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(71) Applicant(s):
Ezee Whip Ice-cream Limited
(Incorporated in the United Kingdom)
Maple House, Main Street, COSGROVE,
Milton Keynes, MK19 7DL,
United Kingdom

(72) Inventor(s):
Andrew Michael Wells

(74) Agent and/or Address for Service:
Urquhart-Dykes & Lord LLP
Midsummer House,
413 Midsummer Boulevard,
CENTRAL MILTON KEYNES, MK9 3BN,
United Kingdom

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INT CL[7] A23G, B65D
Other: ONLINE:WPI,EPODOC

(54) Abstract Title: **Food container having a piston for dispensing**

(57) A food container (1;101) for storing and dispensing an individual portion of semi-solid food stuffs includes a hollow body member (5;105) having a closed end (11;111), and a piston (7;107) having an outlet (23;123) formed therein, wherein the container (1;101) is arranged to store the food stuff between the closed end (11;111) of the body and the piston (7;107), and the piston (7;107) is arranged for sliding movement relative to the body (5;105) such that the food stuff is dispensed from the container (1;101) via the outlet (23;123) in the piston when the separation between the piston (7;107) and the closed end (11;111) of the body is reduced.

Apparatus for dispensing from the container (1;101) includes a drive mechanism arranged to drive the piston into the body so that the food stuff is dispensed from the container (1;101) through the outlet (23;123), the drive mechanism including a piston engagement member (47) having an outlet through which the food stuff is dispensed.

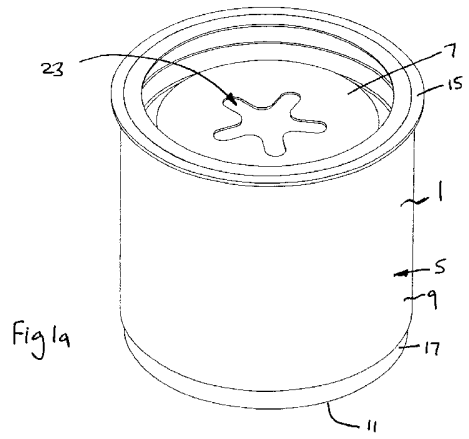

Fig 1a

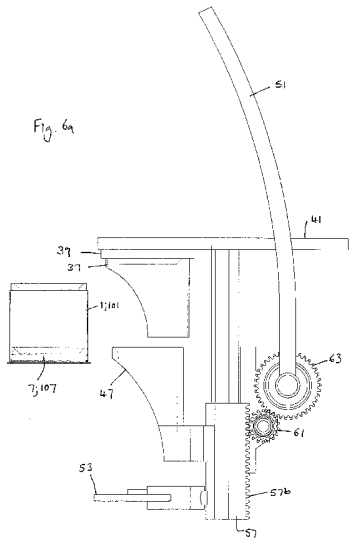

Fig. 6a

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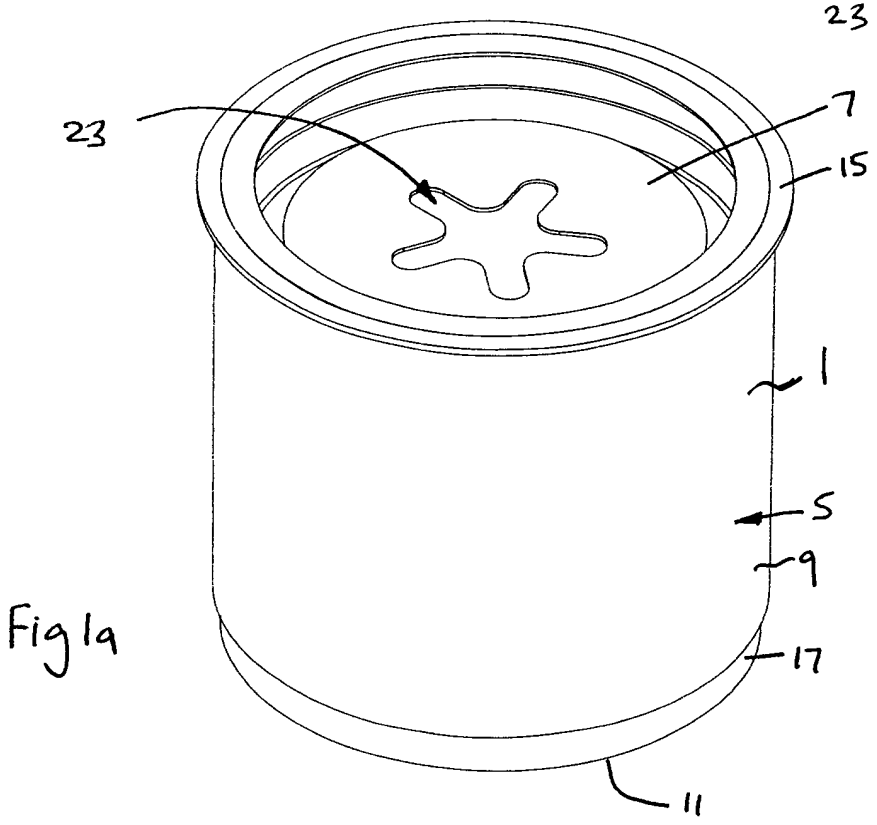


Fig 1a

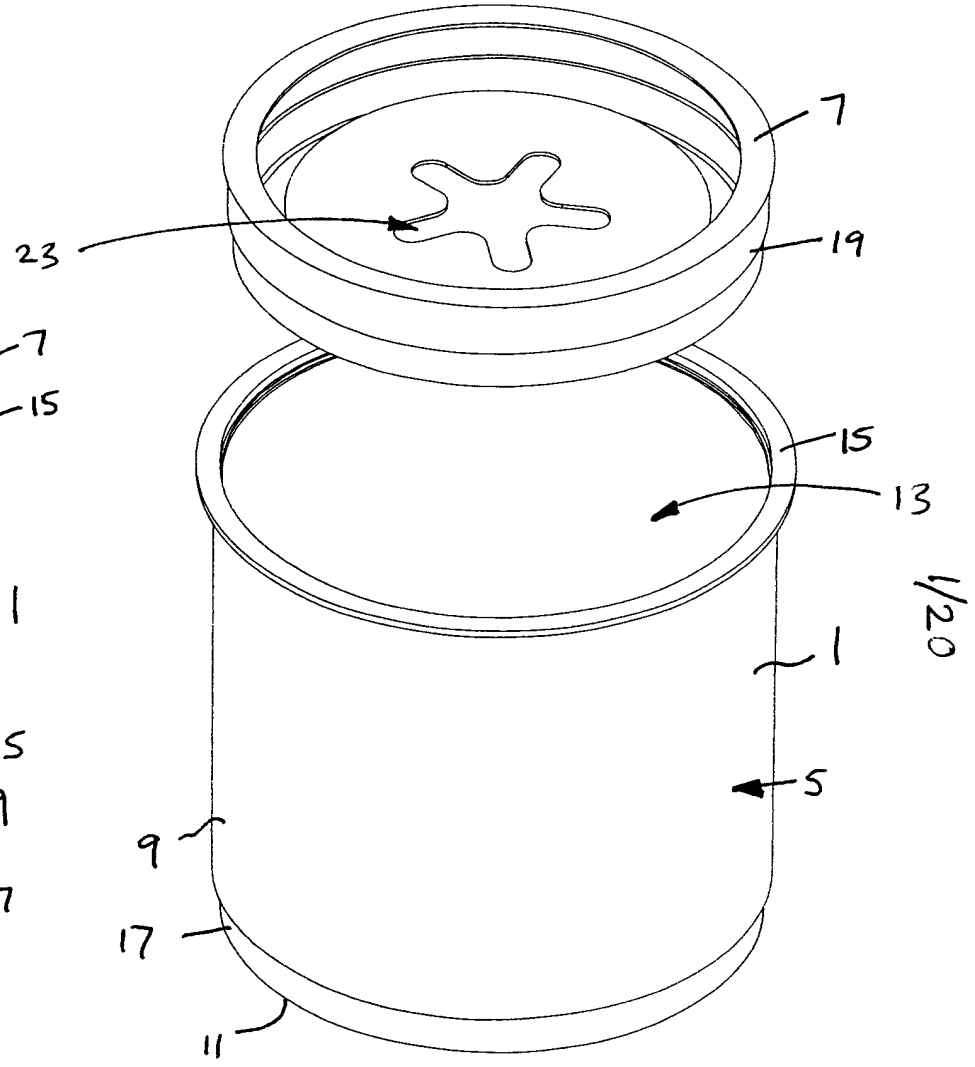


Fig. 1b

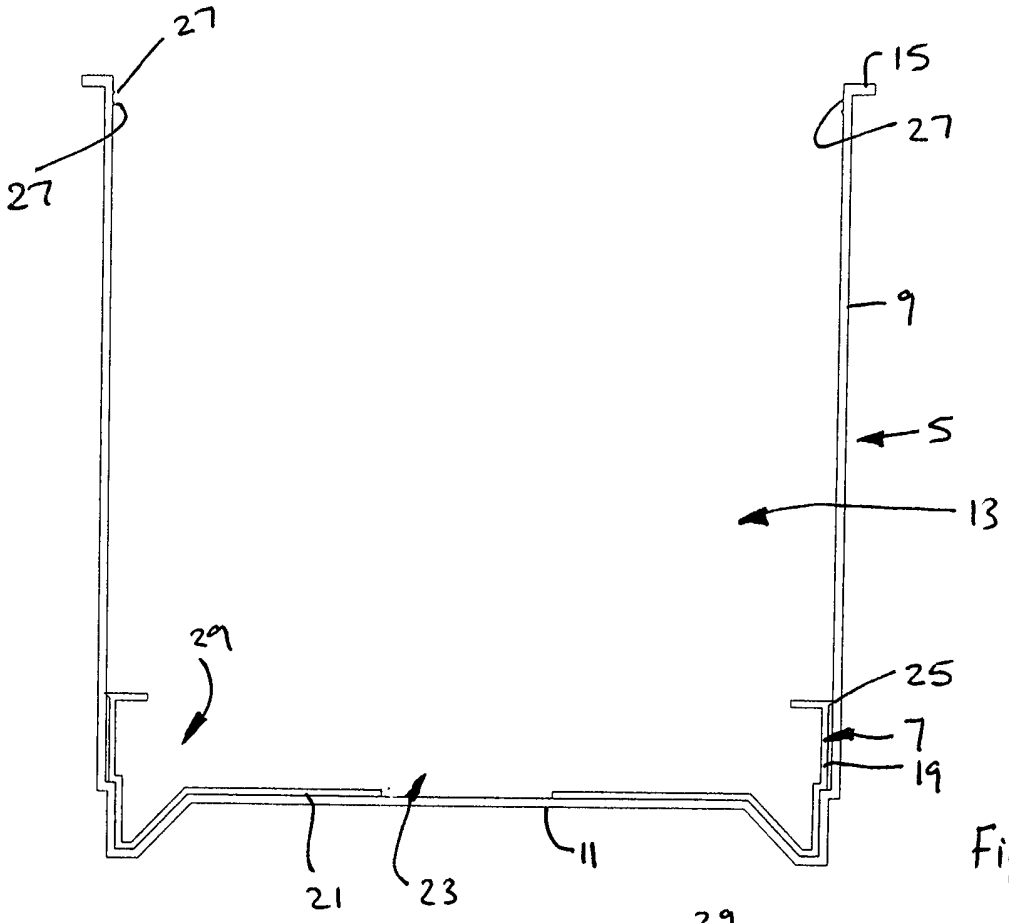


Fig. 2a

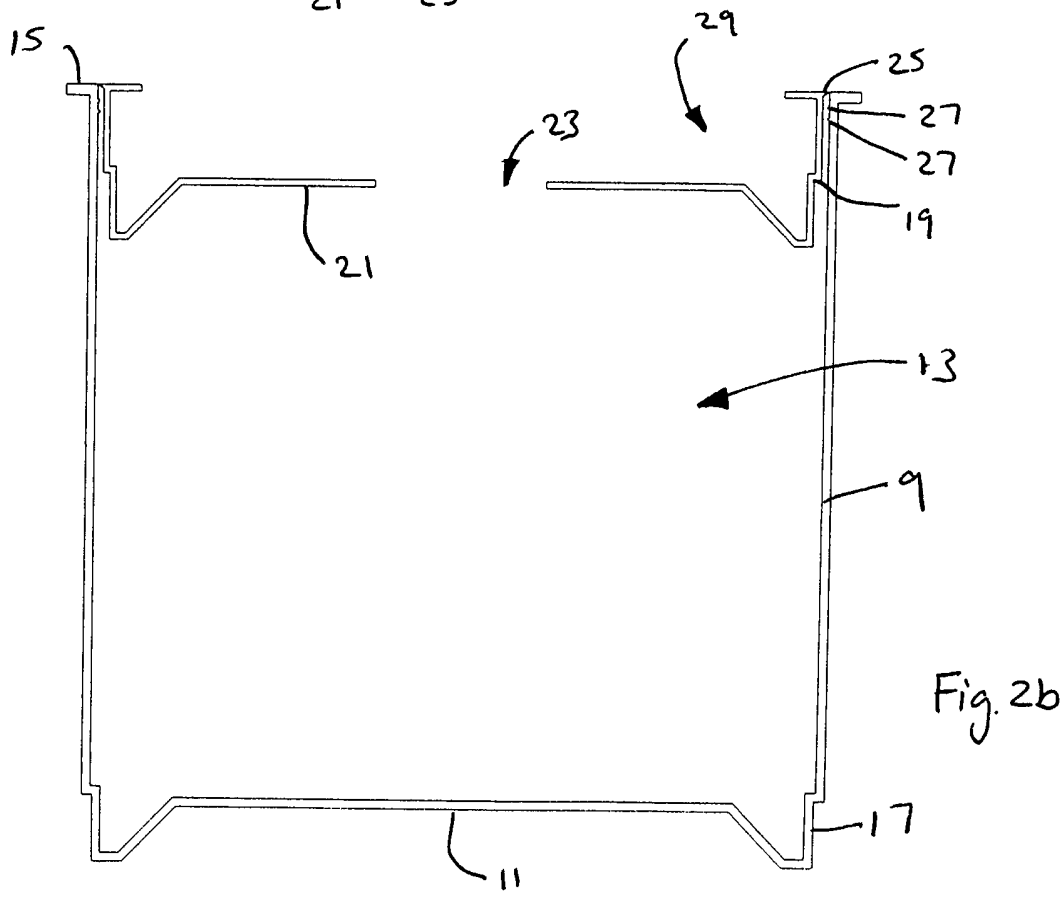


Fig. 2b

Fig. 3a

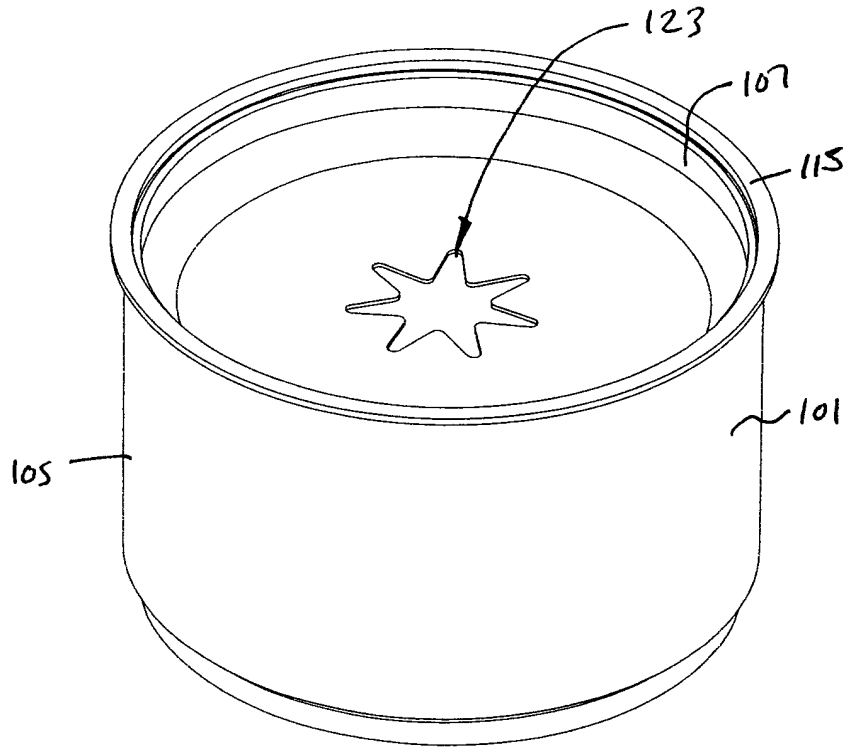
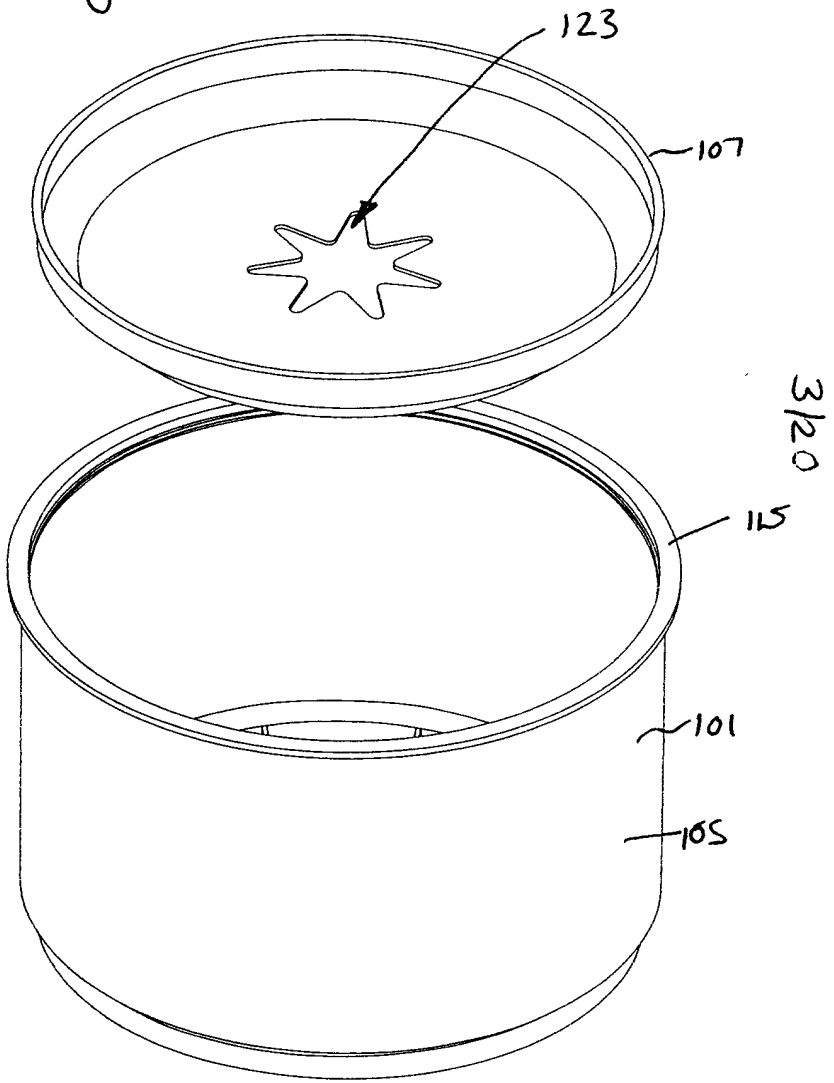


Fig. 3b



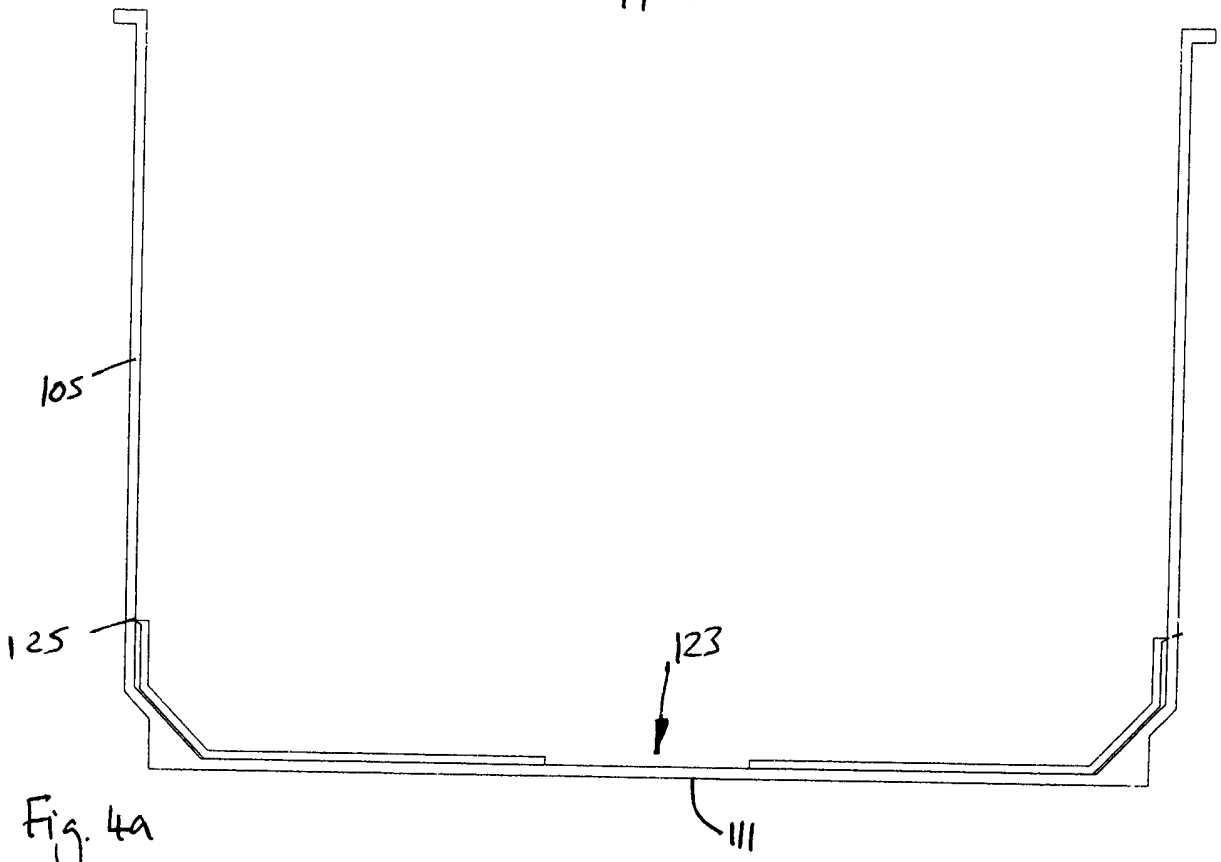


Fig. 4a

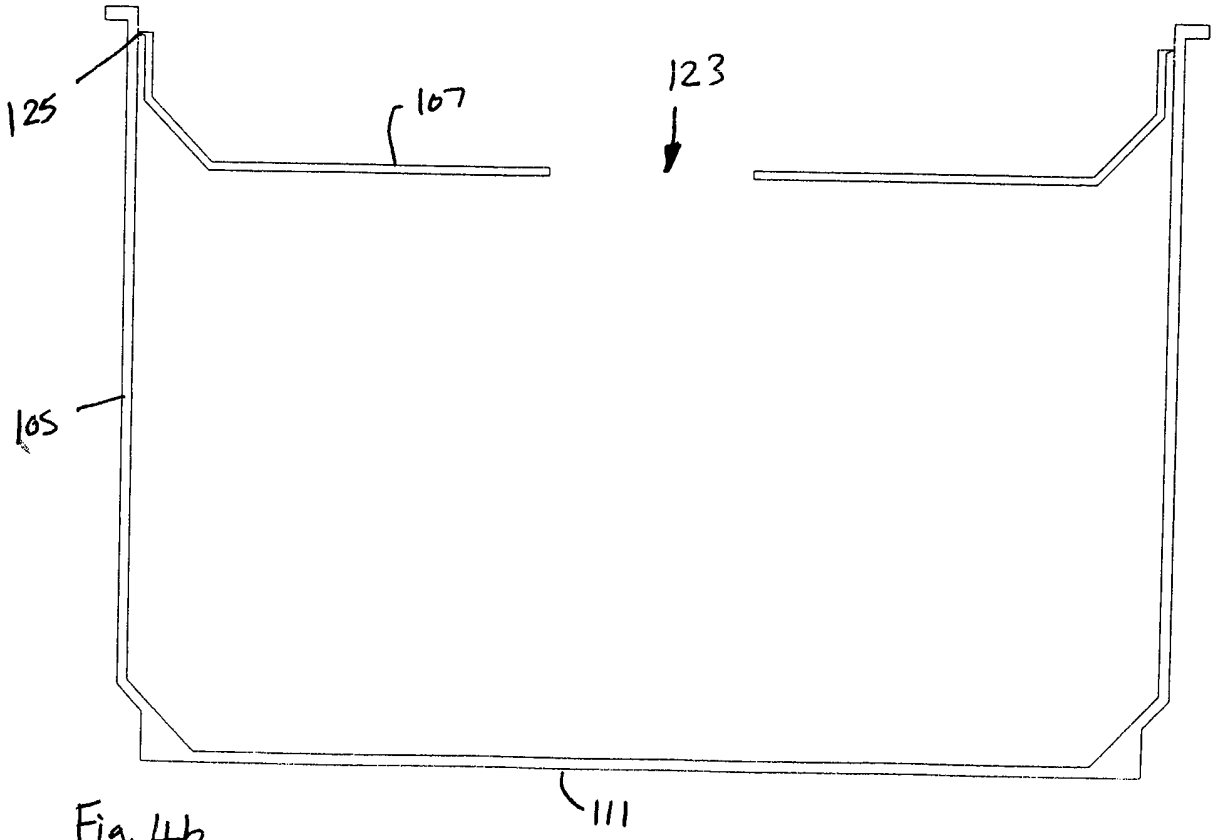


Fig. 4b

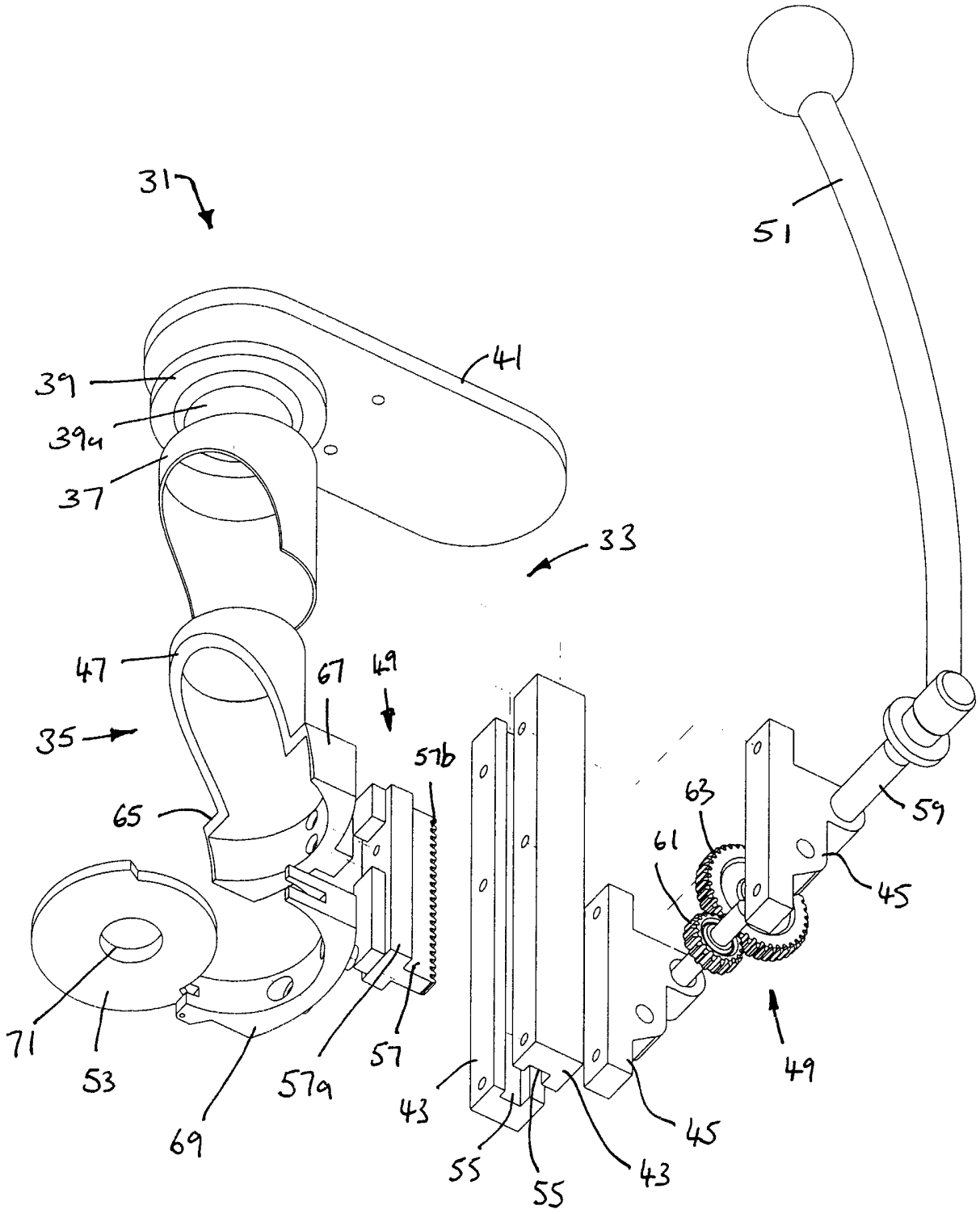

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Fig. 5

Fig. 6a

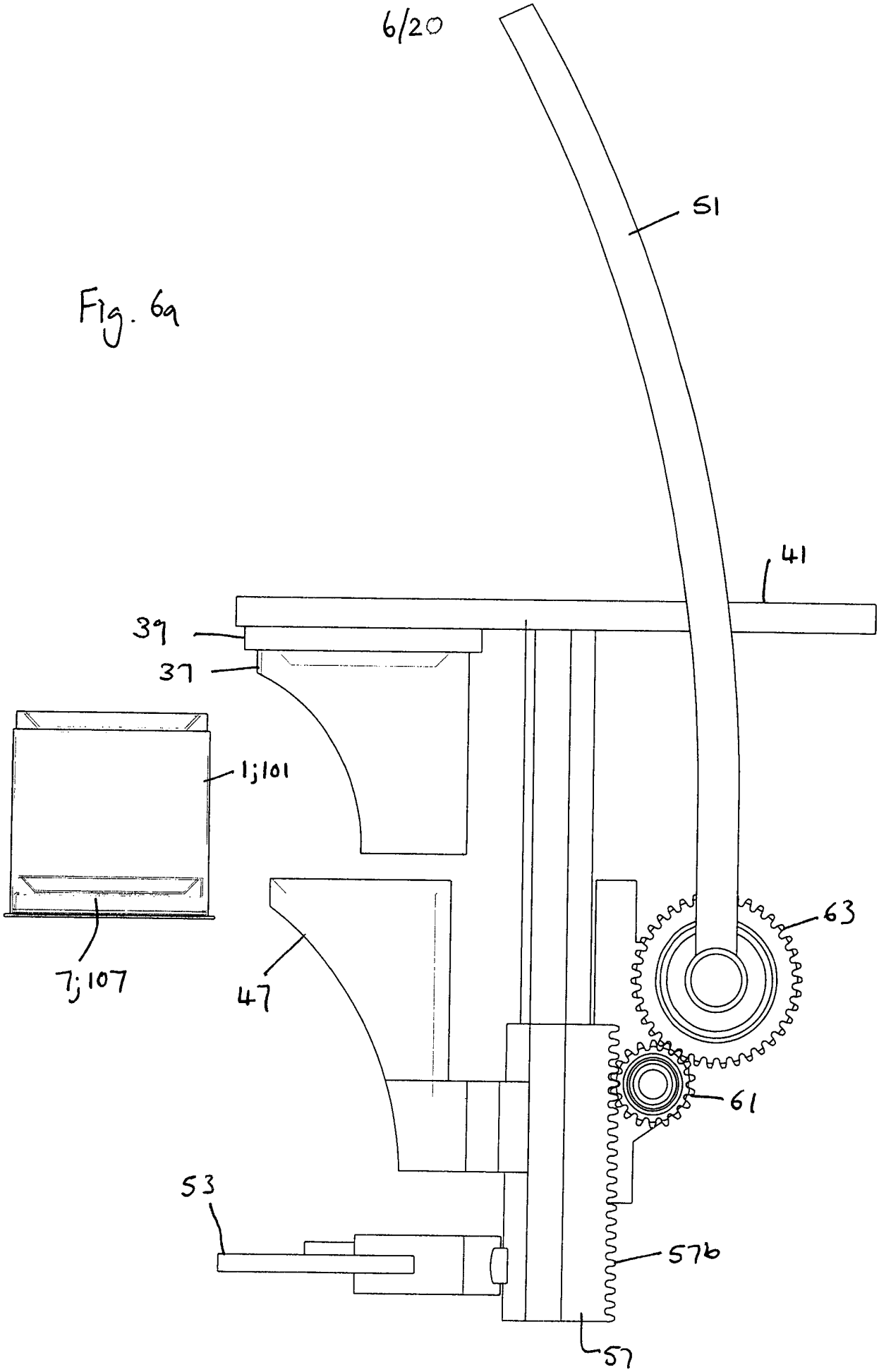
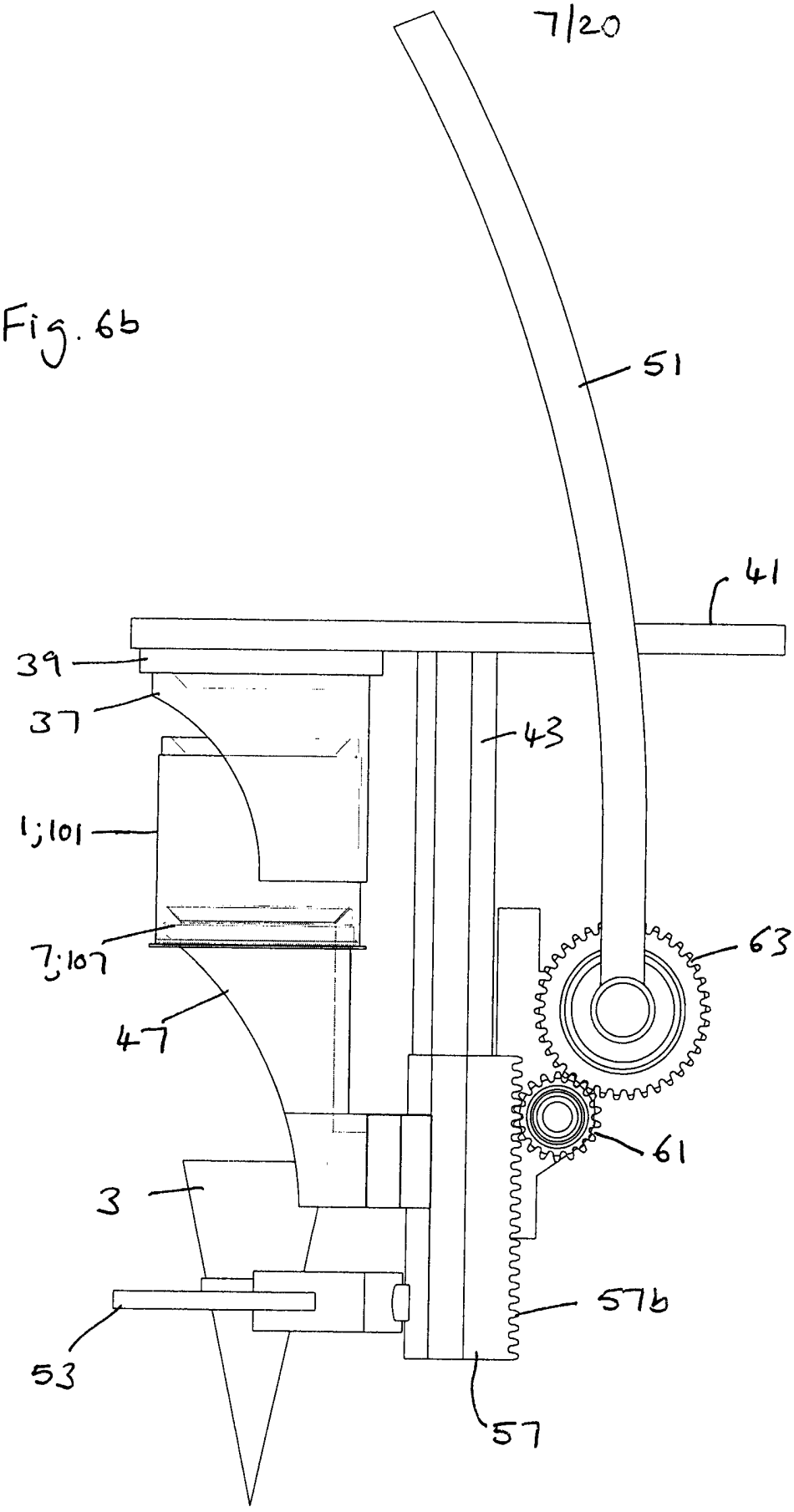


Fig. 6b



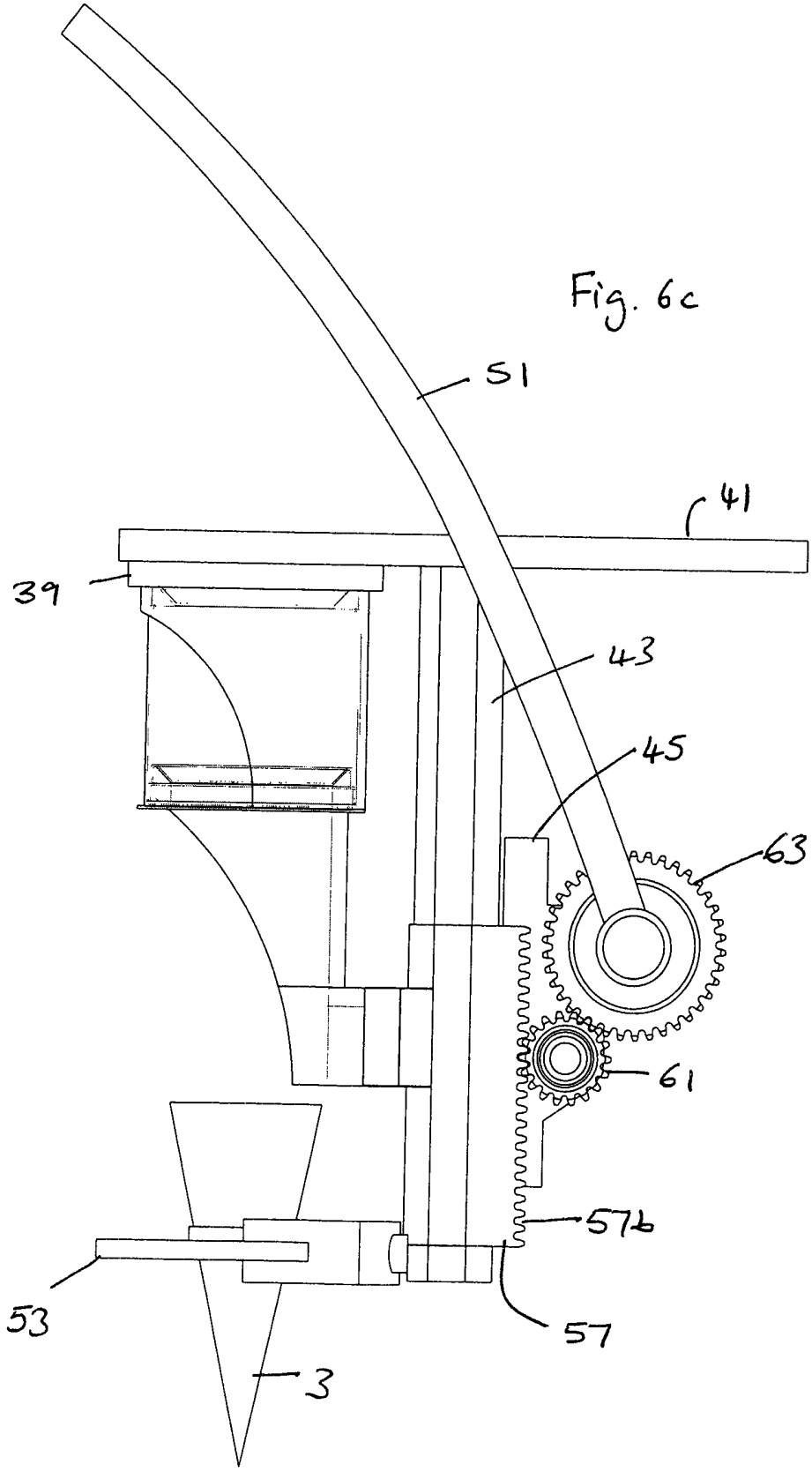


Fig. 6c

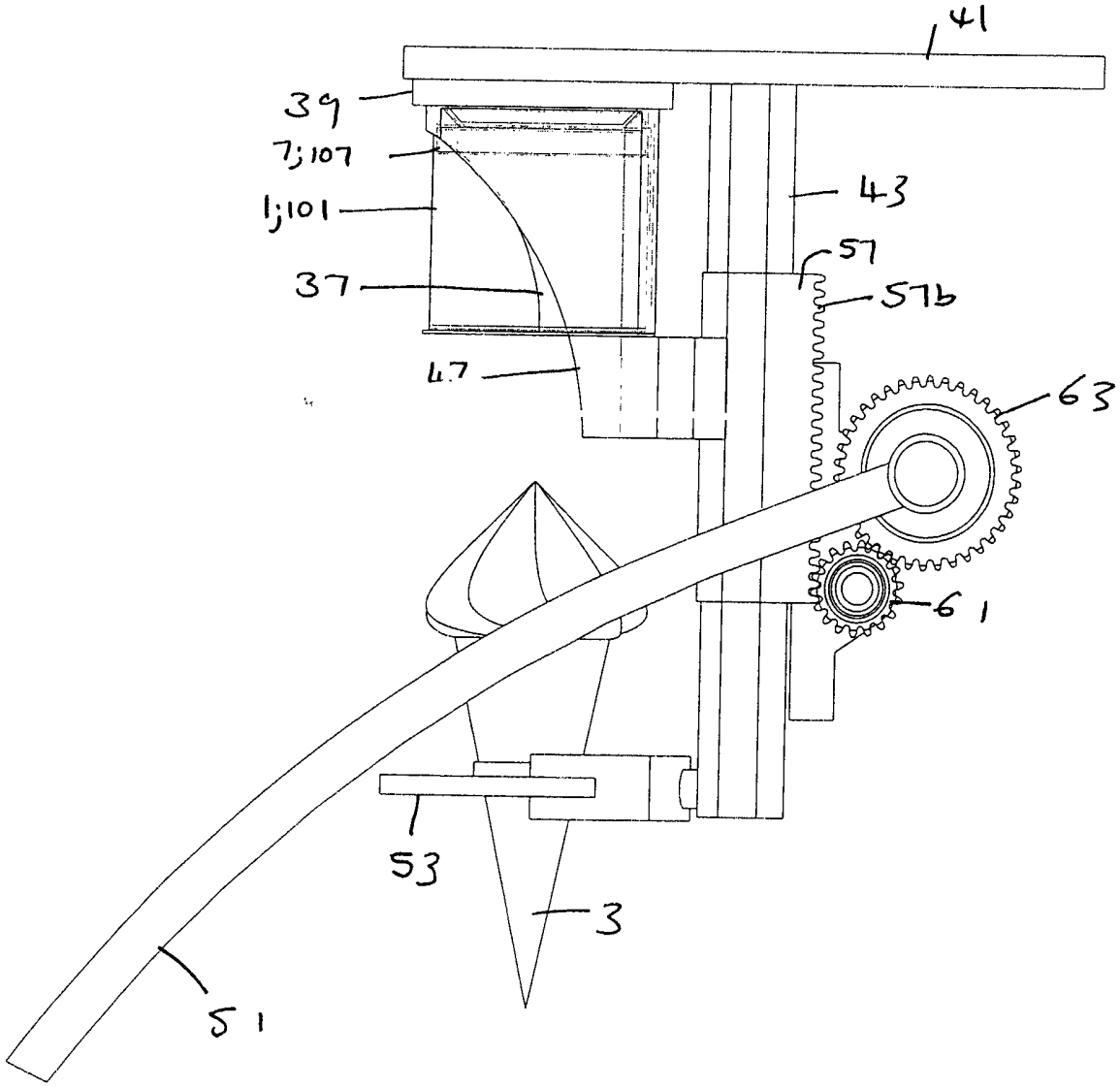


Fig. 6d

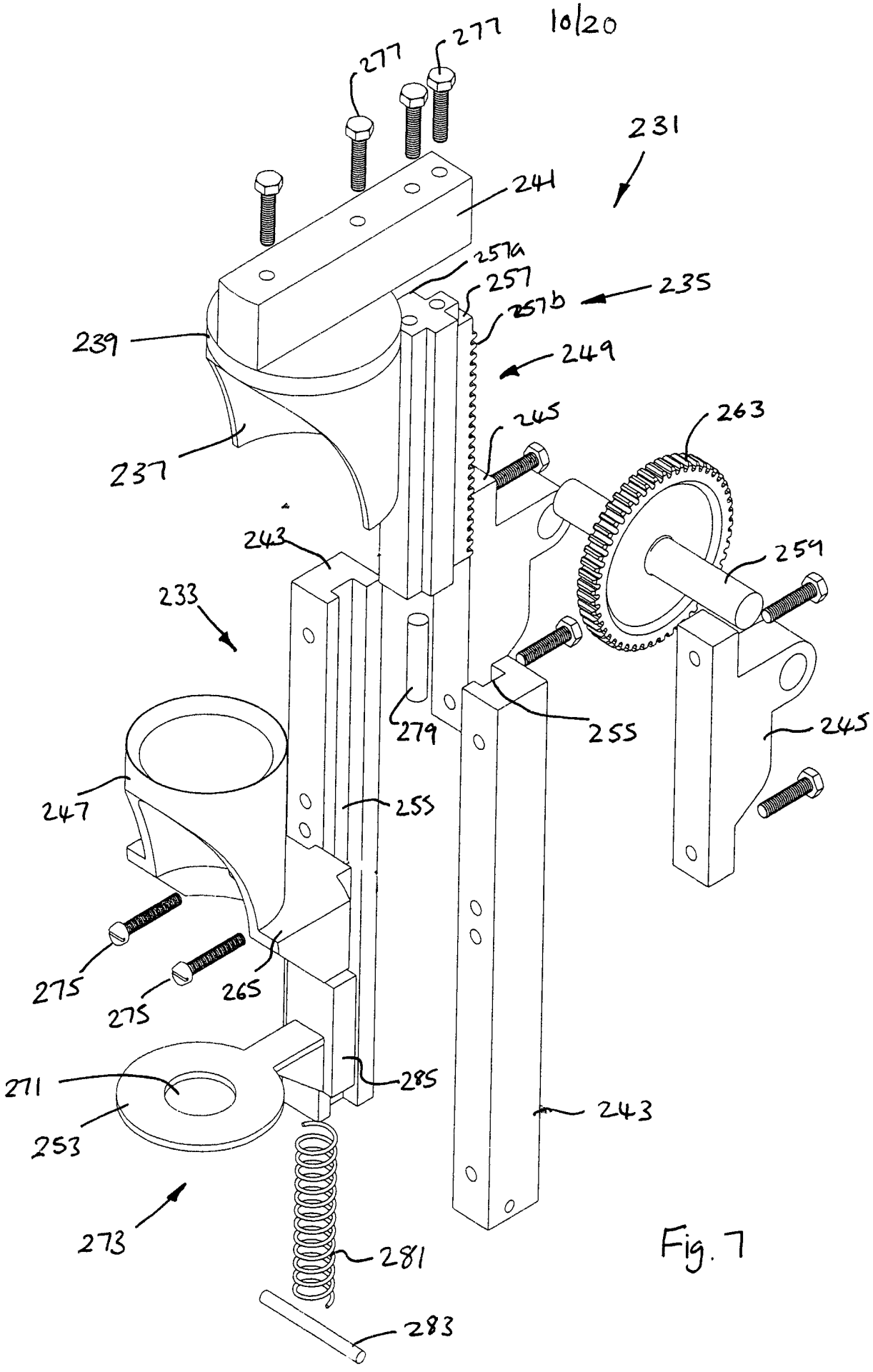

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Fig. 7

Fig. 8a

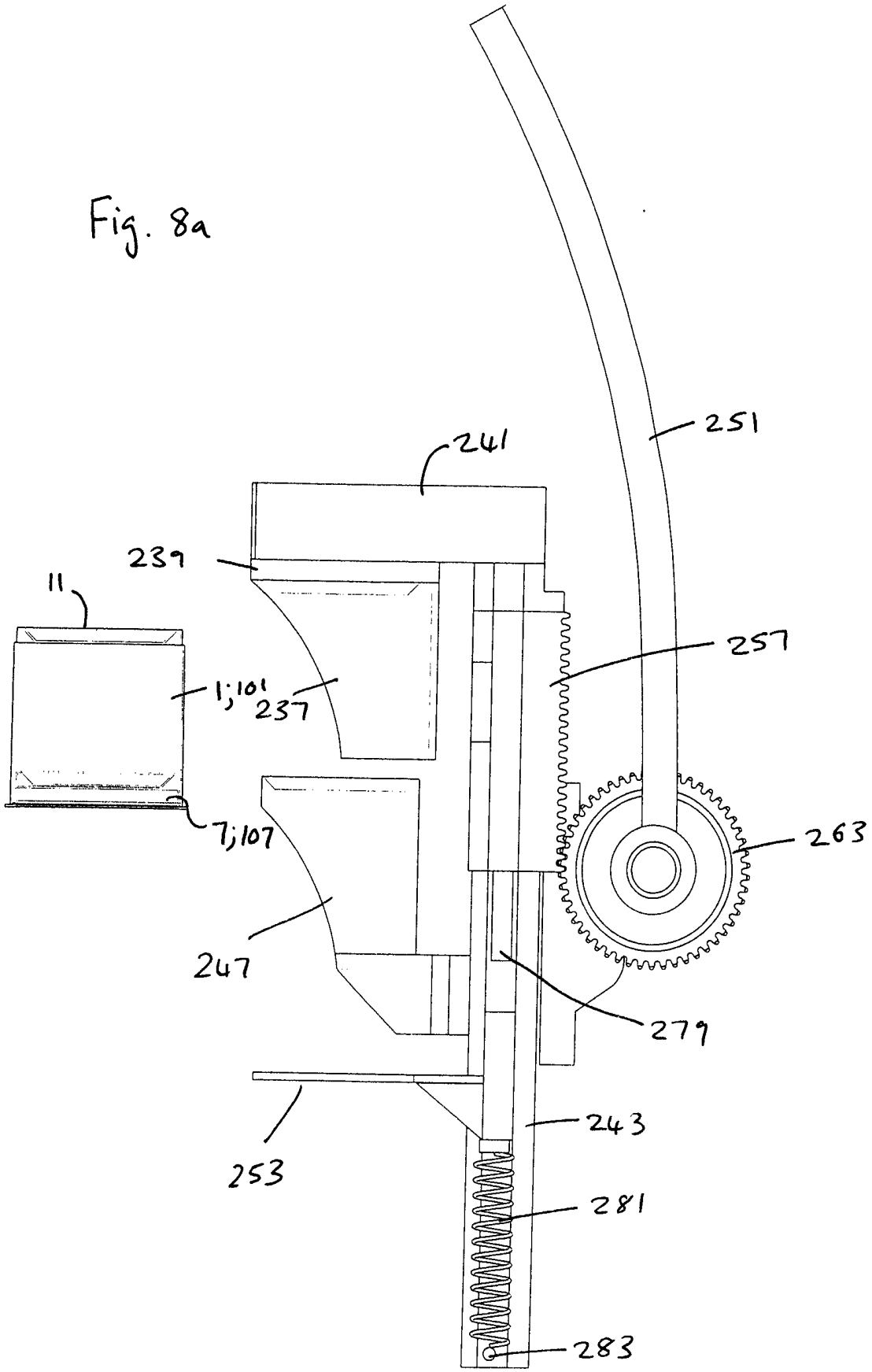


Fig. 8b

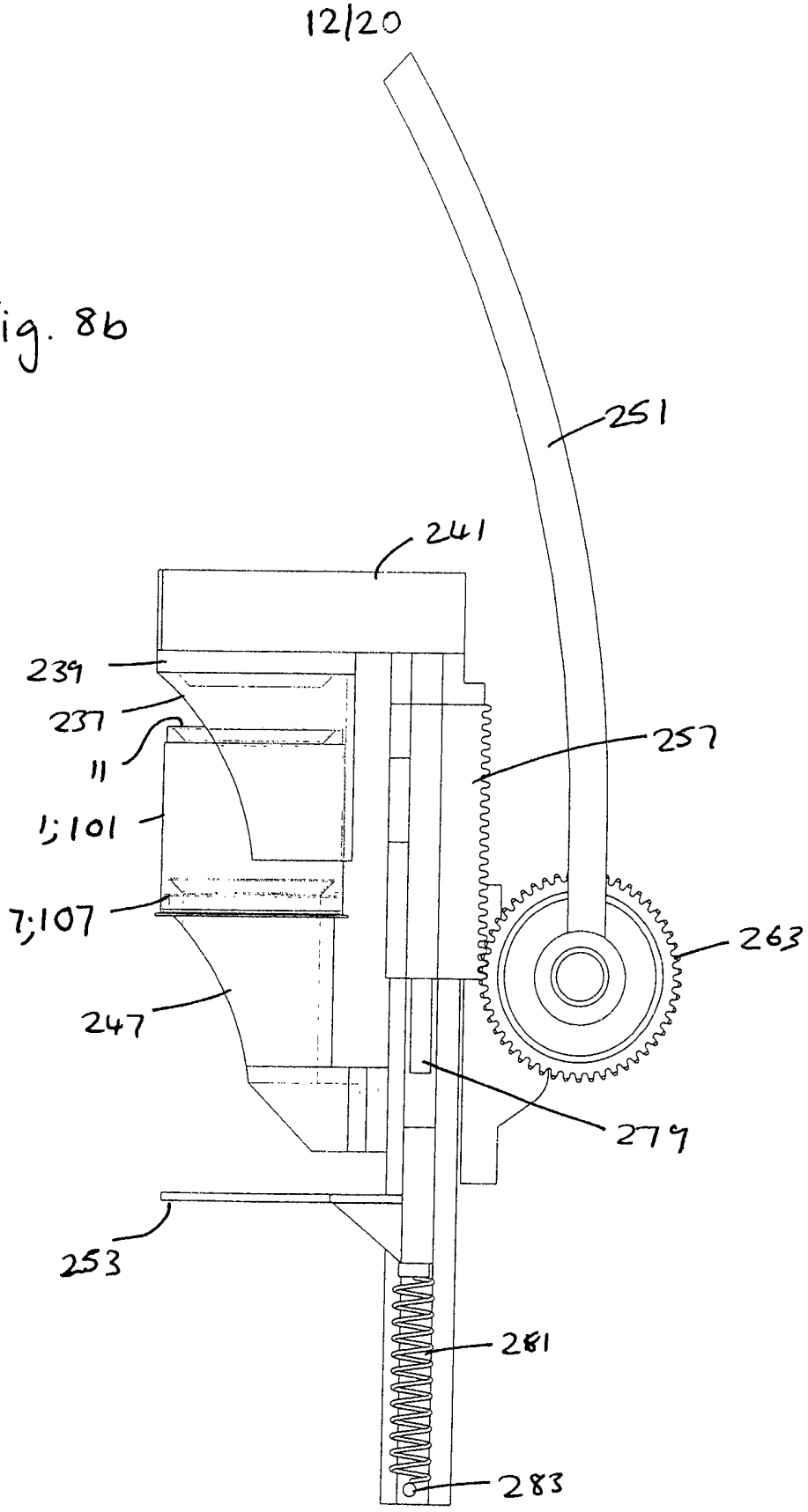


Fig. 8c

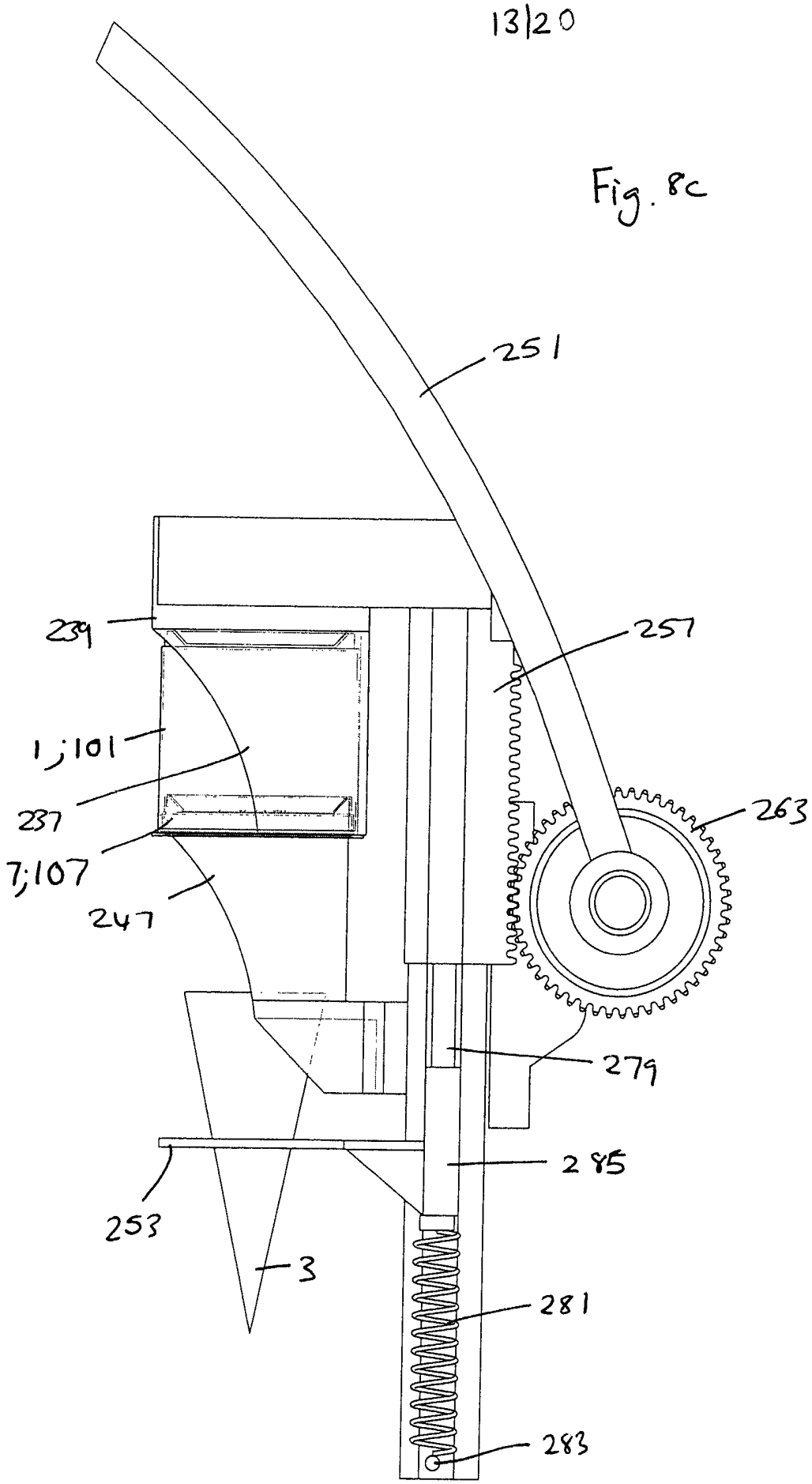
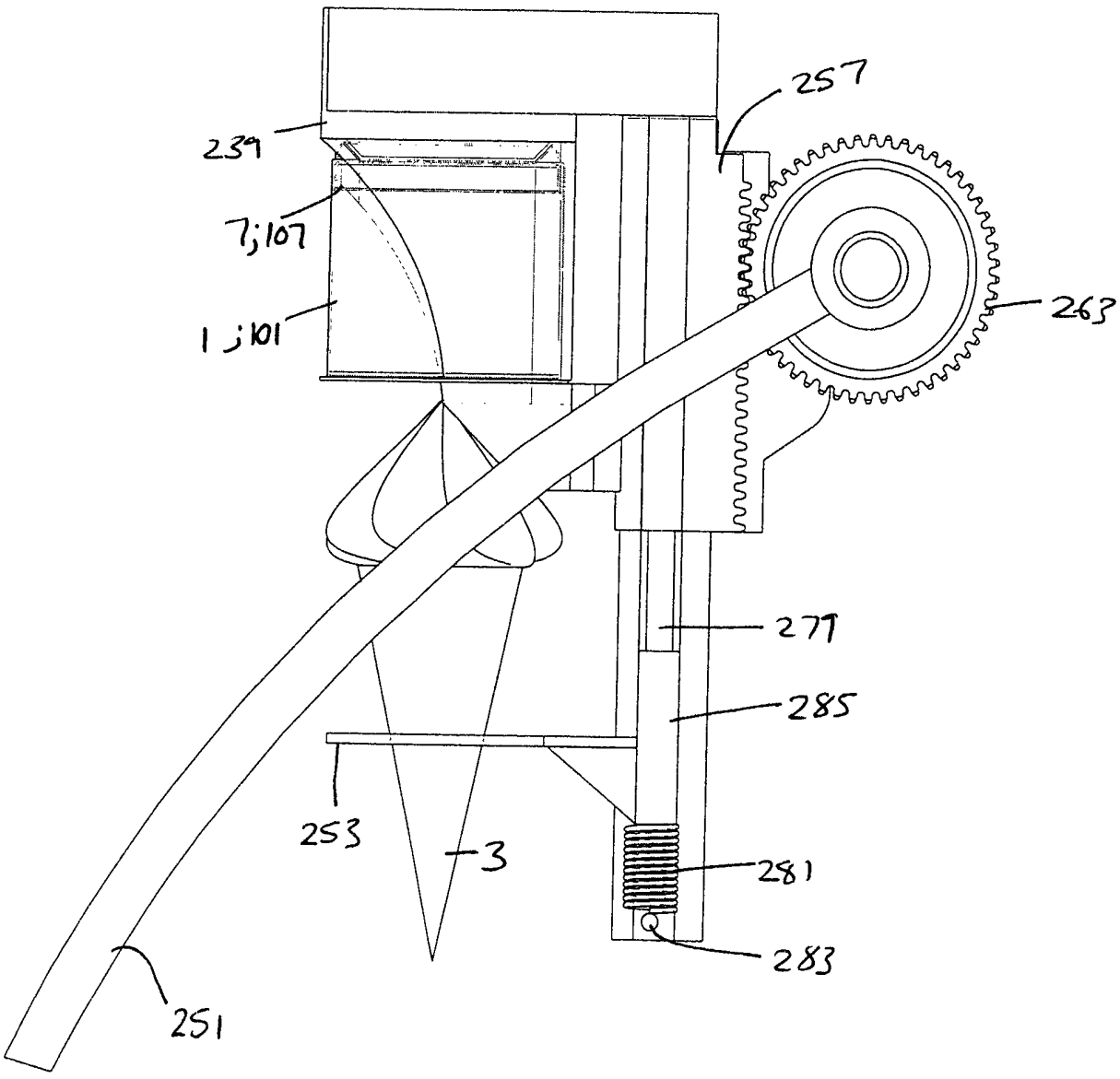


Fig. 8d



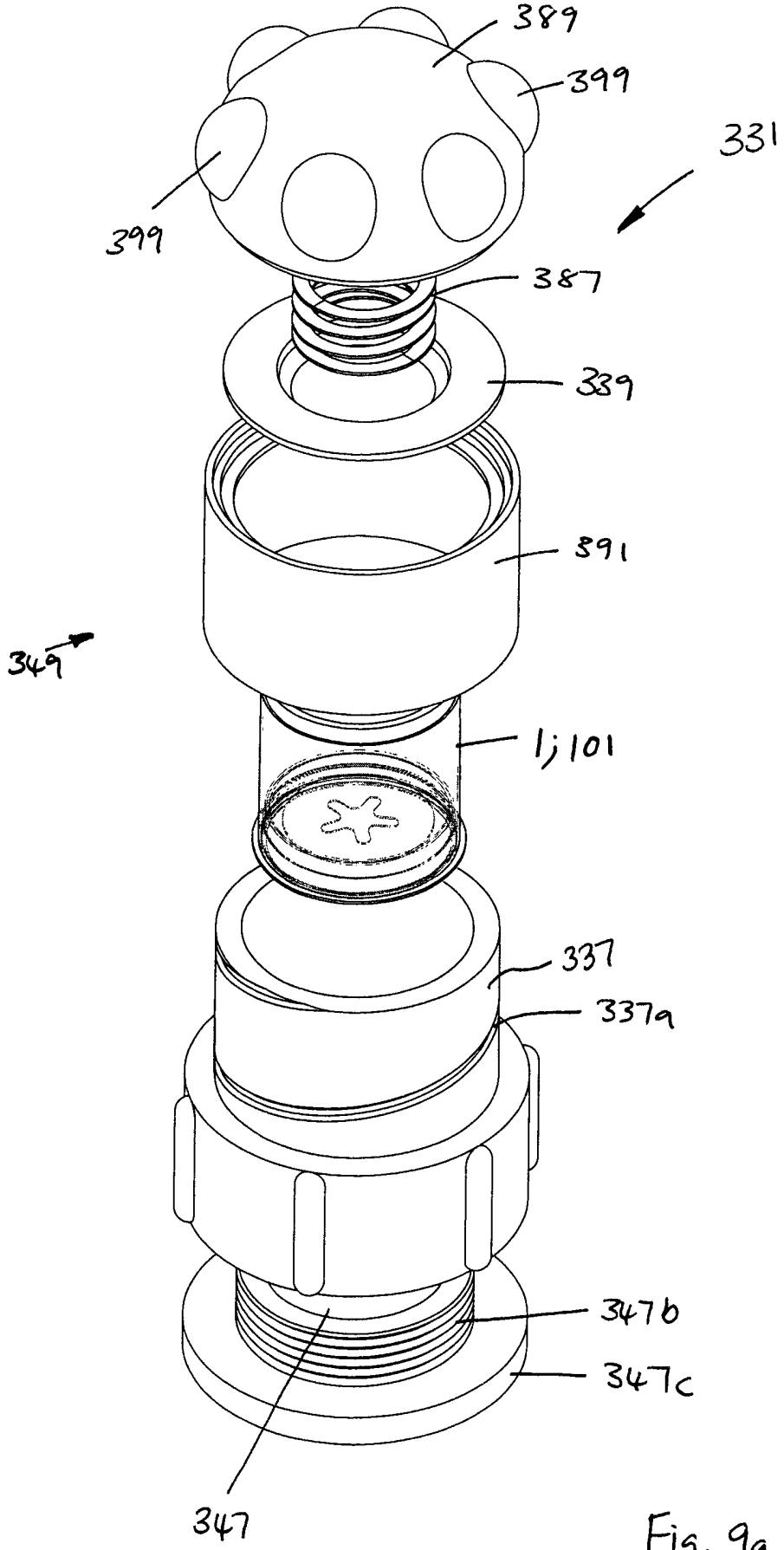


Fig. 9a

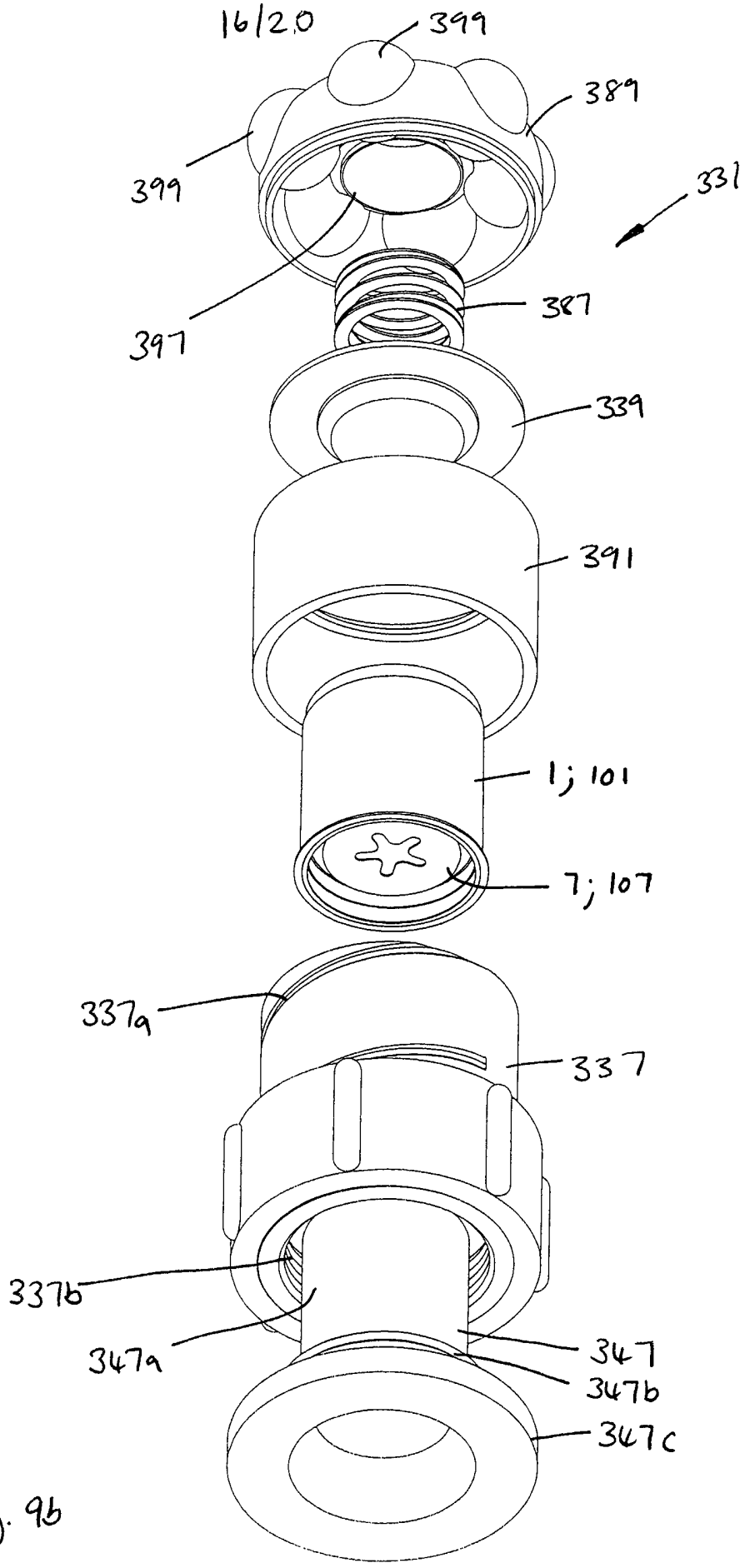

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Fig. 9b

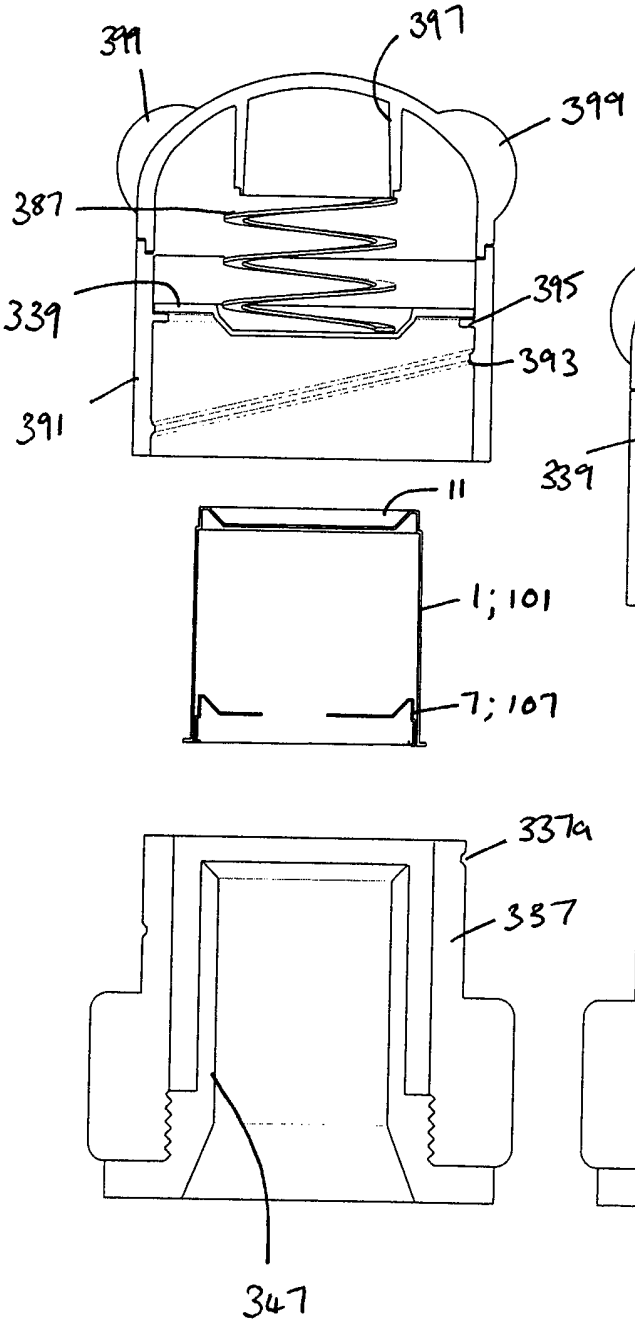

Fig. 10a

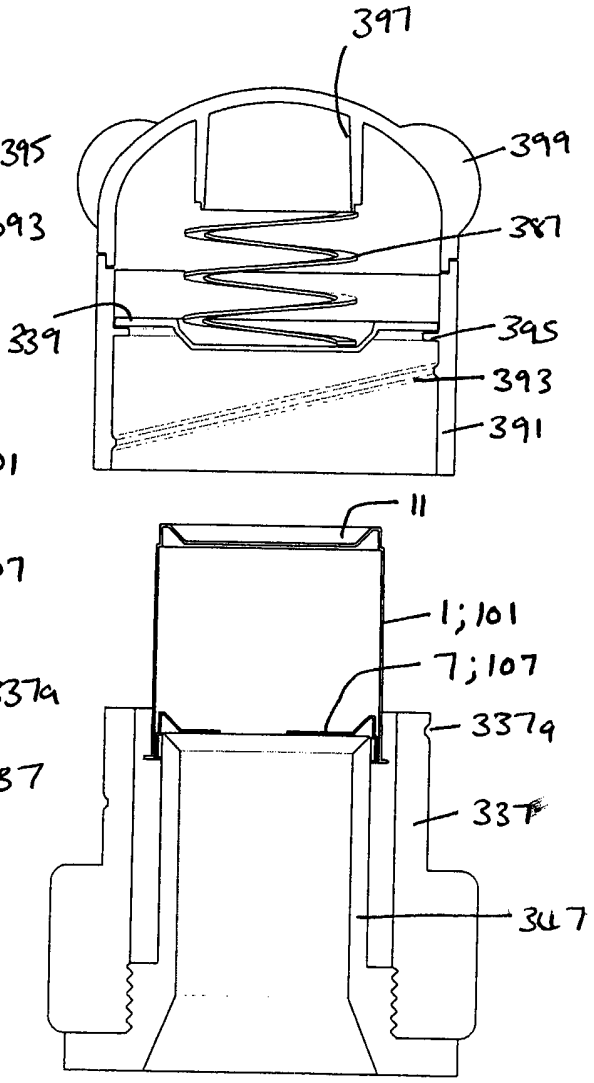

Fig. 10b

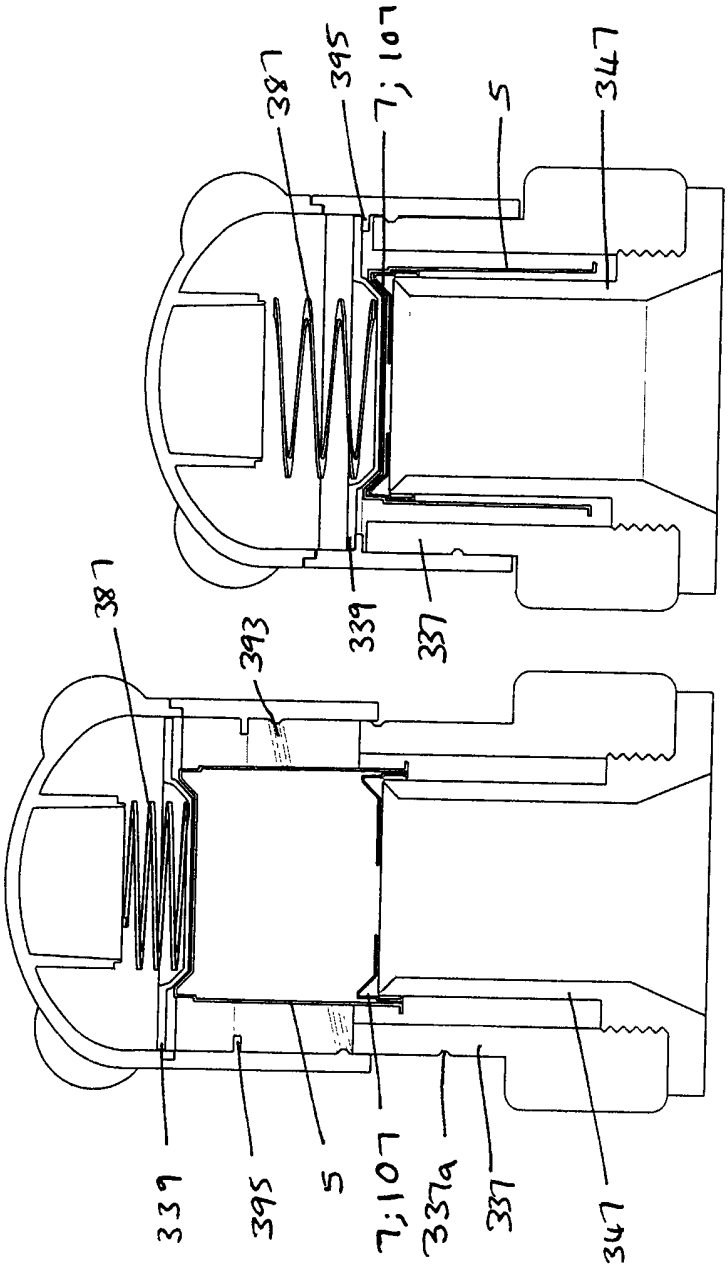

Fig. 10d

Fig. 10c

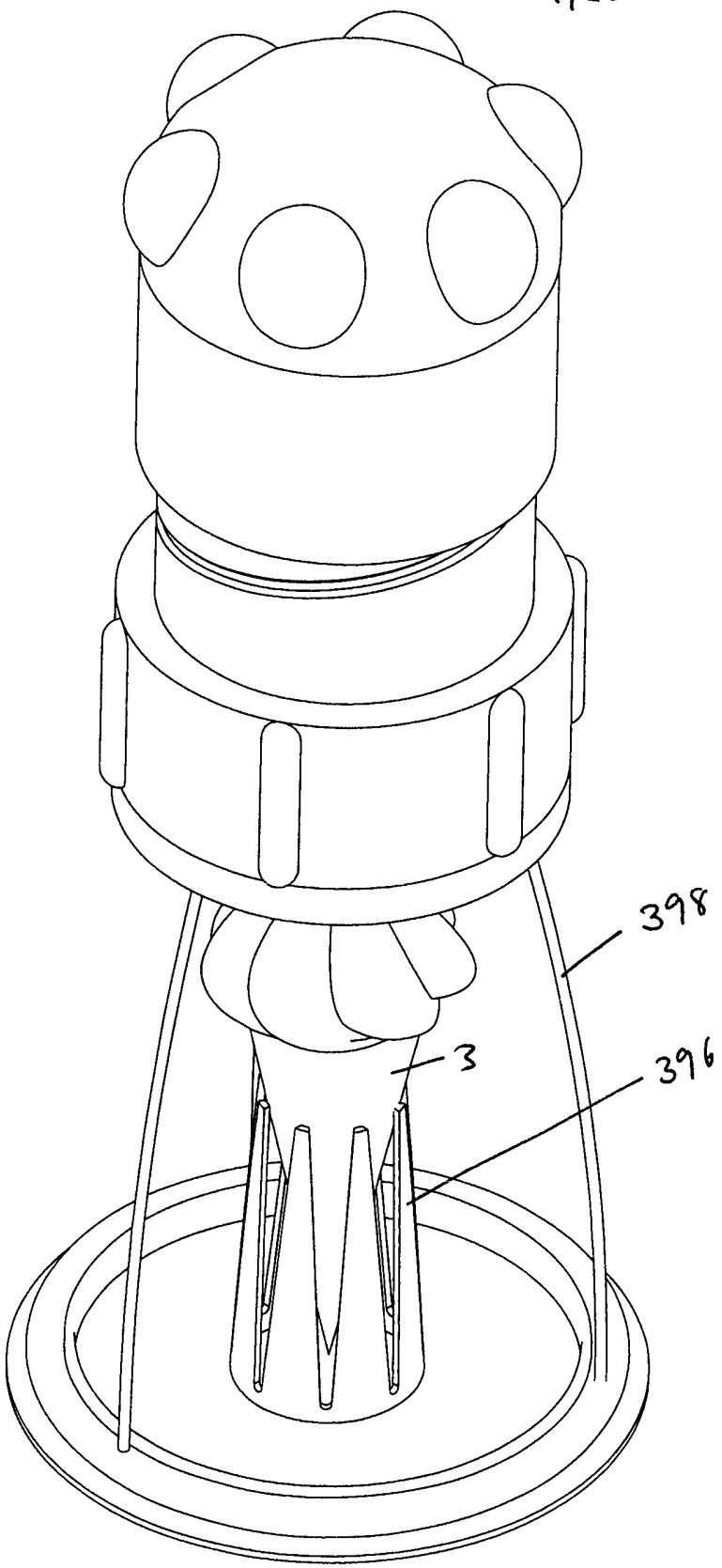

Fig. 11a

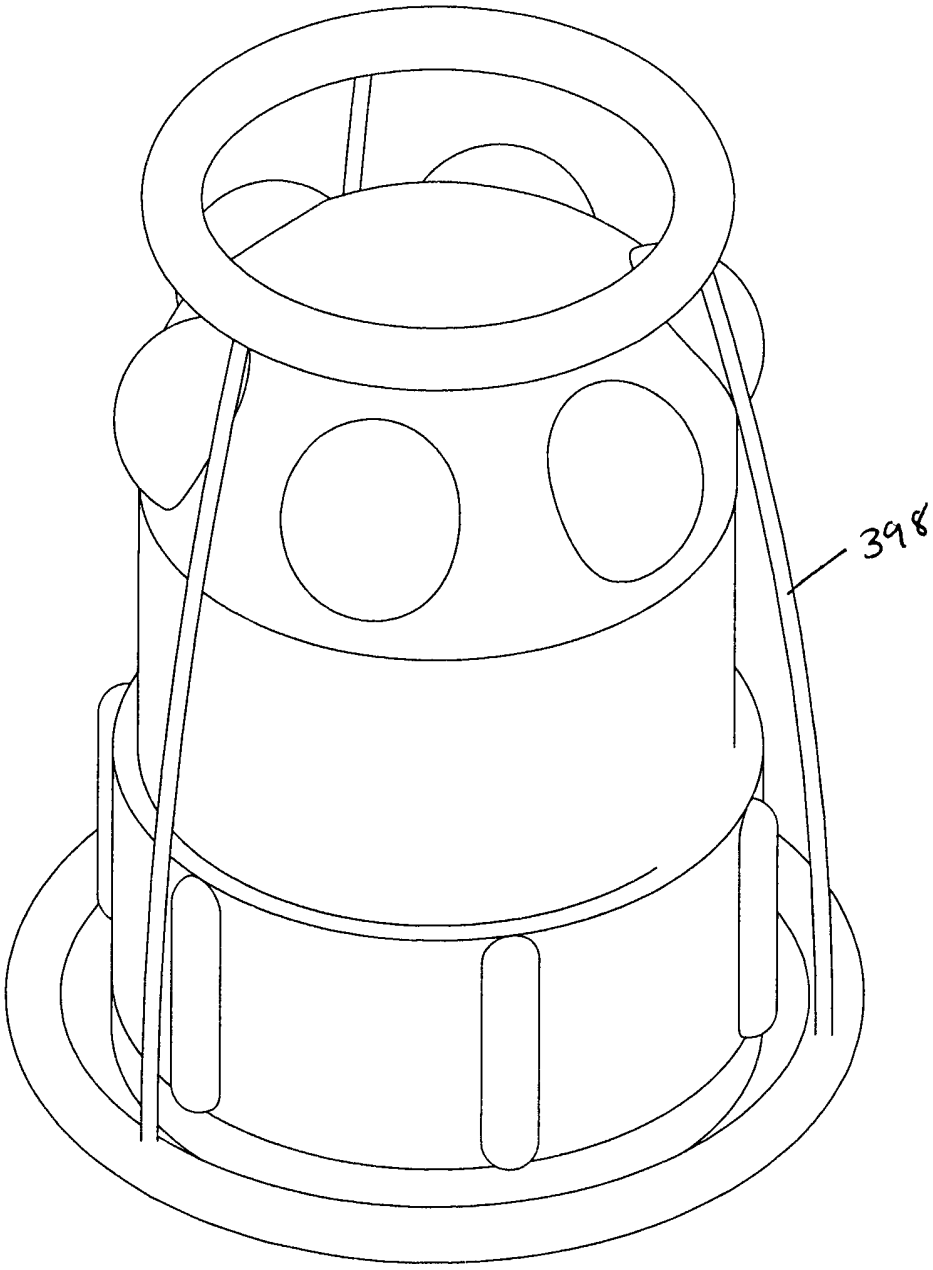

Fig. 11b

A FOOD CONTAINER, DISPENSING APPARATUS AND METHOD

The present invention relates to a container for food stuffs, and to an apparatus and a method for dispensing food from the container. In particular, but not exclusively, the invention relates to a food container for dispensing semi-solid food stuffs, such as ice-cream and frozen yoghurt desserts.

Containers having an aperture at one end and a piston at the other have been used for semi-solid foods, for example as described in EP 0995685. The piston moves along the container towards the aperture as the food is dispensed. A disadvantage of this type of container is the arrangement requires a bespoke filing machine to fill it with ice-cream and to seal the container. This is because the container has to be sealed at both ends and inverted during the filling-sealing process. Firstly, an aluminium foil seal is applied to the aperture. The container is then removed from the machine and inverted to receive the ice-cream. Ice-cream is dispensed into the container and the container is subsequently sealed by inserting the piston. Standard ice-cream filing machines are not able to invert containers and must be modified to do so. This is very costly for manufacturers.

The container described in EP 0995685 is costly to produce because of the structural strength required by the container to withstand the forces applied to it by the dispensing apparatus described in that document. If the container did not have the required strength the container would be distorted during dispensing by the pressure of the contained product.

Furthermore, the containers described in EP 0995685 can be washed and reused. This is unhygienic since the containers are not always thoroughly cleaned, which can lead to harmful bacteria forming and pose health risks for consumers of the ice-cream.

It is the object of the present invention to provide a food container that mitigates at least some of the aforementioned problems, and an apparatus and a method for dispensing ice-cream from the container.

According to a first aspect of the invention there is provided a food container for storing and dispensing an individual portion of a semi-solid food stuff, including a hollow body member having a closed end, and a piston having an outlet formed therein, wherein the container is

arranged to store the food stuff between the closed end of the body and the piston and the piston is arranged for sliding movement relative to the body such that the food stuff is dispensed from the container via the outlet in the piston when the separation between the piston and the closed end of the body is reduced.

Since the outlet is located in the piston, it is only necessary to seal the container at one end. Therefore it is possible to fill and seal the container using a standard ice-cream filling machine without having to invert the container. Typically, the container is loaded onto the filing machine and a predetermined volume of ice-cream is dispensed into the container, for example a sufficient amount for a single portion of ice-cream (typically 100-165ml). The piston is then located in the open end of the container, and a seal can be applied to the container. Alternatively, a seal can be pre-applied to the piston to cover the outlet formed in the piston. In either case, the time taken to fill and seal the container is reduced since there are fewer process steps to perform. Furthermore, the arrangement provides a better seal between the piston and the container, the container can be stored with the closed end downwards thereby preventing leakage from the container, and ice-cream can be eaten directly from the container without the need for dispensing equipment.

Advantageously the piston includes a scraper member for engaging an internal face of the body member. This cleans the body of the container and also provides an improved sealing arrangement. The piston may include a cavity for receiving an eating implement. Preferably the eating implement is a plastic or wooden spoon. Preferably the piston can be arranged for nesting so that a plurality of pistons can be stacked end to end.

Preferably the body includes a side wall having a thickness in the range 0.2 to 1.2 mm, and more preferably in the range 0.3 to 1 mm, and more preferably in the range 0.4 to 0.8 mm. Preferably the container is made of a plastics material such as polypropylene, is substantially cylindrical and the closed end is integrally formed with the body of the container. Preferably the container is sealed with a flexible cover. The container may be arranged for nesting so that a plurality of containers can be stacked end to end. Similarly, the piston can be arranged for nesting so that a plurality of pistons can be stacked end to end.

Advantageously the container may include retaining means for retaining the piston at the closed end of the container after a dispensing operation. For example, the dimensions and configuration of the body of the container and the piston are such that the piston becomes

lodged towards the closed end of the container, and cannot easily be removed. This prevents reuse of the container which is important for hygiene purposes since it has been found that when containers are reused they are not always thoroughly cleaned before being reused, which can allow harmful bacteria to form in the container. Alternatively, or additionally, the container may include at least one mechanical locking formation such as a rib or rim to retain the piston at the closed end of the container.

According to a second aspect of the invention there is provided the use of a container including a hollow body with a closed end, and a piston with an outlet formed therein, for storing an individual portion of semi-solid food stuff, wherein the piston is arranged for sliding movement relative to the body of the container and the food stuff is dispensable from the container via the outlet when the separation between the piston and the closed end of the container body is reduced.

According to a third aspect of the invention there is provided apparatus for dispensing a semi-solid food stuff from a food container having a hollow body, a piston mounted in the body and an outlet formed in the piston, said apparatus including a drive mechanism arranged to drive the piston into the body so that the food stuff is dispensed from the container through the outlet, the drive mechanism including a piston engagement member having an outlet through which the food stuff is dispensed. The dispensed food stuff is extruded into a receptacle such as a wafer cone or bowl that is located below the apparatus.

Advantageously the apparatus may include support means to prevent the container from collapsing during a dispensing operation. This enables containers having thin walls to be used to dispense ice-cream. Preferably the support means includes a substantially tubular support member that at least partially surrounds the body of the container. The tubular support member may have an aperture formed in its side wall to allow containers to be loaded onto the piston engagement member more easily.

Preferably the support means and the piston engagement member are arranged substantially co-axially, and at least a part of the piston engagement member is arranged to fit into the support means with sufficient clearance such that the body of the container can be located in the space between the support means and the piston engagement member. In some embodiments the piston engagement member is located within the support means substantially coaxially therewith, and the relative positions of those components are fixed.

Advantageously the piston engagement member can include a tubular or annular part. Preferably the piston engagement member has an external profile that is complementary to the internal profile of the container. At least part of the piston engagement member is arranged to fit into the container. Preferably the piston engagement member is arranged to initially engage the piston below the body of the container. For example, the apparatus can be arranged such that the piston is arranged to move along a substantially vertical axis, and the piston engagement member is located below the piston and is substantially aligned with the vertical axis.

The drive mechanism can be arranged to drive the container over the piston engagement member. With this arrangement the dispensing point is stationary. Alternatively, or additionally, the drive mechanism can be arranged to drive the piston engagement member into the container. This causes the dispensing point to move. This is advantageous since it creates a space for the dispensed ice-cream to extend above the receptacle.

In some embodiments the drive mechanism includes a rack and pinion drive system. In other embodiments the drive mechanism includes a screw drive system. Preferably the drive systems are manually operable.

Advantageously the drive mechanism may include resilient means arranged to cause relative movement between the body of the container and the piston engagement member. Preferably the resilient means comprises a spring. The drive mechanism can be arranged to load the resilient means prior to a dispensing operation, and includes means for maintaining the resilient means in its loaded state until an operator initiates the dispensing operation. For example, the means for maintaining the resilient means in a loaded state comprises at least one of a closure member for preventing ice-cream from dispensing from the container, a latching arrangement, structural formations or a mechanism.

Advantageously the apparatus may include a receptacle support means for supporting a receptacle arranged to catch the food stuff when it is dispensed from the container. For example, the receptacle support means can include a substantially U-shaped or annular member for supporting a receptacle. The drive mechanism can be arranged to include means for adjusting the position of the receptacle support means during a dispensing operation. Preferably the receptacle support means includes resilient means for returning the receptacle support to a start position after a dispensing operation has been completed. Preferably the

receptacle support means includes a locking mechanism arranged to lock the position of the receptacle support means, for example when the receptacle support means has moved its full extent during a dispensing operation.

Advantageously the apparatus may include thermal insulating means for the container to control tempering of the ice-cream in the container.

According to a fourth aspect of the invention there is provided a method for dispensing a semi-solid food stuff from a food container, said method including inserting into a dispensing device a container having a hollow body, a piston and an outlet formed in the piston, said dispensing device having a piston engagement member and a drive mechanism arranged to cause relative movement between the body of the container and the piston engagement member to reduce the separation between the piston and the closed end of the container such that the food stuff is dispensed from the container via the outlet.

Advantageously the method may include supporting the body of the container to prevent the container from collapsing during a dispensing operation and / or engaging the piston from below the body of the container. The method may include moving the dispensing point of the container.

Advantageously the dispensing device used in the method may comprise any configuration of the apparatus described above. Advantageously the method may include any configuration of the container described above.

Advantageously the method may include using a container that includes means for retaining the piston towards the closed end of the container body.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

Figures 1a and 1b are perspective views of a container in accordance with the current invention;

Figures 2a and 2b are sectional views of the container of Figures 1a and 1b showing a piston in full and dispensed positions;

Figures 3a and 3b are perspective views of a second container in accordance with the current invention;

Figures 4a and 4b are sectional views of the container of Figures 3a and 3b showing a piston in full and dispensed positions;

Figure 5 is an exploded view of a first dispensing machine in accordance with the current invention;

Figures 6a to 6d are side views of the dispensing machine of Figure 5 illustrating a dispensing operation;

Figure 7 is an exploded view of a second dispensing machine in accordance with the current invention;

Figures 8a to 8d are side views of the dispensing machine of Figure 7 illustrating a dispensing operation;

Figures 9a and 9b are exploded views of a third dispensing machine in accordance with the current invention;

Figures 10a to 10d are side views of the dispensing machine of Figures 9a and 9b illustrating a dispensing operation;

Figures 11a shows the third dispensing machine mounted on a stand; and

Figure 11b shows the third dispensing machine stored within the stand.

A container 1 for storing semi-solid food stuffs in accordance with the invention is shown in Figures 1a to 2b. The container 1 is typically used to store an individual portion of a frozen dessert type product such as ice-cream or frozen yoghurt, but may be used to store any type of semi-solid food stuff. The container 1 is arranged such that the dessert can be dispensed from the container into a receptacle 3, for example a bowl or wafer cone, by means of a dispensing device such as one of the devices shown in Figures 5 to 11b.

The container 1 comprises a substantially cylindrical body 5 and a piston 7.

The body 5 includes a circumferential side wall 9, and an end wall 11, which define a cavity 13 for receiving the food stuff. The end of the body opposite the end wall 11 is open and is

arranged to receive the piston 7. A rim 15 extends circumferentially outwards around the open end of the body and is arranged to receive a removable flexible seal (not shown), such as an aluminium foil, that adheres to the rim 15, thereby sealing the container 1. Preferably the end wall 11 and the side wall 9 are formed integrally. For example, the body 5 can be formed from a plastics material such as polypropylene using an injection moulding, vacuum forming, thermo-forming or blow moulding process. In such cases, the cylindrical side wall 9 will be slightly tapered to enable the body 5 to be removed from the mould. The containers 1 can be made having thinner walls than required by previous containers for ice-cream products known in the art, such as those described in EP 0995685. The side wall 9 of the container typically has a thickness in the range 0.2 to 1.2 mm, and preferably within the range 0.3 to 1 mm, and more preferably in the range 0.4 to 0.8 mm This leads to a significant saving in material costs.

The side wall 9 of the container is preferably stepped 17 towards the end wall 11 to enable stacking of the containers. This allows containers to be stacked end to end and enables easy handling of pre-sealed containers, for example when loading a stack into a box or a filling machine magazine. The end wall 11 of the container may be flat but is preferably profiled to include a depressed portion to improve the rigidity of the container 1, to aid extrusion by funnelling, and to interact with the dispensing machine (see below).

The piston 7 has a substantially cylindrical side wall 19 and a circular end face 21, which contains an outlet 23. The outlet 23 preferably comprises an aperture, but may comprise a nozzle or any other suitable form of outlet. The piston 7 is located in the container 1 and is arranged for sliding movement therein. A rim 25 is preferably provided on the side wall of the piston, which extends circumferentially around the side wall 19. The rim 25 is arranged to engage the internal face of the container side wall and provides a seal between the piston 7 and the container 1. The rim 25 scrapes the container side walls as the piston 7 moves through the body 5 during a dispensing operation, thereby cleaning the walls. The wall 9 gives slightly, allowing the piston 7 to slide along the tapered side wall 9. Preferably the piston 7 is arranged for nesting with other similar pistons 7 so that several pistons can be stacked together.

Two lips 27 are located on the internal face of the side wall towards the open end of the container. The lips 27 extend circumferentially around the side wall. The piston 7 can be located in the container 1 such that the rim 25 is initially positioned between the lips 27 on the

container side wall. The lips 27 provide a small amount of resistance to movement of the piston 7 to prevent the piston 7 from falling out of the container body 5.

Preferably the shape of the end face 21 of the piston is complementary to the shape of the end wall 11 of the container, so that substantially all the ice-cream in the container 1 is dispensed.

The outlet 23 in the piston is preferably star shaped. A star shaped outlet 23 produces an attractive decorative pattern on the surface of the ice-cream as it is extruded through the outlet 23 and allows the extruded ice-cream to flex so that it may be served easily in either dishes or wafer cones. A flexible seal can be applied directly to the piston 7 to cover the outlet 23. This enables the piston 7 to be pre-sealed before inserting it into the container 1. The flexible seal applied to the piston 7 can be in addition, or as an alternative, to the flexible seal applied to the rim 15.

Preferably there is a cavity 29 between the end face of the piston and the flexible seal for storing a spoon or spatula (not shown) therein. This enables a user of the container 1 to eat ice-cream directly from the tub, after removing the flexible seal and the piston.

Preferably the arrangement of the container body 5 and the piston 7 is such that the piston 7 becomes lodged towards the end wall 11 of the container after a dispensing operation. For example, the container body 5 may have a slightly tapered side wall 9 which produces a reduced diameter towards the end wall 11 of the container. When the piston 7 is driven towards the end wall 11, the side wall 9 flexes slightly to accommodate the piston 7 and the deformation of the side wall 9 holds the piston 7 firmly in place, making it difficult to remove the piston 7 from the container . Formations on the side wall of the container can be included to more firmly retain the piston in place.

By removing the flexible seal and inverting the container 1, the ice-cream can be dispensed into the receptacle 3 by relative movement between the piston 7 and the body 5 of the container, for example by pushing the piston 7 into the body 5 or by pushing the body 5 over the piston 7. In either case, ice-cream is extruded through the outlet 23 in the piston 7.

A second container 101 in accordance with the invention is shown in Figures 3a to 4b. This container 101 is similar in most respects to the container described above: however the shape of the outlet 123 in the piston 107 is different, the container body 105 has a flat end wall 111

and the shape of the piston is complementary to the end wall 111. The piston 107 also includes a rim 125.

The containers 1;101 according to the invention have advantages over prior art containers particularly with regard to ice-cream filing operations. For example, the filling operation for the container described in EP 0995685 requires an aluminium foil seal to be applied to the aperture. The container is then removed from the filling machine and inverted to receive the ice-cream. Ice-cream is dispensed into the container and the container is subsequently sealed by inserting the piston. Most standard filing machines are not able to invert containers and must be modified to do so. This is very costly for manufacturers.

The containers 1;101 in accordance with the invention over comes this problem by including an outlet 23;123 in the piston. The container is loaded onto the filing machine, and a predetermined volume of ice-cream is dispensed into the container, for example a sufficient amount for a single portion of ice-cream (typically 100-165ml). The piston 7;107 is then located in the container, and the flexible seal is adhered to the rim 15;115, thereby sealing the container. Alternatively, the piston 7 may have been pre-sealed and therefore insertion of the piston 7 into the container, seals the container. Thus the container only requires one sealing operation and it is not necessary to invert it during the filing-sealing process. This enables standard filing machines to dispense ice-cream into the containers, and seal the containers, without modification. Furthermore, the time taken to fill and seal the container is reduced since there are fewer process steps to perform.

It is envisaged that modifications can be made to the containers described above that fall within the scope of the invention, for example the container need not be cylindrical. The container could be any suitable shape. The volume of the container will usually be 100ml - 300ml, however different sized containers could be used. The outlet could be any suitable shape and may be positioned anywhere on the piston, not necessarily in the middle.

Figures 5 to 6d show a first embodiment of an ice-cream dispensing machine 31 in accordance with the invention. The dispensing machine 31 is arranged to dispense portions of ice-cream from containers 1;101 similar to those described above, and other similar containers. The following description of the dispensing machines 31 (and 231;331) will be made with reference to the first embodiment of the container 1 only, for the purposes of clarity.

The dispensing machine 31 includes a dispensing mechanism for decreasing the separation of the piston 7 and the end wall 11 of the container, thereby dispensing ice-cream through the outlet 23. The dispensing mechanism has a fixed part 33 and a moveable part 35. The fixed part 33 includes an outer sleeve member 37, a closure member 39 that closes one end of the outer sleeve and that engages the end wall 11 of the container, an upper structural member 41, a pair of support members 43 for supporting the upper structural member, a pair of axle supports 45, and a base member (not shown). The moveable part 35 includes an inner sleeve 47, a rack and pinion drive mechanism 49 for moving the inner sleeve 47 relative to the fixed part 33, and a movable receptacle support plate 53.

The support members 43 are attached to the base at their lower ends and extend substantially perpendicularly to the plane of the base. The support members 43 are preferably made from steel but may be made from other materials such as aluminium or a suitable plastic. Each support member has a groove 55 that extends longitudinally along its length. The support members 43 are arranged in parallel such that the grooves face each other and the members are spaced apart. The support members 43 receive the rack 57 from the drive mechanism, such that the rack is arranged for sliding movement in the support member grooves 55 (see below). The axle support members 45 are attached to the rear faces of the support members by bolts (not shown).

The upper structural member 41 is attached to the upper ends of the support members by bolts (not shown). The upper structural member is substantially planar. The closure member 39 is attached to the underside of the upper structural member. The closure member 39 is substantially disc shaped and has a lower surface 39a that has a complementary profile to the closed end of the container. When a container 1 is located in the outer sleeve 37, the lower surface 39a abuts the closed end 11 of the container and provides a substantially rigid surface for the container 1 to press against.

The outer sleeve 37 is attached to the closure member 39 and depends therefrom. The outer sleeve 37 is arranged to receive the container 1 and preferably has an internal profile that is complementary to the external profile of the container. For example, when the dispensing machine 31 is arranged to dispense ice-cream from the container 1 described above, the outer sleeve 37 is substantially cylindrical and has an internal diameter slightly larger than the external diameter of the container. The outer sleeve 37 is formed such that part of the side wall

is omitted so that the operator of the machine can easily load a container 1 directly onto the lower sleeve 47 through the outer sleeve 37. This is advantageous since it enables the moveable part 35 to have a smaller action, that is a smaller movement. If the outer sleeve 37 did not have an opening in its side wall the container 1 would have to be loaded onto the inner sleeve 47 below the outer sleeve 37 thus requiring a larger movement of the moveable part 35 to enable this. If the movement is longer, it reduces the mechanical advantage of the apparatus, which makes it more difficult to dispense ice-cream from the container 1.

The drive mechanism 49 includes an operating handle 51, upper and lower axles 59, a pinion 61, and a drive gear 63. The axles 59 are pivotally mounted in holes formed in the axle support members 45. The axles 59 are arranged substantially parallel to each other and perpendicular to the support members 43. The upper axle carries the drive gear 63, which is positioned equidistantly between the axle supports 45, and the operating handle 51, which is attached to one end. The drive gear 63 and operating handle 51 are attached for rotation with the upper axle, such that rotation of the drive handle causes the drive gear to rotate. The pinion 61 is mounted on the lower axle in mesh with the drive gear. Rotation of the drive gear 63 in a first direction causes rotation of the pinion in the opposite direction. Optionally, the drive mechanism 49 may include a mechanism (not shown) or spring (not shown) for automatically returning the drive handle 51 to a start position after a dispensing operation.

The rack 57 is substantially T-shaped in section and includes a bearing part 57a that is arranged for sliding movement in the grooves of the support members and a drive part 57b comprising several gear teeth distributed along the length of the drive part. The rack is located in the grooves such that the rack teeth are in mesh with the pinion teeth and rotational movement of the operating handle 51 causes translational movement of the rack 57.

The inner sleeve 47 member is attached to the rack, and is arranged for translational movement therewith. The inner sleeve 47 is tubular, having a wide axial bore. The external profile of the inner sleeve is complementary to the internal profile of the container. For example, if the dispensing machine 31 is arranged to dispense ice-cream from the container 1 described above, the inner sleeve 47 will be substantially cylindrical and will have an external diameter that is slightly smaller than the internal diameter of the container. The inner sleeve 47 is arranged co-axially with the outer sleeve 37. Preferably, the length of the inner sleeve 47 is approximately

equal to the height of the container. The inner sleeve 47 includes a rim 65 and a side wall 67 that depends from the rim. Preferably the internal face of the side wall is curved.

The upper surface of the inner sleeve 47 is arranged to engage the piston 7. During a dispensing operation, the inner sleeve 47 drives the piston 7 towards the closed end of the container thereby dispensing ice-cream through the outlet 23 in the piston. The dispensed ice-cream is extruded through the axial bore of inner sleeve 47 into a receptacle 3 positioned below the inner sleeve 47. The inner sleeve 47 may also include an aperture formed in its side wall so that an ice-cream cone filled with ice-cream can be more easily removed from the machine.

The receptacle support plate 53 is positioned directly below the inner sleeve 47 and includes a mounting member 69 that is attached to the support members 43 such that the support plate extends substantially perpendicularly therefrom. The plate 53 has an aperture 71 in the centre that is arranged to receive wafer cones. In use, a cone is placed upright into the aperture 71 and ice-cream dispensed from the container 1 is extruded through the inner sleeve 47 and into the cone. Alternatively, the ice-cream can be dispensed into a bowl or tub that can be located on the upper surface of the support plate. Since the plate is pivotally attached to the mounting member 69 it can be rotated outwards to accommodate a larger receptacle, or to allow the operator to hold the receptacle in his/her hand. Optionally, the support plate 53 can include a radially extending opening thereby defining a substantially U-shaped plate to enable the wafer cone to be removed more easily from the support, via the opening.

Since the support plate 53 is fixed to the support members 43 and the inner sleeve 47 is fixed to the rack 57, during a dispensing operation the separation between the inner sleeve 47 and the support plate 53, and hence between the dispensing point and the receptacle, increases as ice-cream is dispensed. The arrangement provides sufficient space for ice-cream to extend above the rim of the wafer cone, whilst ensuring that the size of the structural members is kept to a minimum.

Preferably the dispensing machine 31 includes a casing (not shown) for housing the machine to provide an attractive appearance and to keep the mechanical parts of the machine clean for hygiene purposes.

The operation of the dispensing machine 31 will now be described. A container 1 is removed from a refrigerated storage unit such as a freezer unit. The ice-cream should be tempered by being brought to a temperature that is suitable for dispensing, which is around -12 to - 20 degrees Celsius. This can be easily achieved in commercial operations with dedicated tempering units, which allow the internal temperature of the unit to be set correctly. The container 1 is loaded onto the upper surface of the inner sleeve 47 such that it is oriented with the closed end of the container facing towards the closure member 39 and the piston 7 is in contact the inner sleeve member 47. The piston 7 rests on the upper surface of the inner sleeve member 47 and the body 5 of the container is located above the inner sleeve within the outer sleeve member 37. A receptacle 3, such as a wafer cone, is held directly beneath the inner sleeve 47 by the operator, with the support plate rotated away from the machine, or located in / on the support plate. The operator pulls the operating handle 51 causing the drive gear 63 and the pinion 61 to rotate, thereby moving the rack 57, inner sleeve member 47 and container 1 upwards. The closed end 11 of the container engages the closure member 39 and further movement of the container body 5 is arrested.

Further rotational movement of the operating handle 51 causes the inner sleeve member 47 to drive the piston 7 upwards into the body 5 of the container thereby dispensing ice-cream through the outlet 23 in the piston 7. The ice-cream is extruded through the tubular inner sleeve 47 and into the wafer cone. The star shaped outlet 23 produces an attractive decorative pattern on the surface of the ice-cream as it is extruded through the outlet 23. As the piston 7 moves further into the body 5 of the container the dispensing point moves away from the receptacle 3, thus creating a larger space for ice-cream to extend above the wafer cone 3. The outer sleeve 37 supports the container body during the dispensing operation and prevents it from collapsing.

The piston rim 25 scrapes the internal face of the side wall of the container as it moves towards the closed end 11 of the container. When the piston 7 reaches the closed end 11 of the container substantially all of the ice-cream will have been dispensed from the container 1. The operator serves the ice-cream and returns the operating handle 51 to the start position. The empty container 1 is removed and is disposed of. The dispensing machine 31 is then ready to receive a new container.

A second embodiment of the invention is shown in Figures 7 to 8d. The second dispensing machine 231 includes a dispensing mechanism for decreasing the separation of the piston and the end wall 11 of the container, thereby dispensing ice-cream from the container 1, and a mechanism 273 for adjusting the position of a receptacle for receiving the dispensed ice-cream, such as a wafer cone or bowl.

The dispensing mechanism includes a fixed part 233 and a moveable part 235. The fixed part 235 includes a pair of support members 243, a pair of axle supports 245, an inner sleeve member 247 member and a base member (not shown). The moveable part 235 includes an outer sleeve member 237, an operating handle 251, and a rack and pinion drive mechanism 249 for moving the outer sleeve 237 relative to the fixed part 233. Optionally, moveable part 235 may include a mechanism (not shown) or spring (not shown) for automatically returning the drive handle 251 to a start position after a dispensing operation.

The support members 243 and base are similarly arranged to the first embodiment. The inner sleeve 247 is attached to the support members by two bolts 275. The inner sleeve 247 has a rim 265. The axle supports 245 are similar to those of the first embodiment, however they are arranged to support a single axle 259.

The outer sleeve 237 is similar to the outer sleeve of the first embodiment and includes a similar closure member 239. The outer sleeve 237 is connected to the rack by an upper support member 241 and is secured thereto by bolts 277. The outer sleeve 237 and rack 257 are fixed together and therefore translational movement of the rack 257 adjusts the vertical position of the outer sleeve 237. The rack 257 is cross-shaped in section and includes a bearing part 257a and a drive part 257b. The bearing part is arranged for sliding movement in grooves 255 located in the support members. The rack 257 is arranged to be driven by the operating handle 251 mounted on the axle 259 via the pinon 263. When the operator pulls the operating handle 251 downwards, the moveable part 235 is arranged to move the outer sleeve 237 towards the inner sleeve 247, such that when a container 1 is positioned on the upper surface of the inner sleeve, the inner sleeve 247 maintains the position of the piston 7 and the outer sleeve 237 drives the body 5 of the container downwards over the piston 7, thereby dispensing ice-cream through the outlet 23 in the piston 7. Since the piston 7 does not move during the dispensing operation, the dispensing point is stationary.

The mechanism for moving the receptacle 273 comprises a drive member 279, a receptacle support 253, a helical spring 281, a support pin 283 and a releaseable lock mechanism (not shown). The drive member 279 comprises a cylindrical rod that is located in a blind bore in the lower surface of the rack, and protrudes vertically downwards therefrom. The receptacle support 253 is arranged to support a wafer cone or a bowl. The support 253 includes an annular plate portion and a stem for attaching the annular plate portion to the bearing part 285. The annular portion defines an aperture 271 for receiving a wafer cone and has a planar surface for receiving a bowl or other container for carrying ice-cream. Optionally, the annular member can be replaced by a substantially U-shaped member to enable the wafer cone to be removed more easily from the support 253. The bearing part 285 is arranged for sliding movement in the grooves 255 in the support members. The helical spring 281 is located in the grooves 255 of the support members below the bearing part 285 of the receptacle support and is arranged to be resiliently deformed as the receptacle support is driven downwards by the drive member 279.

The drive member 279 moves downwards with the rack 257 as the operating handle 251 is rotated. The drive member 279 engages the bearing part 285 and further rotation of the operating handle 251 drives the receptacle support 253 downwards against the action of the spring 281. This causes the receptacle 3 to move away from the dispensing point, which enables ice-cream to extend above the top of the receptacle without soiling the dispensing machine 231. The drive member 279 and bearing part 285 are preferably arranged such that approximately one third of the ice-cream is dispensed from the container 1 before the drive member 279 engages the bearing part 285, for example to approximately fill a wafer cone with ice-cream before the wafer cone moves away from the dispensing point. This helps to produce a pleasing conical shape of ice-cream that extends above the top of the wafer.

The releaseable lock mechanism is arranged to lock the position of the receptacle support 253 when a dispensing operation has been completed and the receptacle support 253 has moved to its maximum extent. The releaseable lock mechanism comprises a latching arrangement that can be manually released. The resiliency of spring 281 then returns the receptacle support 253 to its start position.

During a dispensing operation, the operator removes the flexible seal from a new container 1 and loads the container 1 onto the inner sleeve 247. The container 1 is oriented such that the

piston 7 sits on the upper surface of inner sleeve. A receptacle 3, such as a wafer cone, is mounted in the aperture 271 of the receptacle support. The operator pulls on the operating handle 251 causing the pinion 263 to rotate thereby moving the rack 257 downwards This causes the outer sleeve 237 to move downwards into engagement with the closed end 11 of the container. The closed end 11 of the container engages the closure member 239 and further rotational movement of the operating handle 251 causes the outer sleeve 237 to drive the body 5 of the container downwards over the piston 7 thereby dispensing ice-cream through the outlet 23 in the piston 7. The ice-cream is extruded through the inner sleeve 247 and into the wafer cone. As the piston 7 moves further into the body 5 of the container, the piston 7 rim scrapes the internal face of the side wall of the container thereby cleaning the container 1. Since the position of the piston is fixed, and the body 5 of the container slides relative to the piston 7, the ice-cream dispensing point is stationary. The outer sleeve 237 prevents the container 1 from collapsing.

After a predetermined amount of ice-cream has been dispensed from the container 1 into the wafer cone, the drive member 279 engages the bearing part 285 of the receptacle support and drives the support downwards away from the dispensing point, thereby compressing the spring 281. Further rotation of the operating handle 251 causes the receptacle support 253 to move further away from the dispensing point until all the ice-cream has been dispensed from the container 1, the piston 7 abuts the closed end 11 of the container, and the releaseablelock mechanism maintains the position of the receptacle support 253. After dispensing, the operator returns the operating handle 251 to the start position and removes the receptacle 3 from the support. The operator releases the lock mechanism, thereby causing the receptacle support 253 to be driven upwards by the resiliency of the spring 281 to its original position. The operator removes the used container 1 from the machine and inserts a new container 1 for the next dispensing operation.

Figures 9a to 11b show a third dispensing machine 331 in accordance with the invention. The dispensing machine 331 includes a dispensing mechanism having a drive mechanism 349 comprising a drive assembly and a support assembly.

The support assembly includes an outer sleeve member 337 and an inner sleeve member 347. The inner sleeve 347 has a first part 347a that is substantially cylindrical and has an outside diameter that is slightly smaller than the diameter of the piston. The length of the first part

347a is slightly greater than the height of the container. Towards the base of the inner sleeve there is an external screw thread 347b and a flange 347c that forms the base of the machine. The inner sleeve 347 fits into the outer sleeve 337 co-axially and is fixed in place by mating the external screw thread 347b with an internal screw thread 337b formed towards the base of the outer sleeve 337. The outer sleeve 337 has an internal diameter that is slightly larger than the outside diameter of a container having a thermal jacket. Alternatively, it can be arranged to be slightly larger than the outside diameter of the container without a jacket. A coarse screw thread 337a is formed in the outer surface of the outer sleeve. The coarse screw thread 337a is opposite handed to the internal screw thread 337b so that the inner and outer sleeves 347,337 do not unscrew during a dispensing operation. When the inner sleeve 347 is located within the outer sleeve 337 there is an annular space between the sleeves. The annular space is arranged to receive the body 5 of the container during a dispensing operation.

The drive assembly includes a drive plate 339, a spring 387, an end cap 389 and a drive body 391. The drive body 391 comprises a tubular member having an internal coarse screw thread 393 that is complementary to the external thread formed in the outer surface of the outer sleeve, and is arranged to mate therewith. The drive plate 339 comprises a disc member having a profiled centre part that is complementary to the end wall 11 of the container 11. The drive plate 339 is arranged to fit into the drive body 391 and is arranged for sliding movement therein. The drive body 391 includes an internal rim 395 which limits the movement of the drive plate. The end cap 389 is attached to the drive body 391 towards its upper end. The end cap is dome-shaped and houses the spring 387. The end cap includes a seat 397 and the spring 387 is located between the seat 397 and the drive plate 339. The drive assembly is arranged to be screwed onto the support assembly via the coarse screw threads. The end cap 389 includes formations 399 to enable the operator to screw the drive assembly onto the support assembly.

Optionally, a thermal insulating jacket (not shown) can be applied to the container 1 to prevent the ice-cream at the sides of the container from heating up too quickly. The insulating jacket may comprise any suitable thermal insulating material, such as a plastics material. The jacket may take the form of bubble wrap commonly used in the packaging industry. For embodiments where it is envisaged that a thermal jacket is required, the internal diameter of the outer sleeve 37 can be arranged to accommodate a container 1 wearing the thermal jacket.

The dispensing machine 331 may be mounted on a stand 398 and the stand may be used in conjunction with a wafer cone support 396 (see Figure 11a). The dispensing machine may be stored within the stand (see Figure 11b).

The operation of the dispensing machine 331 will now be described. The operator separates the drive assembly from the support assembly and preferably mounts the support assembly on the stand 393. The operator obtains a container 1 from a freezer unit. The flexible seal is removed, and the container 1 is placed onto the inner sleeve 347. The container 1 is oriented such that the piston 7 sits on the upper surface of the inner sleeve.

The ice-cream should be tempered by being brought to a temperature that is suitable for dispensing, which is around -12 to - 20 degrees Celsius. The temperature of a domestic freezer unit is typically around -20 degrees Celsius, and the actual storage temperature will vary according to the position of the ice-cream with the unit. Therefore it may be necessary to allow the container 1 to stand for a time so that the temperature of the ice-cream can rise to the dispensing temperature. The operator may choose to wrap the container 1 in a thermally insulating jacket during this period to allow the ice-cream to warm to the dispensing temperature more evenly, thereby reducing melting of ice-cream close to the sides of the container. This is at the discretion of operator.

A receptacle, such as a wafer cone, is located beneath the stand preferably in a cone support 396.

The drive plate 339 is seated on the rim 395 of the drive body and is held there under the action of the spring 387. The operator places the drive assembly onto the support assembly so that the coarse screw threads 337a,393 engage and begins to screw the drive assembly onto the support assembly. The drive plate 339 engages the end wall 11 of the container and slides relative to the drive body 391 into the end cap 389, thereby compressing the spring 387. Further rotational movement of the drive assembly relative to the support assembly causes the drive plate 339 to drive the body 5 of the container to move relative to the piston 7 which his held in place by the inner sleeve 347 member. Ice-cream is dispensed from the outlet 23 in the piston 7 as the container body 5 moves past the piston 7, and is extruded through the inner sleeve 347 into the wafer cone below. When the drive assembly can no longer rotate with respect to the support assembly, the drive plate 339 continues to dispense ice-cream from the container 1 by forcing the container body 5 past the piston 7 due to the resiliency of the spring

387 acting on the drive plate 339. The dispensing operation ends when the piston 7 abuts the end wall 11 of the container and substantially all the ice-cream has been dispensed therefrom.

Preferably, the dispending operation requires less than one full turn of the drive assembly to dispense all of the ice-cream from the container. For example, the dispensing machine can be arranged such that the drive assembly is rotated between one quarter and one third of one turn to fully dispense all of the ice-cream.

The operator then unscrews the drive assembly and removes the empty container 1. A new container 1 can be placed into the machine 331 for a subsequent dispensing operation or, since the parts are separable, the operator can dismantle the machine for cleaning.

It will be appreciated by the skilled person that modifications can be made to the embodiments described above that are within the scope of the invention, for example the mechanism for moving the receptacle away from the dispensing point in the second embodiment could be adapted for inclusion in the first embodiment. The dispensing machines can be arranged such that both the container and the piston are forced to move by the drive mechanism.

The spring could be omitted from the third embodiment and the drive plate could be fixed within the drive body such that dispensing takes place entirely under the screwing action. Alternatively, the embodiment can be arranged such that substantially all of the ice-cream in the container can be dispensed under the action of the drive plate which is driven by the resiliency of the spring.

A valve member can be included in the support assembly to prevent ice-cream being dispended from the container. The valve member would block the outlet 23 in the piston 7 thereby preventing the ice-cream from being extruded through the outlet 23 in the piston 7 when the drive assembly is screwed onto the support assembly. The valve member can be removed when the operator is ready and the resiliency of the spring causes the drive plate to force the body to move relative to the piston 7 and dispense ice-cream. This is useful, for example when the container is stored in a freezer unit at a temperature that is lower than the dispensing temperature. When the container is loaded into the dispensing machine 31, the ice-cream is not ready to be dispensed and therefore has to wait until its temperature increases before it can be dispensed. Preferably a thermal insulating jacket is applied to the container

in this instance to allow the ice-cream to warm up more evenly. The valve member is used to prevent some of the ice-cream escaping before the temperature is correct.

An alternative way of addressing the same problem is to use a lock member, lock formation or lock mechanism to hold the spring away from the drive plate, or the drive plate from the end wall 11 of the container, until the ice-cream is ready for dispensing.

CLAIMS

1. A food container for storing and dispensing an individual portion of a semi-solid food stuff, including a hollow body member having a closed end, and a piston having an outlet formed therein, wherein the container is arranged to store the food stuff between the closed end of the body and the piston and the piston is arranged for sliding movement relative to the body such that the food stuff is dispensed from the container via the outlet in the piston when the separation between the piston and the closed end of the body is reduced.

2. A food container according to claim 1, wherein the piston includes a scraper member for engaging an internal face of the body member.

3. A food container according to claim 1 or 2, wherein the container is arranged for nesting so that a plurality of containers can be stacked end to end.

4. A food container according to any one of the preceding claims, wherein the piston is arranged for nesting so that a plurality of pistons can be stacked end to end.

5. A food container according to any one of the preceding claims, wherein the piston includes a cavity for receiving an eating implement.

6. A food container according to any one of the preceding claims, wherein the body includes a side wall having a thickness in the range 0.2 to 1.2 mm,

7. A food container according to claim 6, wherein the side wall has a thickness in the range 0.3 to 1 mm, and more preferably in the range 0.4 to 0.8mm.

8. A food container according to any one of the preceding claims, including retaining means for retaining the piston at the closed end of the container after a dispensing operation.

9. The use of a container including a hollow body with a closed end, and a piston with an outlet formed therein, for storing an individual portion of semi-solid food stuff, wherein the piston is arranged for sliding movement relative to the body of the container and the food stuff is dispensable from the container via the outlet when the separation between the piston and the closed end of the container body is reduced.

10. Apparatus for dispensing a semi-solid food stuff from a food container having a hollow body, a piston mounted in the body and an outlet formed in the piston, said apparatus

including a drive mechanism arranged to drive the piston into the body so that the food stuff is dispensed from the container through the outlet, the drive mechanism including a piston engagement member having an outlet through which the food stuff is dispensed.

11. Apparatus according to claim 10, including support means to prevent the container from collapsing during a dispensing operation.

12. Apparatus according to claim 11, wherein the support means includes a substantially tubular support member that at least partially surrounds the body of the container.

13. Apparatus according to claim 11 or 12, wherein the support means and the piston engagement member are arranged substantially co-axial, and at least a part of the piston engagement member is arranged to fit into the support means with sufficient clearance such that the body of the container can be located in the space between the support means and the piston engagement member.

14. Apparatus according to any one of claims 10 to 13 wherein the piston engagement member includes a tubular or annular part.

15. Apparatus according to any one of claims 10 to 14, wherein the piston engagement member is arranged to initially engage the piston below the body of the container.

16. Apparatus according to claim 15, wherein the apparatus is arranged such that the piston is arranged to move along a substantially vertical axis, and the piston engagement member is located below the piston and is substantially aligned with the vertical axis.

17. Apparatus according to any one of claims 10 to 16, wherein the drive mechanism is arranged to drive the container over the piston engagement member.

18. Apparatus according to any one of claims 10 to 17, wherein the drive mechanism is arranged to drive the piston engagement member into the container.

19. Apparatus according to any one of claims 10 to 18, wherein the drive mechanism includes a rack and pinion drive system.

20. Apparatus according to any one of claims 10 to 18, wherein the drive mechanism includes a screw drive system.

21. Apparatus according to any one of claims 10 to 20, wherein the drive mechanism includes resilient means arranged to cause relative movement between the body of the container and the piston engagement member.

22. Apparatus according to claim 21, wherein the drive mechanism is arranged to load the resilient means prior to a dispensing operation, and includes means for maintaining the resilient means in its loaded state until an operator initiates the dispensing operation.

23. Apparatus according to 22, wherein the means for maintaining the resilient means in a loaded state comprises at least one of a closure member for preventing ice-cream from dispensing from the container, a latching arrangement, structural formations or a mechanism.

24. Apparatus according to any one of claims 10 to 23, including receptacle support means for supporting a receptacle arranged to catch the food stuff when it is dispensed from the container.

25. Apparatus according to claim 24, wherein the drive mechanism includes means for adjusting the position of the receptacle support means during a dispensing operation.

26. Apparatus according to claim 25, wherein the receptacle support means includes resilient means for returning the receptacle support to a start position.

27. Apparatus according to claim 25 or 26, wherein the receptacle support means includes a locking mechanism arranged to lock the position of the receptacle support means.

28. Apparatus according to any one of claims 10 to 27, including thermal insulating means for the container.

29. A method for dispensing a semi-solid food stuff from a food container, said method including inserting into a dispensing device a container having a hollow body with a closed end, a piston and an outlet formed in the piston, said dispensing device having a piston engagement member and a drive mechanism arranged to cause relative movement between the body of the container and the piston engagement member to reduce the separation between the piston and the closed end of the container such that the food stuff is dispensed from the container via the outlet

30. A method according to claim 29, including moving the dispensing point of the container.

31. A method according to claim 29 or 30, including supporting the body of the container to prevent the container from collapsing during a dispensing operation.

32. A method according to any one of claims 29 to 31, including engaging the piston from below the body of the container.

33. A method according to any one of claims 29 to 32, wherein the dispensing device comprises apparatus according to any one of claims 10 to 28.

34. A method according to any one of claims 29 to 33, wherein the container includes means for retaining the piston towards the closed end of the container body.

35. A food container as described herein with reference to and as illustrated by the Figures 1a to 2b.

36. A food container as described herein with reference to and as illustrated by the Figures 3a to 4b.

37. Apparatus substantially as described herein with reference to and as illustrated by Figures 5 to 6b.

38. Apparatus substantially as described herein with reference to and as illustrated by Figures 7 to 8b.

39. Apparatus substantially as described herein with reference to and as illustrated by Figures 9 to 11b.

Application No: GB0505780.7 15 **Examiner:** Mike Henderson

Claims searched: 1 to 39 **Date of search:** 9 August 2005

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 & 9 at least	GB 1062295 A (BEECHAM GROUP LTD) (Whole disclosure relevant)
X	1, 9 & 10 at least	GB 446344 A (ANDERSON) (Whole disclosure relevant)
X	1 & 9 at least	GB 411573 A (JAMIESON) (Whole disclosure relevant)
X	1, 9 & 10 at least	GB 401003 A (VOELK) (Whole disclosure relevant)
X	1 & 9 at least	GB 394945 A (HULT) (Whole disclosure relevant)
X	1 & 9 at least	US 5370260 A (PARAMSKI) (Whole disclosure relevant)
X	1 & 9 at least	US 5044525 A (McKINNEY) (Whole disclosure relevant)
X	1 & 9 at least	US 2763405 A (SHVETZ) (Whole disclosure relevant)
X	1 & 9 at least	US 2231412 A (McCARTHY) (Whole disclosure relevant)
X	1, 9 & 10 at least	FR 2742138 A1 (BACARDI MARTINI) (Whole disclosure relevant)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if	P	Document published on or after the declared priority date but

	combined with one or more other documents of same category.		before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

B8D; F1R

Worldwide search of patent documents classified in the following areas of the IPC[07]

A23G; B65D

The following online and other databases have been used in the preparation of this search report

ONLINE:WPI,EPODOC