

(19)



Octrooi centrum
Nederland

(11)

2009865

(12) **C OCTROOI**

(21) Aanvraagnummer: **2009865**

(51) Int.Cl.:
B65B 5/10 (2006.01)

(22) Aanvraag ingediend: **22.11.2012**

(43) Aanvraag gepubliceerd:

-

(47) Octrooi verleend:
27.05.2014

(45) Octrooischrift uitgegeven:
04.06.2014

(73) Octrooihouder(s):
VMI Holland B.V. te Epe.

(72) Uitvinder(s):
**Gerrit Jan Scholten te Epe.
Pieter Cornelis Meijers te Epe.**

(74) Gemachtigde:
ir. F.A. Geurts te Den Haag.

(54) **Device for dispensing and packing solid substances.**

(57) The invention relates to a device which accommodates a series of feeder units arranged for selectively discharging an amount of solid substances from one or more feeder units for packing. Said device comprises a holding device provided with an array of feeder positions arranged adjacently in a plane, a collection frame arranged below the holding device comprising a series of collection trays for capturing discharged solid substances from said feeder units and each collection tray comprises an output opening, and a packing unit arranged below the collection frame for collecting the captured solid substances from the output opening of a tray and packing said solid substances. The collection frame and the holding device are movable with respect to each other. The collection trays have an elongated shape with a longitudinal direction which extends substantially parallel to said plane and over a length of at least two of said feeder positions.

NL C 2009865

Dit octrooi is verleend ongeacht het bijgevoegde resultaat van het onderzoek naar de stand van de techniek en schriftelijke opinie. Het octrooischrift komt overeen met de oorspronkelijk ingediende stukken.

No. NLP192124A

Device for dispensing and packing solid substances

BACKGROUND

The invention relates to a device which accommodates a series of feeders for solid substances, in particular pills, tablets or capsules, in particular for medical use, and which are arranged for selectively dispensing an amount of said solid substances from one or more feeders for packing. The invention further relates to a method for dosing and packing of said solid substances.

Such a device and method is, for example, disclosed in the U.S. Patent 5,481,855. This US Patent describes a tablet packing device which accommodates a plurality of types of tablets and selectively discharges them from feeders for packing. A plurality of feeder units is provided along the circumferential edge of a circular split ring unit. Five feeders are mounted one over another in each of the feeder units. The split ring unit comprises a pocket plate at its top and a shutter plate at its bottom. The pocket plate is formed with a plurality of holes all of which are wider at the top. A tablet which is discharged from one of the feeders will fall into a hole formed in the pocket plate. Since a shutter plate covers

the hole, the tablet bounces on the shutter plate and settles down after a while. Thereafter, the shutter plate is rotated to open the hole to drop the table to a hopper which is arranged under the split ring unit. The tablet is
5 the slid down along the inner wall of the hopper and, when a hopper cover provided at the bottom of the hopper is opened, it is dropped further there-through into a packing sheet. After the tablet has reached the inside of the packing sheet which is folded, it is sealed in one backing
10 bag by use of heater rollers.

In the device as described in US 5,481,855, it is possible to save the time required to pack the tablets according to the tablet types by presetting the time required for each type of tablet to settle down from
15 landing and discharging the tablet after lapse of the preset time. Moreover, less bouncy tablets can be accommodated in the higher feeders, while lower feeders accommodate tablets which have a longer stabilization time period and are used more frequently.

20 Although the known device takes account of the settling time for each type of tablet, the time for a series of packing operations is determined by this settling time and cannot be reduced further.

It is an object of the present invention to
25 provide an improved device and method which allow a further reduction of the time required for a series of packing operations.

SUMMARY OF THE INVENTION

30 According to a first aspect, the invention provides a device which accommodates a series of feeder units for solid substances which series is arranged for selectively discharging an amount of said solid substances
35 from one or more feeder units for packing, said device comprising:

a holding device provided with an array of feeder

positions arranged adjacently in a plane, wherein the holding device at each of said array of feeder positions is provided with a holder for one of said feeder units and with a through opening for passing discharged solid substances there through,

a collection frame arranged below the holding device, wherein the collection frame and the holding device are movable with respect to each other, wherein said collection frame is provided with a series of collection trays, said trays have an elongated shape with a longitudinal direction which extends substantially parallel to said plane and over a length of at least two of said through openings, wherein said trays comprises a receiving opening at a side facing said holding device for capturing said discharged solid substances and each comprises an output opening, and

a packing unit arranged below the collection frame for collecting the captured solid substances from the output opening of a tray and packing said solid substances.

By using collection trays which are movable with respect to the table, and thus with respect to the feeder units arranged on said array of feeder positions, each of said trays can collect the required solid substances from one or more of said feeder units, which need to be packed for one of the doses according to a prescription. By using a series of collection trays, multiple doses of solid substances from one or more of said feeder units can be collected simultaneously, in stead of successively as in the device as described in US 5,481,855. This provides a further reduction of the time required for a series of packing operations.

In the device as described in US 5.481.855 where tablets from feeders first fall on a pocket plate with a shutter plate at its bottom and are released into a tray after the tables have settled down. In the device of the invention, the series of feeders are arranged on feeder positions which are arranged adjacently in a plane. Thus

the feeders on these feeder positions are arranged directly above the collection trays. Any amount of solid substances discharged by the feeders falls directly in one of the collection trays, substantially without delay.

5 In addition, the trays in the device of the invention have an elongated shape with a longitudinal direction which extends substantially parallel to said plane and over a length of a plurality of said through openings. Thus multiple feeders of said series of feeders
10 can discharge an amount of solid substances directly into one of the trays, in particular depending on the required recipe.

 In an embodiment, said feeder units of said series each comprises a discharge opening, and wherein said
15 discharge openings of said feeder units, when arranged at corresponding feeder positions, are substantially aligned with a corresponding one of said through openings.

 In an embodiment, the discharge openings of the feeder units of said series is arranged at substantially
20 the same distance above the receiving opening of the trays. Preferably the feeder units are arranged immediately above the receiving opening of the trays. By arranging the feeder units, and in particular the discharge opening thereof, at the same distance above the
25 receiving opening of the trays the time required to transport an amount of said solid substances from the feeder units into the trays is essentially the same for all feeder units of the series of feeder units. In addition, when arranging the feeder units immediately
30 above the receiving opening the time required to transport an amount of said solid substances into the trays is substantially minimized, which provides a further reduction of the time required for a series of packing operations.

 In an embodiment, the collection frame is
35 rotatable around a rotation axis, wherein the rotation axis extends substantially perpendicular to said plane. In an embodiment, the longitudinal direction of said trays is

arranged substantially radially with respect to said rotation axis. By rotating the collection frame, the collection trays move underneath the holding device and the series of feeder units arranged at the feeder positions thereof. Each one of the collection trays can capture and accumulate one or more of the solid substances which are selectively discharged from one or more feeder units arranged in a substantially circular path above said collection tray.

10 In an embodiment, said trays extend from a position near the rotation axis to an edge of said holding device. Each one of the collection trays can capture and accumulate one or more of the solid substances which are selectively discharged from one or more feeder units arranged in a substantially circular area above said trays. When all feeder units are arranged in said circular area, the collection tray is able to collect one or more of said solid substances from any one or from any combination of said feeder units.

20 In an embodiment, a width of said trays increases in a radial outward direction with respect to said rotation axis. Preferably the trays are wedge shaped, and a series of said trays covers a substantially circular area under the holding device

25 In an embodiment, the holding device is arranged for substantially stationary holding the series of feeder units. In particular, the feeder units are arranged stationary in the device of the invention, and the collection trays are moved underneath these stationary feeder units.

30 In an embodiment, said trays comprise a bottom surface which is arranged to slope down to said output opening. In an embodiment, said output opening is provided with a closing member which is movable into a first position for closing the output opening and into a second position for allowing said solid substances to move out of the tray. When moving the trays with respect to the holding

device, each tray can collect solid substances from each feeder unit arranged above the path of the tray, and can hold these substances as long as the closing member is in the first position.

5 In an embodiment, the packing unit is arranged at a stationary position in the device of the invention, underneath the movable collection trays. When the output opening of one of the trays aligns with the stationary position of the packing unit, the closing member of this
10 particular tray is moved to the second position which allows the solid substances in this tray to move through the output opening into the packing unit.

 In an embodiment, the receiving opening of a tray extends substantially parallel to said plane and over
15 a length of at least two of said through openings.

 In an embodiment, the holding device comprises one or more special feeder positions, which are arranged directly above the packing unit for passing discharged solid substances from a feeder unit on the one or more
20 special feeder positions via a corresponding through opening, a corresponding receiving opening and output opening of a tray, directly into the packing unit. These special feeder positions are available for special feeder units for the delivery of drugs which could contaminate the
25 inner surface of a tray. By arranging these special feeder units at these special feeder position, the drug released from the special feeder units fall directly into the packing unit, substantially without contacting the inside of a collection tray.

30 In an embodiment, the device comprises a supply member for supplying one or more feeder units to the device, and a manipulator system to transport at least one of said feeder units from the supply member onto one of said feeder positions on the holding device. When one or
35 more of the feeder units has discharged all its supply of solid substance and thus is substantially empty, these empty feeder units need to be replaced by corresponding

full ones. Usually this exchanging of an empty feeder unit by a full one is time consuming and requires attendance of an operator. By providing the device of the invention with the supply member and the manipulator system, the exchanged
5 of an empty feeder unit by a full one can be automated.

In an embodiment, the device comprises a discharge member for removing one or more feeder units from the device, and wherein the manipulator system is arranged for transporting at least one of said feeder units from one
10 of said feeder positions on the holding device towards the discharge member.

In an embodiment, the supply member and/or the discharge member comprises a conveyor, preferably a belt conveyor.

15 In an embodiment, the manipulator comprises a robotic arm. In an embodiment, the robotic arm is arranged on said holding device. In an embodiment, the robotic arm is arranged on said holding device at or near the rotation axis of the collection frame. The robotic arm is arranged
20 centrally on the holding device and is preferably arranged to reach each one of the feeder positions on the holding device, preferably to reach one or more of the feeder units arranged on the supply member, and preferably to position one or more of the empty feeder units on the discharge
25 member. The use of a robotic arm has the advantage that it also can be used for additional tasks, for example to shake a specific feeder unit when the solid substance comprised therein is stuck inside and cannot be discharged from said feeder unit.

30 In an embodiment, one or more of the collection trays is removable arranged on the collection frame. The removable collection trays can be removed from the collection frame for easy cleaning of these trays.

In an embodiment, one or more of the collection
35 trays is provided with a supplementary sheet which is arranged on at least a part of a bottom wall of said one or more of the collection trays. In an embodiment, said

supplementary sheet is removable and/or disposable. Due to the use of these supplementary sheets, the frequency of cleaning the trays is at least reduced. Preferably the supplementary sheets cover essentially the complete part of the bottom wall onto which the solid substances fall from the feeder units and onto which the solid substances move towards the output opening. In this case the trays essentially do not need to be cleaned, and only the supplementary sheets need to be replaced periodically.

According to a second aspect, the invention relates to a method for selectively discharging an amount of solid substances from one or more feeder units from a series of feeder units for packing, in particular using a device or an embodiment as described above, said method comprises the steps of:

providing a holding device with the series of feeder units on an array of feeder positions arranged adjacently in a plane, wherein the holding device at each of said array of feeder positions is provided with a holder for one of said feeder units and with a through opening for passing discharged solid substances there through,

discharging a prescribed amount of solid substance from one or more prescribed feeder units towards a collection frame arranged below the holding device, wherein the collection frame and the holding device are movable with respect to each other, wherein said collection frame is provided with a series of collection trays, said trays have an elongated shape with a longitudinal direction which extends substantially parallel to said plane and over a length of at least two of said through openings, wherein said trays comprises a receiving opening at a side facing said holding device for capturing said discharged solid substances in one of said trays, and each one of said trays comprises an output opening, and

moving the captured solid substances from said one of said trays into a packing unit arranged below the collection frame, which packing unit collects the captured

solid substances from the output opening of said one of said trays and packs said solid substances.

In an embodiment, said method comprises the step of providing a recipe to a controller of the device, which
5 recipe comprises the amount and type of solid substance which needs to be packed, wherein the controller controls the device to discharge the prescribed amount of solid substance from the one or more prescribed feeder units into a particular collection tray.

10 In an embodiment, said method comprises the step of providing a series of recipes to the controller, wherein the controller controls the device to discharge for each recipe of said series of recipes, the prescribed amount of solid substance from the one or more prescribed feeder
15 units into a separate one of said collection trays.

In an embodiment, the prescribed amount of solid substance in the separate ones of said collection trays are individually packed in said packing unit.

The various aspects and features described and
20 shown in the specification can be applied, individually, wherever possible. These individual aspects, in particular the aspects and features described in the attached dependent claims, can be made subject of divisional patent applications.

25

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be elucidated on the basis of
30 an exemplary embodiment shown in the attached drawings, in which:

Figure 1 shows a schematic cross section of an embodiment of the invention,

Figure 2 shows the right hand side of the
35 schematic cross section of figure 1 in more detail,

Figure 3 shows a schematic top view of the holding device of the embodiment of figure 1,

Figure 4 shows a schematic top view of the collection frame of the embodiment of figure 1, and

Figure 5 shows a schematic view of a packing system comprising a device which accommodates a series of feeder units for solid substances which series is arranged for selectively discharging an amount of said solid substances from one or more feeder units for packing.

10 DETAILED DESCRIPTION OF THE INVENTION

An exemplary embodiment of a device according to the invention is schematically shown in figures 1 and 2. The device 1 accommodates a series of feeder units 2, 21 arranged for selectively discharging an amount of solid substances, such as pills, tablets or capsules, in particular for medical use, from one or more feeder units 2, 21 for packing. Said device 1 comprises a holding device 3 provided with an array of feeder positions 31 (see figure 3) arranged adjacently in a plane P, a collection frame 4 arranged below the holding device 3 comprising a series of collection trays 41, 41' for capturing discharged solid substances from said feeder units 2, 21 and each collection tray 41 comprises an output opening 42, and a packing unit 5 arranged below the collection frame 4 for collecting the captured solid substances from the output opening 42 of a tray 41 and packing said solid substances.

The holding device 3 in this example, comprises a table which defines the plane P as shown in figure 2, which is provided with the array of feeder positions 31 as shown in figure 3, arranged adjacently in said plane P. The holding device 3 is provided with a holder at each of said array of feeder positions 31 for holding one of said feeder units 2, 21. In addition, the holding device 3, and in particular the table, is provided with through openings 32 for passing discharged solid substances there through. As schematically indicated in figure 3, each feeder position

31 is provided with a corresponding through opening 32. Figure 1 is a schematic cross section along the line I-I of figure 3.

The feeder units 2, 21 of said series each comprises a discharge opening at a bottom side 22 of each one of said feeder units 2, 21. Said discharge openings of said feeder units 2, 21, when arranged at corresponding feeder positions 31, are substantially aligned with a corresponding one of said through openings 32.

As clearly shown in the partial cross section of figure 2, the bottom side 22 comprising the discharge openings of said feeder units 2, 21 is arranged substantially at the plane P. The feeder units 2, 21 are arranged immediately above the plane P, in particular immediately above the through openings 32. By arranging the feeder units 2, 21, and in particular the discharge opening thereof in a substantially horizontal plane P and in particular immediately above the through openings 32, the time required to transport an amount of said solid substances from the feeder units 2, 21 into the trays 41 is essentially the same for all feeder units 2, 21 of the series of feeder units.

Below the holding device 3, a collection frame 4 is arranged. The collection frame 4 and the holding device 3 are movable with respect to each other. In this example, the holding device 3 is arranged for substantially stationary holding the series of feeder units 2, 21. In particular, the feeder units 2, 21 are arranged stationary in the device 1, and the collection frame 4 is moved underneath these stationary feeder units 2, 21. The collection frame 4 is rotatable around a rotation axis R, wherein the rotation axis R extends substantially perpendicular to said plane P. The rotation of the collection frame 4 is driven by a motor 43.

In an embodiment said motor 43 is a stepper motor or is stepwise driven around the rotation axis R. This stepwise driving is arranged to have at least one stop for

each tray 41, 41' where the output opening 42 of said tray aligns with the packing unit 5.

The collection frame 4 is provided with a series of collection trays 41, 41' which are arranged around the rotation axis R, as shown in figure 4. Figure 1 is a schematic cross section along the line II-II of figure 4.

Said trays 41, 41' have an elongated shape with a longitudinal direction which extends substantially parallel to said plane P and over a length of at least two of said through openings 32. Each one of said trays 41 comprises a receiving opening 44 at a side facing said holding device 3 for capturing said discharged solid substances. The bottom side 22 of the feeder units 2, 21, comprising the discharge openings of said feeder units 2, 21 is arranged substantially at the same distance above the receiving opening 44 of the trays 41.

The trays 41 are substantially open at the upper side thereof, which open upper side defines the receiving opening 44 of the tray. As shown in figures 1 and 2, the open upper side extends substantially parallel to said plane P and over a length of at least two, and in particular over a length of a plurality of said through openings 32.

The longitudinal direction of said trays 41 is arranged substantially radially with respect to said rotation axis R. By rotating the collection frame 4, the collection trays 41, 41' move underneath the holding device 3 and the series of feeder units 2, 21 arranged at the feeder positions 31 thereof. Each one of said collection trays 41, 41' can capture and accumulate one or more of the solid substances which are selectively discharged from one or more feeder units 2, 21 arranged in a substantially circular path above said collection trays 41, 41' as shown in figure 3.

As shown in figures 1, 2 and 4, said trays 41, 41' extend from a position near the rotation axis R to an edge 33 of said holding device 3. Each one of the

collection trays 41, 41' can capture and accumulate one or more of the solid substances which are selectively discharged from one or more feeder units 2, 21 arranged in a substantially circular area T on said table of the holding device 3 as shown in figure 3. Each one of the collection trays 41, 41' is able to collect one or more of the solid substances from substantially any one or from any combination of the feeder units 2, 21 which are arranged in said circular area T.

As schematically indicated in figure 4, the width of said trays 41, 41' increases in a radial outward direction with respect to said rotation axis R. Preferably the trays are wedge shaped, and the series of said trays 41, 41' covers a substantially circular area under the holding device 3. The circular arrangement of collection trays 41, 41' comprises for example 20 collection trays 41.

As shown in figures 1 and 2, each one of said trays 41, 41' comprises a bottom surface 45 which is arranged to slope down to said output opening 42. Said output opening 42 is provided with a closing member 46 which is movable into a first position, as shown in figure 2, for closing the output opening 42 and movable in the direction M into a second position for allowing said solid substances to move out of the tray 41. When moving the trays 41, 41' with respect to the holding device 3, each tray 41, 41' can collect solid substances from each feeder unit 2, 21 arranged above the path of the tray 41, and can hold these substances at the output opening 42 as long as the closing member 46 is in the first position.

Preferably the collection trays 41, 41' are removable arranged on the collection frame 4. The removable collection trays 41" can be removed by substantially sliding them in a radial direction out of the collection frame 4, as schematically indicated in figures 3 and 4.

Alternatively or in addition, the collection trays 41, 41' can be provided each with a supplementary sheet (not shown) which is arranged on at least a part of a

bottom wall 45. This supplementary sheet is removable and/or disposable. Preferably the supplementary sheets cover essentially the complete part of the bottom wall 45 onto which the solid substances fall from the feeder units 2, 21 and onto which the solid substances move towards the output opening 42. In this case the trays 41 essentially do not need to be cleaned and do not need to be removable, and only the supplementary sheets need to be replaced periodically.

10 Below the collection frame 4, a packing unit 5 is arranged for collecting the captured solid substances from the output opening 42 of a tray 41 and packing said solid substances.

15 The packing unit 5 is arranged at a stationary position in the device 1, underneath the movable collection trays 41. When the output opening 42 of the tray 41 aligns with the stationary position of the packing unit 5, the closing member 46 is moved to the second position which allows the solid substances in the tray 41 to move through
20 the output opening 42 into the packing unit.

 The packing unit 5 comprises a supply of foil 51 which supplies a foil 52 to a folding unit 53 which folds the foil 51 into U-shaped foil 54 which is open at the top. This open top 55 is ready to receive the solid substances
25 from a tray 41. When the solid substances are deposited from the tray 41 into the U-shaped foil 54, the foil with the solid substances is moved in the direction D to a vertical seal unit 56, which provides a substantially vertical seal behind the deposited solid substances.
30 Accordingly the solid substances from each one of said trays 41 is arranged in individual pockets of said U-shaped foil 54. Subsequently, the foil is moved in the direction D to a closing seal unit 57 which provides a seal at the upper side 55 of the U-shaped foil for enclosing the solid
35 substances in individually closed pockets 59, as shown in figure 2. As shown in figures 1 and 2, the packing unit 5 is arranged on a movable carrier 60.

In a further embodiment, the device 1 can also be provided with two or more packing units 5, 5' as indicated in figure 1.

The holding device 3 also comprises one or more
5 special feeder positions, which are arranged above a transfer area TA where the solid substances are transferred from the collection trays 41 to the packing unit 5. Preferably the special feeder positions are arranged directly above the packing unit 5 for passing discharged
10 solid substances from a feeder unit 21 on the one or more special feeder positions via a corresponding through opening, a corresponding receiving opening 44 and output opening 42 of a tray 41, directly into the packing unit 5. These special feeder positions are available for special
15 feeder units 21 for the delivery of drugs which could contaminate the inner surface of a tray 41. By arranging these special feeder units 21 at these special feeder positions, the drug released from the special feeder units 21 fall directly into the packing unit 5. When using a
20 further packing unit 5', the holding device 3 can also comprise one or more special feeder positions for feeder units 21', which are arranged above a further transfer area where the solid substances are transferred from the collection trays 41 to the further packing unit 5'.

25 Special feeder units 21 which are not directly above the output opening 42 when at the packing unit 5, are provided with a channel or chute 34 which guides solid substances discharged from said feeder units 21 to an area directly above the output opening 42 when at the packing
30 unit 5.

In addition the holding device 3 may comprise a supply unit 23 with a sorted medicine supply for delivering an amount of sorted medicaments from supply trays 231, 232, 233 into a collection tray 41. As shown in figures 2 and 3,
35 such a supply unit 23 is preferably arranged at the circumferential edge 33 of the table 3.

When one or more of the feeder units 2, 21 has

discharged substantially all its supply of solid substance and thus is substantially empty, these empty feeder units 2, 21 need to be replaced by corresponding full ones. In order to exchange an empty feeder unit by a full one, the
5 device 1 comprises a supply member 71 for supplying one or more new and/or full feeder units 24 to the device 1, and a manipulator system 6 to transport at least one of said new and/or full feeder units 24 from the supply member 71 onto one of said feeder positions 31 on the holding device 3. In
10 addition, the device 1 comprises a discharge member 72 for removing one or more feeder units 25, in particular empty feeder units, from the device 1. As schematically indicated in the figures, the supply member 71 and the discharge member 72 comprises a conveyor 7, preferably a belt
15 conveyor, which can be used for both supplying and removing one or more feeder units

The manipulator 6 comprises a robotic arm 61, 62, which is arranged on said holding device 3. As shown in figure 1, the robotic arm 6 is arranged on said holding
20 device 3 at or near the rotation axis R of the collection frame 4. By arranging the robotic arm 61, 62 centrally on the holding device 3, a gripper 63 for picking up one or more feeder units is arranged to reach each one of the feeder positions 31 on the holding device 3, to reach one
25 or more of the new and/or full feeder units 24 arranged on the supply member 71, and to position one or more of the empty feeder units 25 on the discharge member 72.

Each one of the feeder units 2, 21 can contain a large supply of identical pills, tablets or capsules; in
30 short medicaments. Each one of these medicaments may have a specific weight and/or specific size and dimensions, which makes each one of the feeder units 2, 21 specific to hold and discharge a specific medicament. The specific feeder units 2, 21 are provided with an identification
35 code which is readable by a sensor in the device. By reading the identification code, for example when a specific feeder unit 2, 21 is placed on the holding device

3 by the robotic arm 61, 62, the information of the location of the specific feeder unit 2, 21 and the medicaments it contains is provided to a control system 8 for the device, which control system 8 stores this
5 information in a memory.

The sensor is for example arranged in the gripper 63 of the robotic arm 61, 62. Alternatively or in addition one or more of the feeder position 31 are provided with a sensor for acquiring the identification
10 code.

The control system 8 is coupled to the device 1, and in particular to the feeder units 2, 21, to the supply unit 23, to the motor 43, to the packing unit 5, to the manipulator 6 and/or to the supply member 71 and the
15 discharge member 72 as schematically shown in figure 1. The control system 8 provides control commands to the device 1 and, in particular to the feeder units 2, 21, to discharge a prescribed amount of medicament from one or more of said feeder units 2, 21, into a particular collection tray 41.
20 The control system 8 selects the specific feeder unit 2, 21 in accordance with the prescribed type of medicament, by using the information stored in the memory.

Furthermore, each of the feeder units 2, 21 and/or the holding device 3 is provided with a feedback
25 sensor which reports the discharge of one or more pills, tablets or capsules from a specific one of said feeder units 2, 21 back to the control system 8. The control system 8 can thus determine whether or not the discharged medicaments into a specific collection tray 41 is in
30 accordance with the prescribed amount.

In an embodiment, a part of the area of holding device 3 can be used for the storage of feeder units. The robotic arm 61, 62 with the gripper 63 is arranged for moving feeder units from the storage area on the holding
35 device 3 to feeder positions 31 with through openings 32, and vice versa. In particular, the transfer area TA where the solid substances are transferred from the collection

trays 41 to the packing unit 5, which on the one hand is used for arranging special feeder units 21 as described above, is on the other hand used for the storage of feeder units 2, 21.

5 When the device 1 is in use, a recipe is provided to the control system 8 for the device 1, which recipe comprises the amount and type of medicaments which need to be packed. The control system translates the recipe into control commands which are send to the device
10 1 to discharge the prescribed amount of medicaments from one or more prescribed feeder units 2, 21 into a particular collection tray 41, in order to collect the required amount and type of medicament in said particular collection tray 41 which corresponds to the recipe. The prescribed amount
15 and type of said medicament according to the recipe is moved towards the packing unit 5 and is individually packed in foil 52.

 In stead of a single recipe, usually a series of recipes is provided to the control system 8. Again, the
20 control system 8 translates the recipe into control commands which are send to the device 1 to discharge for each recipe of said series of recipes, the prescribed amount of medicaments from one or more prescribed feeder units 2, 21 into a separate one of said collection trays
25 41, in order to collect an amount and type of medicament in each one of said collection trays 41 which corresponds to one recipe of said series of recipes. In addition the control commands are arranged for collecting the medicaments of subsequent recipes of said series of recipes
30 in subsequent collection trays 41, which deliver the collected medicament subsequently to the packing unit 5. The packing unit 5 individually packs the medicaments from each collection tray 41, and thus provides a series of packed medicaments in accordance with the series of
35 recipes, and preferably in the same order as the series of recipes. It is noted that the device 1 may also be provided with two packing units 5, 5' as schematically shown in

figure 1, or even more.

The packing unit 5 is preferably provided with a printing unit for printing the recipe onto the foil, preferably at or near the pocket 59 which contains the medicaments according to the recipe. Such a printing unit is for example arranged in the folding unit 53 and obtains the required printing data from the control system 8.

In an alternative embodiment, the packing unit 5 is provided with a substantially vertical foil unit in which the foil is substantially funnel shaped, which funnels are filled from the top and subsequently sealed.

Figure 5 shows an example of a packing system 100 according to the invention. The system 100 comprises device arranged inside a cage 108, which accommodates a series of feeder units 102 for solid substances which series is arranged for selectively discharging an amount of said solid substances from one or more feeder units 102 for packing. Said device comprises a holding device 103 provided with an array of feeder positions arranged adjacently in a plane just as in the example as shown in figure 3. The holding device 103 at each of said array of feeder positions is provided with a holder for one of said feeder units 102 and with a through opening for passing discharged solid substances there through. Underneath said holding device 103, a collection frame and a packing unit are arranged which correspond substantially to the examples as explained above and shown in figures 1, 2 and 4. In the system the collection frame and the packing unit are mounted inside the system, behind a panel 104.

The system is furthermore provided with entry devices 170 which allow the introduction of new and/or filled feeder units 102 or the removal of empty feeder units 102.

In addition the system 100 may comprise a supply unit 123 with a sorted medicine supply for delivering an amount of sorted medicaments from supply trays as shown in figures 2 and 3, and described in more detail above.

As described above, a part of the area of holding device 103 can be used for the storage of feeder units 102. The robotic arm 161, 162 with the gripper 163 is arranged for moving feeder units from the storage area on the holding device 103 to feeder positions with through openings, and vice versa. When even more storage of feeder units is required, such storage may be provided against the inner wall of the cage 18 and/or may be provided in a storage column 109 which is arranged adjacent to the holding device 103. Also the storage feeder units 110 in the storage column 109 are accessible by the robotic arm, by turning the column 109 so that the required storage feeder unit 110 faces towards the robotic arm 106.

The packing system 100 may be provided with one or more of such storage columns 109 along the periphery of the holding device 103. These one or more storage columns 109 are connected to and controlled by the control system of the packing system 100.

The packing system 100, and in particular the collection frame and/or the packing unit can be provided with a vacuum device in order to prevent the accumulation of dust inside the trays and/or packing unit.

In addition a control panel 111 is arranged in a wall part, above the holding device 103, or above the supply unit 123 as shown in figure 5, in order to input data and/or control commands into the system.

It is to be understood that the above description is included to illustrate the operation of the preferred embodiments and is not meant to limit the scope of the invention. From the above discussion, many variations will be apparent to one skilled in the art that would yet be encompassed by the spirit and scope of the present invention.

For example an alternative, small or simple model of the packing system of figure 5, the robotic arm and/or the storage against the inner wall of the cage 18 and/or a storage column is omitted.

C O N C L U S I E S

1. Inrichting die een reeks van toevoereenheden voor vaste substanties huisvest, welke reeks is ingericht voor het selectief afgeven van een hoeveelheid van de vaste substanties van één of meer toevoereenheden voor het
5 verpakken hiervan, waarbij de inrichting omvat:

een vasthoudinrichting voorzien van een matrix van in een vlak naast elkaar geplaatste toevoerposities, waarbij de vasthoudinrichting bij elke van de matrix van toevoerposities is voorzien van een houder voor één van de
10 toevoereenheden en van een doorvoeropening voor het hierdoor voeren van afgegeven vaste substanties,

een onder de vasthoudinrichting geplaatst verzamelgestel, waarbij het verzamelgestel en de vasthoudinrichting ten opzichte van elkaar beweegbaar zijn, waarbij het verzamelgestel is voorzien van een reeks
15 verzamelbakken, waarbij de bakken een langgerekte vorm hebben met een longitudinale richting die zich in hoofdzaakparallel aan het vlak uitstrekt over een lengte van ten minste twee van de doorvoeropeningen, waarbij de
20 bakken een ontvangopening aan een naar de vasthoudinrichting gekeerde zijde omvat voor het invangen van de afgegeven vaste substanties en waarbij de bakken elk een uitvoeropening omvat, en

een onder het verzamelgestel geplaatste
25 verpakkingseenheid voor het verzamelen van de ingevangen vaste substanties uit de uitvoeropening van een bak en het verpakken van de vaste substanties.

2. Inrichting volgens conclusie 1, waarbij het verzamelgestel draaibaar is rond een rotatie-as, waarbij de
30 rotatie-as zich in hoofdzaak loodrecht ten opzichte van het vlak uitstrekt.

3. Inrichting volgens conclusie 2, waarbij de longitudinale richting van de bakken in hoofdzaak radiaal

geplaatst is ten opzichte van de rotatie-as.

4. Inrichting volgens conclusie 2 of 3, waarbij de bakken zich uitstrekken vanaf een positie nabij de rotatie-as tot een rand van de vasthoudinrichting.

5 5. Inrichting volgens conclusies 2, 3 of 4, waarbij een breedte van de bakken toeneemt in een radiaal buitenwaartse richting ten opzichte van de rotatie-as.

6. Inrichting volgens een der voorgaande conclusies, waarbij de bakken een bodemoppervlak omvatten dat is ingericht om neerwaarts naar de uitvoeropening te hellen.

7. Inrichting volgens conclusie 6, waarbij de uitvoeropening is voorzien van een sluitorgaan dat beweegbaar is in een eerste positie voor het sluiten van de uitvoeropening en in een tweede positie voor het toelaten van een verplaatsing van de vaste substanties uit de bak.

8. Inrichting volgens een der voorgaande conclusies, waarbij de vasthoudinrichting is ingericht voor het in hoofdzaak stationair vasthouden van de reeks toevoereenheden.

9. Inrichting volgens een der voorgaande conclusies, waarbij elke van de toevoereenheden van de reeks een afgeefopening omvat, en waarbij de afgeefopeningen van de toevoereenheden, indien op overeenkomstige toevoerposities geplaatst, in hoofdzaak in lijn liggen met een overeenkomstige van de doorvoeropeningen.

10. Inrichting volgens conclusie 9, waarbij de afgeefopeningen van de toevoereenheden op in hoofdzaak dezelfde afstand boven de ontvangopening van de bakken geplaatst zijn.

11. Inrichting volgens een der voorgaande conclusies, waarbij de ontvangopening van de bakken zich in hoofdzaak parallel aan het vlak uitstrekken over een afstand van ten minste twee van de doorvoeropeningen.

12. Inrichting volgens een der voorgaande conclusies, waarbij de vasthoudinrichting één of meer

speciale toevoerposities omvat, die direct boven de verpakkingseenheid zijn geplaatst voor het doorvoeren van afgegeven vaste substanties uit een toevoereenheid op de één of meer speciale toevoerposities via een
5 overeenkomstige doorvoeropening, een overeenkomstige ontvangopening en uitvoeropening van een bak, direct in de verpakkingseenheid.

13. Inrichting volgens een der voorgaande conclusies, verder omvatten een toevoerorgaan voor het naar
10 de inrichting toevoeren van één of meer toevoereenheden, en een hanteringsysteem voor het transporteren van ten minste één van de toevoereenheden van het toevoerorgaan op één van de toevoerposities op de vasthoudinrichting.

14. Inrichting volgens conclusie 13, waarbij de
15 inrichting een afvoerorgaan voor het van de inrichting verwijderen van één of meer toevoereenheden, en waarbij het hanteringsysteem is ingericht voor het transporteren van ten minste één van de toevoereenheden van één van de toevoerposities op de vasthoudinrichting naar het
20 afvoerorgaan.

15. Inrichting volgens conclusies 13 of 14, waarbij het toevoerorgaan en/of het afvoerorgaan een transporteur omvat, bij voorkeur een bandtransporteur.

16. Inrichting volgens conclusie 13, 14 of 15,
25 waarbij het hanteringsysteem een robotarm omvat.

17. Inrichting volgens conclusie 16, waarbij de robotarm op de vasthoudinrichting is geplaatst.

18. Inrichting volgens conclusie 17, indien afhankelijk van conclusie 2, waarbij de robotarm op de
30 vasthoudinrichting geplaatst is op of nabij de rotatie-as van verzamelgestel.

19. Inrichting volgens een der voorgaande conclusies, waarbij één of meer van de verzamelbakken is voorzien van een inlegvel dat op ten minste een deel van
35 een bodemwand van de één of meer van de verzamelbakken is geplaatst.

20. Inrichting volgens conclusie 19, waarbij het

inlegvel verwijderbaar en/of wegwerpbaar is.

21. Werkwijze voor het selectief afgeven van een hoeveelheid van vaste substanties uit één of meer toevoereenheden van een reeks toevoereenheden voor het
5 inpakken, in het bijzonder onder gebruikmaking van een inrichting of een uitvoeringvorm zoals hierboven omschreven, waarbij de werkwijze de stappen omvat van:

het verschaffen van een vasthoudinrichting met een reeks van toevoereenheden op een matrix van in een vlak
10 naast elkaar geplaatste toevoerposities, waarbij de vasthoudinrichting bij elke van de matrix van toevoerposities is voorzien van een houder voor één van de toevoereenheden en van een doorvoeropening voor het hierdoor voeren van afgegeven vaste substanties,

15 het afgeven van een voorgeschreven hoeveelheid vaste substantie uit één of meer voorgeschreven toevoereenheden naar een onder de vasthoudinrichting geplaatst verzamelgestel, waarbij het verzamelgestel en de vasthoudinrichting ten opzichte van elkaar beweegbaar zijn,
20 waarbij het verzamelgestel is voorzien van een reeks verzamelbakken, waarbij de bakken een langgerekte vorm hebben met een longitudinale richting die zich in hoofdzaakparallel aan het vlak uitstrekt over een lengte van ten minste twee van de doorvoeropeningen, waarbij de
25 bakken een ontvangopening aan een naar de vasthoudinrichting gekeerde zijde omvat voor het invangen van de afgegeven vaste substanties in één van de bakken, en waarbij elke bak een uitvoeropening omvat, en

het verplaatsen van de ingevangen vaste
30 substanties van de ene van de bakken in een onder het verzamelgestel geplaatste verpakkingseenheid, waarbij de verpakkingseenheid de ingevangen vaste substanties ontvangt uit de uitvoeropening van die ene van de bakken en de vaste substanties inpakt.

35 22. Werkwijze volgens conclusie 21, waarbij de werkwijze de stap omvat van het verschaffen van een recept aan een besturingsinrichting van de inrichting, welk recept

een hoeveelheid en een type van de vaste substantie die moet worden ingepakt omvat, waarbij de besturingsinrichting de inrichting bestuurd om de voorgeschreven hoeveelheid van de vaste substantie af te geven uit de één of meer
5 voorgeschreven toevoereenheden in een specifieke verzamelbak.

23. Werkwijze volgens conclusie 22, waarbij de werkwijze de stap omvat van het verschaffen van een reeks recepten aan de besturingsinrichting, waarbij de
10 besturingsinrichting de inrichting bestuurd om voor elk recept van de reeks recepten, de voorgeschreven hoeveelheid van de vaste substantie af te geven uit de één of meer voorgeschreven toevoereenheden in een afzonderlijke van de verzamelbakken.

15 24. Werkwijze volgens conclusie 23, waarbij de voorgeschreven hoeveelheid van vaste substantie in de afzonderlijke bakken van de verzamelbakken individueel ingepakt worden in de verpakkingseenheid.

o-o-o-o-o-o-o-o-o-

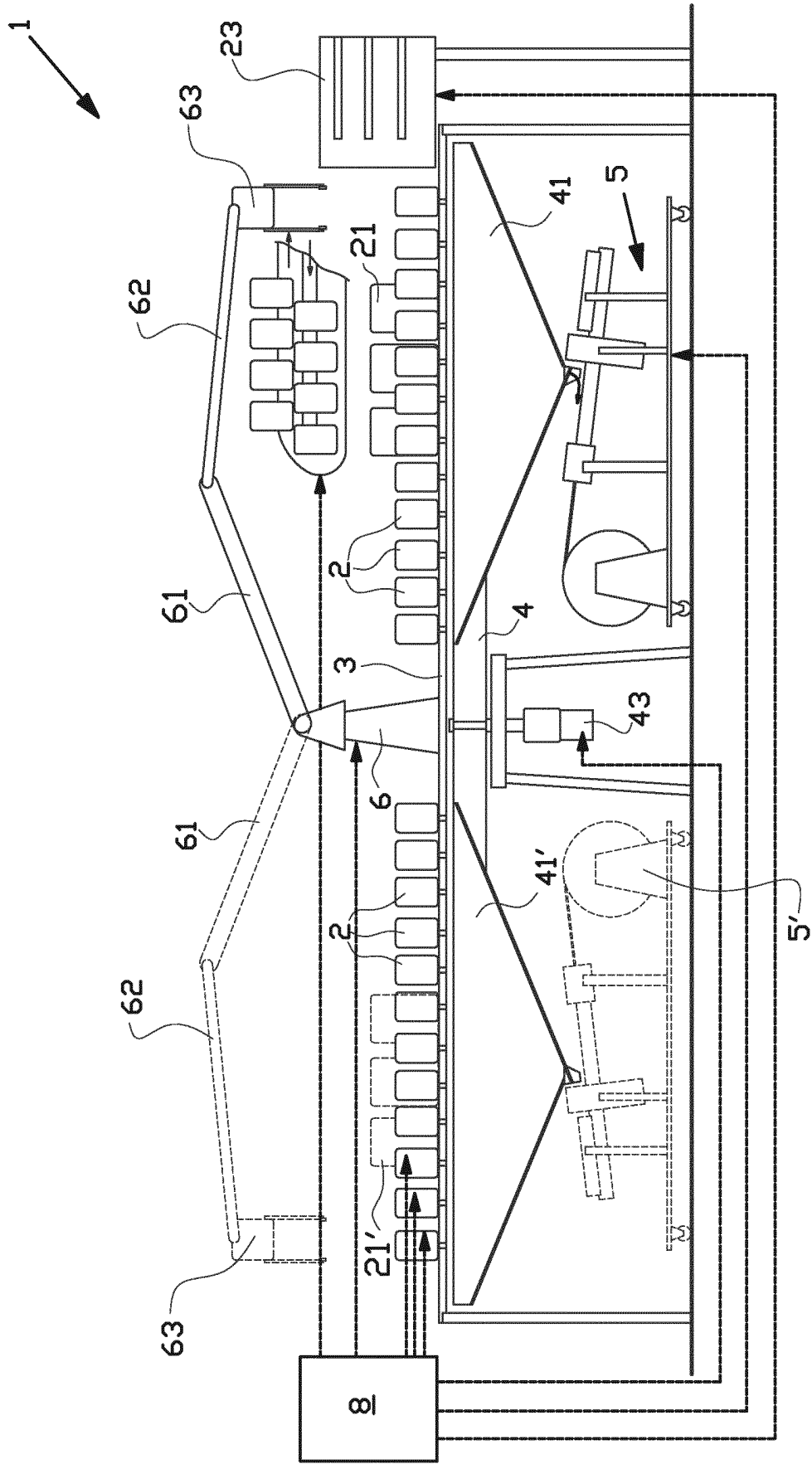
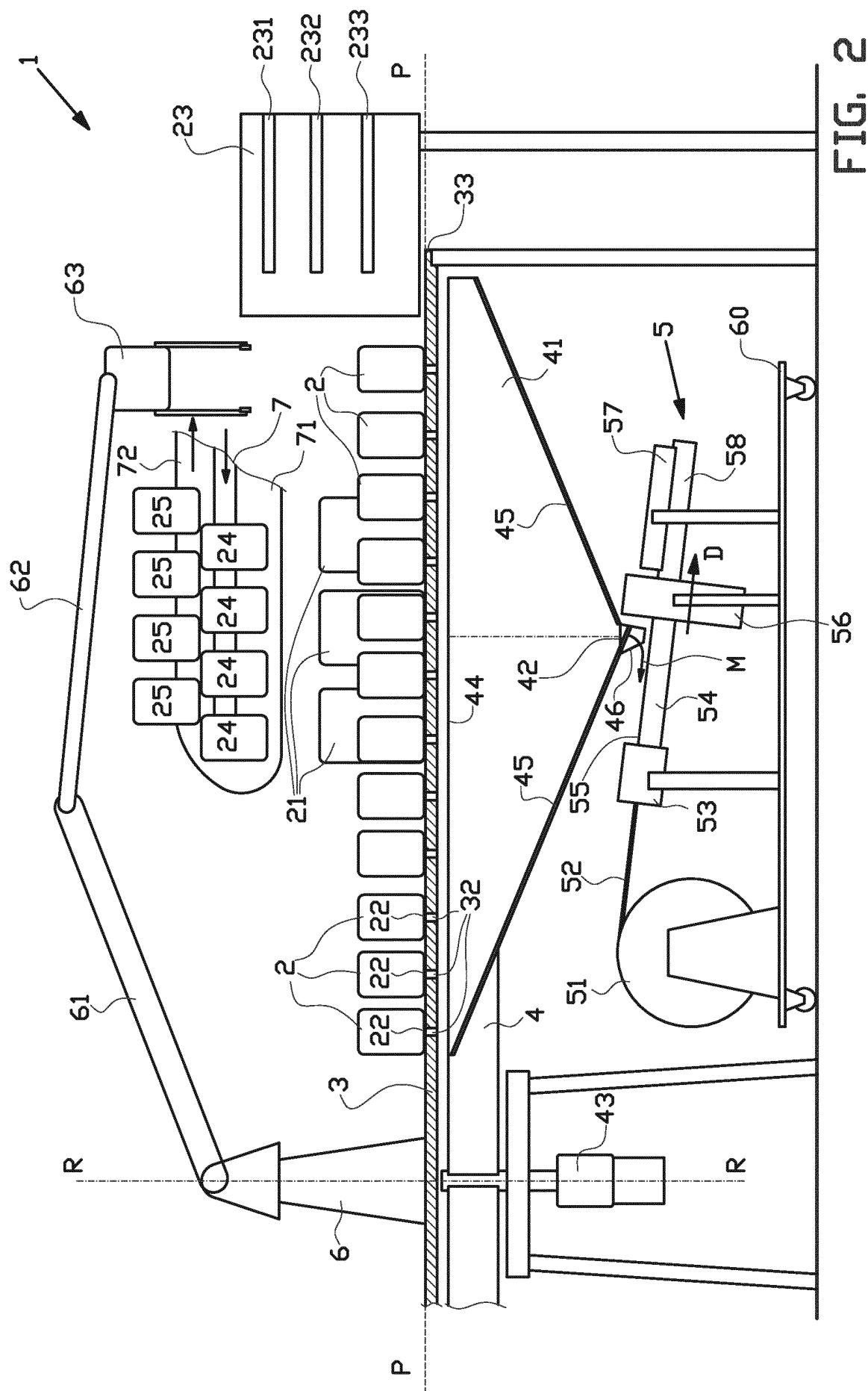


FIG. 1



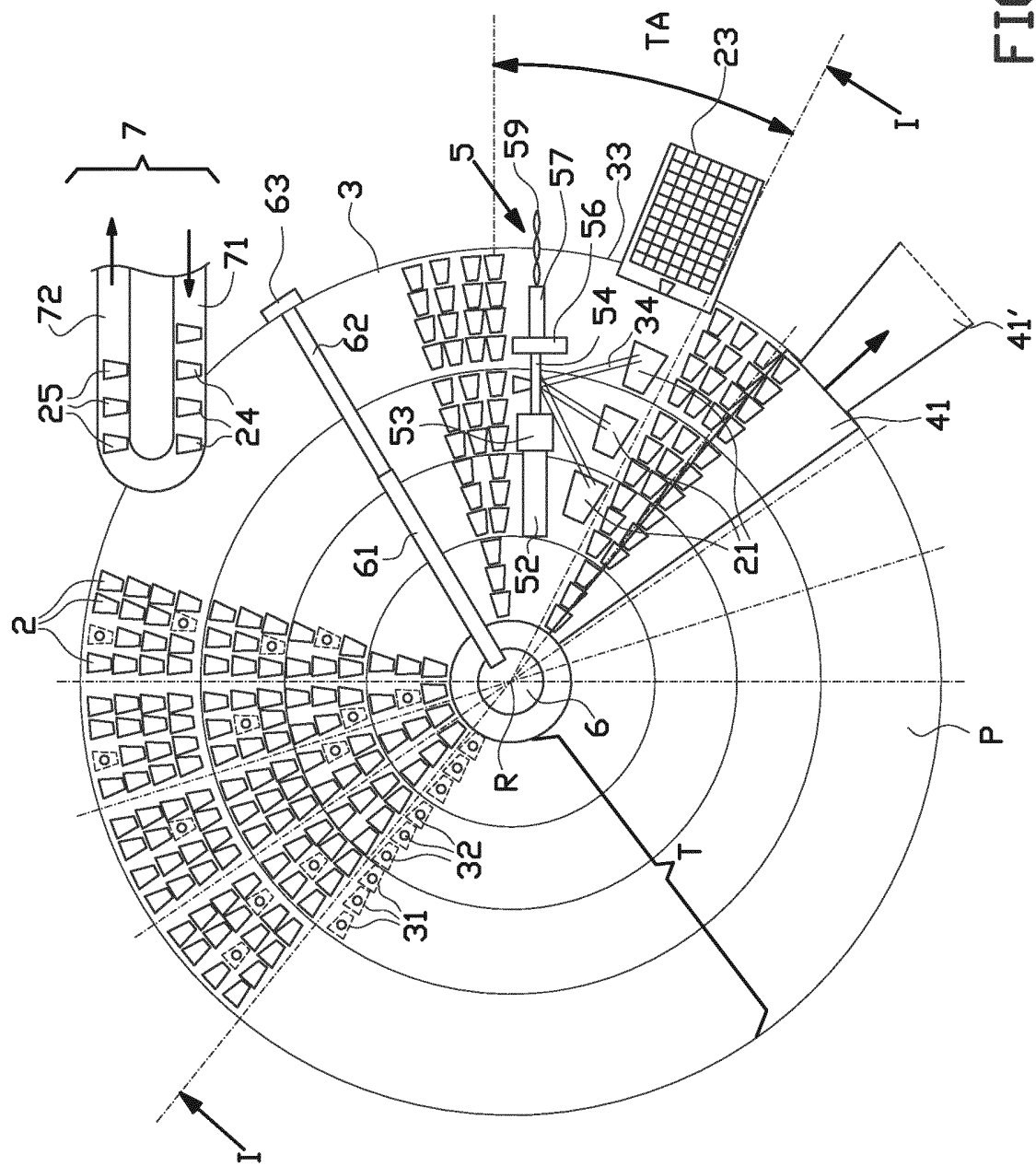


FIG. 3

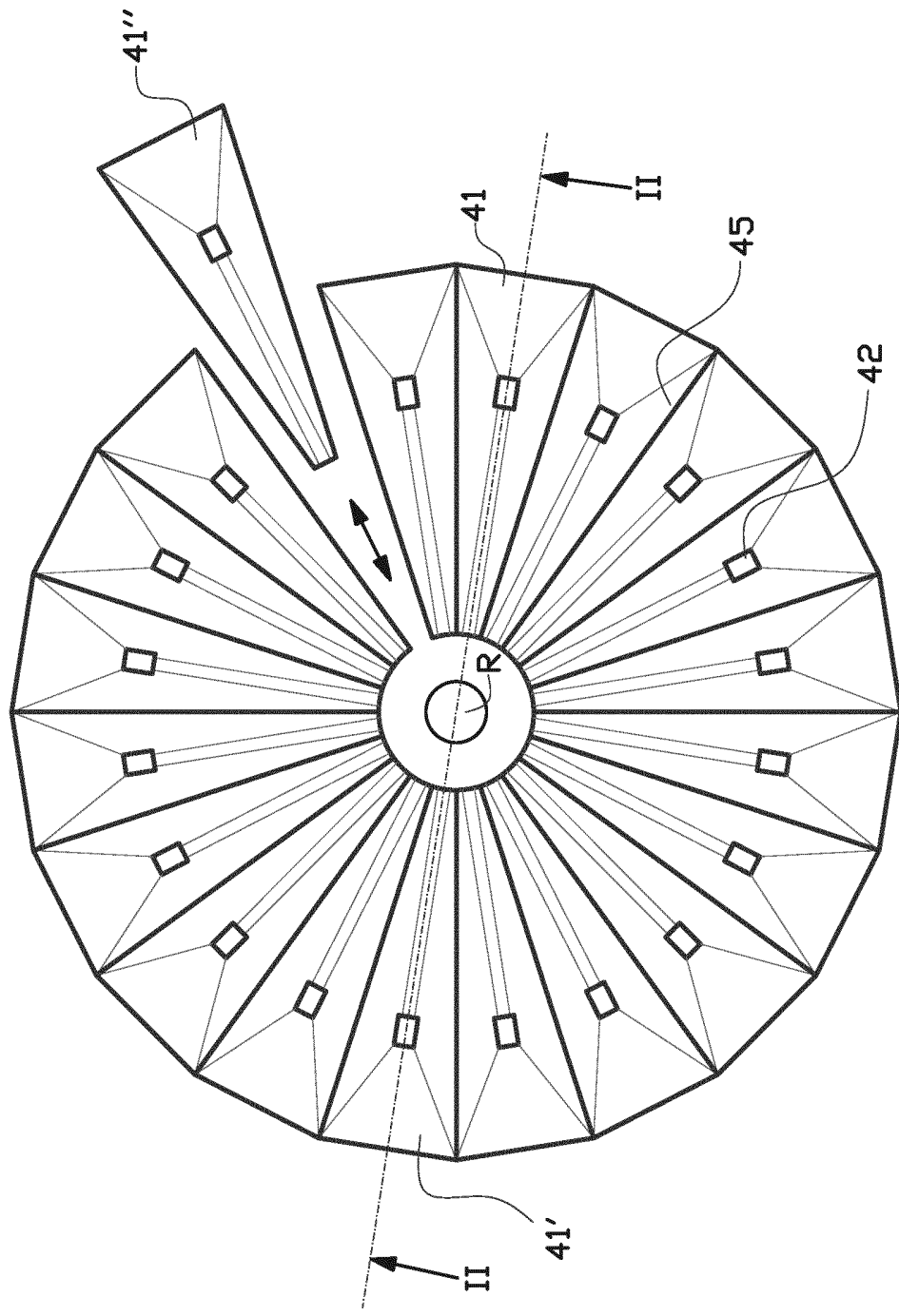


FIG. 4

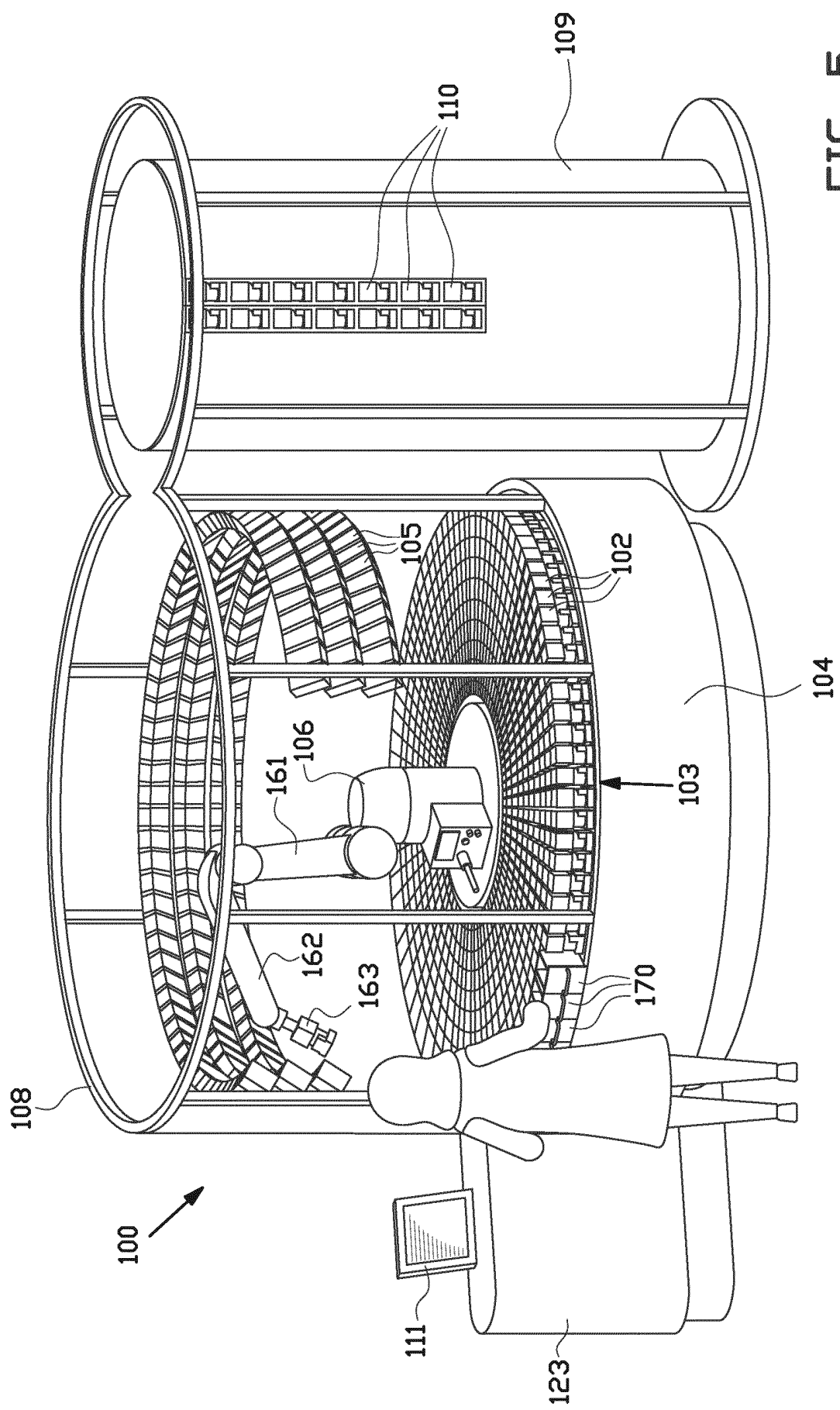


FIG. 5

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE		KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE	
		NLP192124A	
Nederlands aanvraag nr.		Indieningsdatum	
2009865		22-11-2012	
		Ingeroepen voorrangsdatum	
Aanvrager (Naam)			
VMI Holland B.V.			
Datum van het verzoek voor een onderzoek van internationaal type		Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr.	
22-12-2012		SN59338	
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)			
Volgens de internationale classificatie (IPC)			
B65B5/10			
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK			
Onderzochte minimumdocumentatie			
Classificatiesysteem		Classificatiesymbolen	
IPC		B65B	
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen			
III.	☐	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES	(opmerkingen op aanvullingsblad)
IV.	☐	GEBREK AAN EENHEID VAN UITVINDING	(opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2009865

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B65B5/10
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)
B65B

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)

EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
A	US 6 792 736 B1 (TAKAHASHI HIDEYUKI [JP] ET AL) 21 september 2004 (2004-09-21) * kolom 9, regel 1 - kolom 10, regel 10; figuren 5-7 *	1-24
A	----- US 6 449 921 B1 (KIM JIN S [KR]) 17 september 2002 (2002-09-17) * kolom 4, regel 49 - kolom 5, regel 6; figuur 4 *	12
A	----- US 6 036 812 A (WILLIAMS JEFFREY P [US] ET AL) 14 maart 2000 (2000-03-14) * kolom 3, regel 40 - regel 50; figuren 1,5 *	13-18

☐ Verdere documenten worden vermeld in het vervolg van vak C.

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvraag vermeld

"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid

24 april 2013

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

De bevoegde ambtenaar

Schelle, Joseph

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2009865

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 6792736	B1	21-09-2004	TW 460397 B 21-10-2001
			US 6792736 B1 21-09-2004
			US 2004261357 A1 30-12-2004
			WO 0134090 A1 17-05-2001

US 6449921	B1	17-09-2002	GEEN

US 6036812	A	14-03-2000	AU 1714999 A 28-06-1999
			EP 1416451 A2 06-05-2004
			US 6036812 A 14-03-2000
			US 6176392 B1 23-01-2001
			WO 9929467 A2 17-06-1999

WRITTEN OPINION

File No. SN59338	Filing date (<i>day/month/year</i>) 22.11.2012	Priority date (<i>day/month/year</i>)	Application No. NL2009865
International Patent Classification (IPC) INV. B65B5/10			
Applicant VMI Holland B.V.			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

Examiner Schelle, Joseph

WRITTEN OPINION

Application number
NL2009865

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the application as filed.
 - ☐ filed together with the application in electronic form.
 - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	1-24
	No: Claims	
Inventive step	Yes: Claims	1-24
	No: Claims	
Industrial applicability	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 Reference is made to the following document:

D1 US 6 792 736 B1 (TAKAHASHI HIDEYUKI [JP] ET AL) 21
 september 2004 (2004-09-21)
- 2 The subject-matter of claim 1 is neither known from nor rendered obvious by the available prior art. The criteria of patentability are therefore met.

Document D1 (see in particular: col. 9, line 1 - col. 10, line 10; figure 5-7) shows the closest prior art .

Contrary to the device according to claim 1 the collection trays 21 of the known device do not have an elongate shape enabling them to extend over a length of at least two of the through openings of the holding device and do not have a receiving opening facing the holding device for (directly) capturing the solid substances discharged from the feeder units.

Solid substances discharged from a predetermined array of feeder units 7 are being captured by four interposed stationary hoppers 51, 52, 53, 54 and then delivered into one of the collection trays 21.

The device known from D1 suffers from the drawback that only four predetermined compositions of solid substances can be packaged.

The device according to claim 1, owing to the differentiating features that the collection trays have an elongate shape with a longitudinal direction which extends over a length of at least two of the through openings of the holding device and with a receiving opening facing the holding device for (directly) capturing the solid substances discharged from the feeder units, obviates this drawback and thus renders the known device more versatile in terms of the composition of the solid substances to be packaged.

The above assessment applies mutatis mutandis to the method according to claim 21.
- 3 The claims 2 to 20 and 22 to 24 are dependent and as such also meet the criteria of patentability.