(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 July 2014 (24.07.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/112878 A1

(51) International Patent Classification:
B30B 9/30 (2006.01) *B65F 1/14* (2006.01)

(21) International Application Number:
PCT/NL2014/050025

(22) International Filing Date:
21 January 2014 (21.01.2014)

(25) Filing Language: Dutch

(26) Publication Language: English

(30) Priority Data:
2010151 21 January 2013 (21.01.2013) NL

(71) Applicant: **SK INTERNATIONAL B.V.** [NL/NL]; Admiraalsweg 6, NL-2315 SC Leiden (NL).

(72) Inventor: **KLUIVERS, Hans**; Dorus Rijkerskade 10, NL-2315 WB Leiden (NL).

(74) Agent: **ALGEMEEN OCTROOI- EN MERKENBUREAU B.V.**; P.O. Box 645, NL-5600 AP Eindhoven (NL).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: DEVICE FOR COLLECTING WASTE AS WELL AS COMPACTING MEANS FOR USE WITH SUCH A DEVICE

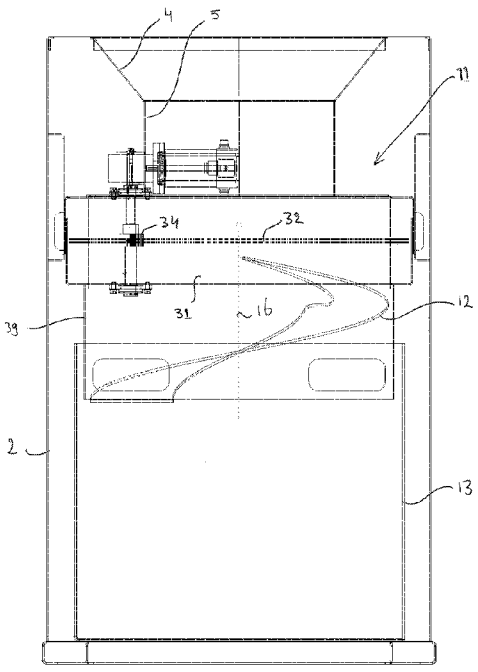

Fig 2

(57) Abstract: The invention provides a device for collecting waste, comprising a container (13) for waste, which container (13) is provided with an open upper side, and compacting means for compacting waste in the container (13). The compacting means comprise at least one inclined pressure element (12), which is provided at the upper side of the container (13). The compacting means (12) further comprise drive means (35) for rotatably driving the pressure element (12) about a vertical rotation axis (16), a free central passage (15) for waste on the side or sides of the at least one pressure element (12) that face(s) the rotation axis (16), as well as a stationary shell (39) provided along the circumference of at least part of the length of the pressure element (12).

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Title: Device for collecting waste as well as compacting means for use with such a device

Description

The present invention relates to a device for collecting waste according to the preamble of claim 1. On the Dutch market, a device is sold, under the name of "klikopers", in which the compacting means comprise a pressure element which is connected to a pivotable arm. By moving the pressure element into a filled container by means of the pivotable arm, the contents of the container are compressed, so that space for additional waste is created inside the container.

A device according to the preamble of claim 1 is described in German publication DE 3609745 A1, more specifically with reference to figure 4 thereof. The device described therein comprises a drum which is rotatable about a vertical rotation axis. Said drum consists of an upper funnel-shaped part and a lower cylindrical part that connects thereto. Disposed under the drum is a waste container, which is provided with an opening in the upper side, to which the bottom side of the lower cylindrical part connects. The device described in said document further comprises a stationary, vertically oriented worm which is provided centrally in the lower cylindrical part and which tapers off at the bottom end. The worm comprises a central shaft body, to the outer side of which the spiral of the worm connects with about four windings. The central shaft body and the four windings form one whole. In use, waste passes in downward vertical direction into the space between the worm and the wall of the cylindrical part of the drum upon rotation of the drum, which is provided on the inner side thereof with vertical strip-shaped elements oriented toward the worm; the waste rotates along with the drum and subsequently falls into the waste container. The contents of the waste container can be compressed upon rotation of the drum as a result of cooperation between the drum and the worm along the entire length of the worm. In order to move waste within the range of operation of the worm, the device described in said document further comprises a spiral, downwardly tapering grab, which rigidly connects to the upper end of the aforesaid worm and which is likewise stationary, therefore, viz. within the upper funnel-shaped part of the drum. Unlike the worm, said grab merely has a waste conveying function. A connecting rod connects to the upper end of the aforesaid central shaft body of the

worm, which connecting rod extends via the inner side of the spiral grab and which is connected to an outer housing of the device.

An important drawback of the above-described device is that rotation of the drum is required in order to ensure that waste gets into the waste container. In particular relatively large waste will remain on the worm if such rotation does not take place. This is disadvantageous for energy reasons, but in addition it is also quite unpleasant for a user, for example in the case of a breakdown of the drive system of the drum or of failure of the control system of the device. Another drawback is that driving the drum results in a large rotating surface and associated driving gear and guide means, which constitute a risk of jamming. From an energy point of view, this adds to the drawbacks of the device. In use, a column of waste will form along the length of the worm, which column will rotate along with the drum so as to be able to move down in the direction of the waste container. In addition, the known device is less suitable, if even at all, for use for voluminous consumer waste, since the device will need to have relatively large dimensions in that case, which is disadvantageous on account of the amount of space that is of necessity taken up.

The object of the invention is to provide a device as referred to in the introduction which is more user-friendly for a user, such as typically a consumer, than the known device described in the foregoing, and which is suitable for use in a catering environment, for example, where relatively much relatively light and voluminous waste is produced, such as typically at a fast-food establishment. In order to achieve that object, the compacting means further comprise drive means for rotatably driving the pressure element about a vertical rotation axis, a free central passage for waste on the side or sides of the at least one pressure element that face(s) the rotation axis, as well as a stationary shell provided along the circumference of at least part of the length of the pressure element. Via the free central passage of the pressure element, which is absent in the prior art and which enables waste to pass the pressure element without impediment, waste can be deposited in the container whilst the pressure element can press down the waste by rotating, on account of the slope thereof, by pressing down on the waste as a kind of spatula, thus compacting the waste. The skilled person will appreciate that there is a slope if the orientation of the pressure element is different from that of a horizontal plane, or at least of a plane perpendicular to the rotation axis of the pressure element. The invention makes continuous filling of the container possibly, even if the

drive means should not be operative, because the container is at all times accessible to this via the free central opening, providing it is not full. In spite of this, it is also possible to compact the contents of the container by means of the pressure element by pressing said contents down with the pressure element. In addition, the device is very safe to use because the risk of a person's fingers or the like getting wedged can be very small with a device according to the invention. In order to prevent or at least reduce the risk of waste present on the pressure element rotating along with the pressure element, the compacting means of the present invention comprise a stationary shell provided along the circumference of at least part of the length of the pressure element. Said stationary shell offers resistance upon contact with waste present on the pressure element, as a result of which the waste in question will sooner tend to fall from the pressure element and into the container. The device according to the invention can furthermore be designed to comprise a limited number of moving parts, which are relatively small in size and which can be readily screened by a housing or the like.

A very effective embodiment can be obtained if the spiral has a central axis that coincides with the rotation axis.

In general it is preferable when using a spiral pressure element if the angle through which the spiral of the pressure element extends is at most 360 degrees. If the angle in question should exceed this value, this would not lead to an additional compacting effect whereas it would lead to a greater overall height.

According to another preferred embodiment, the pressure element is strip-shaped along at least part of its length, preferably along its entire length. Pressing down waste in the container can in that case take place effectively via the lower flat side of the strip, which to that end preferably has a horizontal orientation.

It is preferable if the cross-section of the pressure element in a plane through the rotation axis exhibits a slope along part of the length of the pressure element. Said slope is a slope in the radial direction, therefore, and thus perpendicular to the slope according to the main aspect of the present invention. This can contribute toward the cooperation between the shell and the pressure element, or in general assist in the movement in radial direction of waste that lands on the at least one pressure element, which feature can be utilised for filling the container uniformly with waste. Within the framework of the present preferred

embodiment it is not necessary for the slope in question to be present along the entire length of the pressure element.

The cooperation with the aforesaid stationary shell can be enhanced in particular if the slope according to the preceding preferred embodiment is such that the pressure element is positioned lower on the side remote from the rotation axis than on the side facing the rotation axis.

The compacting action in particular benefits if at least a lower end of the pressure element extends into the container via the open upper side, at least in an operative position.

In order to make it possible in a simple manner to move the container in horizontal direction, the invention provides the advantageous possibility that the device comprises moving means for moving the pressure element and/or the container relative to each other from the operative position to a non-operative position in which the pressure element is positioned entirely above the container.

The effect of the shell can be enhanced in particular if the stationary shell is unround. A polygonal shape may be considered in that regard, for example, but also a profile provided in the wall of the shell, such as a corrugation pattern, but also the provision of a few resistance elements, for example lamellae connected to the shell.

For constructional reasons it is advantageous if the drive means comprise transmission means comprising an engagement part which extends on the outer side of the pressure element, or at least of the extension thereof, and which is engaged by an engaging part of the transmission means.

To realise at least one full rotation of the pressure element, it is preferable if the engagement part extends along at least substantially the entire circumference of the pressure element, whether or not in line with the pressure element.

A very effective transmission can be obtained if the engagement part comprises teeth which are engaged by the engaging part. The engaging part may also be provided with teeth in that case.

It is furthermore constructionally advantageous if the compacting means are provided with a rotary shell provided on the circumference of the pressure element, which rotary shell is rigidly connected to the pressure element. The rotary

shell may in that case also function as a guide for waste that is deposited in the device.

It suffices if the rotary shell is only connected to a part of the pressure element that is located at an upper end of the pressure element, so that space is available around the pressure element and under the rotary shell for other means, such as the round or unround shell that has been discussed in the foregoing.

To realise a univocal rotation of the pressure element, in spite of the fact that it has a free passage, it is advantageous if the compacting means are provided with at least three guide elements, preferably guide wheels, on the circumference of the rotary shell, which guide elements retain the rotary shell in horizontal direction.

Because of the weight of the pressure element and of parts that are rigidly connected to the pressure element, the pressure element will tend to move down in the container, whilst the waste will exert an upward force on the pressure element during compacting operation of the pressure element. In order to offer resistance against said forces and keep the pressure element at the same vertical level in the operative condition, it is preferable if the compacting means are provided with an annular retaining member, which is rigidly connected to the rotary shell on the circumference thereof, wherein running means, preferably running wheels, are provided both at the upper side and at the bottom side of the retaining member, which running means retain the retaining member in vertical direction.

For safety reasons it is preferable if the device also comprises a housing which is provided with an opening (closable or not closable) which housing surrounds the compacting means and the drive means, wherein the opening is positioned above the free central passage.

To make it possible to empty the container, it is furthermore preferable if the housing has a door via which, in an open position thereof, the container can be moved into and out of the housing, and if the moving means according to an above-discussed preferred embodiment comprise further transmission means for moving the pressure element from the operative position to the higher non-operative position, which transmission means act between the door and the pressure element for moving the pressure element and/or the container from the operative position to the non-operative position during the opening of the door

and for moving the pressure element and/or the container from the non-operative position to the operative position during the closing of the door.

In order to help achieve that waste which is being deposited in the device via the open upper side of the housing will indeed get into the container via the central passage in the container, it is advantageous if the opening is funnel-shaped.

The invention is in particular suitable for use with containers having a capacity of at most 300 litres.

As already discussed in the foregoing, it is or at least can be advantageous if the device comprises sensor means for detecting the fact that waste is being deposited in the device and, on the basis of said detection, delivering a signal to control the drive means.

The invention also relates to compacting means for use in a device as described in the foregoing. Such compacting means comprise at least one inclined pressure element, which at least one pressure element is intended for being provided at the upper side of a container, drive means for rotatably driving the pressure element about a vertical rotation axis, as well as a free central passage for waste on the side or sides of the at least one pressure element that face(s) the rotation axis.

The invention will now be explained in more detail by means of a description of a non-limitative preferred embodiment of a device according to the invention, in which reference is made to the following figures:

Figure 1 is an isometric view of a waste bin in operative condition;

Figure 2 is a transparent side view of the waste bin of figure 1;

Figure 3 is an isometric view of the compacting unit of the waste bin;

Figure 4 is a vertical sectional view of the compacting unit of figure 3 along the line M-M in figure 6;

Figure 5 is a horizontal sectional view of the compacting unit of figure 3 along the line N-N in figure 7;

Figure 6 is a transparent top plan view of the compacting unit;

Figures 7 and 8 are side views oriented perpendicular to each other of the compacting unit;

Figure 9 shows the waste bin in a non-operative condition with the door open and the container pulled out;

Figure 10 is a transparent side view of the waste bin of figure 9;

Figures 11 and 12 are side views of the waste bin with the door open and the door closed, respectively.

The waste bin 1 shown in the various figures appended hereto essentially consists of a housing 2 containing a waste container 13 and a compacting unit 11 disposed above said waste container. The waste bin 1 further comprises a linkage 21 for moving the compacting unit 11 up and down when the door 3 of the housing 2 is being opened and closed, respectively. The various parts of the waste bin will be described in more detail hereinafter.

The housing 2 is substantially block-shaped and is provided with a door 3 on one side. The housing 2 has an open upper side 6 comprising a funnel-shaped part 4 and a cylindrical opening 5. A user can deposit waste in the waste bin 1 via the open upper side 6.

The waste container 13 is a block-shaped box having an open upper side and handles 14 by means of which the waste container can be moved into and out of the housing 2 in the open position of the door 3 (see figure 9). The waste container 13 is provided in the lower part of the housing 2 and rests on the bottom thereof.

The compacting unit 11 is provided at the upper side of the waste container 13 and serves to compact the contents of the waste container 13, so that the amount of waste that can be collected in the waste container 13 is increased. At the upper side, the compacting unit 11 is provided with a screening ring 17, whose internal diameter corresponds to that of the cylindrical opening and concentrically connects thereto. To make this compacting activity possible, the compacting unit 11 is provided with a spiral pressure element 12 having a vertical central axis 16, about which the pressure element 12 can be rotatably driven in a manner yet to be described in more detail. The spiral extends through 270 degrees or, in other words, through three quarters of a revolution. The pressure element 12 is strip-shaped, said strip-shape having an at least substantially horizontal orientation and also an inclined orientation on account of the spiral shape of the pressure element 12. The cross-section of the strip shape may exhibit a slope, preferably in outward direction, viewed in a vertical plane through the spiral axis, in order to induce the waste that lands on the pressure element 12 to move toward the resistance shell 39 (yet to be discussed). The width of the strip shape of the pressure element 12 has value b1

over the upper quarter of the revolution of the spiral and value b2 over the two lower quarters of the revolution of the spiral, b2 being greater than b1. The external diameter of the spiral is constant along the length of the pressure element. Where the strip shape has a width b1, the internal diameter of the pressure element is about the same as that of the screening ring 17. Since b2 is greater than b1, the internal diameter of the pressure element 12 at the location where the strip shape thereof has width b2 is smaller than the internal diameter of the pressure element 12 at the location where the strip shape thereof has width b1. The strip shape of the pressure element 12 does not taper off at the bottom end, therefore, but retains width b2. Value b2 is greater than 20 per cent of the external diameter of the pressure element 12. In this example, b2 is about 0.3 times the external diameter of the pressure element 12.

The pressure element 12 has a cylindrical central passage 15 for waste over the entire height of the pressure element 12, which passage 15 is completely free. At the upper side of the pressure element 12, the pressure element 12 is connected to a concentric drive shell 31, for example by means of a welded joint. On the outer circumference of the drive shell 31, approximately halfway the height of the drive shell 31, a concentric annular gear 32 is connected to the drive shell 31. The compacting unit 11 further comprises a frame 33. A driving gear 34 is mounted for rotation about a vertical rotation axis relative to said frame 33. The gear 34 can itself be driven by means of an electric motor 35, which is connected to the gear 34 via a right-angled transmission 36. Energization of the electric motor 35 will thus result in rotation of the pressure element 12. Energization of the electric motor 35 can for example take place on the basis of signals received from a sensor, such as a sensor of the optical type, which signals that waste is being deposited in the waste container, more specifically that waste is passing through the cylindrical opening 5, for example.

To guide the rotary movement of the pressure element 12, four guide wheels 37, which are mounted in bearings in the frame 33 and which are rotatable about vertical axes of rotation, are provided both at the upper side and at the bottom side of the gear 32, evenly distributed over the circumference of the drive shell 1. The compacting unit 11 is further provided with running wheels 38, four at the bottom side of the gear 32 and four at the upper side of the gear 32, for vertically retaining the pressure element 12 and the parts that are fixedly connected thereto.

The upper side and the bottom side of the annular gear 32 function as running surfaces for said running wheels 38, which are mounted in the frame 33 for rotation about horizontal axes of rotation that are oriented toward the spiral axis of the pressure element 12.

The compacting unit 11 further comprises an unround, octagonal in the present embodiment, stationary resistance shell 39, which surrounds the pressure element 12, under the drive shell 31, over the larger part of the height thereof. The resistance shell 39 has a constant cross-section, viewed along the axial length thereof. As is clearly shown in particular in figure 2, for example, the lower parts of the resistance shell 39 and the pressure element 12 extend into the waste container 13 via the open upper side of the waste container 13, at least in the operative condition of the waste bin 1.

The fact that the resistance shell 39 extends partially within the waste container 13 in the operative condition of the waste bin 1 obstructs movement of the waste container 13 into and out of the housing 2, which is necessary for emptying the waste container and placing a new waste bag, if desired. The present invention provides a solution to this problem by causing the compacting unit 11 to be moved upward, via a mechanical transmission, when the door 3 of the housing 2 is opened, such that the bottom side of the compacting unit 11, which is in fact the bottom side of the resistance shell 39 or the bottom side of the pressure element 12, will be located at a higher level than the upper side of the waste container 13. The mechanical transmission in question comprises the aforesaid linkage 21 with pivot rods 23, 24, 25, 26, 27 and a central rod 28 (figures 11 and 12). Said linkage 21 is connected, via a rod 28 thereof, to the door 3, for example by means of a pull rod, cable or chain (not shown). The linkage 21 is further connected to the housing 2 via rods 23, 24, 25 thereof, and to the frame 33 of the compacting unit 11 via rods 26, 27. To make this connection possible, the frame 33 is provided with attachment eyes 40. Furthermore, a locking rod 22 as known per se to the skilled person is provided for keeping the door in an open position.

The waste bin 1 can be used as follows:

Waste is deposited in the waste bin 1 via the open upper side 6 of the housing 2. Via the tubular opening 5, said waste falls through the central passage 15 of the pressure element 12, whose spiral axis is in line with the central axis of the opening 5. Because of the free nature of the passage 15, the waste can

move through the passage without impediment. On the basis of control signals received from or at least on the basis of sensor means (not shown), for example of the optical type, which signal the fact that waste is being deposited, the electric motor 35 is energized temporarily, so that the pressure element 12 is rotatably driven in anti-clockwise direction (seen in top plan view) about the rotation axis 16. Insofar as waste should be present on the pressure element 12, said waste will tend to fall off the pressure element 12 and into the waste container 13, also on account of the presence of the stationary shell 39. This process is repeated every time waste is deposited in the waste container.

Eventually the waste container 13 will be filled to such an extent that the waste in the waste container 13 comes within reach of the pressure element 13 during rotation thereof. This rotation leads to the pressure element 12 sweeping over the waste like a spatula, pressing the waste downward in the waste container 13, so that this waste is compacted in the waste container 13. The rotary movement of the pressure element 12, in particular of the lower end thereof, provides a repeated vertical pressing movement in combination with a mixing rotation of the waste in the container, preventing the waste in the container from springing up. The fact that the strip shape of the pressure element 12 has width b2 at the lower end is advantageous in this regard.

During filling of the container, waste will also tend to accumulate within the resistance shell 39. Because of the unround shape of the resistance shell, said waste is prevented from rotating along with the pressure element 12 (or at least the risk of this is significantly reduced). Instead, the waste will heap up and tend to fall down into the waste container 13. Once the waste container 13 is filled to a sufficient degree, which can be detected, for example, by measuring the power required from an electric motor 35 and delivering a control signal as soon as said required power exceeds a particular threshold value, it can be communicated to people in the vicinity of the waste container 1, for example by means of an acoustic or optical signal, that the waste container 13 is full. The compacting unit 11 can then be moved upward by opening the door 3, so that the compacting unit can be positioned entirely above the waste container 13, whereupon the waste container 13 can be slid out of the housing 2 via the open door 3, be emptied and subsequently be returned to its position within the housing, after which the door 3 can be closed again.

The waste bin 1 has been described merely by way of illustration of a possible embodiment of the present invention. Various variants are possible within the framework of the present invention. The appended claims are primarily relevant for determining the scope of the present invention. As regards possible variants, it is pointed out, for example, that the pressure element can also be driven by means of a different type of transmission than the above-described gear transmission. Thus it is possible, for example, to make use of an elongate driving element, such as a belt or a chain that is passed over at least part of the rotary shell 31, which driving element is driven via an electric motor, or to make use of a friction wheel transmission. It is also possible to adapt the electric motor for operation by means of a switch and to make use of approach sensors. Thus the device can be set to turn off the electric motor as soon as persons approach the device. The sensor means may also be counter means, which count the number of times waste passes through the central passage 15, which is likewise a measure of the degree to which the container is filled.

The invention in particular provides the advantage that a device according to the invention can be designed to be very user-friendly, so that it is also suitable for use in self-service restaurants, for example. It is very important in this regard that the device according to the invention can be operated in a very safe manner, in spite of the presence of moving parts. The invention is also suitable for use in underground waste containers, which underground waste containers will generally have a capacity of more than 1000 litres.

CLAIMS

1. A device for collecting waste, comprising a container for waste, which container (13) is provided with an open upper side, and compacting means for compacting waste in the container, which compacting means comprise at least one inclined pressure element (12), which at least one pressure element (12) is provided at the upper side of the container (13), characterised in that the compacting means further comprise drive means (35) for rotatably driving the pressure element (12) about a vertical rotation axis (16), a free central passage (15) for waste on the side or sides of the at least one pressure element (12) that face(s) the rotation axis (16), as well as a stationary shell (39) provided along the circumference of at least part of the length of the pressure element.

2. A device according to claim 1, characterised in that the pressure element is spiral shaped, which spiral has a central axis that coincides with the rotation axis.

3. A device according to claim 2, characterised in that the angle through which the spiral of the pressure element extends is at most 360 degrees.

4. A device according to claim 2 or 3, characterised in that the pressure has an external diameter which is constant.

5. A device according to claim 1, 2, 3 or 4, characterised in that the pressure element is strip-shaped along at least part of its length and preferably has a horizontal orientation.

6. A device according to claim 5, characterised in that the cross-section of the pressure element in a plane through the rotation axis exhibits a slope along part of the length of the pressure element.

7. A device according to claim 6, characterised in that the slope is such that the pressure element is positioned lower on the side remote from the rotation axis than on the side facing the rotation axis.

8. A device according to claim 5, 6 or 7, characterised in that, at least at the lower end of the pressure element, the strip shape has a width of at least 20 per cent of the diameter of the pressure element at the location of the lower end of the pressure element.

9. A device according to any one of the preceding claims, characterised in that at least a lower end of the pressure element extends into the container via the open upper side, at least in an operative position.

10. A device according to claim 9, characterised in that the device comprises moving means for moving the pressure element and/or the container relative to each other from the operative position to a non-operative position in which the pressure element is positioned entirely above the container.

11. A device according to any one of the preceding claims, characterised in that the stationary shell is unround.

12. A device according to any one of the preceding claims, characterised in that the drive means comprise transmission means comprising an engagement part which extends on the outer side of the pressure element, or at least of the extension thereof, and which is engaged by an engaging part of the transmission means.

13. A device according to claim 12, characterised in that the engagement part extends along at least substantially the entire circumference of the pressure element, whether or not in line with the pressure element.

14. A device according to claim 12 or 13, characterised in that the engagement part comprises teeth which are engaged by the engaging part.

15. A device according to any one of the preceding claims, characterised in that the compacting means are provided with a rotary shell provided on the circumference of the pressure element, which rotary shell is rigidly connected to the pressure element.

16. A device according to claim 15, characterised in that the rotary shell is only connected to a part of the pressure element that is located at an upper end of the pressure element.

17. A device according to claim 15 or 16, characterised in that the compacting means are provided with at least three guide elements, preferably guide wheels, on the circumference of the rotary shell, which guide elements retain the rotary shell in horizontal direction.

18. A device according to claim 15, 16 or 17, characterised in that the compacting means are provided with an annular retaining member (32), which is rigidly connected to the rotary shell (31) on the circumference thereof, wherein running means, preferably running wheels (38), are provided both at the upper side

and at the bottom side of the retaining member, which running means retain the retaining member (32) in vertical direction.

19. A device according to any one of the preceding claims, characterised in that the device also comprises a housing which is provided with an opening (closable or not closable) and which surrounds the compacting means and the drive means, wherein the opening is positioned above the free central passage.

20. A device according to claim 19 and according to claim 10, characterised in that the housing has a door via which, in an open position thereof, the container can be moved into and out of the housing, and that the moving means comprise further transmission means which act between the door and the pressure element for moving the pressure element and/or the container from the operative position to the non-operative position during the opening of the door and for moving the pressure element and/or the container from the non-operative position to the operative position during the closing of the door.

21. A device according to claim 19 or 20, characterised in that the opening is funnel-shaped.

22. A device according to any one of the preceding claims, characterised in that the container has a capacity of at most 300 litres.

23. A device according to any one of the preceding claims, characterised in that the device comprises sensor means for detecting the fact that waste is being deposited in the device and, on the basis of said detection, delivering a signal to control the drive means.

24. Compacting means for use in a device according to any one of the preceding claims, wherein the compacting means comprise at least one inclined pressure element, which at least one pressure element is intended for being provided at the upper side of a container, drive means for rotatably driving the pressure element about a vertical rotation axis, as well as a free central passage for waste on the side or sides of the at least one pressure element that face(s) the rotation axis.

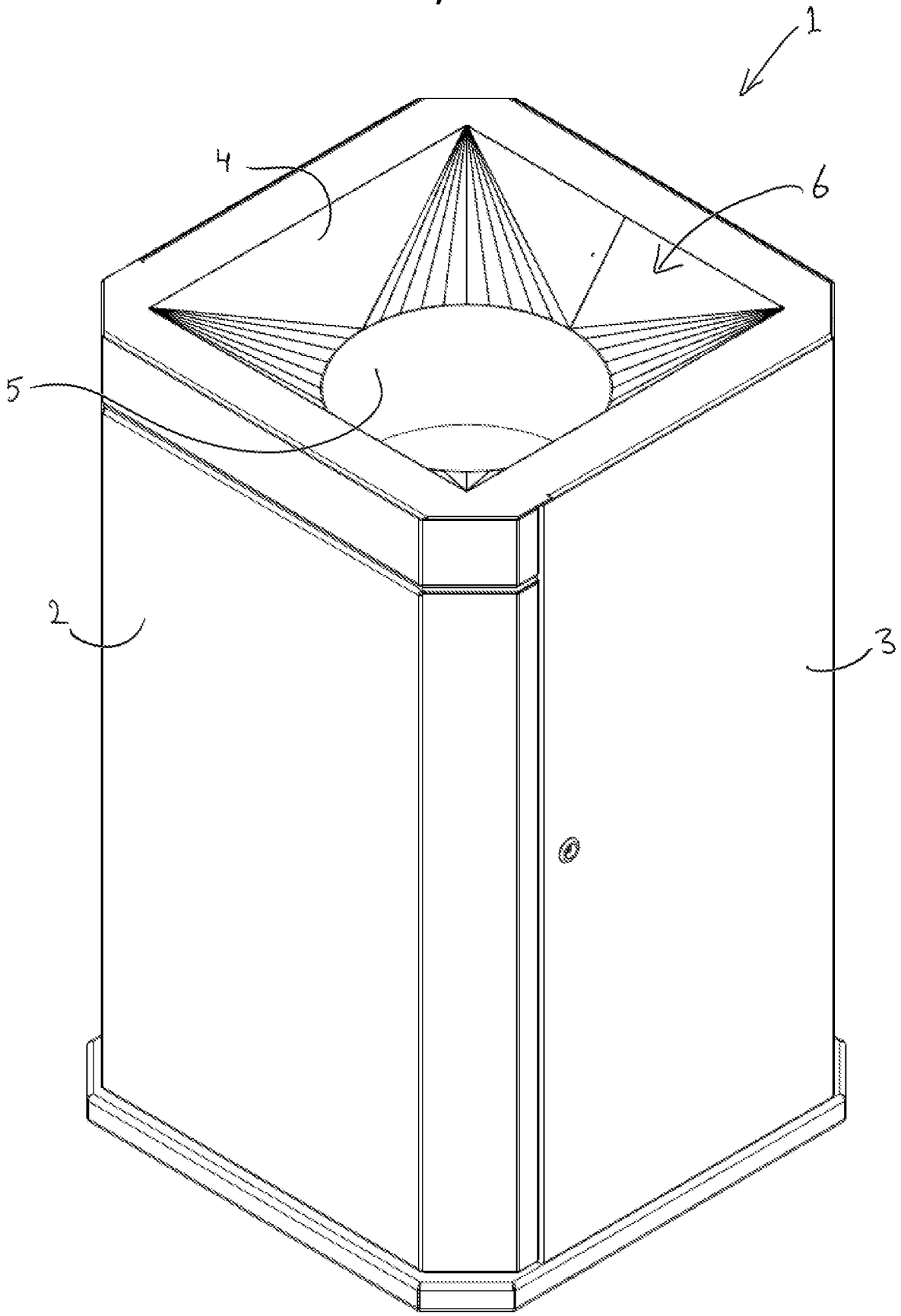

Fig 1

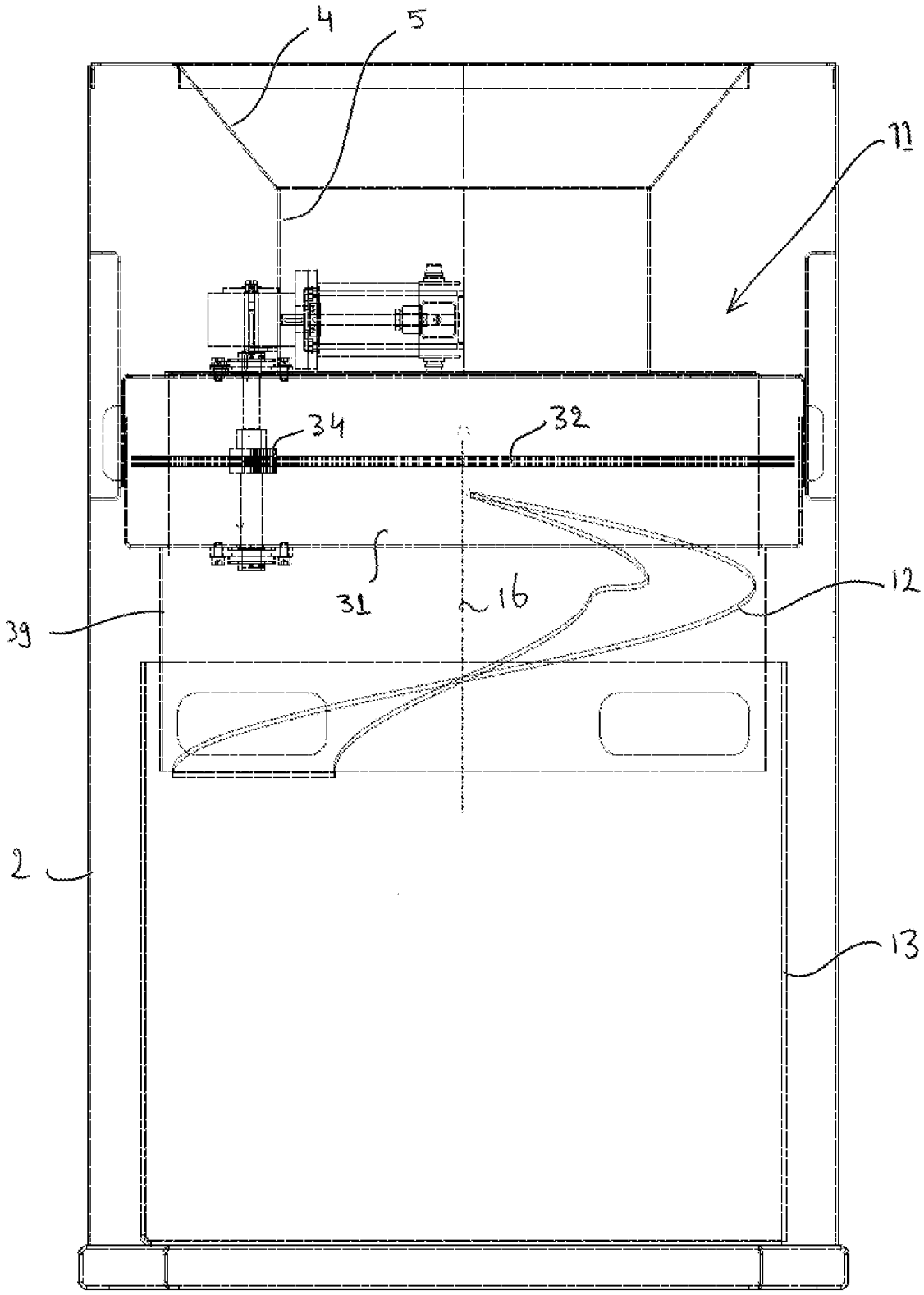

Fig 2

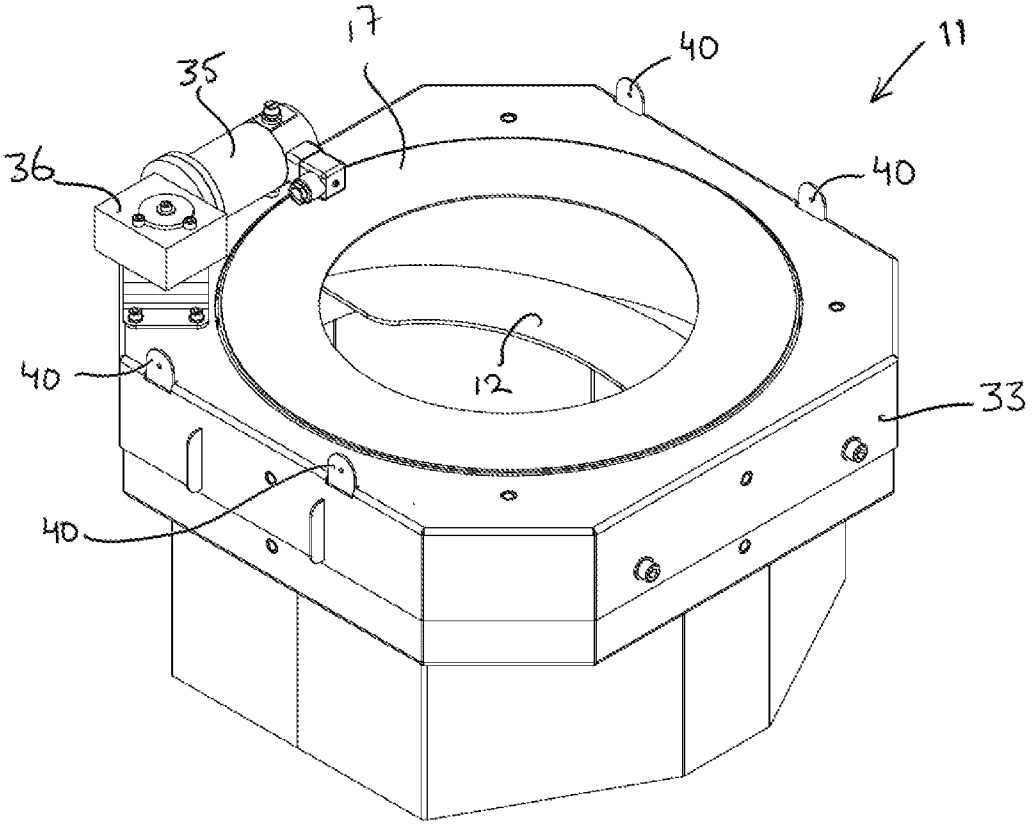

Fig 3

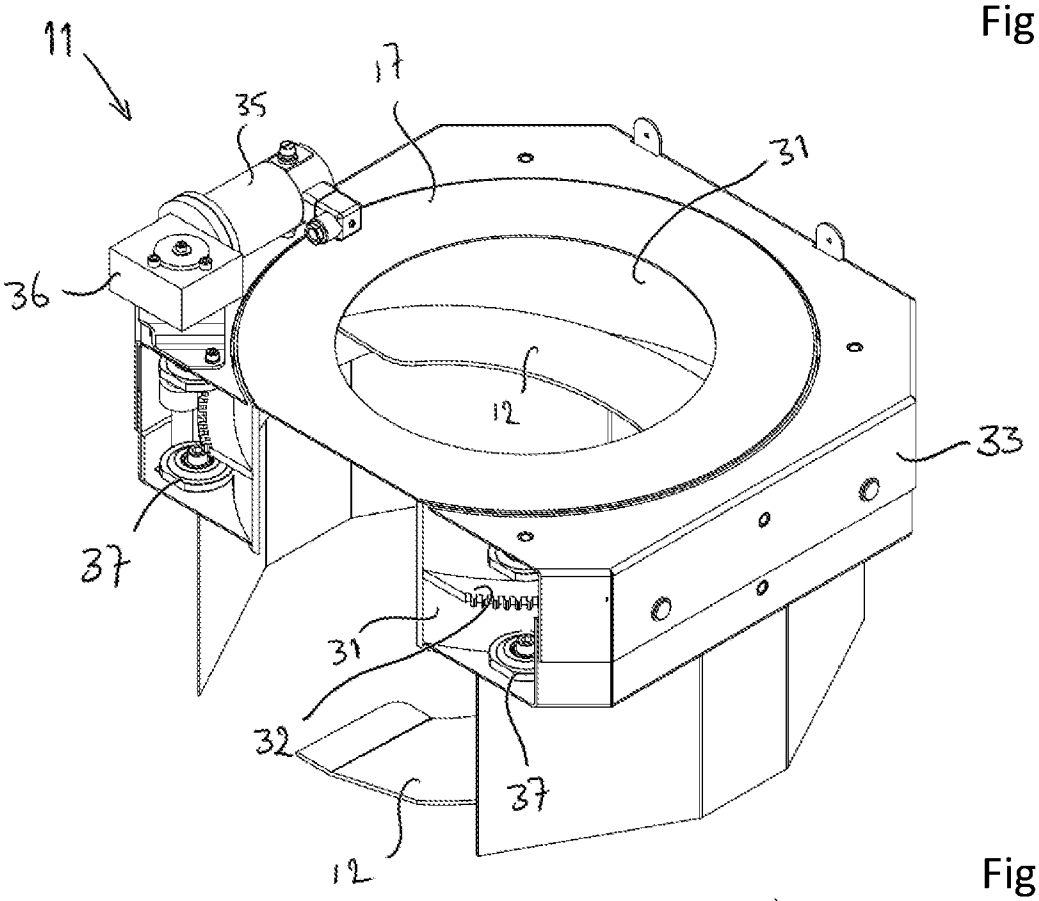

Fig 4

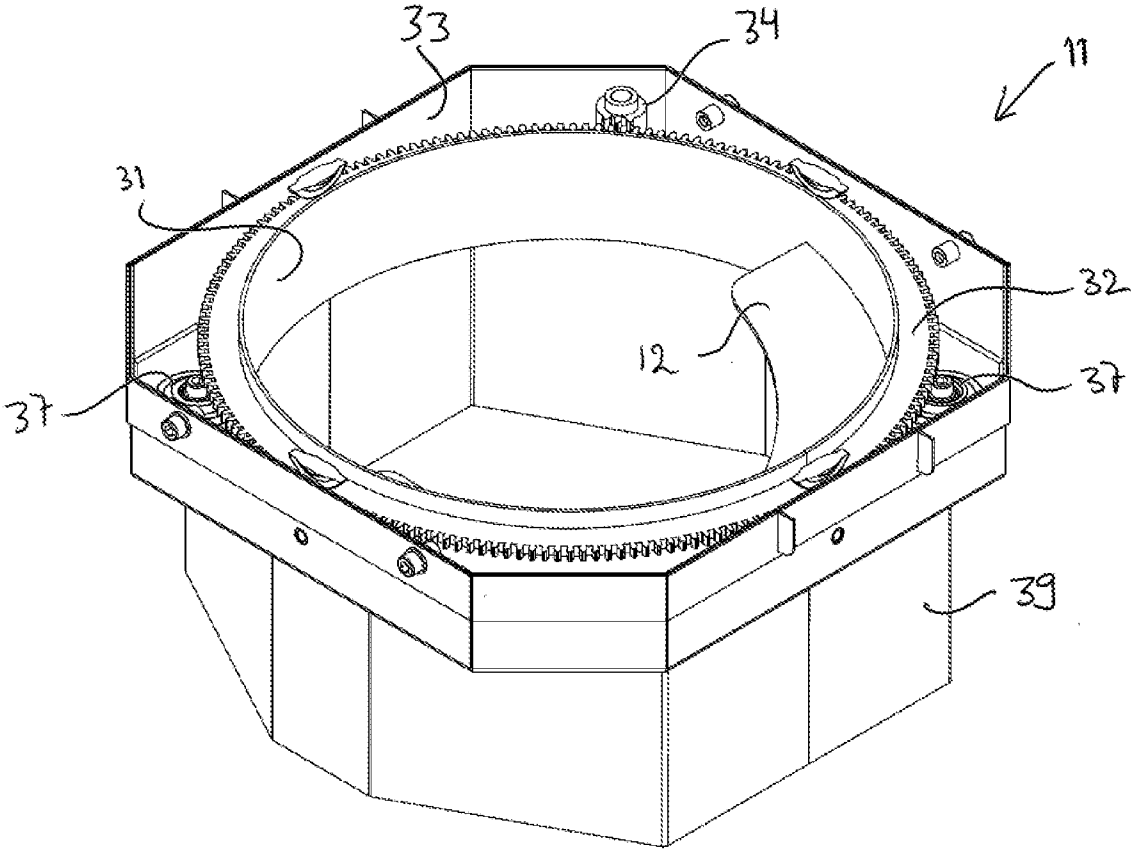
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Fig 5

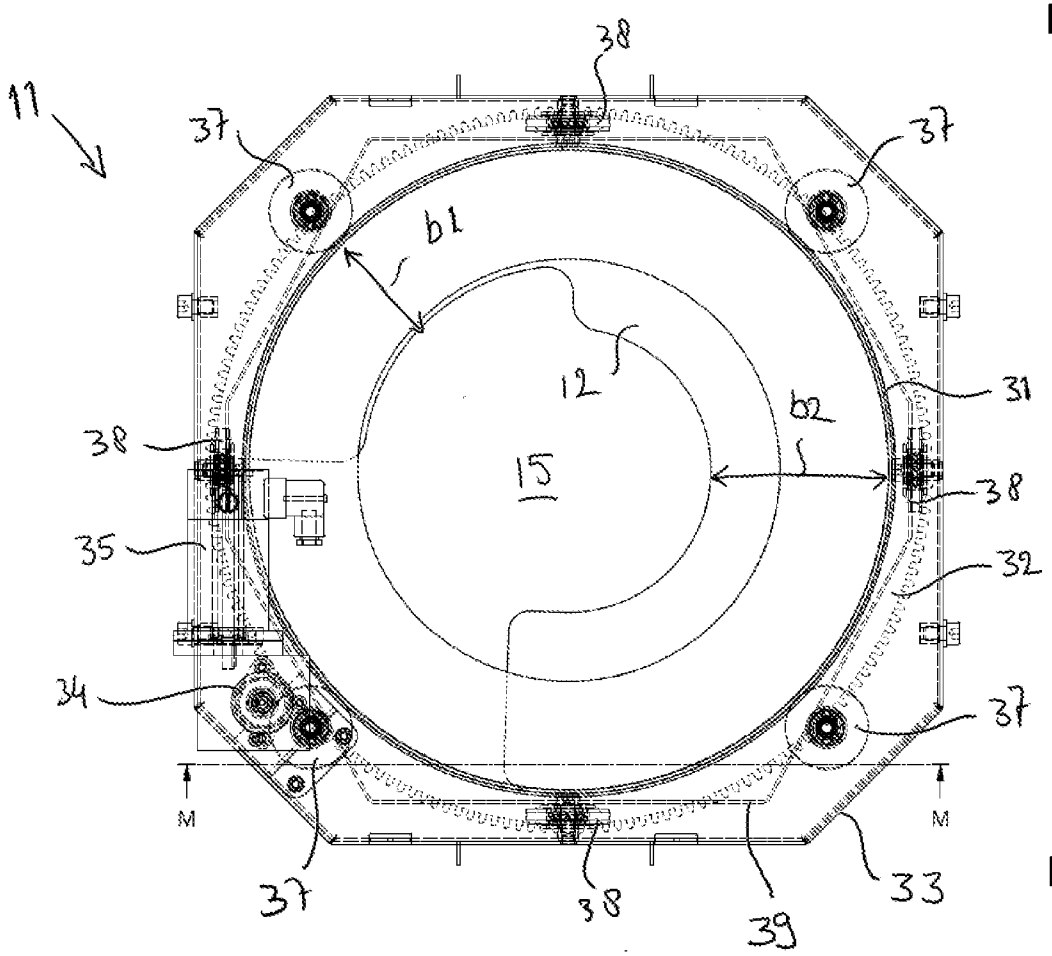
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Fig 6

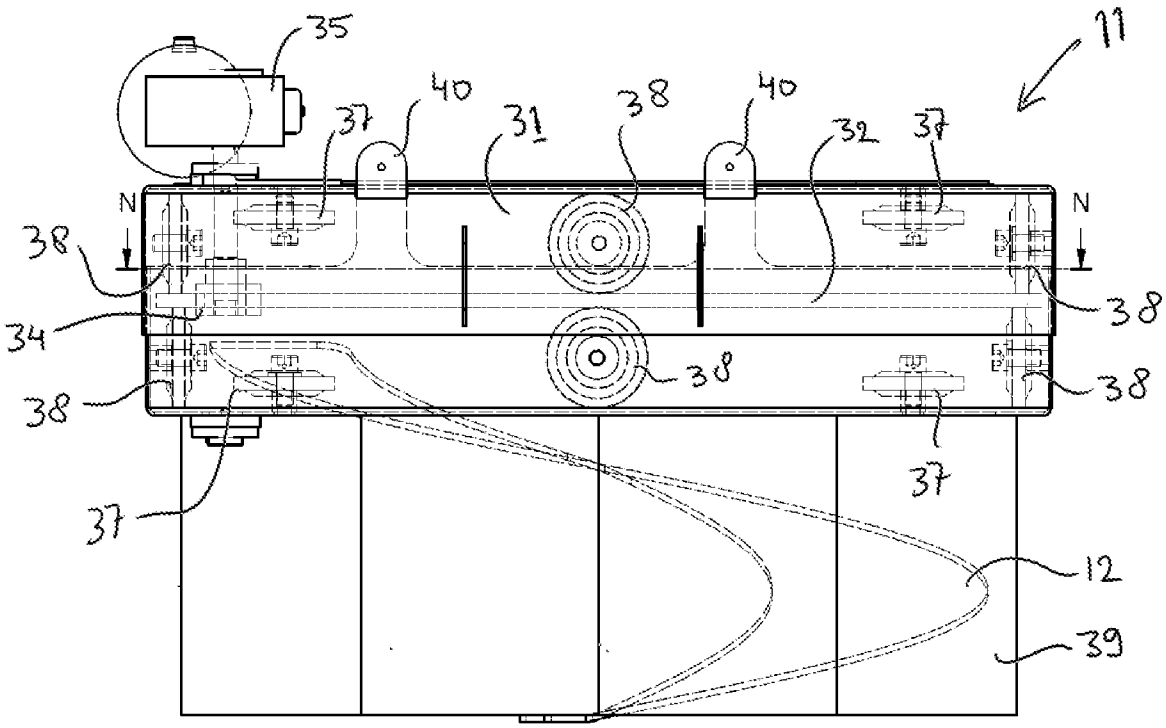
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Fig 7

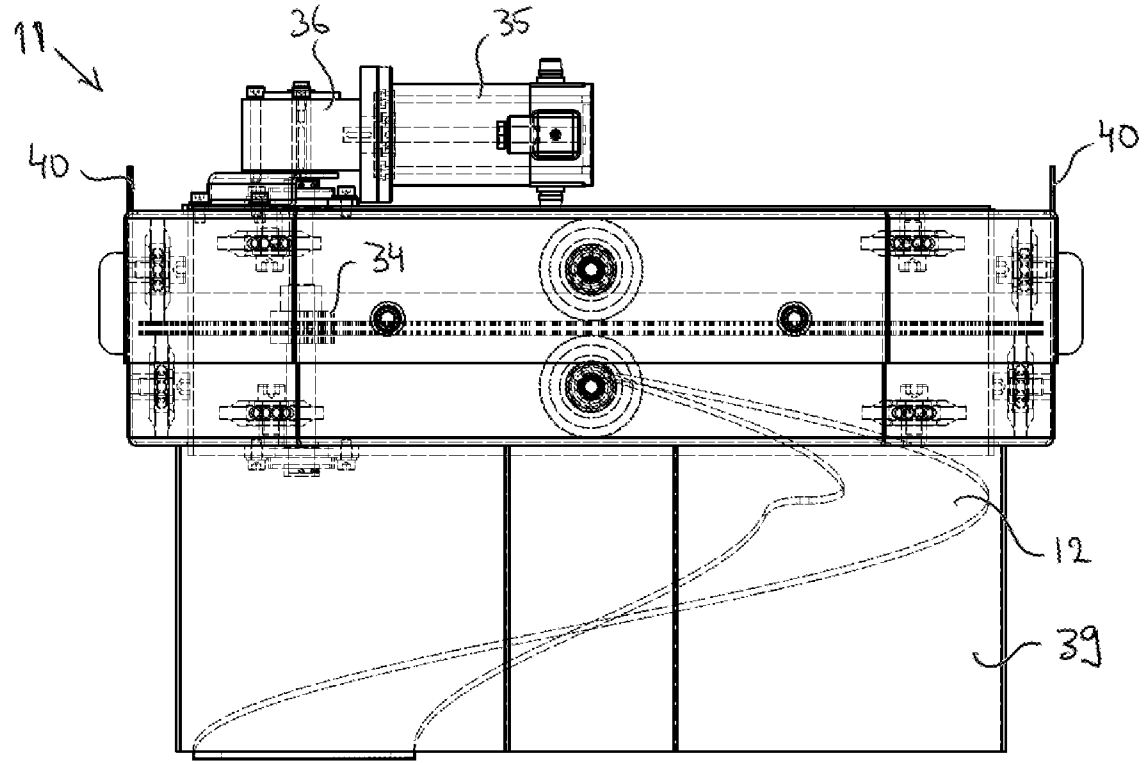
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Fig 8

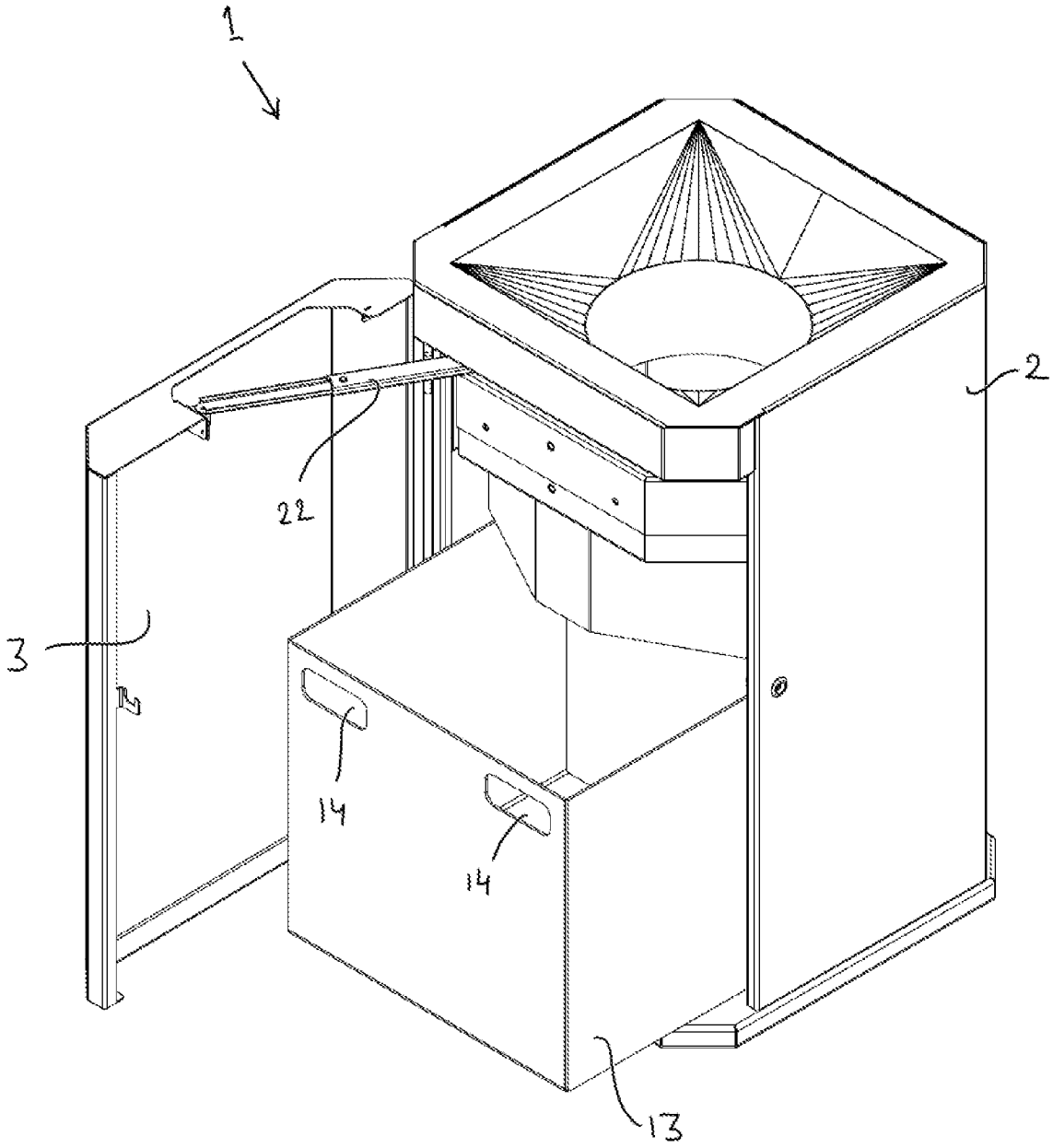

Fig 9

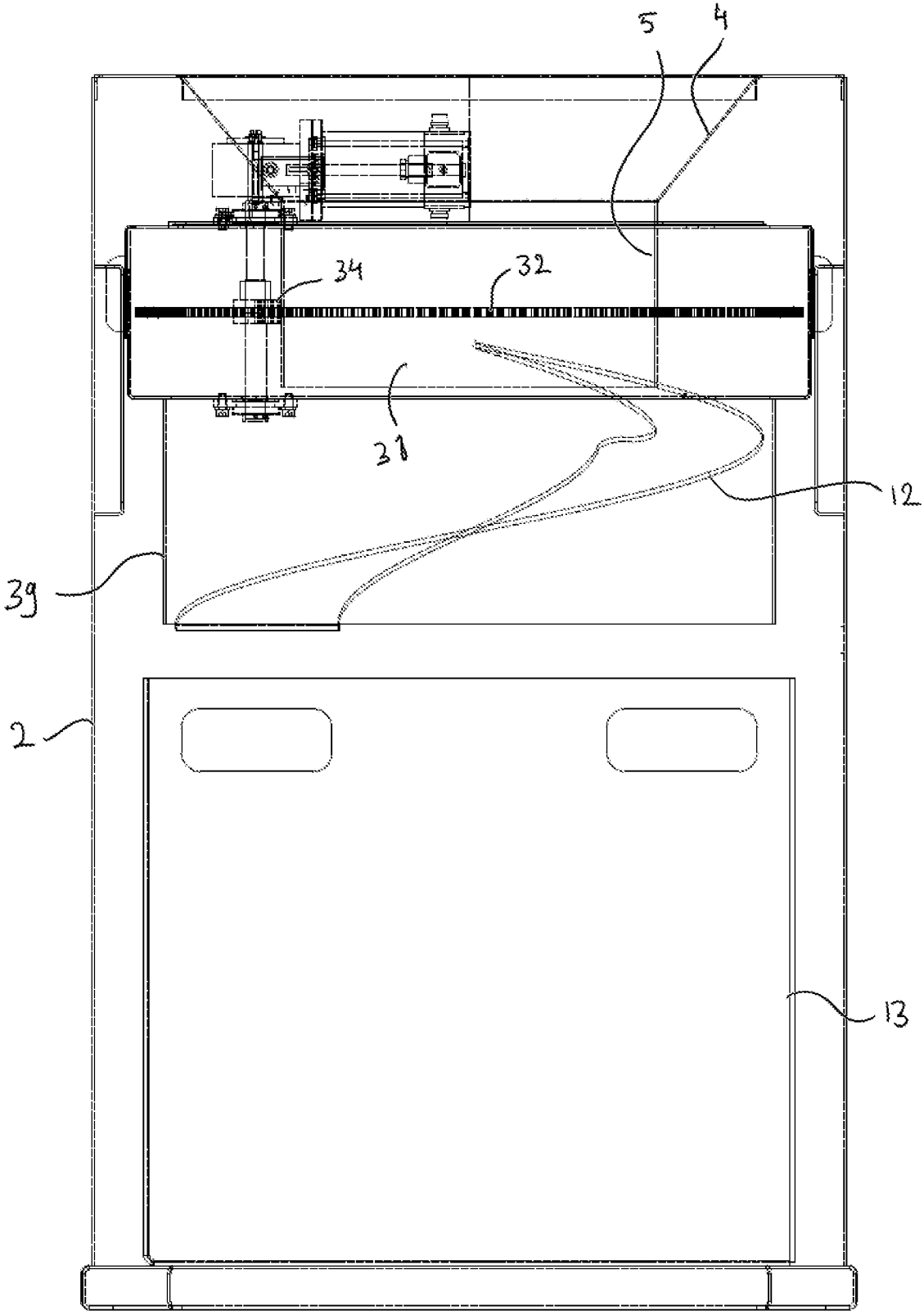

Fig 10

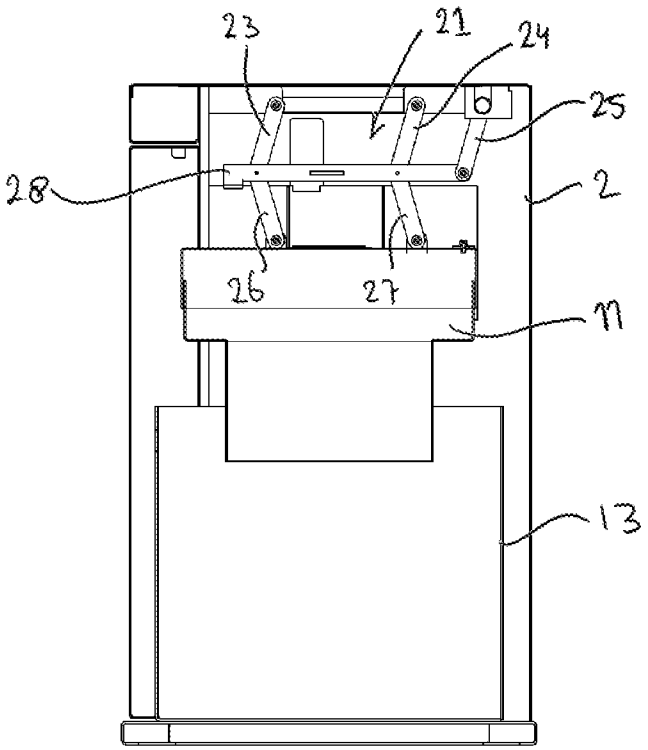

Fig 11

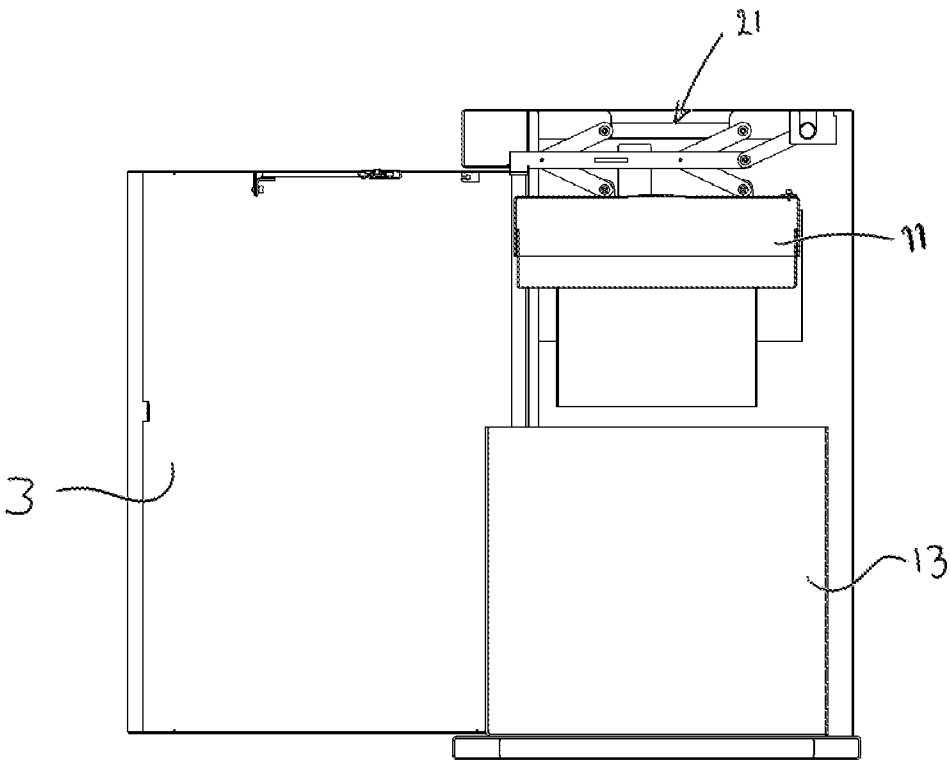

Fig 12

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2014/050025

A. CLASSIFICATION OF SUBJECT MATTER
INV. B30B9/30 B65F1/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B30B B65F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 36 09 745 A1 (BERGMANN HEINZ) 1 October 1987 (1987-10-01)	1-10, 12-16, 19-24
A	column 3, line 39 - line 45 column 4, line 44 - line 56 column 5, line 34 - line 39 column 8, line 18 - line 33 claim 1; figure 4	11,17,18

Y	DE 93 11 846 U1 (FAUN UMWELTTECHNIK AG [DE]) 2 December 1993 (1993-12-02)	1-10, 12-16, 19-24
A	page 2, line 36 - page 3, line 16 figures 1,2	11,17,18

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 March 2014	01/04/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Jensen, Kjeld

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2014/050025

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	BE 1 017 862 A3 (JASPERS ERIC [BE]) 1 September 2009 (2009-09-01) page 2, line 6 - line 17 page 4, line 22 - page 7, line 9 figures 1-5	1-10,12, 14, 19-22,24

Y	AT 396 915 B (PICKART JOSEF [AT]) 27 December 1993 (1993-12-27)	15,16,19
A	abstract; figures	1-14,17

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A	paragraph [0002] paragraph [0027] paragraph [0032] figure 1b	1-22

A	JP 2006 150383 A (SASAKI CORP) 15 June 2006 (2006-06-15) abstract; figures	1-24

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/NL2014/050025

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DE 9311846 U1	02-12-1993	NONE	
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		US 2013220150 A1	29-08-2013
		WO 2012063051 A1	18-05-2012