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(71) Applicant: **URBAN REFUSE DEVELOPMENT, SLU**
25003 Lleida (ES)

(72) Inventors:
- **ROCA ENRICH, Ramon**
  25310 Agramunt (ES)
- **FARRÉ CABANILLAS, Josep Anton**
  25310 Agramunt (ES)
- **ROCA GOMEZ, Xavier**
  25600 Balaguer (ES)

(74) Representative: **Juncosa Miró, Jaime et al**
Torner, Juncosa i Associats, S.L.
C/Pau Claris, 108, 1r 1a
08009 Barcelona (ES)

(54) PACKAGE COLLECTION DEVICE THROUGH AT LEAST ONE RETRACTABLE HOLLOW COLUMN

(57) The present invention relates to a package collection device for collecting packages through at least one hollow column movable, by means of an actuator device (30), between an extracted position, in which an upper portion with at least one package inlet (24) is located above ground level (N), and a retracted position, and furthermore including a storage conduit (40) with an upper end (41) below ground level with an upper end vertically aligned with the hollow column (20), and with a lower end in connection, through an interposed hatch (43), with a pneumatic package collection duct system; wherein an upper portion of the storage conduit and a portion of the hollow column (20) are inserted snugly one into the other at least when the hollow column (20) is in the retracted position and/or connected by means of an extensible connector conduit.

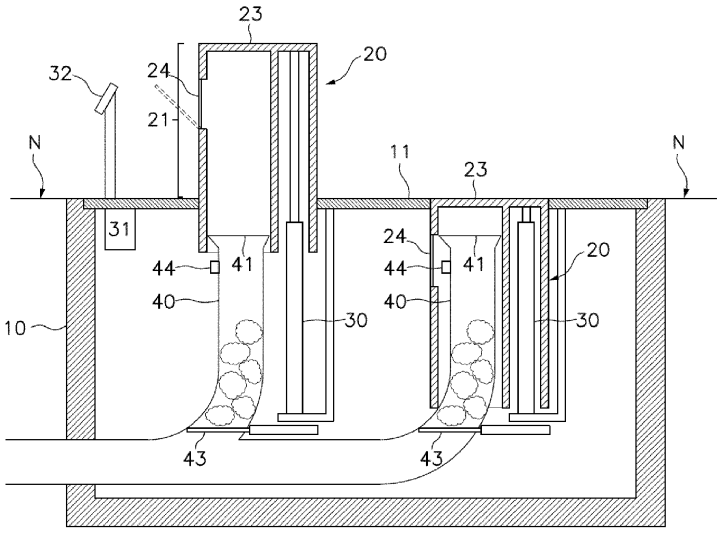

Fig. 1

EP 3 939 910 A1

Description

Field of the Art

[0001] The present invention relates to a package collection device for collecting packages through one or more retractable hollow columns provided with package inlets. Said hollow column can be partially extracted above ground level or completely concealed below ground level by means of an actuator device, with an upper surface of the hollow column being flush with the ground level providing a support plane.

[0002] Said hollow column is connected, below ground level, with an upper end of a storage conduit which is in connection with a duct system in charge of channeling and conveying said packages by means of an airstream generated by suction from a collection center.

[0003] Typically, the packages will be waste products, but the conveyance of another type of packages is also contemplated.

State of the Art

[0004] Package collection devices for collecting packages through at least one column including a pit located below ground level are known, for example, through documents US2528056A, US3800973, ES2209690T3, DE102004001336A1, and DE19837453A1.

[0005] All these documents describe devices with an underground receptacle which can be lifted above ground level by means of an actuator device to facilitate its emptying or extraction; however, none of them describe a retractable hollow column.

[0006] Document DE102010018567A1 describes a device similar to the one mentioned above, but in which the hollow column can be concealed below ground level. However, the solution described in this document requires periodic emptying of the underground receptacle located below the hollow column, and does not envisage any alternative system for emptying the pit of the packages stored therein.

[0007] Documents US2011282486A1 and US10399799B2 describe collection devices for collecting packages provided with a hollow column in connection with a pneumatic package collection duct system which allows suctioning the packages collected through said hollow columns. However, these documents do not contemplate the retractability of said hollow columns, nor do they contemplate measures which allow connecting said mobile hollow column with the non-mobile duct system, or solutions providing a compact solution that allows integrating said collection device in a small-sized pit.

[0008] The foregoing and other problems are solved by the present invention.

Brief Description of the Invention

[0009] The present invention relates to a collection device for collecting packages through at least one retractable hollow column.

[0010] It is understood that the packages are introduced by a user into the package collection device through said at least one hollow column.

[0011] The collection device may therefore consist of several hollow columns, for example, intended for collecting different types of packages.

[0012] In a preferred but non-exclusive example, the packages are waste products, for example different fractions of waste products separated according to their type, containers, paper, glass, etc., to facilitate recycling.

[0013] The proposed invention comprises, in a manner that is known *per se,* the following components:

- at least one hollow column including an upper portion with at least one package inlet;
- a storage conduit, defining a package storage space, with a lower end in connection, through an interposed hatch, with a pneumatic package collection duct system, and with an upper end connected to said at least one package inlet of the at least one hollow column.

[0014] Ground level shall be understood to be a plane, that is horizontal or has a slight deviation of at most 15°, for example, with respect to the horizontal, which users in charge of depositing packages in the hollow column can pass through. The components of the device located below ground level, mainly the storage conduit, may be buried, if the ground level coincides with the soil level, for example contained inside an underground pit. Alternatively, when the ground level from which the hollow columns emerge is located in a building with several superimposed levels, the components located below ground level will be located in a lower level of said building.

[0015] Said storage conduit amasses the packages deposited by the users through said at least one package inlet until the emptying thereof through the pneumatic package collection duct system is determined, at which time the hatch located in the lower end of the storage conduit opens while a pneumatic suction of the packages through said pneumatic package collection duct system occurs at the same time.

[0016] Typically, these pneumatic package collection duct systems consist of a network of ducts connecting a plurality of collection points with a collection center. In the collection center, a suctioning unit suctions air from the inside of said network of ducts having air inlets, normally in the collection points, generating an airstream that goes from the collection points to the collection center, entraining the packages deposited in the collection points to the center where they are stored and usually compacted for subsequent conveyance and processing. The proposed collection device for collecting packages would constitute one of said collection points.

[0017] Each collection device for collecting packages may consist of one or more hollow columns and/or of several storage conduits, the package inlets of a hollow column being connected to one and the same storage conduit or to different storage conduits.

[0018] For example, it is proposed for a collection device to include, for example, several hollow columns, each with one or more package inlets, each hollow column being connected to a different storage conduit. Alternatively, it is contemplated that the collection device includes several package inlets in one and the same hollow column, each of said package inlets being connected to a different storage conduit.

[0019] The present invention furthermore proposes, in a manner that is not known in the state of the art *per se,* the following features:

- an actuator device actuating the guided movement of the mentioned at least one hollow column between an extracted position, in which the upper portion is above ground level, and a retracted position, in which the hollow column is completely below the mentioned ground level, with a flat cover of the hollow column being flush with the ground level; and wherein

- the upper end of the storage conduit is located below ground level, vertically aligned with the hollow column, and is connected to said hollow column by means of an upper portion of the storage conduit and a portion of the hollow column snugly inserted one into the other at least when the hollow column is in the retracted position and/or by means of an extensible connector conduit.

[0020] The actuator device allows moving the hollow column or columns in a guided manner between the retracted position and the extracted position, these hollow columns therefore being retractable.

[0021] Typically, said guided movement of the hollow column will be a rectilinear, preferably vertical, movement.

[0022] The hollow column will be guided, for example, by means of guides located below ground level and parallel to the path of movement, to which there will be attached in a sliding manner a lower portion of the hollow column, located below ground level in both the extended position and the retracted position and below the upper portion.

[0023] The actuator device will be in charge of actuating the movement of the hollow column between the extracted and retracted positions. The actuator device may consist, for example, of pneumatic pistons, hydraulic pistons, or linear motors or other configurations such as a rack-and-pinion configuration.

[0024] The upper portion of the hollow column, which emerges above the plane of the ground in the extended position but is concealed below said ground level in the retracted position, comprises one or more package inlets which, with the hollow column being in the extracted position, will be accessible to a user passing through the ground level.

[0025] An upper end of the upper portion of the hollow column is preferably flat and parallel to the plane of the ground. In the retracted position, said upper end will be flush with the ground level, allowing a user to pass above the hollow column without any obstacle.

[0026] An inner conduit of the hollow column communicates the package inlet with a lower aperture of the hollow column located in the lower portion, such that any package introduced into the hollow column through a package inlet falls through the inner conduit due to the effect of gravity, exiting the hollow column through said lower aperture.

[0027] The upper end of the storage conduit is located below ground level and vertically aligned with the hollow column.

[0028] Said upper end will preferably be a static upper end, i.e., it will not move together with the vertical column, so its position is fixed regardless of the position of the hollow column.

[0029] Furthermore, said upper end may serve as an air inlet when the suctioning unit generates suction in the conduit connected to said storage conduit, entraining packages located inside said storage conduit or even around the upper end.

[0030] Said upper end and a portion of the hollow column, which will include at least a part of said lower portion adjacent to the lower aperture of the hollow column, are inserted snugly one into the other at least when the hollow column is in the retracted position, forming together a telescopic segment.

[0031] In other words, if the hollow column has a cross-section with a size larger than the upper end of the storage conduit, the hollow column will be arranged around said upper end when the hollow column is in the retracted position, said upper end being contained inside the hollow column, preferably concentric to one another.

[0032] In such case, it is also proposed for the upper end to be able to include a flared opening fitted into the hollow column.

[0033] Alternatively, if the upper end of the storage conduit has a cross-section with a size larger than the hollow column, then the upper end will be arranged around the hollow column when the hollow column is in the retracted position, said hollow column being contained inside the upper end.

[0034] Any of these two alternatives allow a compact construction that requires very little space below ground level, since the storage conduit and the hollow column partially overlap in length in the retracted position, constituting a telescopic segment. This allows the package storage conduit to also partially overlap with the hollow column in the retracted position, efficiently maximizing the storage capacity below ground level.

[0035] The installation of a sealing system or a her-

metic joint between the hollow column and the storage conduit is not considered necessary; however, said possibility is not ruled out to prevent the packages from being interposed between both elements. The hollow column may include air inlets to allow an airstream to be produced through the storage conduit from the hollow column during the emptying of the storage conduit. Said air inlets may be arranged to allow the entry of air with the hollow column being in the retracted position.

[0036] According to an example, said air inlets will be arranged at the upper end of the hollow column. Alternatively, they will be arranged in side walls of the hollow column and/or air inlets will be included in the ground level to allow the entry of air from above the ground level to a casing, space, or pit located below ground level containing the collection device. Said air inlets of the ground level can be, for example, a gap between the hollow column and the hole from which said hollow column emerges, or grills arranged around same.

[0037] Alternatively or additionally, it is proposed for said upper end of the storage conduit to be connected to a portion of the hollow column by means of an extensible connector conduit, i.e., a conduit the length of which can be modified as it is flexible or elastic, for example, a compressible or corrugated conduit of variable length or a textile tube. Therefore, the connection will be maintained regardless of the position of the hollow column, since the extensible connector conduit will expand or shrink to adapt to the movement of the hollow column. Typically, said extensible connector conduit will be interposed between and connected to the upper end of the storage conduit and the hollow column.

[0038] With the upper end of the storage conduit being arranged below and vertically aligned with the hollow column in the extracted position and connected to a portion of the hollow column by means of a snug insertion and/or by means of an extensible connector conduit, it is assured that the packages introduced through the package inlets will fall into the storage conduit through the upper end by gravity, being stored in said storage conduit until the emptying thereof.

[0039] The storage space, defined inside the storage conduit, can occupy from the lower end to the upper end of the storage conduit. Therefore, part of said storage space may be contained inside a portion of the hollow column at least when said hollow column is in the retracted position, given that said portion of the hollow column and the upper end are inserted one into the other, thereby maximizing the storage space.

[0040] When the connection also includes an extensible connector conduit, the package storage space can also occupy at least part of said extensible connector conduit when the hollow column is in the extended position. When the hollow column moves to the retracted position, the length of the extensible connector conduit would be reduced, but this is not true for the package storage space which would then occupy a larger portion of the extensible connector conduit or the entire length thereof and part of the hollow column in the retracted position.

[0041] It is also proposed for the collection device to be able to include a pit located below ground level. In such case, the storage conduit will be located inside said pit and also the hollow column in the retracted position. Therefore, a compact solution like the one proposed allows reducing the size of said pit, reducing the technical requirements for its installation and its cost.

[0042] According to an alternative construction, the storage conduit itself or a casing enveloping it contains all the components of the collection device that must be located below ground level, allowing said storage conduit or said casing to be buried directly in the ground, reducing operations and installation costs.

[0043] Optionally, the upper end of the storage conduit and the lower portion of the hollow column are at least partially inserted one into the other also when the hollow column is in the extracted position. In such case, part of the upper portion of the hollow column and the upper end of the storage conduit may also be inserted one into the other in the retracted position.

[0044] In other words, the hollow column and the storage conduit are not inserted one into the other only in the retracted position, but they are also partially inserted one into the other in the extracted position. In such case, the upper end of the storage conduit and the hollow column will always be inserted one into the other in both the extracted position and the retracted position, thereby assuring that there is always a continuity between the inner conduit of the hollow column and the storage conduit.

[0045] Alternatively, it is also contemplated for the hollow column and the storage conduit not to be inserted one into the other in the extracted position, said insertion being caused only when the hollow column is moved to the retracted position. In such case, with the hollow column being in the extracted position, there will be no continuity between the inner conduit of the hollow column and the storage conduit, although since they are vertically aligned, the packages would go from the inner conduit to the storage conduit by gravity without problem. This option facilitates the entry of air from the pit into the storage conduit, as well as the cleaning, inspection, and maintenance tasks.

[0046] The storage conduit may furthermore include a fill sensor of the storage space for determining its fill level, said fill sensor being connected to the hatch of the lower end of the storage conduit.

[0047] This allows the packages dumped through the hollow column to accumulate inside said storage conduit while the hatch remains closed, activating the suctioning unit and the opening of the hatch only when the fill sensor detects that the storage space has been filled to a maximum fill limit located below ground level, or when the filling of the storage space is comprised between a medium fill limit and a maximum fill limit, reducing energy consumption.

[0048] If the storage conduit is overfilled, the packages

would protrude above the upper end of the storage conduit or be arranged in an area intended for containing the hollow column in the retracted position, making the placement of the hollow column in the retracted position difficult or preventing same. To that end, the existence of said fill sensor is important, allowing detecting when the fill level of the storage conduit is close to maximum so as to proceed to empty same by means of activating the suctioning unit and opening the hatch.

[0049] The fill sensor may consist, for example, of an optical detector such as a distance meter used for measuring descending vertical distances and oriented towards the inside of the storage conduit, or a light beam transverse to the storage conduit which detects a specific fill level by means of the interruption thereof. Other types of sensors, such as sonic or radiofrequency sensors, are also contemplated.

[0050] The storage conduit may include a curved or non-vertical portion inserted into the hollow column when it is in the retracted position.

[0051] Typically, the storage conduit is essentially vertical, and the pneumatic package collection duct system consists of essentially horizontal ducts. To achieve a better conveyance of the packages from the storage conduit to the pneumatic collection duct system, the lower end of the storage conduit preferably has a curvature for a smoother transition between the vertical direction and the horizontal direction. The inclusion of this curved segment or part thereof inside the hollow column in the retracted position allows obtaining a more compact configuration of the collection device, and therefore lower installation costs.

[0052] The hollow column may furthermore contain and support a press device provided with a press surface that can be vertically inserted into the storage conduit through the upper end, said press surface being movable between a standby position, in which it is not interposed between said at least one package inlet and the storage conduit, and a pressing position, in which it is at least partially interposed between said at least one package inlet and the storage conduit.

[0053] The pressing surface will move vertically, either together with the movement of the hollow column between the extracted and retracted positions, or by means of actuation by the press device, causing the packages contained inside the storage space to be pressed.

[0054] In other words, when the press device is in the standby position, it is not interposed between the package inlet and the storage conduit, but when it is in pressing position, said press device is at least partially inserted into the storage conduit at least when the hollow column is in the retracted position.

[0055] This allows, with the hollow column being in the extracted position, the press device not to interfere with package collection, but when the hollow column is in the retracted position, said press device can be in the pressing position, being inserted at least partially into the storage conduit, compressing the packages housed therein.

[0056] The press device can move from the pressing position before, during, or after the movement of the hollow column from the extracted position to the retracted position, allowing the press device to be located in the pressing position, for example, and then proceeding with the movement of the hollow column, thereby causing the partial insertion of the press device into the storage conduit through its upper end and the compaction of the packages accumulated therein, thus allowing more packages to be stored before proceeding to perform emptying by suction.

[0057] This arrangement of the press device is applicable in both the embodiment according to which the storage conduit is housed inside the hollow column when it is in the retracted position, and the embodiment according to which the hollow column is the one that is partially inserted into the storage conduit when it is in the retracted position, also being compatible with the use of the extensible connector conduit.

[0058] The press device may include, for example:

- a pressing surface vertically movable between the standby position, in which it is located above said at least one package inlet, and the pressing position, in which it is located below said at least one package inlet and transverse to the conduit communicating the package inlet with the storage conduit; or

- a pressing surface which is attached to the lower portion of the hollow column such that it can pivot about a horizontal shaft and which is movable between the pressing position, in which it is located transverse to the conduit communicating the package inlet with the storage conduit, and the standby position, in which it is located vertically.

[0059] Evidently, said pressing surface will be operated by means of an actuator mechanism, which may include an electric, hydraulic, or pneumatic motor, a scissor mechanism, a rack-and-pinion mechanism, or others.

[0060] In one embodiment, the overlapping portion of the storage conduit may include at least one longitudinal groove, allowing the pressing surface to be arranged inside the storage conduit and laterally supported from the outside of the storage conduit. This embodiment will be apparent particularly when the storage conduit is inserted into the hollow column and the press device is fixed to the lower portion of the hollow column.

[0061] According to an embodiment, the collection device is contained in a pit covered by a lid flush with the ground level. The at least one hollow column goes through said lid through a snug hole, the hollow column being supported by the lid and connected thereto in a guided manner through the actuator device. In other words, the actuator device and the guides guiding the movement of the hollow column are fixed to the lid of the pit, with the hollow column hanging from said lid. Optionally, the storage conduit will also be hanging from said lid.

[0062] This solution allows prefabricating the assembly formed by the lid and all the devices associated therewith, i.e., the guided hollow column and the actuator device, in a workshop with great precision. Therefore, dimensions and precision in the construction of the pit do not influence the correct positioning and operation of the hollow column with respect to the lid.

[0063] Preferably, the actuator device is controlled by a control unit connected to an actuation signal generator and configured for activating each actuator device of each hollow column included in the collection device in response to signal produced by said actuation signal generator, so as to move each hollow column, individually or simultaneously, from the extracted position to the retracted position, or vice versa.

[0064] The actuation signal generator will be within the reach of the users of the package collection device to request for the hollow column to be positioned in the extracted position and/or in the retracted position.

[0065] The actuation signal generator may comprise, for example, a push-button, a timer, an optical visual code reader, a radiofrequency label reader, an identification card reader, a user biometrics recognition device, a smart phone, or any combination of the foregoing.

[0066] The push-button would allow a user to request the hollow column to lift up or perform collection. The push-button may include, for example, a numeric or alphanumeric keyboard to request an identification or an activation code.

[0067] The timer may determine how long will the hollow column remain extracted or retracted, or may determine the times at which the hollow column can be extracted or retracted.

[0068] The optical visual code reader can be, for example, a barcode or QR code reader, among others, which allows identifying, for example, the user, the packages, or the hollow column to be actuated.

[0069] The radiofrequency label reader can use, for example, the RFID protocol or another equivalent protocol, allowing identification of the labels carried by the users or the packages to be deposited.

[0070] The identification card reader can be, for example, a reader for magnetic cards or contactless cards assigned, for example, to a user or packages.

[0071] The user biometrics recognition device may include fingerprint readers, facial recognition cameras, or other equivalent systems.

[0072] A smart phone or another autonomous signal-emitting device may also be used to send an activation signal to the actuator device, for example, through the Internet, or a telephony signal, or a radiofrequency or infrared signal.

[0073] The upper portion of the hollow column will preferably consist of vertical walls including said at least one package inlet.

[0074] Each package inlet will preferably include a lid attached to said vertical walls of the hollow column such that it can pivot about a horizontal shaft located on a lower side of said lid. This arrangement of the lid allows, if the lid is not closed or not completely closed, forcing said lid to close as it goes through the aperture from which the hollow column emerges, during the descending movement of the hollow column from the extracted position to the retracted position.

[0075] It is also proposed to include position detectors in said lids which allow detecting when the lids are in the open position, preventing the actuation of the actuator device.

[0076] It is also contemplated to incorporate detectors for detecting the resistance of the hollow column to movement which allow determining that the movement of the hollow column generates a resistance greater than a specific predefined threshold, indicative that an obstacle is interposed in the path of movement of the hollow column, stopping in such case the actuation of the actuator device to prevent accidents or malfunctions.

[0077] This can happen, for example, if a person or a heavy object, such as a vehicle, is located above the hollow column when it is in the retracted position and the hollow column is to be moved to the extended position.

[0078] On the contrary, it may also occur if a person or an element of certain consistency is stuck in a package inlet or between the hollow column and the aperture through which the hollow column protrudes from the ground level.

[0079] Said detector for detecting the resistance to movement may be, for example, a detector for detecting the electrical consumption of an electric motor actuating the actuator device. An increase in electrical consumption above a certain threshold is indicative of an obstacle hindering the advancement of the hollow column.

[0080] It is also contemplated to include, at the upper end of the hollow column, or around said hollow column in ground level, presence detectors, pressure detectors, magnetic detectors, or radar detectors which allow detecting the presence of a vehicle, such as a car, a motorcycle, or the like, stopped or parked on top of the hollow column, preventing the actuation of the actuator device when said presence is detected.

[0081] It is understood that one and the same pit may contain several hollow columns, each associated with a different storage conduit, for example, for the collection of different fractions of packages for different recycling or treatment, and said hollow columns can each be operated by an independent actuator device.

[0082] It will be understood that references a geometric position such as, for example, parallel, perpendicular, tangent, etc. allow deviations of up to $\pm 5º$ with respect to the theoretical position defined by said nomenclature.

[0083] Other features of the invention will become apparent in the following detailed description of an embodiment.

Brief Description of the Figures

[0084] The foregoing and other advantages and fea-

tures will be more fully understood based on the following detailed description of an embodiment in reference to the attached drawings that should be interpreted as illustrative and non-limiting, in which:

Figure 1 shows a schematic vertical section of the collection device for collecting packages according to an embodiment in which the pit contains two hollow columns and the corresponding two terminal ducts are partially inserted into the hollow columns, both terminal ducts being connected to one and the same collector integrated in the pneumatic package collection duct system, showing one hollow column in the extracted position and the other one in the retracted position;

Figure 2 shows an embodiment similar to that shown in Figure 1 but in which a press device fixed to the hollow column is furthermore included;

Figure 3 shows a schematic vertical section of the collection device for collecting packages according to another embodiment in which the pit contains two hollow columns and the corresponding two terminal ducts partially housing therein the hollow columns, both terminal ducts being connected to one and the same collector integrated in the pneumatic package collection duct system, showing one hollow column in the extracted position and the other one in the retracted position;

Detailed Description of an Embodiment

[0085] The attached figures show illustrative non-limiting embodiments of the present invention.

[0086] According to a first embodiment of the invention shown in Figure 1, the collection device for collecting packages includes an underground pit 10 completely located below ground level N, covered by a lid 11 that is flush with the ground level N and can be passed through.

[0087] One or more hollow columns 20 go through apertures of said lid 11, allowing their vertical movement between an extracted position, in which an upper portion 21 of the hollow column 20 is above ground level N and a lower portion of the hollow column 20 is below ground level contained inside the pit 10, and a retracted position, in which the hollow column 20 is completely below the mentioned ground level N, contained inside the pit 10.

[0088] Each hollow column 20 is attached to an actuator device 30 fixed to said lid 11 of the pit 10 and also including a guide system for guiding the movement of the hollow column 20 between the retracted and extracted positions. In this embodiment shown in Figure 1, the actuator device 30 consists of a vertical piston.

[0089] Therefore, both the actuator device 30 and the corresponding hollow column 20 hang from the lid 11 of the pit 10.

[0090] The upper portion 21 hollow column 20 has a package inlet 24 provided with a lid articulated at its lower edge to the rest of the hollow column 20. When the hollow column 20 is in the extracted position, a user can open the lid and introduce a package into the hollow column 20 through said package inlet 24.

[0091] The upper portion 21 is finished with a flat cover 23 which, when the hollow column 20 is in the retracted position, is flush with the ground level N, allowing passage above same with no obstacles.

[0092] A pneumatic package collection duct system has an end of a duct connected with said pit 10.

[0093] Inside the pit 10, for each hollow column 20, there is located a storage conduit 40, defining a package storage space located below and vertically aligned with the corresponding hollow column 20, an upper end 41 of the storage conduit 40 below ground level N being open and vertically aligned with the hollow column 20, in connection with the package inlet 24, such that a package introduced through said package inlet 24 will fall by gravity through the hollow column 20, and through said open upper end 41, into the storage conduit 40.

[0094] Each of said storage conduits 40 is connected at its lower end with the pneumatic package collection duct system. A hatch 43 that can be actuated is interposed between the storage conduit 40 and the rest of the pneumatic package collection duct system, such that when said hatch 43 is closed the packages introduced in the storage conduit 40 will be stored therein, and when said hatch 43 opens the packages may be suctioned and conveyed through the pneumatic package collection duct system.

[0095] In this embodiment shown in Figure 1 the upper end 41 of the storage conduit 40 is flared and snugly inserted into the lower portion of the hollow column when is in the extracted position, said lower end of the hollow column surrounding the upper end 41 of the storage conduit 40.

[0096] When the hollow column moves down to the retracted position, greater insertion of the storage conduit 40 into the hollow column 20 occurs. The package storage space and the space required for concealing the hollow column below ground level therefore coincide with one another, achieving a very compact solution that requires little excavation.

[0097] It is also contemplated that, in the extracted position, the upper end 41 of the storage conduit 40 is not inserted into the hollow column 20, but a snug insertion occurs during the descending movement of the hollow column 20 to the retracted position.

[0098] In this embodiment, the upper end of the storage conduit 40 is in a straight vertical segment and the lower end of the storage conduit 40 is in a curved segment connecting the straight vertical segment with the duct of the pneumatic package collection duct system which is essentially horizontal, smoothening the transition between both to facilitate package circulation. With the hollow column in the retracted position, a portion of the curved segment will be contained inside the hollow col-

umn, making the solution even more compact.

[0099] According to an alternative solution shown in Figure 3, a solution that is the opposite of what has been described up until now is proposed, according to which the hollow column is the one which is snugly inserted into the storage conduit 40 when it is in the retracted position. In this example, the hollow column 20 and the storage conduit 40 are not inserted one into the other when they are in the extracted position, but it is contemplated for at least part of the lower portion of the hollow column 20 to be inserted into the storage conduit 40 also in the extracted position.

[0100] In this embodiment, it is proposed for the actuator device 30 to be a gear wheel meshing with a rack provided in the hollow column 20.

[0101] According to an alternative embodiment shown in Figure 4, the upper end 41 of the storage conduit 40 and the lower portion of the hollow column 20 are connected by means of an extensible connector conduit which, in this case, is a corrugated textile or plastic conduit. In the retracted position, the extensible connector conduit shrinks, reducing its length, and in the extracted position, it expands. The packages can be stored inside the expanded extensible conduit, and when the hollow column moves to the retracted position, those packages stored in the extensible connector conduit will be stored inside the hollow column 20.

[0102] In any of the described embodiments, the inclusion of a fill sensor 44 capable of detecting the fill level of the package storage space is furthermore contemplated. Said fill sensor will be in communication, through a control unit, with the hatch 43 to ensure that the fill level never exceeds a maximum fill level, located below ground level N, which prevents placing the hollow column 20 in the retracted position, ordering the emptying of the storage conduit 40 when the fill level is close to the maximum level or when it exceeds a certain pre-established fill level.

[0103] The embodiment of Figure 2 shows a hollow column 20 provided with a press device 50 fixed to the lower surface of the cover 23 of the hollow column 20, including a pressing surface 51 fixed to a device that can extent in a descending vertical direction. This allows collecting and storing the press device 50 in a compact manner inside the upper portion 21 of the hollow column, above the level of the package inlet 24, when the hollow column 20 is in the extracted position, and also allows, when the hollow column 20 in the retracted position or before or during the movement thereof to said position, causing the pressing surface 51 to descend, introducing it into the storage conduit 40 through the upper end 41, causing the compaction of the packages stored therein, increasing the capacity of the storage conduit 40, and therefore reducing the emptying frequency thereof, saving energy.

[0104] Figure 3 shows an alternative embodiment of the press device 50 according to which said device consists of a pressing surface 51 contained in the lower portion of the hollow column 20, attached in an articulated manner to a lower surface of said hollow column 20, allowing the movement thereof between a standby position, in which it is located vertically, placed against the lower surface of the hollow column 20, and a pressing position, in which it is located horizontally, closing the lower aperture of the hollow column 20. When the hollow column 20 moves from the extracted position to the retracted position, said pressing surface 51 will cause the compaction of the packages contained inside the storage conduit 40, with the advantages described above.

[0105] The extraction or retraction of the hollow columns 20 will be controlled by an actuation signal generator 32 which, under certain circumstances, will generate an actuation signal that will be received by a control unit 31 connected to the actuator device 30 of each hollow column 20.

[0106] The actuation signal generator 32 may be, for example, a push-button, a timer, an optical visual code reader, a radiofrequency label reader, an identification card reader, a user biometrics recognition device, a smart phone, or any combination of the foregoing.

[0107] For example, it is contemplated that a user has an identification code, an identification card, or a mobile phone configured for generating a user identification signal when it is in proximity to the collection device, allowing said user to be identified with respect to the actuation signal generator 32 which will produce an actuation signal 32 once the user with access right has been identified.

[0108] Said actuation signal will be received by the control unit 31 which will actuate one or more actuator devices 30 in response, causing the movement of one, several, or all the hollow columns 20 of a collection device from the retracted position to the extracted position, at least during a certain pre-established time, allowing said user to deposit a package through the package inlets 24.

[0109] According to another example, the packages may include a radiofrequency label which, when detected by the actuation signal generator 32, will trigger the generation of an actuation signal to actuate the movement of one or more hollow columns 20.

[0110] According to another alternative, the actuation signal generator 32 will be a biometrics sensor, such as a fingerprint sensor or a facial recognition camera, which allows identifying the users with access rights, triggering the movement of the hollow columns 20.

[0111] It is also contemplated for either the cover 23 of the hollow columns 20 or the lid 11 of the pit to include an air inlet, facilitating the suction of the packages contained in the storage conduit 40.

[0112] Said air inlet may be an air inlet that may consist of a gap or of a grill between the lid 11 and the hollow column 20.

[0113] It will be understood that the different parts making up the invention described in an embodiment can be freely combined with parts described in other different embodiments although said combination has not been explicitly described, provided that they fall within the

scope of the claims and that the combination does not entail any detriment.

Claims

1. A package collection device for collecting packages through at least one hollow column, comprising:

   • at least one hollow column (20) including an upper portion (21) with at least one package inlet (24);
   • a storage conduit (40), defining a package storage space, with a lower end in connection, through an interposed hatch (43), with a pneumatic package collection duct system, and with an upper end (41) connected to said at least one package inlet (24) of the at least one hollow column (20);

   characterized in that the device furthermore includes:

   • an actuator device (30) actuating the guided movement of the mentioned at least one hollow column (20) between an extracted position, in which the upper portion (21) is above ground level (N), and a retracted position, in which the hollow column (20) is completely below the mentioned ground level (N), with a flat cover (23) of the hollow column (20) being flush with the ground level (N); and wherein
   • the upper end (41) of the storage conduit (40) is located below ground level (N), vertically aligned with the hollow column (20), and is connected to said hollow column by means of an upper portion of the storage conduit and a portion of the hollow column (20) snugly inserted one into the other at least when the hollow column (20) is in the retracted position and/or by means of an extensible connector conduit.

2. The collection device according to claim 1, wherein the device furthermore includes a fill sensor (44) of the package storage space connected to said hatch (43) through a control unit configured for emptying the storage conduit of the packages when the fill sensor (44) detects that the package storage space located below ground level has been filled to a maximum fill limit.

3. The collection device according to claim 1 or 2, wherein the hollow column (20) furthermore includes a press device (50) provided with a press surface (51) that can be vertically inserted into the storage conduit (40) through the upper end, said press surface (51) being movable between a standby position, in which it is not interposed between said at least one package inlet (24) and the storage conduit (40), and a pressing position, in which it is at least partially interposed between said at least one package inlet (24) and the storage conduit (40).

4. The package collection device according to claim 3, wherein the press device (50) includes

   • a pressing surface (51) vertically movable between the standby position, in which it is located above said at least one package inlet (24), and the pressing position, in which it is located below said at least one package inlet (24) and transverse to the conduit communicating the package inlet with the storage conduit; or
   • a pressing surface (51) which is attached to the lower portion (22) of the hollow column (20) such that it can pivot about a horizontal shaft and movable between the pressing position, in which it is located transverse to the conduit communicating the package inlet with the storage conduit, and the standby position, in which it is located vertically.

5. The collection device according to claim 1, 2, 3, or 4, wherein the upper portion of the storage conduit and a portion of the hollow column (20) are also snugly inserted one into the other when the hollow column (20) is in the extracted position.

6. The collection device according to any one of the preceding claims, wherein the upper end (41) of the storage conduit (40) is inserted into the hollow column (20).

7. The package collection device according to claim 6, wherein:

   • the upper end (41) of the storage conduit (40) includes a flared opening fitted into the hollow interior of the hollow column (20); and/or wherein
   • the lower end of the storage conduit (40) includes a curved or non-vertical portion inserted into the hollow column (20) when it is in the retracted position.

8. The collection device according to any one of the preceding claims 1 to 5, wherein the hollow column (20) is inserted into the upper end (41) of the storage conduit (40).

9. The package collection device according to any one of the preceding claims, wherein at least a part of the collection device, located below ground level (N), is contained in a pit (10) covered by a lid (11) flush with the ground level (N), said at least one hollow column (20) going through said lid (11) through a

snug hole, and wherein the hollow column (20) is supported by the lid (11) and connected thereto in a guided manner through the actuator device (30).

10. The package collection device according to any one of the preceding claims, wherein the actuator device (30) is controlled by a control unit (31) connected to an actuation signal generator (32) and configured for activating the actuator device (30) in response to signal produced by said actuation signal generator (32).

11. The package collection device according to claim 10, wherein the actuation signal generator (32) comprises a push-button, a timer, an optical visual code reader, a radiofrequency label reader, an identification card reader, a user biometrics recognition device, a smart phone, or any combination of the foregoing.

12. The package collection device according to any one of the preceding claims, wherein the actuator device (30) includes pneumatic pistons, hydraulic pistons, linear motors, or a rack-and-pinion configuration.

13. The package collection device according to any one of the preceding claims, wherein the upper portion (21) of the hollow column (20) consists of vertical walls including said at least one package inlet (24).

14. The package collection device according to claim 13, wherein each package inlet (24) includes a lid attached to said vertical walls of the hollow column (20) such that it can pivot about a horizontal shaft located on a lower side of said lid.

15. The package collection device according to any one of the preceding claims, wherein the components of the collection device located below ground level are contained inside a casing or a pit covered by a lid, and wherein said lid or the upper end (23) of the hollow column (20) include air inlets.

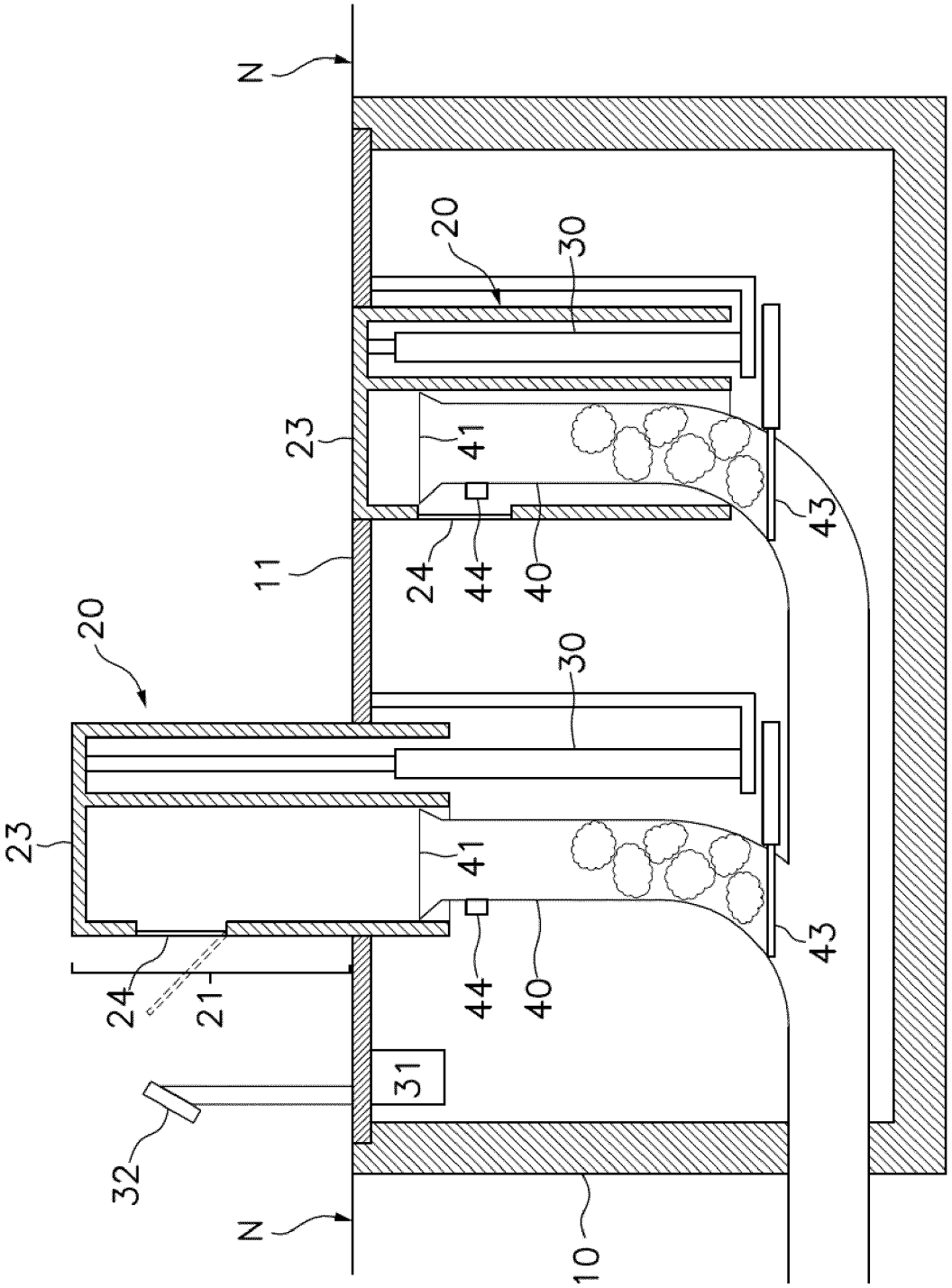

Fig. 1

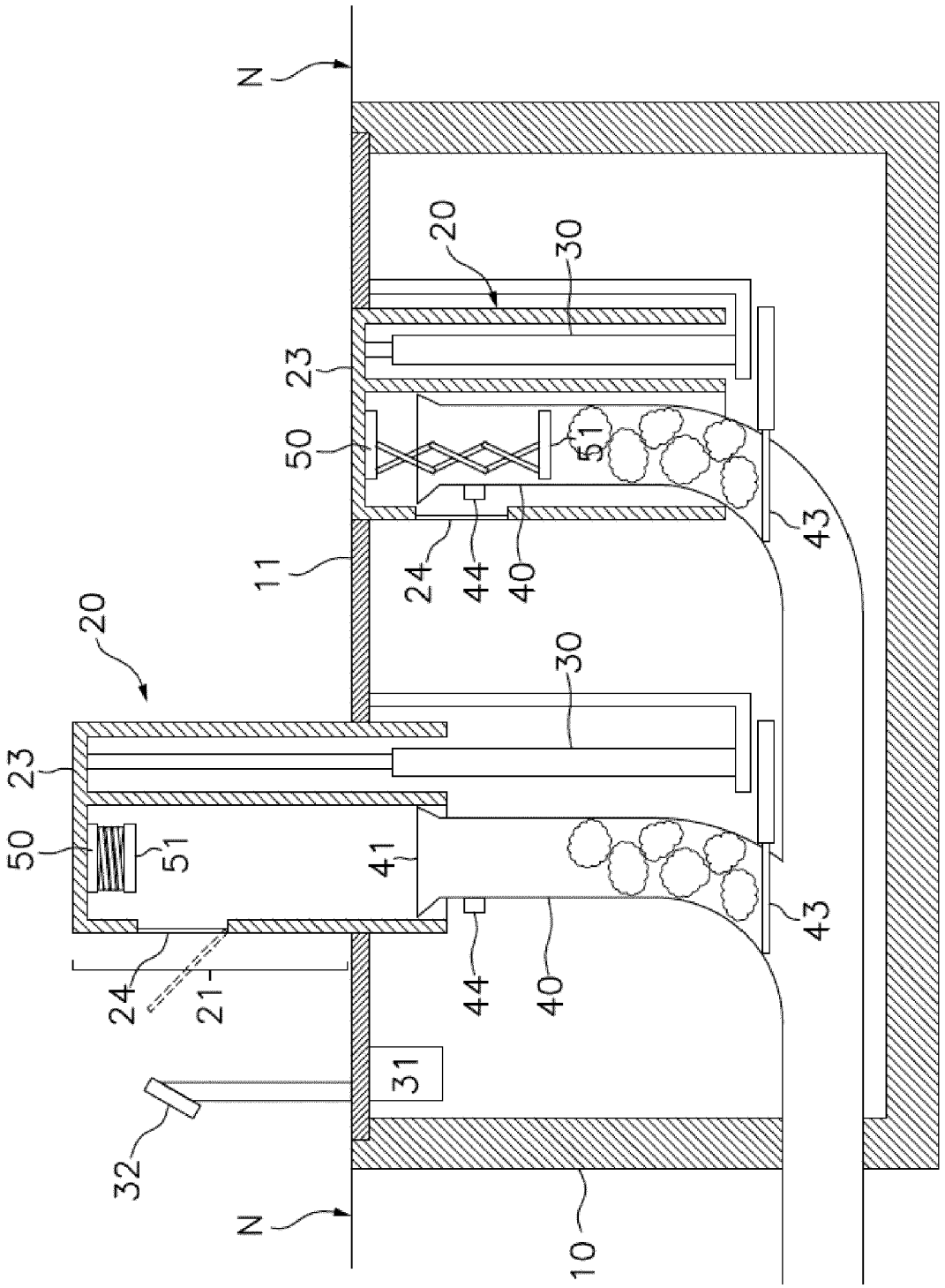
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Fig.2

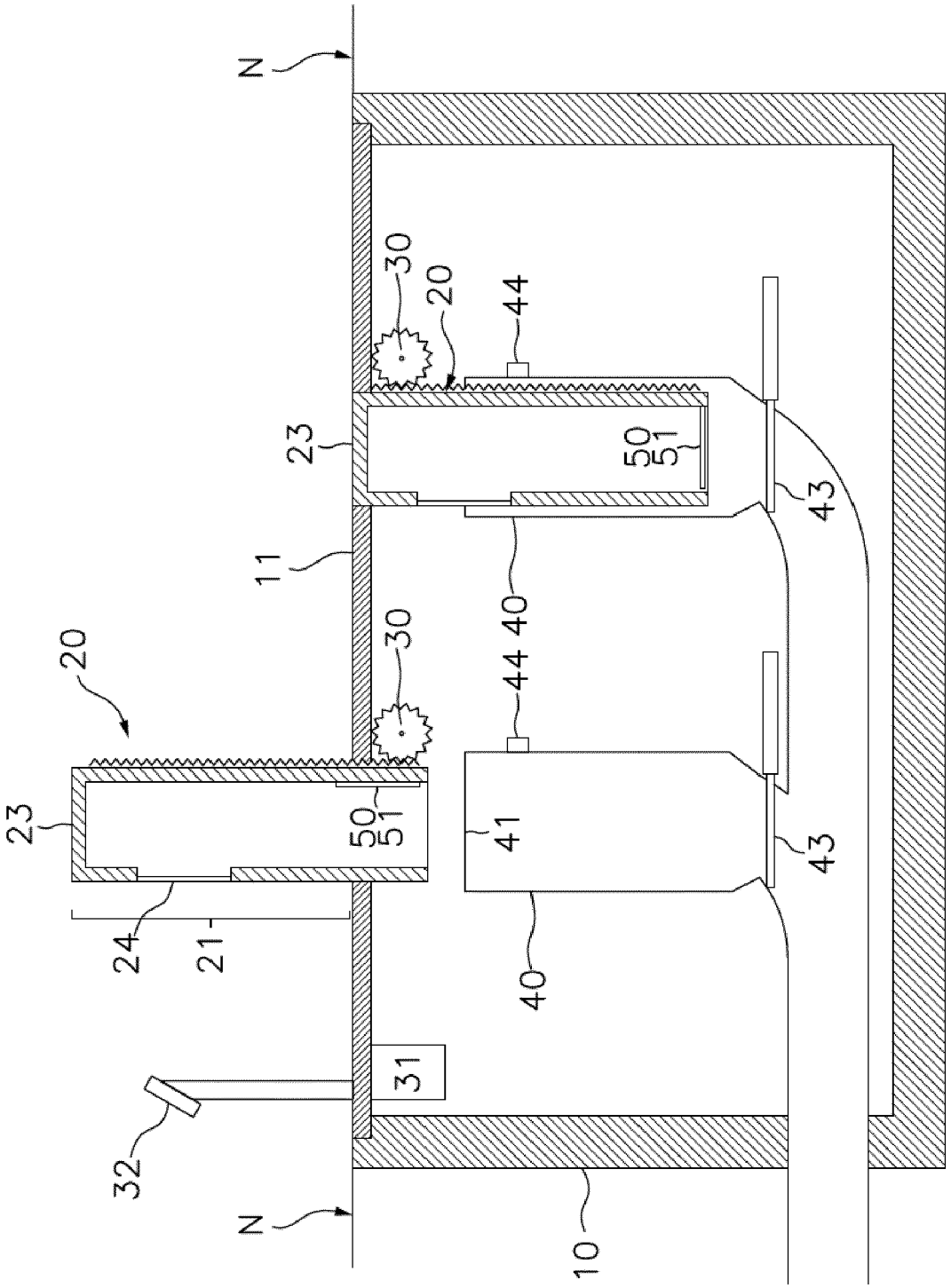

Fig.3

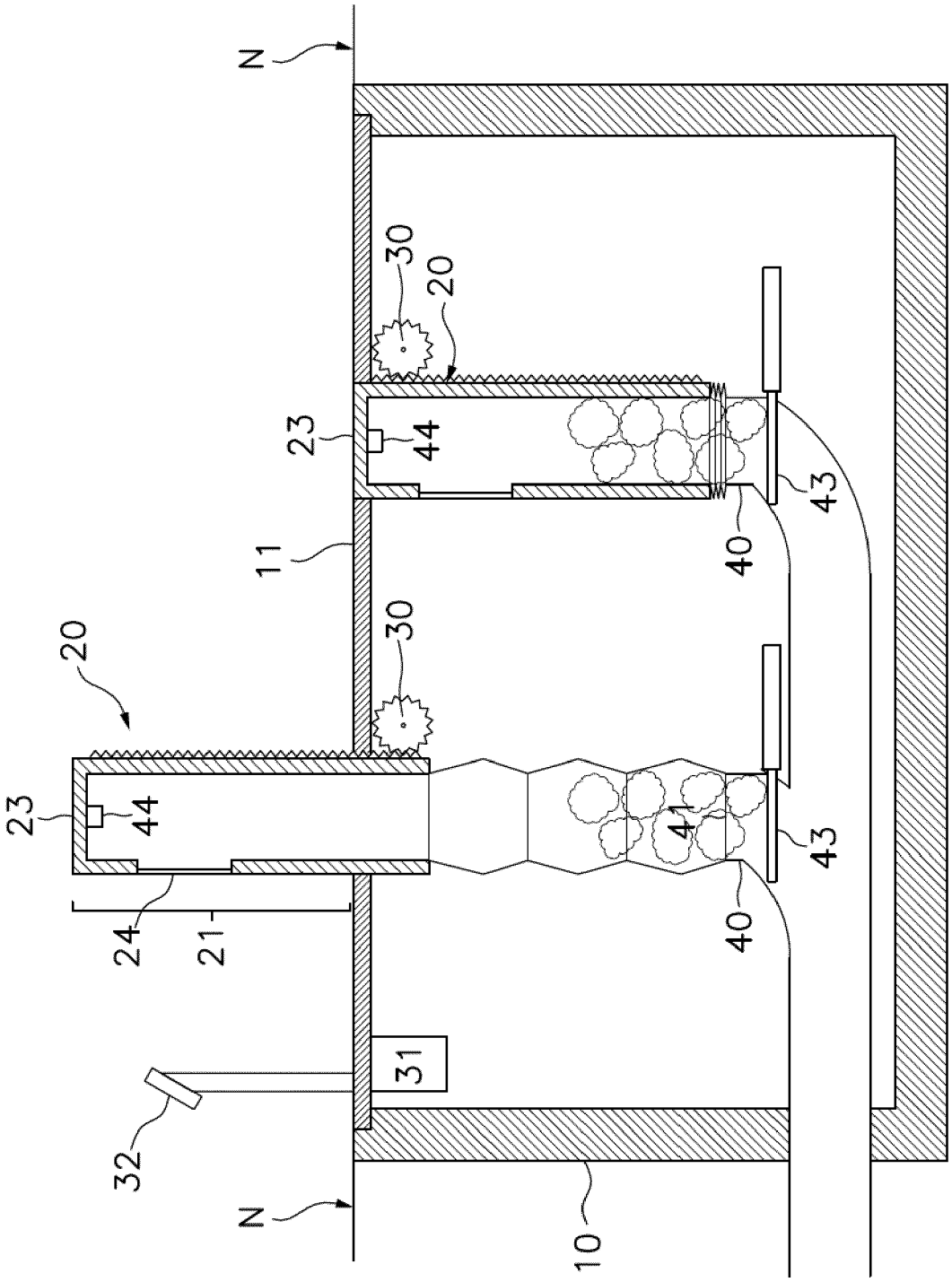

Fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 20 38 2630

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B65F
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 December 2020	Sommer, Jean

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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