chamber and the grinding of the coffee beans, in a first step the metering chamber is filled with coffee beans.

119. Apparatus according to any one of the claims 81 to 118, comprising an insert piece as defined in any one of the claims 59 – 68.

120. Coffee beverage system according to any one of the claims 1 – 80, comprising a coffee brewing apparatus according to any one of the claims 81 – 119, and an insert piece of the system according to any one of the claims 59 – 68.

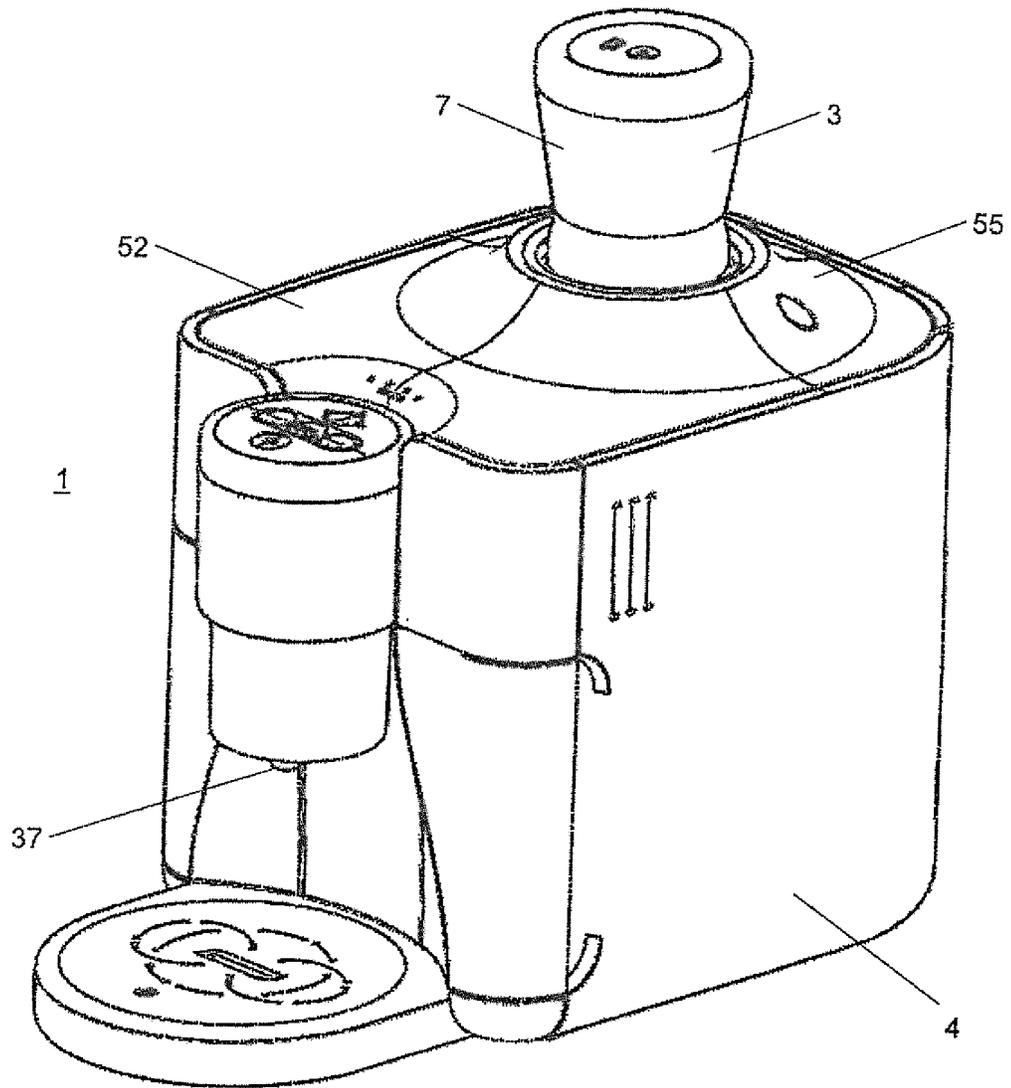


Fig. 1

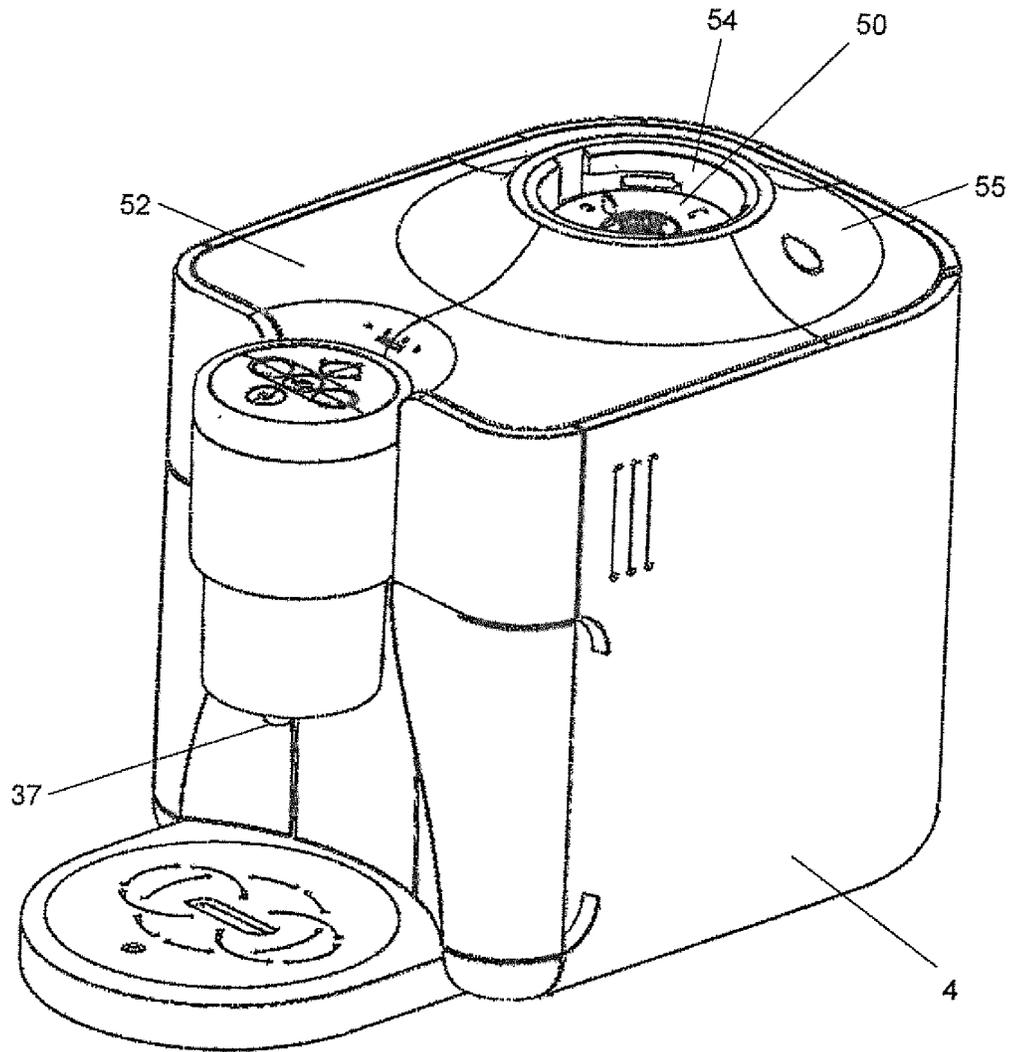


Fig. 2

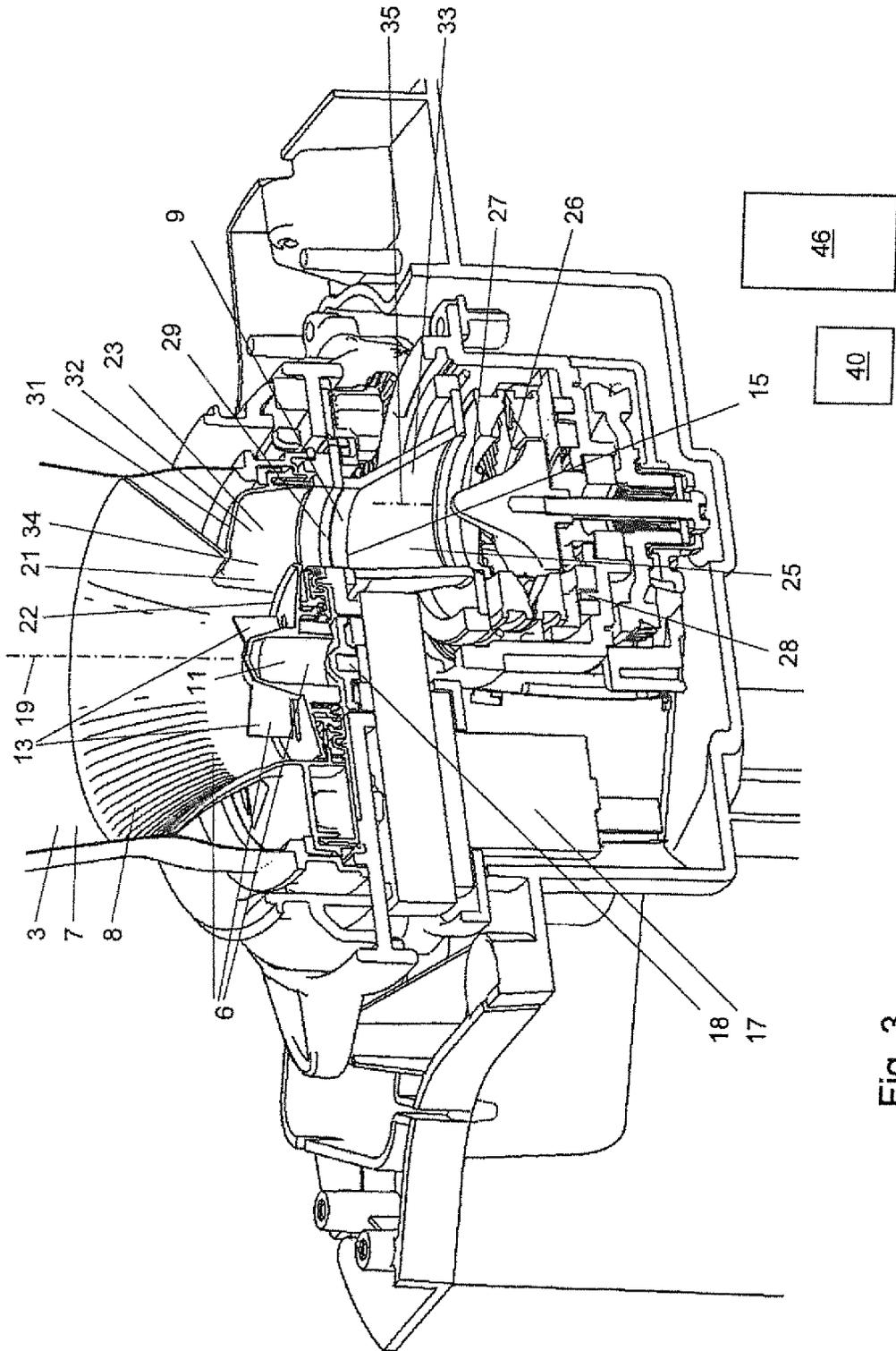


Fig. 3

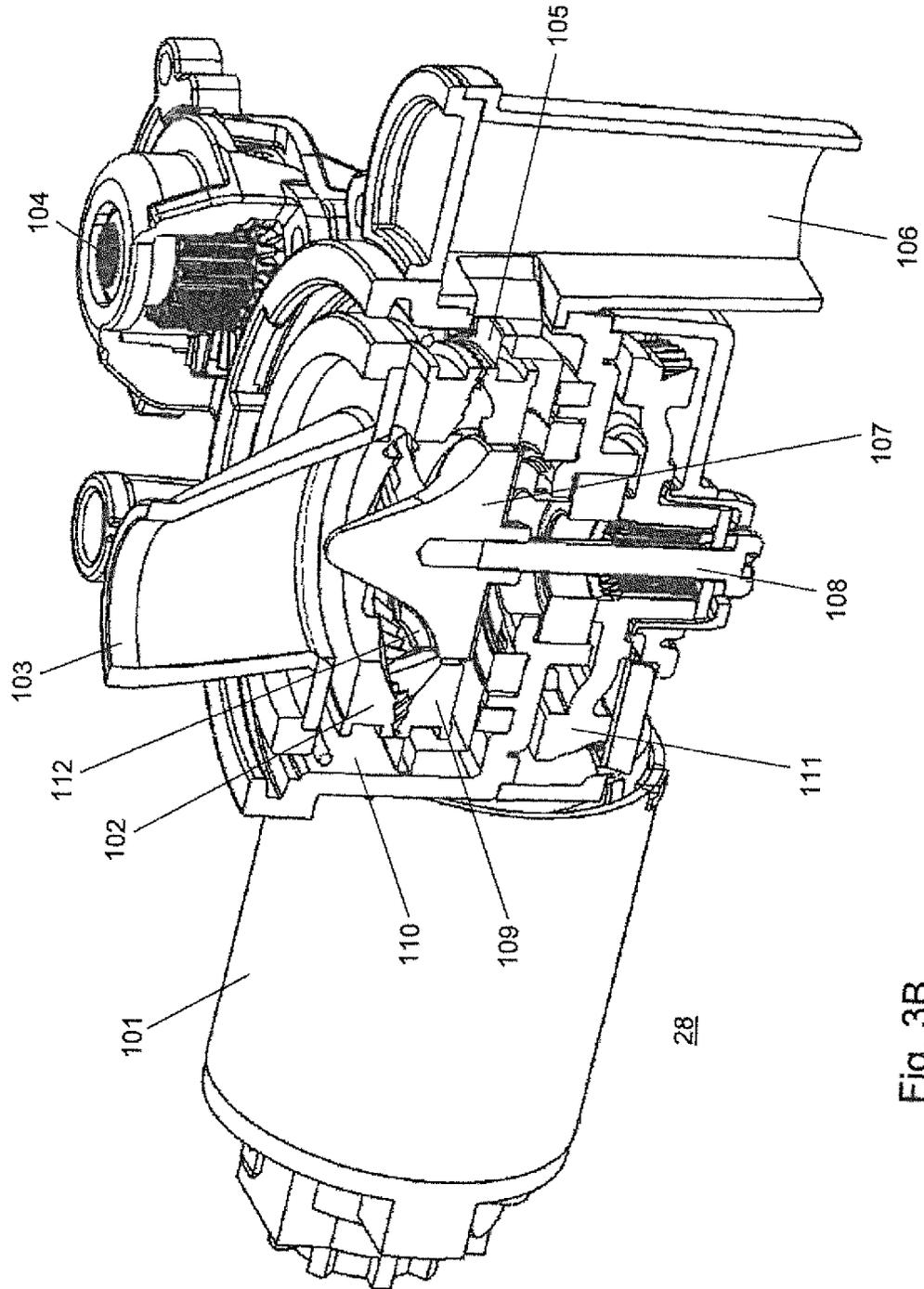


Fig. 3B

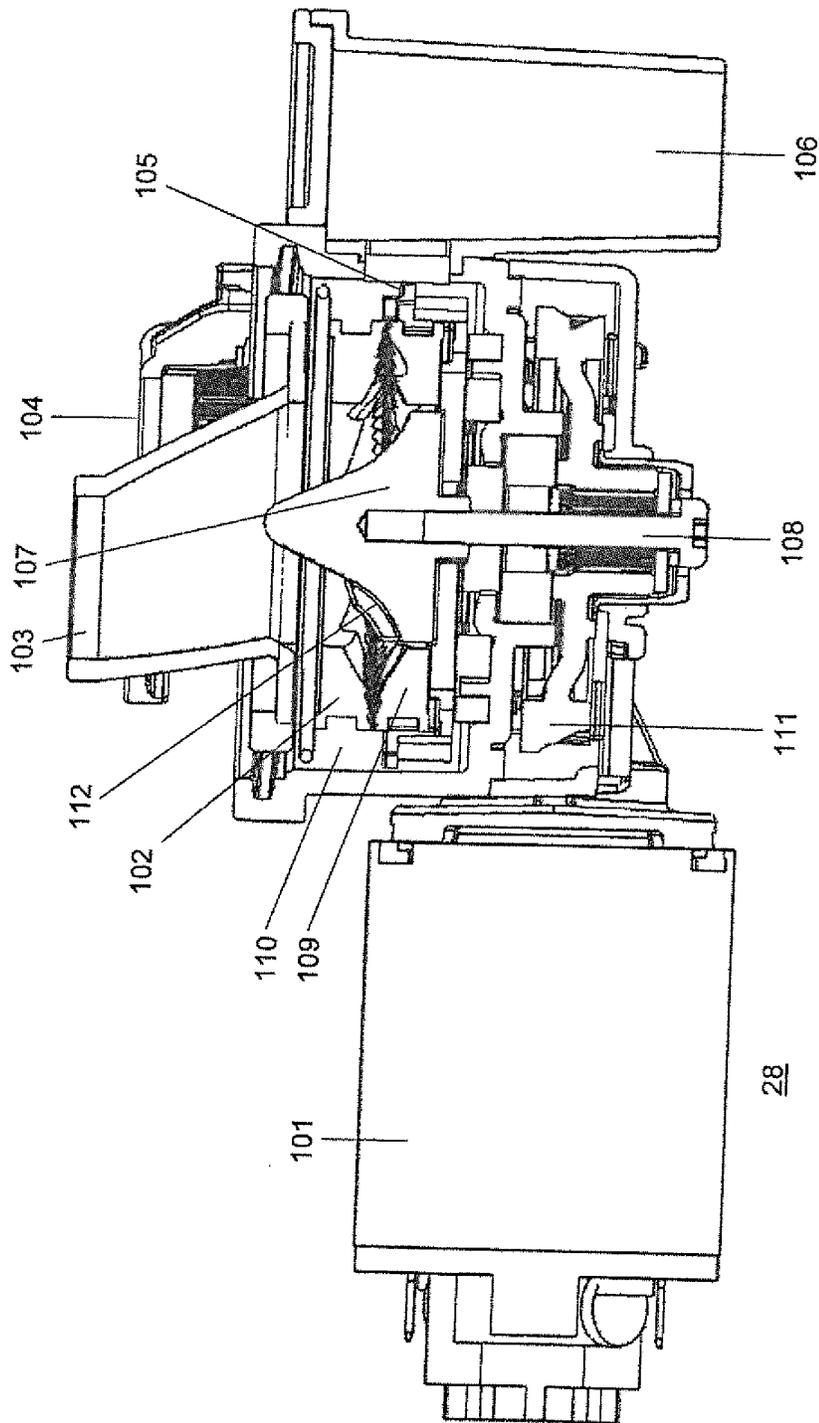


Fig. 3C

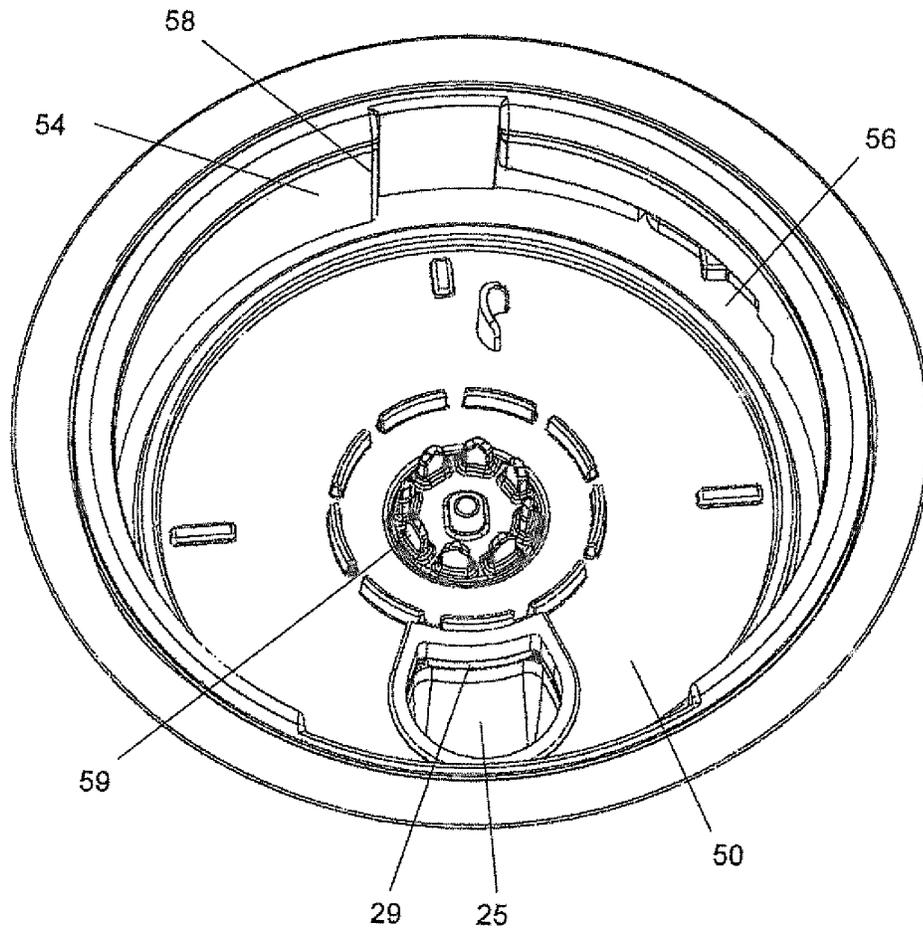


Fig. 4

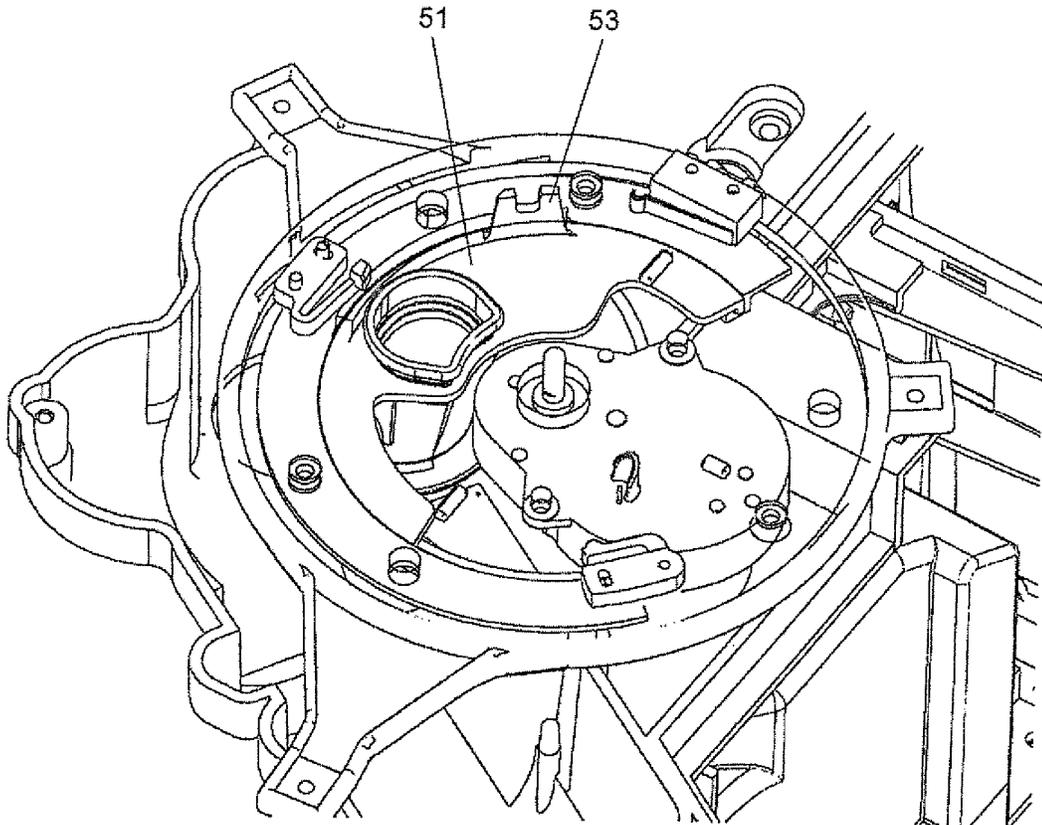


Fig. 4B

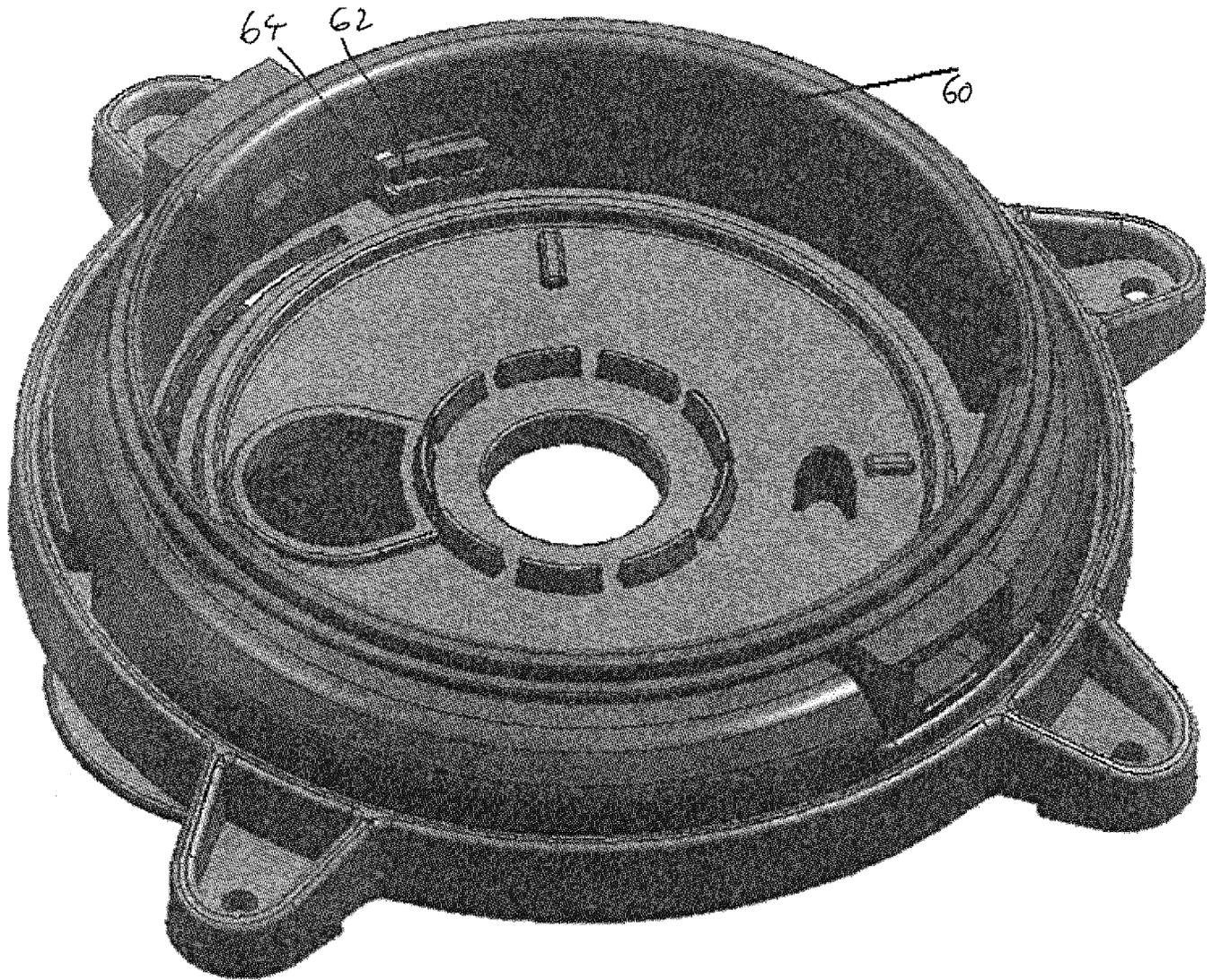


Fig. 4C

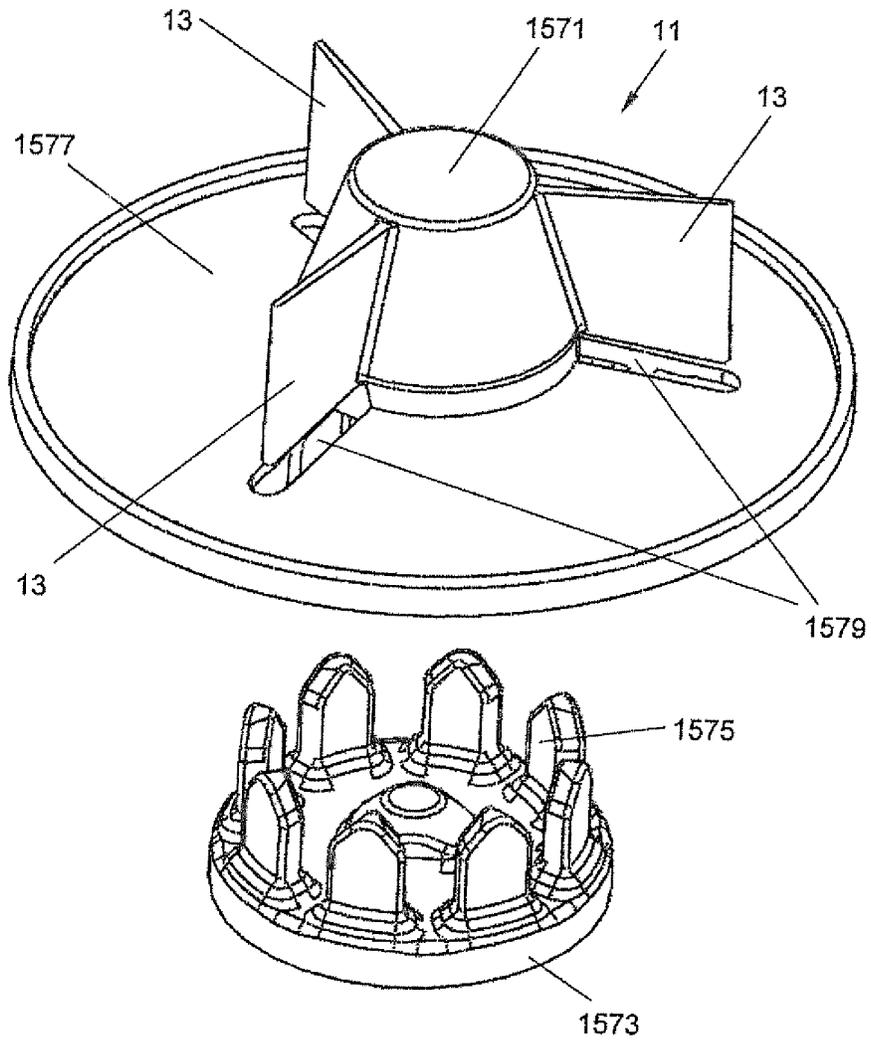


Fig. 5A

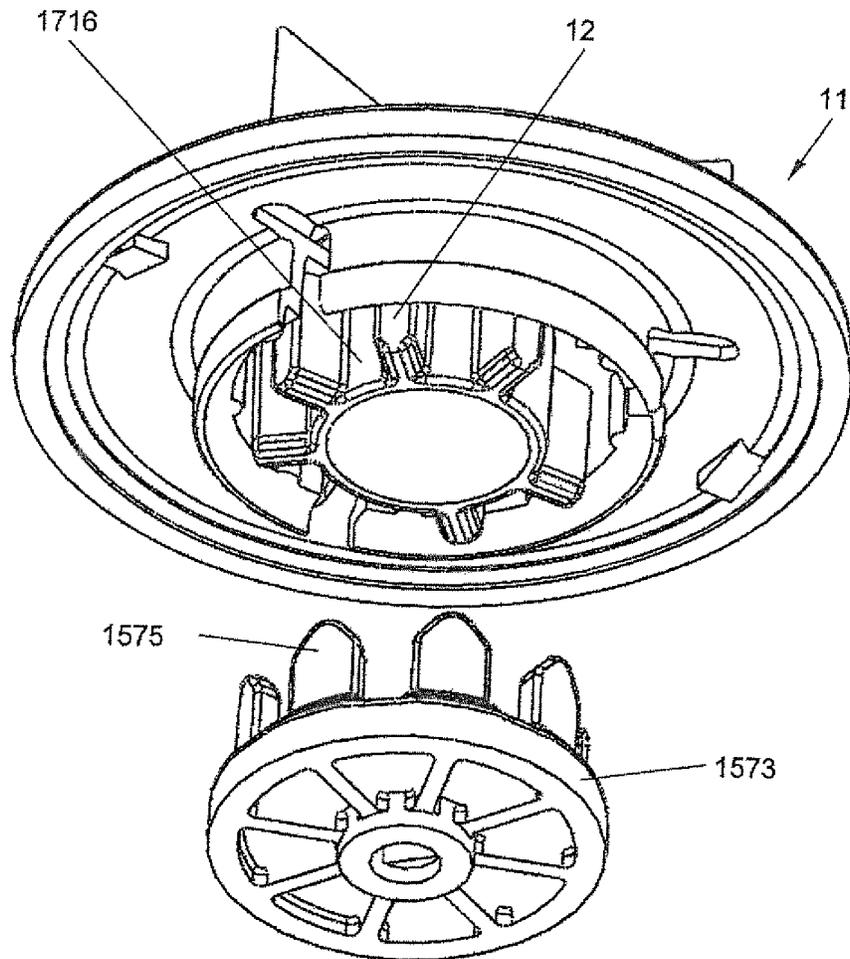


Fig. 5B

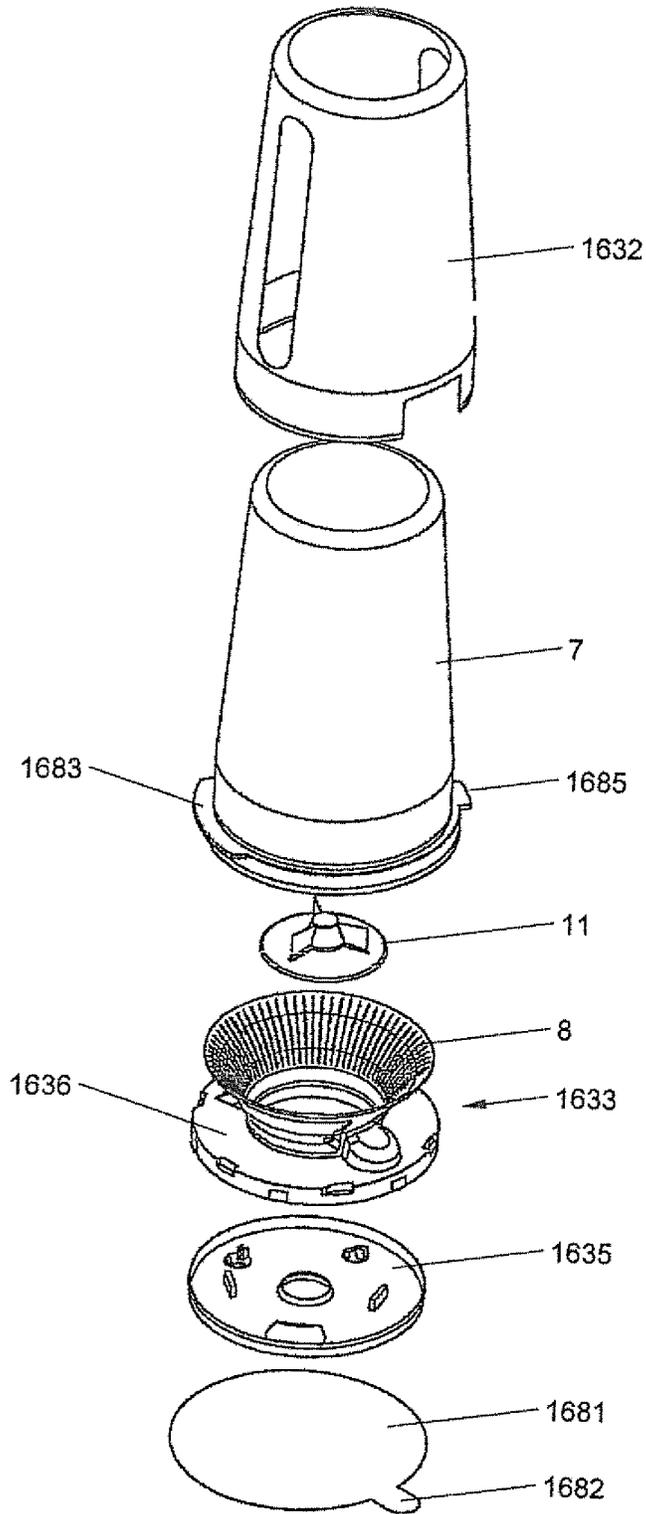


Fig. 6

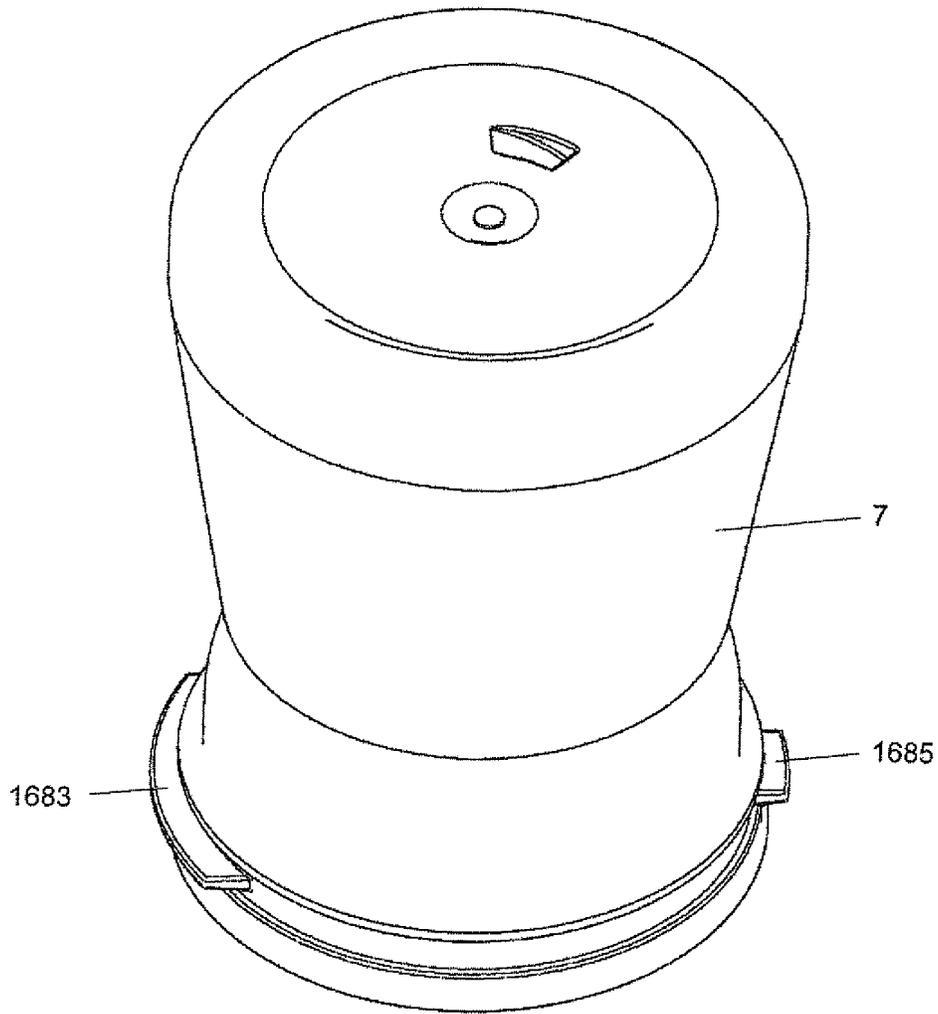


Fig. 6B

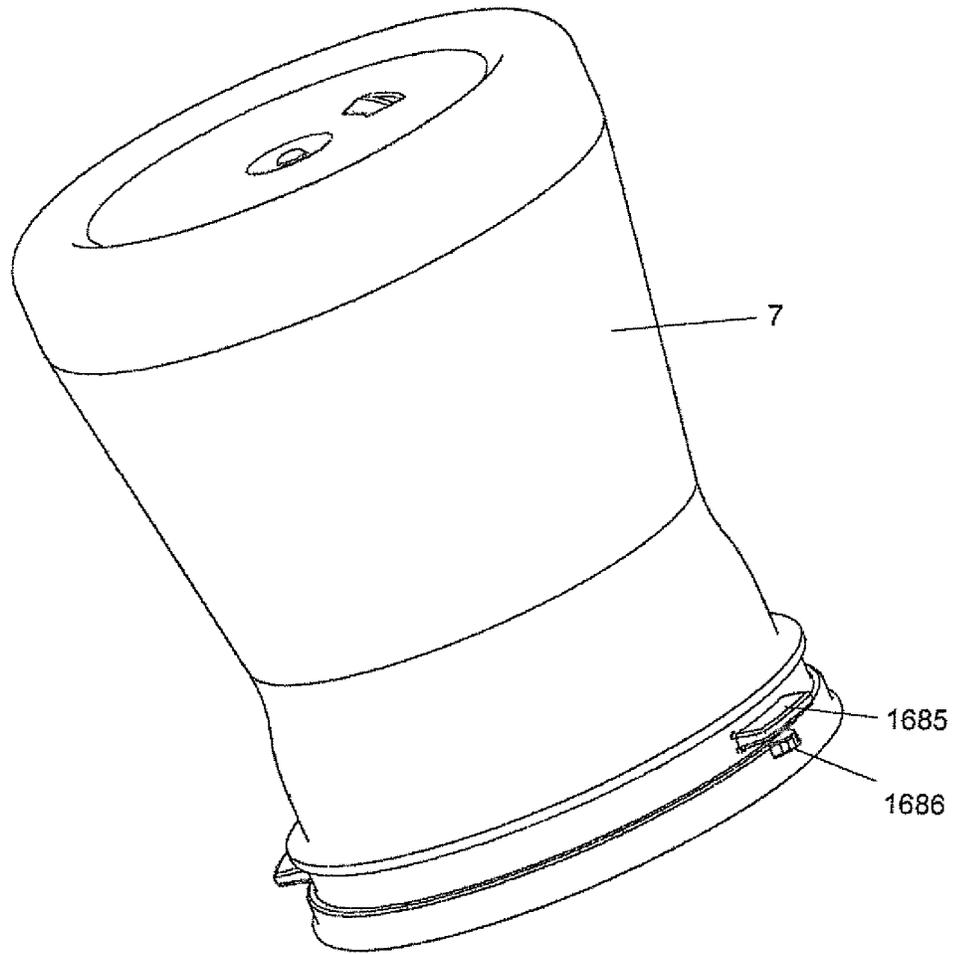


Fig. 6C

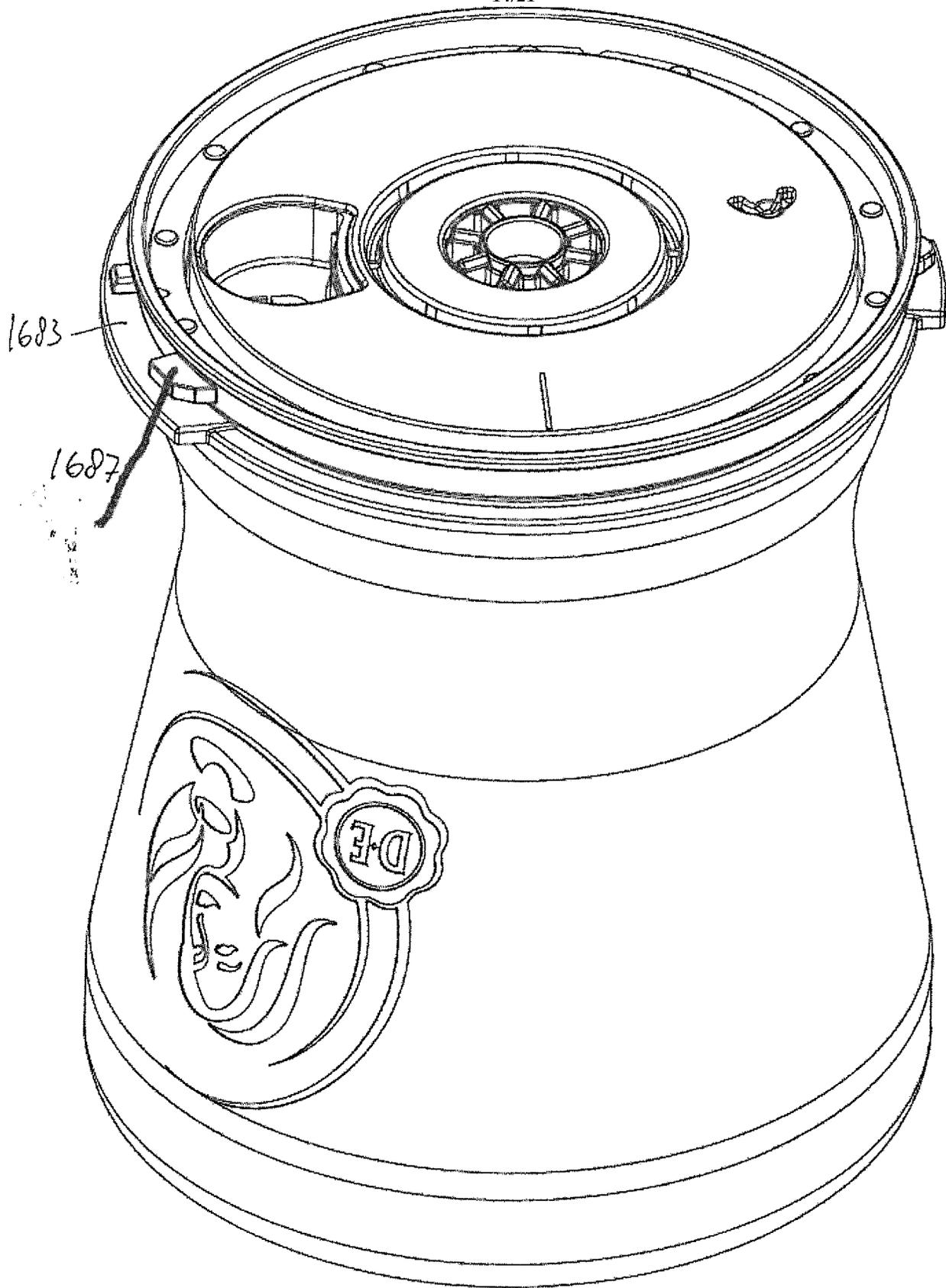


Fig. 6D

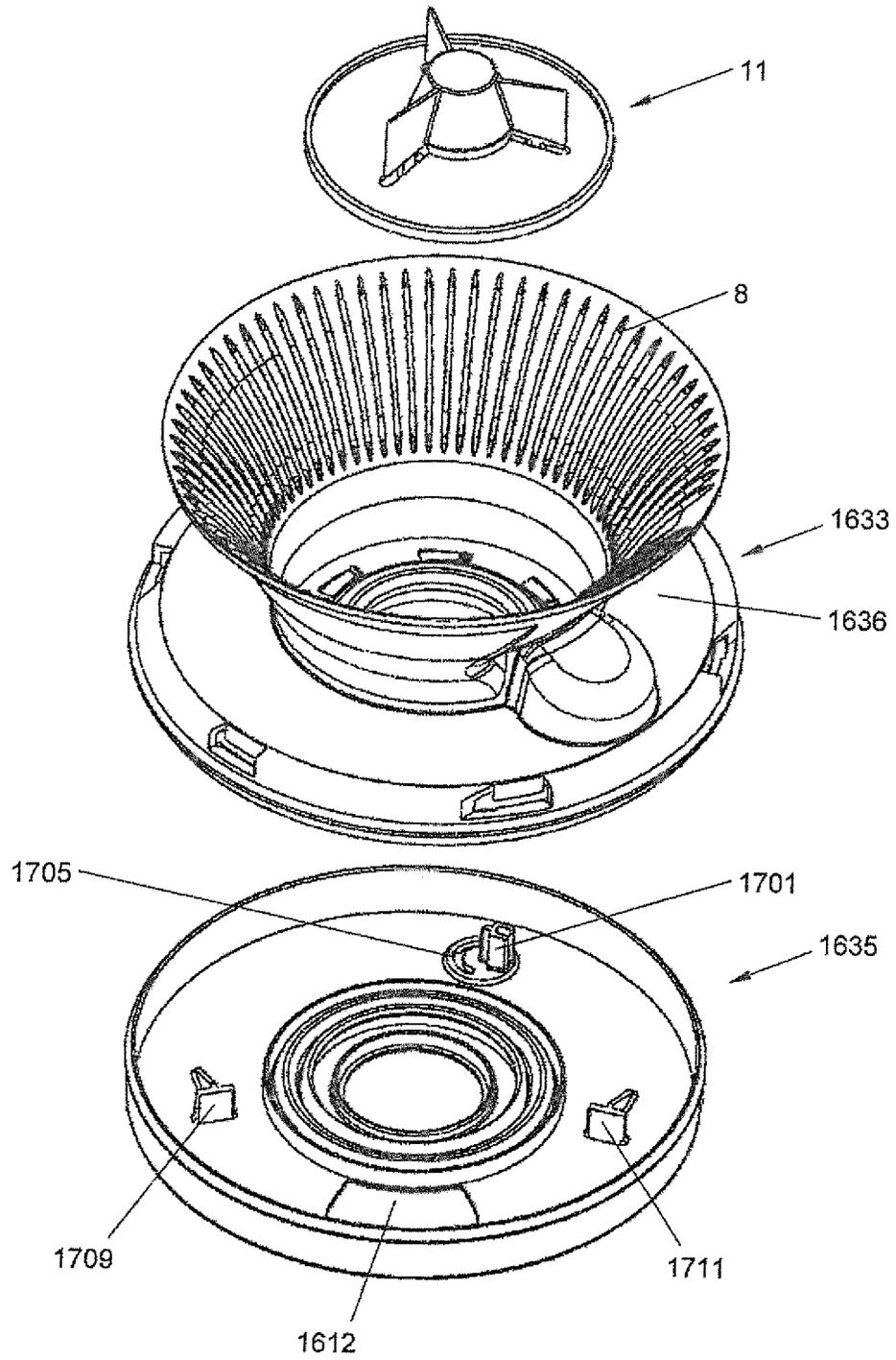


Fig. 7A

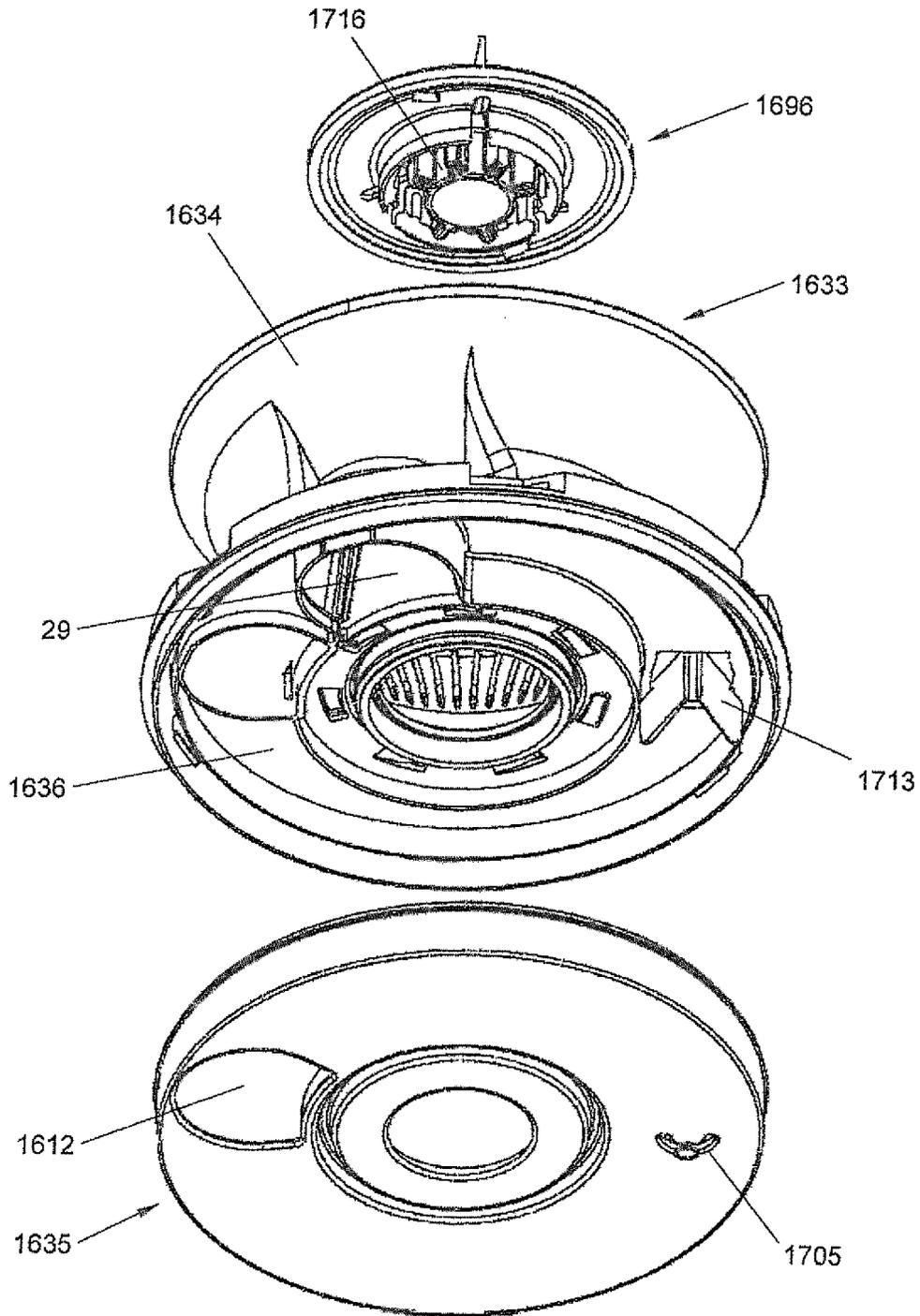


Fig. 7B

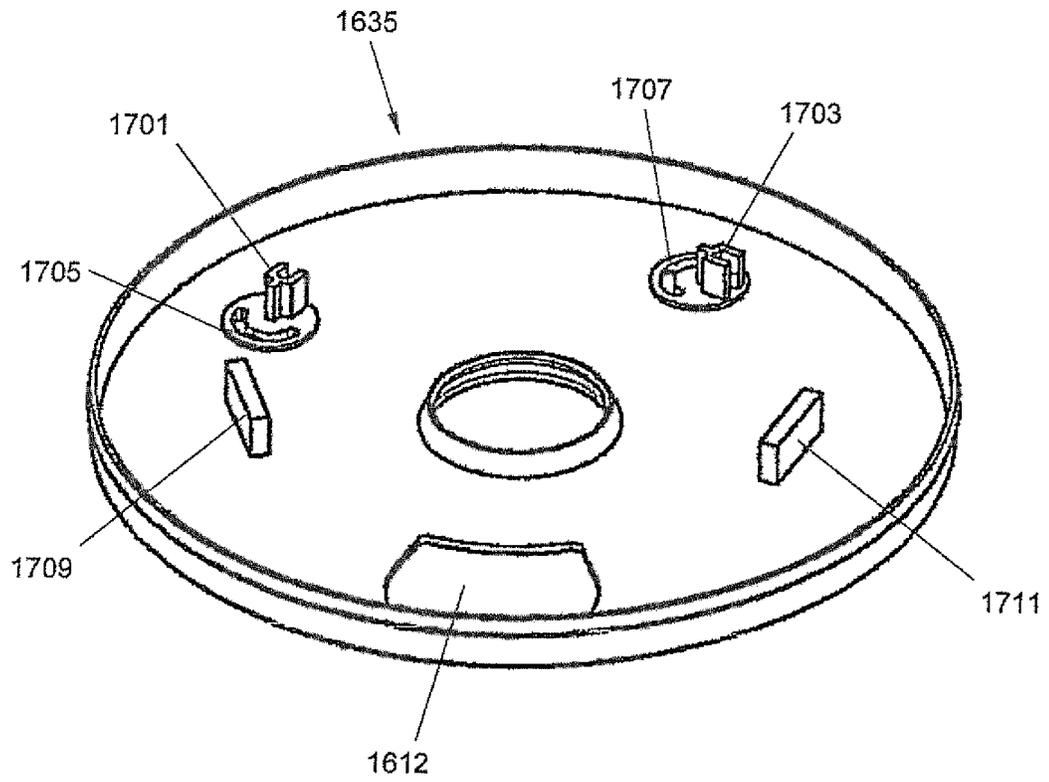


Fig. 7C

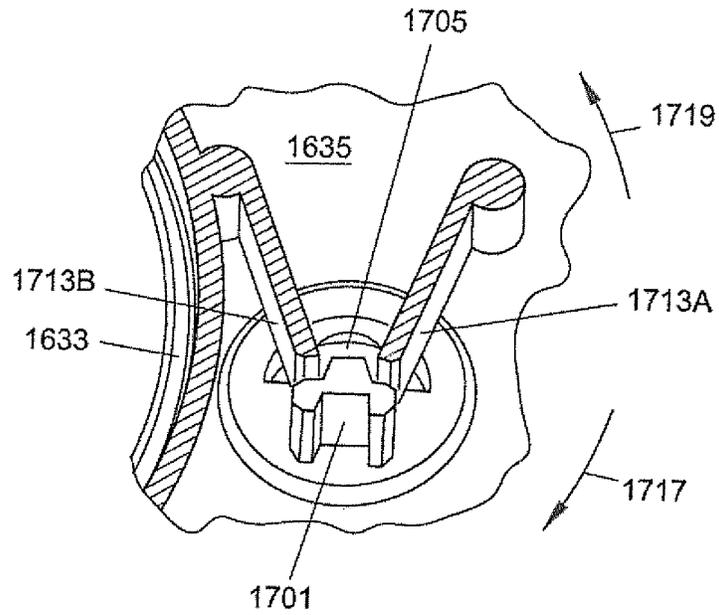


Fig. 8

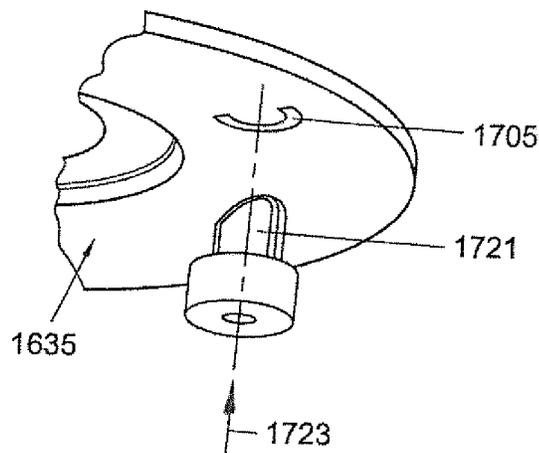


Fig. 9

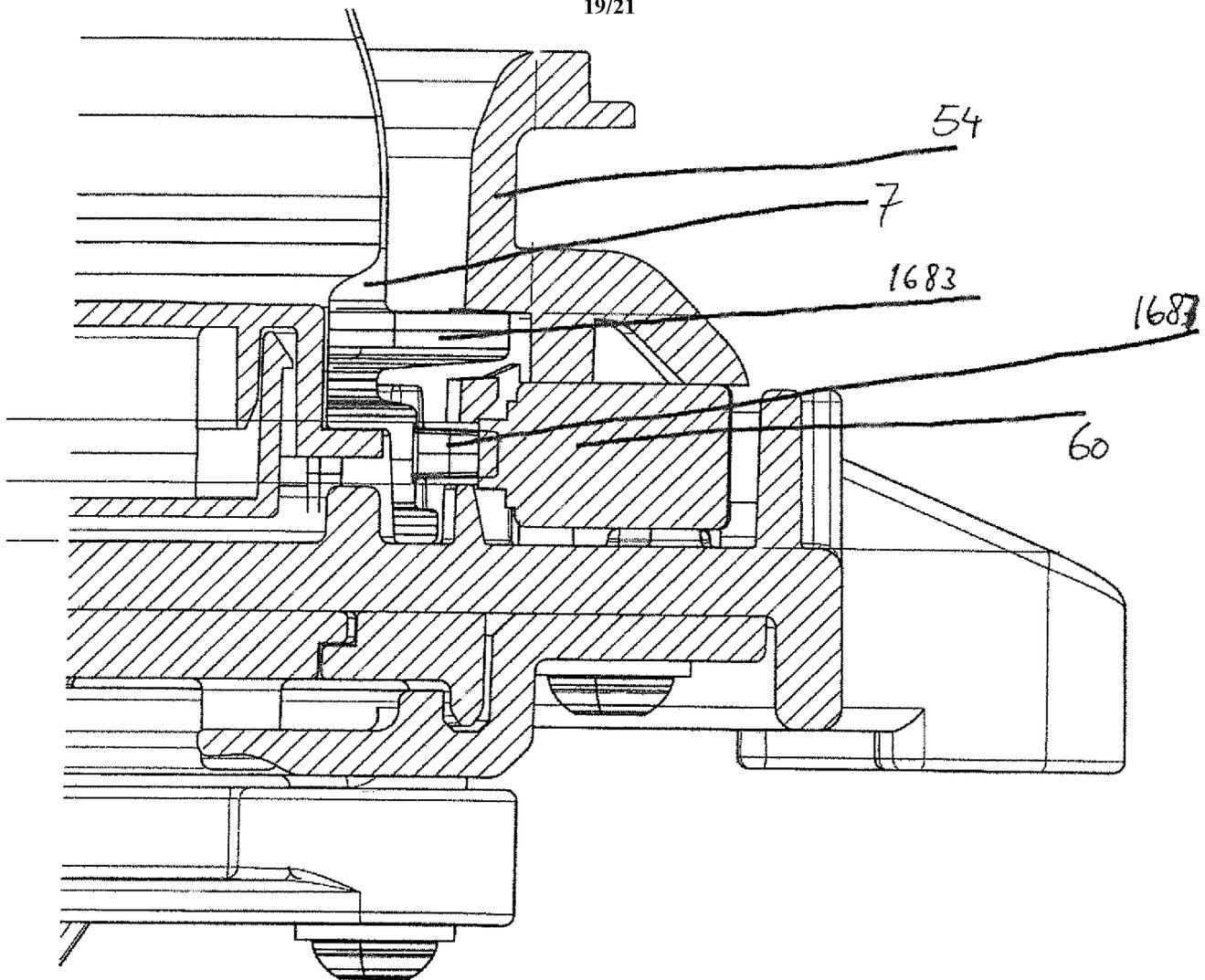
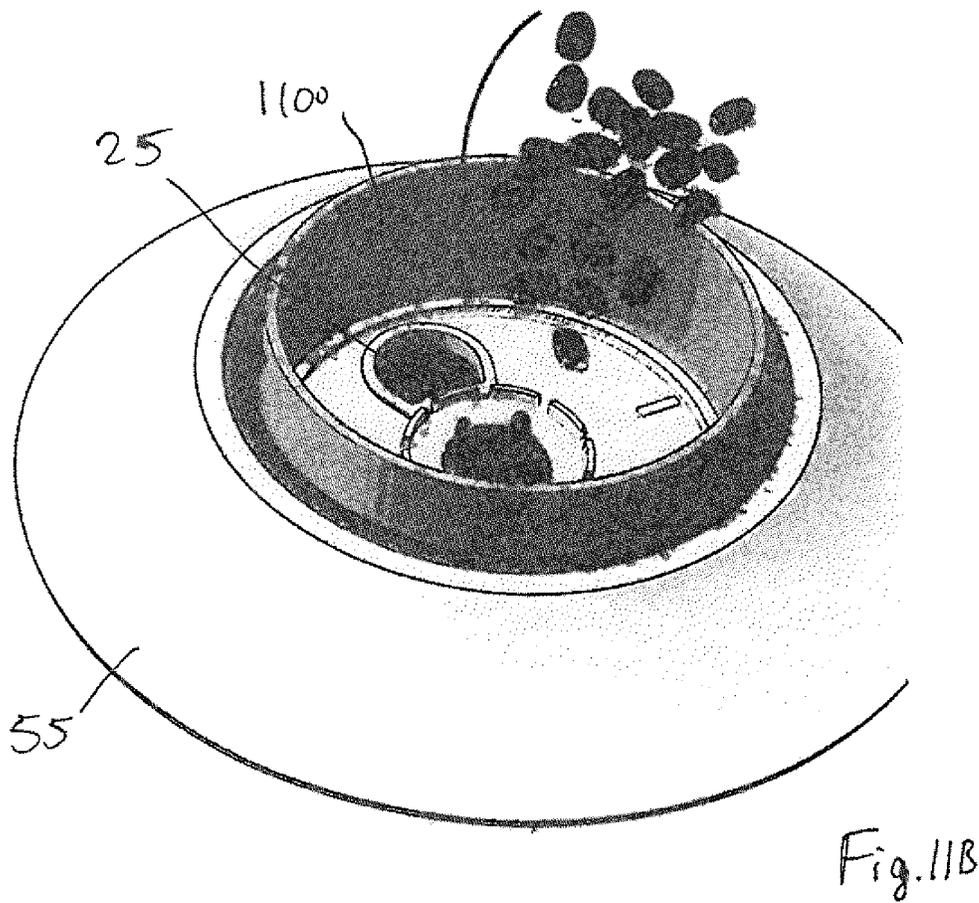
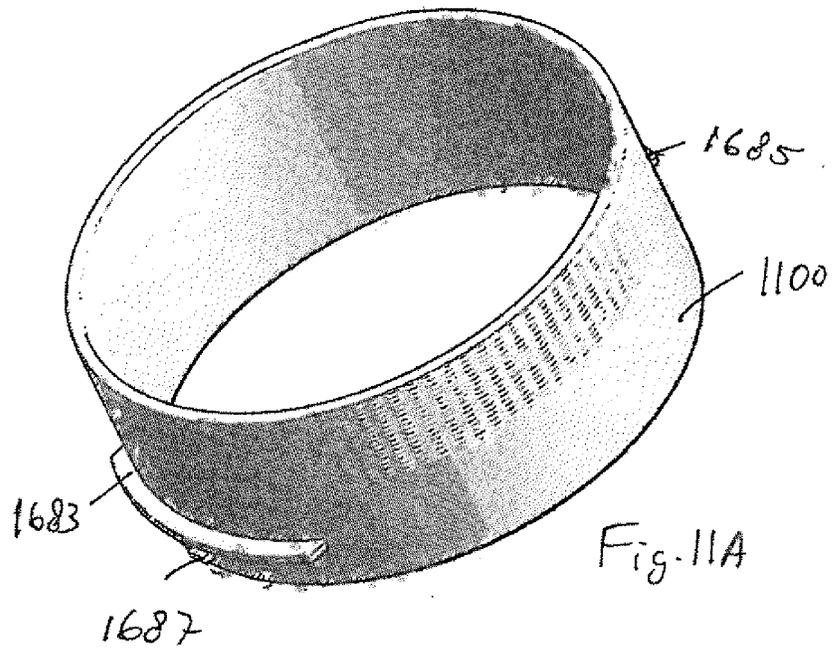


Fig.10



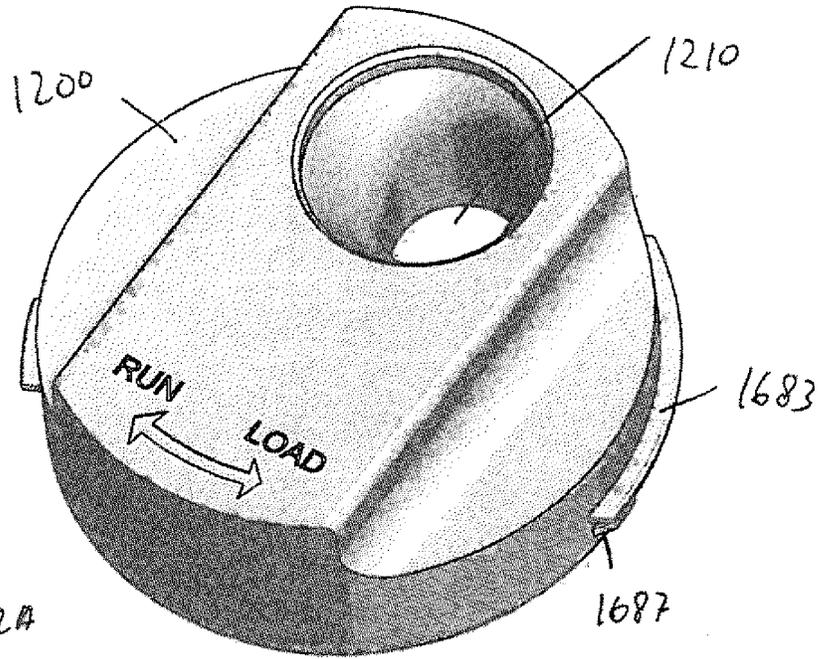


Fig. 12A

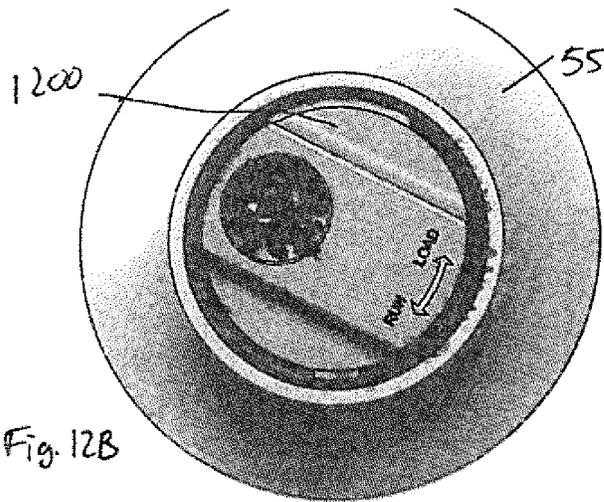


Fig. 12B

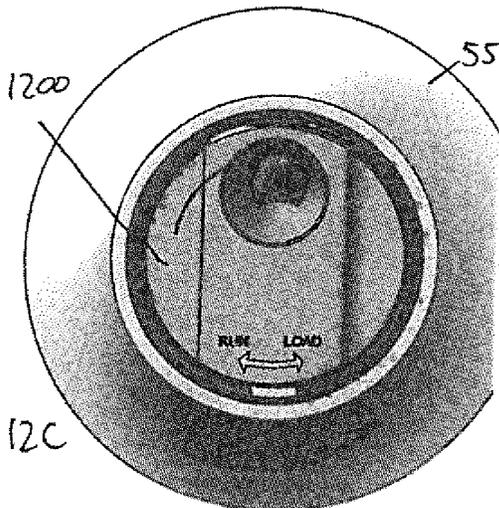


Fig. 12C