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(73) Patenthaver: **Tomra Systems ASA, Drengsrudhagen 2, 1385 Asker, Norge**

(72) Opfinder: **Saether, Geir, J.R. Wilhelmsens vei 10, 1370 Asker, Norge**
Lunde, Tom, Stasjonsveien 69, 1365 Blommenholm, Norge
SIVERTSEN, Ronald, Vabråten 50, N-1392 Vettre, Norge

(74) Fuldmægtig i Danmark: **AWA Denmark A/S, Strandgade 56, 1401 København K, Danmark**

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DESCRIPTION

FIELD OF THE INVENTION

[0001] The present invention is related in general to apparatus for handling items or objects, e.g. for receiving, sorting and storing returnable items or objects, such as empty beverage containers like bottles, cans or the like. The invention is particularly useful in connection with reverse vending machines, although certain aspects of the present invention may also find other fields of use. In particular, the present invention relates to a conveyor means for a facility for receiving returnable items, in particular containers such as bottles, cans and the like of plastic, glass or metal, and for conveying a received returnable item towards a storage, as defined in the preamble of attached claim 1.

BACKGROUND OF THE INVENTION

[0002] The present invention came about following the recognition of the need to provide a more cost efficient reverse vending machine, yet simple, reliable and space saving. In particular, it was recognized the need to reduce overall cost of manufacturing such new machines by addressing such important issues to as minimizing the number of expensive components, such as e.g. camera, barcode reader, object sorter, object conveyor, object rotator, and token printer, as well as minimizing required space, especially as regards floor area.

[0003] However, in such recognition, it was revealed that the invention would become related to a plurality of aspects which all in their own respective manner would contribute to a desirable end result.

[0004] In a decade or so, environmental and economical concerns have spurred significant developments in the field of facilities for collecting cans, bottles, jars and other containers, preferably for recovering the material for recycling purposes. These days, fully automatic systems are available that are capable of receiving and storing many different types of used containers, or even parts of used containers.

[0005] Arrangements for handling recyclable items like returnable empty beverage containers are *inter alia* known from the European publications EP 0 384 885 (SIG Schweizerische Industrie-Gesellschaft), EP 1311448, and the International Patent Application publication WO02/12096 (EP 1313656) (TOMRA SYSTEMS ASA) and EP 14677328 (TOMRA SYSTEMS ASA).

[0006] Till now, available fully automated systems, so-called reverse vending machines (RVMs) and back-room systems, that are capable of receiving and storing used containers

have been quite complex and expensive. They have, therefore, mostly been found in larger stores, shopping centers or supermarkets, or in special facilities put up for collecting recyclable items or objects.

[0007] Accordingly, for the customer who has recyclable items or objects in smaller quantities, and who may not have at disposal a proper vehicle to facilitate easy transportation of recyclable material to a larger store, shopping center or supermarket that may be located at a distance from the person's home, it is often easier to throw the recyclable items out with the garbage.

[0008] The currently available reverse vending machines normally deliver the received objects to a back-room receiving facility or a downstairs facility. The total installation is expensive, requires substantial space, is often complex to install and service, and has operational drawbacks, in particular from a cleaning point of view. Frequent cleaning of soiled operational parts, suitably with water or special cleaning agent, is very important to secure failsafe operation. Returnable beverage containers frequently contain beverage leftovers, which often happen to come into contact with operational parts, thus making such parts sticky and causing operational failure if not properly cleaned. Cleaning is more than often a messy operation, and care has to be made not to harm electrical components.

[0009] Most RVMs need to have the ability to inspect identifying features on the object, such as e.g. a bar code. If such features are not immediately seen by a dedicated detector, the object will need to be rotated to find if such features are indeed present. An object rotating mechanism is expensive and requires substantial space in the longitudinal or depth direction of the RVM. Further, if such RVMs are also to provide object sorting, an additional sorter has to be provided, adding further to the cost of the installation, and the dimension of the RVM as regards depth dimension is in some cases prohibitive when both a rotator and a sorter are to be included. Also, most owners of stores, shopping centers or supermarkets are concerned over RVMs requiring substantial and expensive space for collecting the containers received by the RVM, such space frequently being occupied by container collection tables.

OBJECTS OF THE INVENTION

[0010] The present invention therefore has as a principal object to meet a long felt need to provide an improved automated facility for collecting returnable objects or items, such as recyclable items of plastic, metal or glass, and for overcoming the well-known mentioned drawbacks, thus yielding a low cost facility which exhibits optimal use of limited space, in particular floor space, that may be available almost everywhere, enabling their placement even in smaller stores, convenience stores, local gas stations and public areas. Thereby, such facilities may be more conveniently available to customers. These features and other features to appear through reading of the specification are some of the objectives of the present invention.

SUMMARY OF INVENTION

[0011] The conveyor means of the invention has been described in connection with an inventive facility which allows storage of a large number of returnable items or objects in a mostly vertically oriented storage space without employing a vertical conveyor for filling the storage space.

[0012] Thus, the invention provides usefulness with an upwardly oriented storage having an interior space for storing height-wise returnable items .

[0013] The upwardly oriented storage is suitable for storing in a substantially upwards filling direction returnable objects or items, particularly returnable containers like bottles, cans and the like, preferably such that are made from plastic, glass or metallic material.

[0014] Examples of the storage space part of the storage facility will be further disclosed in the detailed part of the description.

[0015] More specifically, the present invention relates to a conveyor means which is described inter alia for use with a facility for receiving returnable items.

[0016] Such conveyor means is useful for receiving and sorting returnable items, and in the context of the present invention preferably for delivering returnable items for storing in a storage facility, and it has been the purpose of the present invention to provide for a very compact conveyor means for such use.

[0017] The characteristic features of the conveyor means appear from the independent claim 1.

[0018] Further advantageous embodiments of a plunger type of conveyor means according to claim 1 are recited in the attached dependent patent claims 2 - 18.

[0019] The conveyor means as defined are particularly suitable for feeding returnable objects or items, particularly returnable containers like bottles, cans and the like, preferably made from plastic, glass or metallic material to a vertically or upwardly oriented storage for storing returnable objects or items in a substantially upwards filling direction.

[0020] More specifically, the conveyor means is adapted to handle, sort and convey returnable items or objects, and for feeding such items or objects into the substantially vertically or upwardly oriented storage space, without employing a vertical conveyor for filling the storage space.

[0021] In recognition of the necessity to be able to view and recognize characteristic features

of an object, the disclosure of present invention describes a device for enabling camera viewing of characteristic features of an object in order to subsequently enable processing of signals related to viewed features.

[0022] In a reverse vending machine (RVM), it is conventional to view and recognize shape of the object at one location in the RVM and to recognize other identifiable characteristic features such as indicia, barcode etc. at another location. If e.g. a barcode is not directly visible to a barcode reader, the object must be rotated until the barcode becomes visible and can be read by the reader.

[0023] It is a well known fact that in order to be able to detect both contour of the object and read indicia or identifying features located on the object, including object rotation to find and read identifying features, multiple and separate operating units need to be provided, thus requiring extra space within the RVM to carry out the operations. If there is in addition the requirement of a sorting function, additional challenges arise as regards available space. Said EP publications EP1311448 and 1313656 disclose, with reference to an RVM for beverage container such as bottles and cans, the provisions of contour detection, barcode reading and beverage container sorting. Contour detection and sorting is made by one operating unit (see EP 1313656), and a further operating unit (EP1311448) provides for beverage container rotation to find a barcode and barcode reading.

[0024] US 5 934 440 discloses a device with a detection station for reading barcode, rotation of the object such as e.g. a bottle to locate a barcode not immediately visible, as well as a sorting function. However, the possibility of detecting an object contour at such station is not available and needs to be performed by a separate station suitably located upstream, as disclosed in said patent.

[0025] It has therefore been a long felt need to provide for a technical solution which yields a more compact, yet simple and cost-effective arrangement and with the possibility of both detection of contour and identifying features located on the object, as well as a sorting function and other optional functions.

[0026] In the following, the conveyor means of present invention will be explained by way of examples and by reference to the accompanying drawings, wherein the same reference numerals indicate the same elements, although as regards some elements, different reference numerals have been used for elements having same properties of functioning and for practical reasons.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] In the drawings:

fig. **1a** shows in a perspective view, an exemplary mode of a reverse vending machine with

object storage chamber; object supporting, rotating, sorting and conveyor means; camera-aided detector device; supplementary item/ object collector means; token dispenser; token reader; safety apparatus; and drive means,

figs. **1b** and **1c** show the object rotating, sorting and conveyor means with its longitudinal axis tilted relative to the horizontal,

fig. 2a shows an example of an essentially upwardly oriented storage or storage chamber,

figs. **2b** and **2c** show the essentially upwardly oriented storage or storage chamber of fig. **2a** in association with a compactor.

fig. **3** is a further a principle drawing of a storage space or chamber for a storage facility,

fig. **4** is a principle drawing showing an example of an expandable storage chamber for a storage facility,

fig. **5** is a principle drawing showing an example of an expandable storage chamber for a storage facility,

fig. **6** is a principle drawing showing an exemplary layout of a storage facility having multiple storage chambers,

fig. **7** is a principle drawing showing an exemplary possible layout of a storage facility having multiple storage chambers and a drum type conveyor unit,

fig. **8** is a principle drawing showing a possible layout of a storage facility having multiple storage chambers, a conveying and sorting means, and means for reading information from, or detecting the type of, returnable item or object being positioned in an input receiving area,

fig. 9 is a principle drawing of a first embodiment of a conveyor having a moveable plunger in a stationary housing and useful for a storage facility,

fig. **10** is a principle drawing of the conveyor of fig. 9 in a different operational state,

fig. 11 is a principle drawing of a second and modified embodiment of the conveyor of figs. 9 and 10,

fig. **12** is a schematic side view of the conveyor of figure 11,

fig. **13** is a principle drawing of the conveyor of figs. 9 - 12 to illustrate rotation of a returnable item received in the input receiving area of the conveyor,

fig. **14** is a principle sketch of a first example of a camera-aided viewing device for viewing an object with regard to contour of the object and identifying features or indicia on the object,

fig. **15** is a principle, though slightly more detailed sketch of the first example of the camera-aided viewing device showing in more detail a first object supporting, rotation, sorting and conveying means,

fig. **16** is a principle sketch of a second example of the camera-aided viewing device,

fig. **2817** is a principle sketch of a third example of the camera-aided viewing device,

fig. **18** is a principle sketch of a fourth example of the camera-aided viewing device,

fig. **19** is a principle sketch of a fifth example of the camera-aided viewing device,

fig. **20** is a principle sketch of a sixth example of the camera-aided viewing device,

fig. **21** is a principle sketch of a second object supporting, rotation, sorting and conveying means,

fig. **22** is a block schematic diagram of electrically or electronically operative elements in a system incorporating the invention,

fig. **23** shows in a perspective view a reverse vending machine with object storage chamber; object supporting, rotating, sorting and conveyor means; item collector means; token dispenser; token reader; and drive means,

SPECIFIC DESCRIPTION

RVM overview

[0028] Fig. **1a** illustrates in an example a reverse vending machine (RVM) **1** embodying main inventive aspects of the present invention, i.e. object storage chamber **2;** object supporting, rotating, sorting and conveyor unit **3;** camera-aided detector device **4;** supplementary item/ object collector means **5;** token dispenser **6;** token reader **7,** safety apparatus **8,** and drive means **9; 9'. T**he unit **3** (later denoted as **200)** could have to have its longitudinal axis **3'** horizontal or forming an angle α with the horizontal, yielding angle **β** in the range ± 0° - 30°, as indicated on figs. **1b** and **1c.** In the more detailed disclosure to follow, the operational means **2-9** just mentioned will for practical reasons be denoted by other reference numerals. Direction is also made to fig. **12** showing the figure of fig. **1a,** however with more reference numerals inserted to identify location of some of the various operational means which are extensively disclosed in the disclosure to follow in connection with figs. **2-11.**

Upwardly Oriented Storage

[0029] With reference to fig. **2a** showing a principle drawing of a storage chamber according to the present invention, certain features relating to the storage chamber and the principles of the invention will now be explained. In an example, the storage chamber has an elongated and

vertically oriented shape, with bottom and side walls, wherein the side walls are spaced apart, preferably sufficiently to allow for a side-by-side storage of a plurality of returnable items. The storage chamber has an in-feed opening in the lower part of the chamber, preferably arranged in one of the side walls, and feeding of the storage is obtained by driving returnable objects or items to be stored in the chamber into the storage chamber through the in-feed opening. By properly selecting the force by which the objects or items are driven into the storage chamber, and preferably by applying a forced pushing or thrust mode drive, objects/ items already positioned in the storage chamber will be driven away from the in-feed opening and into the interior or back of the chamber until the chamber has been filled to the level at which the in-feed opening is located, and thereafter driven upwards by further objects/items being driven into the chamber.

[0030] In the illustration of fig. **2a,** the storage chamber **100** is provided with a bottom part **120** and a side wall **130, 131 or 132,** respectively, and an upper part **150.** An in-feed opening **140** is located in the lower part of one of the side walls. To allow the storage space **110** to be safely emptied into removable transport container (not shown), e.g. a large box, for removal of returnable items **10** collected in the storage space or chamber **110,** the bottom **120** can be made movable or removable, or one of the side walls **130** can be made movable such that items stored in the chamber or space **110** can be removed therefrom. As the chamber is being filled by returnable objects/ items **10,** it can be expected that the force applied to drive additional objects/ items **10** into the storage through the in-feed opening **140** may give rise to some tension in the items already in the storage, due to other forces such as from friction or the weight of the stored items **10.** Tension or friction may typically result in problems when trying to empty a filled storage space, for which reason a movable interior wall **132** is proposed, such that, in the case where the bottom part **120** is adapted to be opened to empty the storage space, the interior wall **132** may be moved in a direction away from the items **10** already located in the storage room. Thus, the tension is relieved and friction is reduced. This will allow for easy emptying of the storage. As the storage room becomes filled above the input opening, there is a risk that objects/items already positioned in the storage space may flow back through the in-feed or inlet opening. To stop such possible back-flow, a back-flow blocking arrangement **170** is preferably provided in the area of the in-feed opening.

[0031] The storage space exhibits a width dimension **111** being a multiple of the width dimension **11** of a returnable item for storage in said upwardly oriented storage, whereby a plurality of returnable items can be accommodated substantially or at least in part side by side in the interior space.

[0032] On fig. **2a,** a conveyor **200** for feeding items into the storage **100** is shown. Exemplary embodiments of such conveyor will be described with particular reference to figs. **7-11.**

[0033] Although fig. **2a** illustrates a theoretical side-by-side stacking of returned items 10 lowermost inside the storage, practical tests have proved that the items in fact may be lying at least partly in a "criss-cross" manner, as indicated higher in the storage chamber. Thus, in general at least a partly "criss-cross" stacking will be present throughout the stacking in the

chamber.

[0034] Fig. 2b illustrates the use of an item or object compactor device **290** between the conveyor **200** and the storage **100.** The compactor device **290** could be of any suitable type. In an example it could be in the form of a set of spike-provided chains in a wedge-like arrangement in order to provide gradually flattened and punctured returnable items. The use of a set of flattening rollers acting as a compactor device could also be envisaged, as well as other types of well-known compactors.

[0035] Although the conveyor **200** is included upstream of the compactor **290** on fig. **2b,** it will be appreciated that in an example the storage **100** and the compactor **290** could be able to work without the use of the conveyor **200.** In an alternative, as generally indicated on fig. **2c,** a conveyor could be included, as indicated on fig. **2b,** or the conveyor needs not to be provided, or it could be operationally integrated with the compactor unit, the integrated unit being labeled **291.**

[0036] The compactor device **290** of **fig.2b** indicates that it receives returnable items with the longitudinal axis of the item **10** in question transverse to the in-feed direction. The compactor device **291** shown on fig. **2c,** is suitably of a type capable of receiving the returnable item **10** with its longitudinal axis in the in-feed direction. This implies however that the transverse dimension **111** of the storage should preferably be a dimension **11'** related to the compacted item **10'** which exceeds at least a maximum longitudinal extent **11"** of an item **10** to be compacted.

[0037] It will be noted that when items are fed into the storage **100,** after compaction, the orientation of the compacted items will be rather arbitrary or highly in a "criss-cross" fashion, irrespective of whether the items where fed into the compactor in a transverse or longitudinal direction.

[0038] Now, with reference to fig. **3,** an alternative storage chamber in-feed arrangement is explained. In the principle shown in fig. **3,** when compared with the principle shown in fig. **2a -2c,** the in-feed opening **140** is no longer positioned in a side wall, but rather in a bottom part **122** of the storage chamber **100.** By this arrangement, items **10** to be stored will be provided with an upwardly directed movement or drive force component as a result of the in part upwardly directed drive component applied to drive items into the storage space. Similarly to what is shown in figs. **2a - 2c,** there may be provided several options for removing items stored in the storage space, such as by a movable or removable bottom part **121,** or by a side wall arrangement as shown by **130, 131** or **132** in figs. **2a -2c.** The storage chamber illustrated is adaptable to handle an overflow of stored items **10** by being provided with an overflow opening **160** through which excess object/ items due to an overfilling of the storage space may exit from the storage chamber **110** and thereby relieve the storage chamber **110** from possible additional stress, as may result from further filling of the chamber by additional items **10** when the chamber has reached a point of maximum filling.

[0039] Fig. **4** illustrates in principle an expandable storage chamber for a storage facility. The storage chamber may have any type of in-feed opening in its lower part as illustrated by figs. **2a** - **2c** or **3** and is made expandable by a movable top section **151.** Advantageously, by making the movable top section **151** from a light weight material, the driving force applied to a returnable object/ item that enters the storage space through the in-feed opening will be sufficient to move the top section in an upward direction to allow an expansion of the storage chamber. The upward movement of the top section **151** can also be facilitated by mechanical, electrical, hydraulic or pneumatic means, to mention a few, such that the driving force applied to an object or item **10** that enters the storage space can be kept at a level that is independent of the design of or materials selected for the top section.

[0040] Fig. **5** illustrates the principle of another alternative for providing an expandable storage chamber, wherein the upper part **150** comprises flexible members that by an upwards movement of the upper part and the connected flexible members **152** will provide an increase of the storage space as the storage fills with returned items. Advantageously, as explained above with reference to fig. **4,** the top section and flexible members preferably are made from light weight material, such that the upward movement required for expanding the storage chamber may be facilitated by the force applied when driving an element into the storage space through the input in-feed opening. A vertical movement of the upper section and the flexible members **152** can be provided by other means, such as electrical, mechanical, hydraulic or pneumatic, to mention a few.

[0041] Reference is now made to fig. **6,** which provides an illustration of a possible layout having multiple storage chambers. The exemplary storage facility illustrated in fig. **6,** comprises as many as three storage chambers **110, 112** and **114,** respectively, each having a respective in-feed opening positioned for being in communication with a conveyor **200** being capable of receiving an item in an input receiving area **110** and conveying the received item **10** to a selected one of in-feed openings **141, 142** and **143** (see also reference numerals **263, 264** and **265** with respect to the examples of figs. **7 - 11**) of the storage chambers **110, 112** and 114, respectively. The storage chamber **110** is provided with a cooperating supplementary storage space **161** in communication with the first storage chamber **110** by overflow openings **160** in the upper part of adjacent side walls. Storage chambers **110** and **112** have respective in-feed openings **141** and **142** located in respective side walls in their lowermost parts, and are dimensioned appropriately to provide a filling of the respective chamber in an upwardly direction when the appropriate item is driven into the chamber through the respective in-feed opening. In the example of fig. **6,** storage chamber **110** has been provided with a deflector **180** located inside the chamber and at an appropriate distance from the in-feed opening **141** to provide an upwardly directed force component to objects/ items being driven or forced into the storage space in a specific direction, although the driving force may already have an upwardly directed drive component. Thus, the upwardly directed drive forces exerted on the item **10** as it enters the chamber may become more consistent, and also less dependent on the shape and nature of other items **10** already located in the storage. Advantageously, the deflector can be moveable, such as by being tiltable or even removable, to allow easy and complete removal of all items held in the storage chamber when the storage chamber is to be emptied.

[0042] Fig. **7** shows a simplified variant of the layout depicted in fig. **6,** and with a conveyor of a drum type that provides a highly compact facility for receiving, transporting, sorting and storage of returnable items. The arrangement shown in fig. **7** is capable of sorting, conveying and storing large quantities of returnable items while requiring a very small floor space, by employing the compact conveyor and sorter **200** and the vertically oriented storage system of the present invention. Thus, the need for use of a separate lifting arrangement to fill from a low level a tall storage space is being eliminated, such that in an example the storage chamber may extend from any level and up to a ceiling above as desired, which is highly beneficial in a small business environment, like in a convenience store or a gas station, where available floor space typically is quite limited. The fig. **7** example provides for the additional storage or item collector **114** below the conveyor and sorter **200.** In the case of receiving returnable items like bottles and cans, glass bottles could e.g. be dropped by gravity into the collector **114** when the conveyor and sorter **200** has brought such a type of item to be just above a receiving opening of the collector **114.**

[0043] Fig. **8** illustrates a highly compact drum based conveyor with as many as three different storage chambers, denoted by **110, 112** and **114,** for storing different types of returnable items **10.** The conveyor **200** is adapted to receive items **10** in an input receiving area **210,** and to move and output the item, based on certain criteria and a decision made by a controller that operates a drum drive unit, at either a first output **224** for driving the item into a storage space **110,** or to a second output, which is either the second output **226** for driving a received item **10** into the related storage chamber **112,** or the second output **226'** for, in this particular example, allowing also gravity to assist in moving the item **10** from the conveyor to the related storage space **114.** The storage space **114** is particularly useful for items to which a relatively high driving force should not be applied, such as for example fragile glass items or heavy items, such as bottles that carry significant amounts of liquid contents, or for other reasons are found unsuitable for being driven into one of the upright storage spaces **110** or **112** for elevated storing above the level of the input receiving area.

[0044] Although three storage chambers **110, 112** and **114** are shown on fig. **8,** in an example with a rotary conveyor and sorter as depicted, only two storage chambers will be used e.g. **110, 112; 110, 114;** or **112,114** with the related outputs **224, 226; 224, 226';** or **226; 226'.**

[0045] In the layout of fig. **8,** the storage chamber **110** is provided with an overflow opening that provides communication to a supplementary storage chamber **161.** The facility layout shown provides a highly compact design, augmented by the use of the compact drum type conveyor means. For a person who is to deposit a returnable object/ item at the facility, there is conveniently an input receiving area **210** located as shown in the lower half of the facility. The facility includes a returnable object/ item recognition unit **20,** which can include, or be connected with a controller for controlling the operation of the conveyor **200.** The recognition unit **20** can be of an optical or acoustic type, or employ other or supplementary technology, such as magnetic, mechanical or electrical sensing to determine the type of returnable object/ item **10** that has been placed in the input receiving area **210,** or to read information or

identifying features (e.g. bar-code) carried by, or located on, the item **10.** An example of a recognition unit is further disclosed in connection with figs. **25 - 42,** and **46.** In particular, with regard to the storage chambers **110; 112,** by employing a movable side wall **130; 132** or a removable storage chamber **114,** the storage chamber **114** can be extended to fill the unused space shown to appear below the first storage chamber **110.** To facilitate easier filling of the upright oriented storage chambers **110** and **112,** a deflector **180,** such as is shown in fig. **6,** can also be included.

Plunger-type conveyor means

[0046] In the following, a piston-like moveable plunger in a stationary housing-type of conveyor part of the present invention will be explained.

[0047] Reference is first made to fig. **7,** which in principle shows a first embodiment of a substantially linearly moveable plunger in a stationary housing type conveyor, as comprising an elongated housing **260** with an input opening **262** on one side adapted to face the input receiving area **210** of the storage facility, an interior space **261,** a substantially linearly movable plunger or slide member **270,** a first output **263** and a second output **264.** Although exemplified here with a housing based on a straightforward design for a rectilinear movement of the plunger, the housing may be designed to be curved in any direction to allow an output in an arbitrarily chosen angle. With a housing having a curved shape, naturally, the plunger would follow a curved path corresponding to the shape of the housing. Also shown in fig. **7,** is an elongated slot **272** in one side of the housing, which is provided as an access means for allowing a plunger drive means (not shown) to be attached to the plunger **270** for positioning of the plunger in different parts of the interior space **261.** Such a slot can be provided at any longitudinally extending side of the housing, and also at more than one side to provide a balanced drive force to the plunger. In fig. **20** is also shown a returnable object/ item **10** which has been positioned in the input receiving area, and which by the aid of gravity and the provision of the input opening **262** will fall into the interior space **261** of the housing, and thereby become located adjacent to the plunger **270** when the plunger initially has been positioned in a first position which is below the opening **262.**

[0048] In a preferred embodiment of the conveyor and sorter of the present invention, as shown on figs. **7** and **8,** embodying the moveable plunger in a stationary housing type conveyor, the conveyor suitably includes an item turning device, preferably using at least one roller **273or** preferably two rollers **273, 273'** if two outputs **263, 264** are two be used. The device is located adjacent the input opening **262.** The upper side face **271** of the plunger, i.e. the side of the plunger that will be facing the input opening **262,** has a surface structure that is specially prepared to provide good friction against a returnable object/ item **10** that has been deposited in the input receiving area and brought to rest on the upper side face **271** of the plunger. A rotation of the object/ item **10** that rests on the upper side face **271** of the plunger **270** is then obtainable by movement of the plunger **270** while the object/ item **10** is resting on top of the plunger **270,** which rotation is further augmented by the rollers **273, 273'.** The rollers

273, 273' also cause the object/ item **10** to not move away from the opening **262** while rotated or if the longitudinal axis **260'(see** figs. **8** and **10)** of the housing forms an angle with the horizontal. The upper side face **271** of the plunger **270** can be extended in any direction of movement of the plunger **270,** to obtain a desired range of turning of the item 10 that rests on the upper side face **271** of the plunger **270.** Although just one roller **273** may suffice, a preferred embodiment of the plunger type conveyor and sorter has two rollers **273, 273',** one at each side of the input opening **262,** to facilitate rotation of the item **10** in any direction in connection with a movement of the plunger **270** in the longitudinal direction of the housing **260.** The rollers are rotatably supported at each end by mountings **275.** The rollers **273; 273'can** be freely rotatable, or they can be driven by a driver arrangement **274** by way of a separate drive means or by a linkage to the plunger **270** or the driver for the plunger. Preferably, but not necessarily, the drive means **274; 274',** e.g. a motor inside the roller, is arranged such that a surface velocity of the roller **273** during its rotation is about the same as the surface velocity of the upper face **271** of the plunger **270,** relative to the housing **260** as the plunger **270** is moved in the housing **260.** In order to obtain a measure for the mass of a returnable object/ item **10** resting on the plunger **270,** any roller arrangement **273** can include a load cell **276** suitably supporting the roller at one end thereof in order to measure a reaction force exerted on the roller as a function of an acceleration or turning of the object/ item **10** due to movement of the plunger **270,** or a reaction force due to the weight of the item **10,** in particular if longitudinal axis of the housing **260** is made to tilt, e,g. in the range of ± 0° - 30° relative to the horizontal..

[0049] In a next step of operation of the linear movement type conveyor, when the upper face **271** of the plunger has moved away from the opening **262** either towards output **263** or **264,** the returnable object/ item **10** will enter into the interior space **261,** the plunger **270** will then upon movement in an opposite direction apply a driving force to the object/ item **10** to drive it towards and through e.g. the first output **263** if the plunger at first had moved away from the opening **262** towards output **264,** or towards and through e.g. the second output **264** if the plunger had at first moved away from the opening **262** towards output **263.** In either case the plunger **270** would preferably force the item , towards an in-feed opening **140** (see fig. **2a)** or an in-feed opening **141** or **142** (see fig. **6)** of a storage chamber of a storage facility as disclosed herein.

[0050] Now, with reference to figs. **9,** a further variant of the conveyor and sorter of the type having the moveable plunger in a stationary housing will be explained, this embodiment exhibiting three outputs. In this variant, at least three positions for the plunger element in the housing are defined, namely with the plunger positioned immediately under the input opening **262,** with the plunger positioned toward a first output **263** in the first movement direction of the plunger **270,** and a further position where the plunger has been moved near a second output **264.** For the sake of clarity, the rollers **273, 273'** have not been shown on fig. **9,** but the rollers will preferably be present in a practical embodiments. The variant shown in fig. **9** includes a third output **265** of the housing, the third output being located opposite to and below the input opening **262** in the bottom of the housing **260.** Preferably, the third output **265** includes a closing means **265'** which is shown on fig. **10,** but not on fig. **9.** The closing means **265** is capable of controllably blocking the output **265** such that an object/ item 10 that has entered

the interior space **261** of the housing **260** selectively can be kept from exiting the housing through the output **265** if the object/ item **10** is instead to be directed towards a different output, e.g. output **263** or **264.** The means **265'** for selectively closing the third output **265** can be made operational by way of a separate driver or actuator **265",** e.g. a solenoid, or by a linkage to the plunger **270,** for example by placing the output in an open state when the plunger is placed in an extreme position within the housing, such as for example in connection with a movement of the plunger beyond the position of the plunger **270** as shown in e.g. on fig. **9.** By the depositing of an object/ item **10** in the input receiving area **210** immediately above the input opening **262,** and with the third output **265** in an open state, and by locating the plunger **270** in a position where it does not block a passage provided between the input **262** and the third output **265** by the interior space **261** of the housing, the object/ item **10** is allowed to pass through the opening **262,** the interior of the housing **260** and then exit through the opening **265.** The exit of the item **10** after having traveled straight through the housing from the input **262** to the output **265** is shown in fig. **9.**

[0051] Fig. **11** illustrates how the plunger **270** may be used to rotate the object / item **10. ,** e.g. a bottle, by moving the plunger either way, the rollers **273, 273'** assisting a safe and efficient rotation of the item **10.** The understanding of fig. **11** as regards rotation of the item 10 before it enters into the interior **261** of the housing **260** will be the same, irrespective of the presence of the output **265.** In effect, the three-outputs embodiment could be made instead as a two-outputs embodiment, having e.g. outputs **263** and **264,** outputs **263** and **265** or outputs **264** and **265.**

Single Camera Viewing Device

[0052] Fig. **14** depicts a first light source **300** and a second light source **301,** the light source **301** suitably consisting of a plurality of light sub-sources **302, 303, 304, 305.** The light sources **300** and **301** are separately configured to illuminate a first region **306** and a second region **307** of an object, e.g. a returnable item **10;10';10",10'".** A single camera **308** is provided to view at least part of the regions **306** and **307.** The first light source **300** is configured to assist the camera **308** in viewing of contour of objects, items or articles **10,10',10",10'"** of different cross section , e.g. empty beverage packaging such as cans and bottles against a light reflective area or background **313** forming a bright, light emitting background. The light from the first light source **300** is directed towards the object (e,g. one of those labeled **10** through **10'"**) as parallel light using a lens **314.** The second light source **301** is configured to assist camera viewing by the camera **308** for detection and recognition of any identity features located on the object in viewing sector labeled **315.**

[0053] Said identity features are suitably at least one of: bar code, graphic symbol and alphanumeric characters.

[0054] Although it would be feasible to use two cameras instead of a single camera, the use of a single camera yields less technical complexity, a simpler and more maintenance friendly

structure, in addition to requiring less space in order to carry out the required functions. Further, from a components cost aspect and installation cost, the invention also offers a substantial advantage over a two-camera solution.

[0055] When a camera views e.g. an object contour or identifying features thereon, the camera sensor matrix provides a string of matrix pixel signals to be processed in order to identify or recognize such contour or features, including the possibility of letting the camera read and causing identification of e.g. a bar code.

[0056] As seen from figs. **14 -17,** the first light source **300** illuminates the first region **306** via a light path which includes an optical beam splitter (or view splitter) **316** (figs. **14** and **15), 318** (fig. **16)** or **319** (fig. **17),** at least one inclined mirror **320** and the lens **314**. However, it is noted that in the most preferred versions, there is suitably used two mirrors **320** and **321**, as shown on figs. **14 -16,** in the light path.

[0057] Figs. **14**, **15** and **17** depict a light beam splitter **316**; **319** located in an inclined posture in the camera field of view **322** and covers at least part of said field of view , suitably approximately half of the camera field of view. Fig. **16** depicts an optical beam splitter **318** which covers the complete camera field of view.

[0058] It is seen from figs. **14 - 17** that camera viewing of the first region **306** via one mirror **320** or two mirrors **320**, **321** is suitably made with line of sight towards the object shifted by an angle **α** of 90°± 30° relative to camera line of sight towards the object when viewing the second region **307.** In the drawing figs. **14 - 17** the angle *α* is shown as 90°. However, by arranging the mirrors **320**, **321** differently, it is evident that the angle range of 90°± 30° is possible.

[0059] In the case that there is used an optical beam splitter **316** or **319** which is within only half or less of the camera field of view, there is the possibility that when the camera is set to view the second region or part thereof, the splitter is suitably assisted by a vision blocker **323; 324** to prevent the camera from viewing both directly in the sector **315** and through the splitter, the splitter providing a less clear viewing. If the vision blocker **323; 324** is omitted, then the camera will be able to view the entire region **307.**

[0060] Fig. **16** shows the camera in a configuration set to view the second region **307** completely via the beam splitter **318.** This implies that the camera **308** views either the first region **306** via the splitter, the mirrors **321, 320** and the lens **314,** and secondly the second region **307** through the splitter. In this latter situation, the light source **301** is fully or partly activated, and the light source **300** is deactivated.

[0061] The light source **301,** suitably comprising a plurality of light sub-sources **302-305,** is notably located in a region between the beam splitter **316; 318; 319** and an object supporting means in the form of said compact conveyor and sorter **200.** In the examples shown on fig. **14,17 -19,** the object supporting means **200** is shown only schematically, but in more detail on fig. **15.** A more detailed operation of the object supporting means **200** and a possible,

schematically shown alternative on fig. **21,** is disclosed in the preceding disclosure of figs. **1 - 13.**

[0062] It will now be briefly highlighted some of the earlier disclosed features of the object supporting means **200** in a specific context of camera aided viewing of an object, e.g. the object **10,** located on the object supporting means **200,** said supporting means is in the form of the rotary drum **220** (see fig. **15)** with the auxiliary roller **243.** The drum 220and the roller **243** will controllably, but forcibly rotate the object **10** on a portion **220'** or **220"** of the circumference of the drum. The drum **220** has at least one radial inwardly directed, adjustable space or cavity **222** for receiving the object **10** after its rotation on said circumference portion and for transporting the object **10** through rotation of the drum to an output location, e.g. at generally indicated by arrows **224, 226** and **226'.** The camera **308** will be able to view and cause detection of the presence of the object 10 when it has dropped into the adjustable space **222.** This has a safety function aspect and also a security function aspect., i.e. to prevent any swindle attempt. This means that the drum **220** will not start turning until the camera **308** actually observes and causes detection of the object being present in the space **222** and with the movable element **223** operating as a movable bottom in its fully retracted state.

[0063] The direction which the drum will then turn is determined by set criteria which are compared to recognize characteristic features of the object. Further, in case the contour of the object is to be viewable from above, rather than sideways, it would be advantageous to let at least a part of the rotary drum **220** be provided with a coating which is retro-reflective to light, in particular at the portions labeled **220'** and **220"** of the drum **220.** Such a situation is in particular suitable in connection with the example shown on fig. **18** and will be further explained later.

[0064] A brief repeated disclosure is now made of the alternative supporting means as shown on figs. **9 - 13** in the context of camera aided viewing of an object **10.** The single camera is generally denoted by **308, 308',** the reference **308'** symbolizing viewing by the camera **308** via e.g. a beam splitter **318** and mirrors **321, 320** (see fig. **16).** Said supporting means is suitably in the form of the housing **260** forming a guide with an object receiving input opening **262** and a reciprocating plunger or **270** therein. There is suitably at one or both of two longitudinal sides of the opening **262** an auxiliary roller **273; 273'** for roller support upon rotation of the object or item **10; 10'; 10"; 10"'** on the plunger **270** when it is set to move with its upper surface **271** past said opening, thus enabling the camera **308** to read an identifying feature on the object or item **10** if not immediately viewable by the camera. The plunger **270** is controllable to move beyond said opening **262,** e.g. to the position shown by dotted lines **270"** to allow the object to drop into the interior of the housing **260** through said opening **262** and by return movement of the plunger **270** (towards left as shown on fig. **21)** causing the object to be pushed out of the housing to an output location **263.** From the understanding and concept depicted in connection with the supporting means **200** on fig. **15,** it is readily appreciated that the object **10** is camera observable while at a location inside said housing **260** below said opening **262,** provided that such location is in at least part of a field of view of the camera **308.** In a particular example, at least at the upper part **271** of the plunger **270** can be provided with a coating retro-reflective to

light, thus enabling the contour of the object, e.g. **10,** to be viewed from above.

[0065] Fig. **18** shows the use of a single camera **340** and with an optical beam splitter **341** inclined relative to a lens **343.** A light source **342** provides for illumination of the object, e.g. **10,** through lens **343** to provide parallel light rays towards the supporting means **200,** which has its drum parts **220'** and **220"** (see fig. **15)** provided with retro-reflective material or property enabling light not hit by the object to be retro-reflected back to camera **340** via the lens **343** and the splitter **341** to provide an image of the contour of the object. When it is desirable to view and read identifying features on the object, such as e.g. bar-code, a light source **344** is activated, the light source suitably being of the same type as the light source **301.** At the same time, light source **342** may be deactivated, if required.

[0066] Fig. **19** shows an example which in operation is similar to that of fig. **18.** A single camera **345** is used with an optical beam splitter **346** inclined relative to a lens **347.** A light source **348** provides for illumination of the object, e.g. **10,** through lens **347** to provide parallel light rays towards a light reflective background or area **313** enabling light not hit by the object to be retro-reflected back to camera **345** via the lens **347** and the splitter **346** to provide an image of the contour of the object. When it is desirable to view and read (or detect) identifying features on the object, such as e.g. bar code, a light source **349** is activated, the light source suitably being of the same type as the light source **344,** i.e. comprising a plurality of light sub-sources. At the same time the light source **349** is activated, light source **348** may be deactivated, if required. Fig. **20** is a modification of the example of fig. **19,** the major difference being the non-existence of the lens **347,** thus yielding that the object contour is not viewed by means parallel light rays.

[0067] Figs. **14 -17** clearly demonstrate that the first and second regions **306, 307** are partly overlapping, and figs. **18 - 20** indicate full overlapping.

RVM Operational System Overview

[0068] Fig. **22** depicts an overall system in which the present invention is implemented.

[0069] The reverse vending machine (RVM) has said processing and control unit **400** which receives video data from the camera **401** via a video analyzer **402.** The camera **401** is also linked to the operation unit **408,** and the operation unit includes the watchdog timer **403** and a motor control. The motor #1 and its control, denoted **404,** are related to the drive of the supporting means **325, 327,** or the unit **333** as disclosed earlier. A motor overload sensor **405** is also provided to inhibit operation of motor #1 in case of jam not detected by the operational unit **408** or a jam detector **406.** The sensor **405** could be in the form of a pressure sensitive bar, or the roller **243** could have its weight sensor **253** (in fig. **22** denoted by **419)** modified in order to also indicate pressure against the roller caused by a jam due to an object not fully located in the recess or space **222.**

[0070] The operation unit **408** is, as disclosed earlier linked with the camera **401** and the processing and control unit (processor) **400,** and in the present example the unit **408** controls the motor controls **404** and **422** directly, although such control could be via the processor **400.**

[0071] As indicated earlier, optically readable cards will normally be read by e.g. camera **401.** However, if a card is a magnetic readable/ writable card or an r.f. readable/ writable card, there will be the need of a card reader / card encoder unit **411.** The card dispenser **361** as disclosed earlier is on fig. **17** denoted by **412.**

[0072] Suitably, the tokens are ready made, pre-coded cards, like the cards 367 which are dispensable one by one from the dispenser means **369; 412 (fig.22)** and which upon the feed-out from the dispenser **412** via output **412'** is code-read by a code reader/ encoder **411,** in particular if the card is a magnetic stripe or r.f. card. Alternatively, if the card is an optically readable card, the card is read by the camera **401** via aperture **424** and inclined mirror **424'** as more closely disclosed in connection with fig. **17** (see references **365** and **368).**

[0073] If the card is a magnetic stripe card or an r.f. card and with no information on the card when it is located in the dispenser, the code reader/ encoder **411** will be able to encode the card with a card code, such as e.g. a serial number or other identity, or the combination of a card code or serial number or other identity and a redemption value to be rewarded or paid, as the cards are fed out from the dispenser one-by-one.

[0074] If the cards to be used for reward of empty beverage containers deposited in the RVM are not to be delivered from a card dispenser, such token could be a personal token which the customer brings with him to the RVM and uses to transfer card identity data from the card to the RVM. If the card is an optically readable card, it can be read by the camera **401** and as indicated further by reference **411'** when inserted into a slot (see reference **370;** fig. **15)** and viewable through an aperture (see reference **370';** fig. **15)** in the light retro-reflective area (see reference **313;** fig. **15).** If the card is an r.f. readable card, the card could be readable by an r.f. reader **411",** and if the card is a magnetic stripe readable card, the card could be readable by a magnetic stripe reader **411"'.**

[0075] The cards, irrespective of being optically readable, r.f. readable or encodable, or magnetic stripe readable or encodable, could be in the form of a reusable token, in particular because the cards are in any case validated and after reward has been paid, invalidated. The token could be retrieved from a stack or a band of cards. If a band of cards or a zig-zag arranged band of cards is used, the dispenser **369 (412** on fig. **22)** should suitably be replaced by a conventional type of dispenser for such card arrangement. Also, different type of encoder 411 may be required. In any case, the card should have at least an alphanumerical, machine readable code.

[0076] If the token is a card which is optically readable, the card should have a pre-made code thereon, suitably consisting of a bar code or other optically readable code readable by an optical reader such as the camera **401.** As indicated earlier, the bar code or other optically

readable code is preferably retro-reflective to light. Such configuration of the card makes an additional light source for viewing the code on the card superfluous. Conversely, the card could be made of a retro-reflective material and the bar code be made of a non-reflective material.

[0077] The processor **400** will either directly, or via a central computer installation **413** transfer to a rewarding or check-out and payment station **414** information related to a readable token code and information related to said return value. Transfer of information to and from the processor to the computer **413** and the station **414** is suitably via a local area network (LAN) **415.** The station **414** has a card reader **416** to read the card before reward or redemption value is paid. The card is then invalidated through use of a token invalidation means **407** associated with the station **414** or through internal operation in the unit **400** and/ or the computer **413.** In an alternative example the processor **400** communicates with a "tick-off" unit **417,** which could be in the form of a mini-computer, such as so-called PDA. This could be a solution useful for a small store, through which there is conveyed to the unit **417** from the processor displayable information such as visible card identity and sum to be paid. Upon payment of the required money, the operator ticks off the particular item displayed, which is then made void or invalid, cancelled in the unit **400** and/ or computer **413,** and suitably removed from the display on the unit **417.**

[0078] The RVM has suitably a display **418** to properly guide or inform an RVM user how to operate. If the display is a touch screen, the customer may communicate with the processor **400.** The container weight sensor **419** indicated on fig. **22** is provided to engage an end **247** of an axle **243'** (see fig. **15)** of the roller **243,** so as to spot whenever a too heavy beverage container is fed into the RVM through an opening **425** on the RVM. The term "too heavy" in this context is meant to imply that the unit **400,** upon receiving information related to shape and identity features, will compare these data with library data in the unit **400,** and thereby determine whether the object in fact should weigh less or not. This has been disclosed in more detail earlier. Also as indicated, the weight sensor could suitably form or supplement the jam sensor **405.**

[0079] An interlock-mechanism **420** is provided for safety reasons. The mechanism is suitably a set of sensors and switches to ensure that the RVM cannot be operated unless all units are in proper place and all cabinet panels are in proper mounted position and cabinet doors are locked.

[0080] A power supply **421** is provided, suitably linked to power consuming units via the unit **400.**

[0081] A motor and control unit **422** is provided to cause the volume of a collection container **426** to be adjusted by winding or unwinding a flexible side and bottom **426'.** However, although fig. **23** shows a collection container **426,** it would be understood by the average expert in the art that other operational equipment could be installed and operated instead of the collection container. Such equipment could include one or more from the group of: conveyor; pusher unit; rotation means; compactor; disintegrator; sorter means. The positioning and evidently the

configuration of such equipment in cooperation with the motor **422** could be substantially different from that of the collection container **426.** The collection container is particularly suitable for heavier objects, e.g. bottles of glass.

[0082] Reference numeral **423** in fig. **22** denotes a position sensor which is used to detect rotary positions of the drum **220,** or the plunger **270.**

[0083] The reference numeral **100** denotes generally a storage compartment for receiving objects delivered from the supporting, sorting, conveying and push-out unit **200.** The storage chamber or compartment **100,** as shown also in fig. **23** has been extensively disclosed earlier in the present disclosure, see disclosure related to figs. **1 - 13,** and figs. **2 - 8** in particular.

[0084] Modification of the various elements, means and devices related to the numerous aspects of the present invention would be conceivable within the scope of the invention as defined in the attached claims.

REFERENCES CITED IN THE DESCRIPTION

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P A T E N T K R A V

1. Transportørmiddel (200) til et anlæg til modtagelse af returvarer (10), især beholdere såsom flasker, dåser og lignende af plast, glas eller metal, og til at transportere en modtaget returvare mod et lager, hvor transportørmidlet omfatter et tildelt indgangsområde (210),

k e n d e t e g n e t ved, at

at transportørmidlet omfatter

- et langstrakt, stationært hus (260) med et stempel (270), der er indrettet til at være bevægeligt på en stempellignende måde i et indre rum (261) i huset mellem i det mindste en første position og en anden position i en længderetning af huset, hvor huset er anbragt under indgangsområdet og er forsynet med en indgangsåbning (262) i en første væg af huset (260) til tilvejebringelse af kommunikation mellem det tildelte indgangsareal og det indre rum, hvor huset, ved i det mindste én ende, har en udgang (263; 264) (263; 264), som er indrettet til at blive anbragt proksimalt til en tilførselsåbning (140; 141; 142) af et første lagerrum, og

- et stempeldrev (280) til at drive stemplet til og mellem den første og anden position i det indre rum, og ved at transportørmidlet (200) er indrettet

a) til at anbringe stemplet (270) i den første position og til at etablere en åben faldvej, der udstrækker sig fra det tildelte indgangsområde (210) via indgangsåbningen (262) og det indre rum (261), hen imod en anden væg af huset, der er beliggende modsat af den første væg, for at tillade, at en returvare (10), der er blevet anbragt i indgangsområdet (210), falder ind i og bliver modtaget i det indre rum (261), og

b) at styre stempeldrevet (280) til at drive stemplet (270) fra den første position til den anden position for at drive returvaren (10), der er modtaget i det indre rum (261), ud af huset (260), gennem udgangen (263; 264), og mod tilførselsåbningen (140; 141; 142) af det første lagerrum.

2. Transportør ifølge krav 1, hvor stempeldrevet er indrettet til at placere stemplet i en tredje position, hvori det ved sin form og positionering i det væsentlige dækker indgangsåbningen, og hvorved en returvare, som er blevet modtaget i indgangsområdet, er blokeret fra at falde igennem indgangsåbningen ved at returvaren forbliver på stemplet, når stemplet er anbragt i tredje position.

3. Transportør ifølge krav 1 eller 2, hvor stemplet er forsynet med en øvre overflade (271), der er indrettet til at vende mod indgangsåbningen, og hvor transportørmidlet omfatter et rotatormiddel (273; 273'), der er indrettet til at hjælpe med at tilvejebringe en rotation af en returvare, der forbliver på stemplet, ved en bevægelse af stemplet omkring den tredje position.

4. Transportør ifølge krav 1 - 3, der yderligere omfatter et rotatormiddeldrev (274), der er indrettet til at bevirke en bevægelse af en overflade af rotatormidlet til en overfladehastighed, der er i det væsentlige svarende til en overfladehastighed af den øvre over-

flade af stemplet, når stemplet bevæges om den tredje position.

5. Transportør ifølge krav 1 - 4, hvor rotatormidlet er én af en roterende cylinder, en roterende rulle, et rem eller en bevægelig plade.

6. Transportør ifølge krav 1 - 5, hvor rotatormidlet er roterbart båret af en understøtningsmontering (275), der er forsynet med en vejecelle (276) til bestemmelse af en masse af en returvare.

7. Transportør ifølge krav 1 - 6, hvor huset har to alternative udgange, én ved hver ende af huset.

8. Transportør ifølge krav 1 - 7, der yderligere omfatter en tredje udgang modsat til og under indgangsåbningen.

9. Transportør ifølge krav 1 - 8, hvor stemplet har en friktionsstruktur på sin øvre overflade (271).

10. Transportør ifølge et hvilket som helst af de foregående krav 1 - 9, hvor transportøren omfatter et identifikationsanlæg (20) til kontaktfri identifikation af en returvare, der er anbragt i indgangsområdet, og et styremiddel, der er forbundet med identifikationsanlægget, til styring af stemplet til at bevirke en sortering af modtagne returvarer afhængigt af deres identitet.

11. Transportør ifølge krav 10, hvor identifikationsanlægget (20) er indrettet til at anvende en energibølge, der er transmitteret fra anlægget (20), og hvor en retningsreflektor (21) er anbragt på transportøren (200) til reflektering af de transmitterede energibølger tilbage mod identifikationsanlægget, især når stemplet er anbragt i den tredje position ifølge krav 2.

12. Transportør ifølge krav 10 - 11, hvor en retningsreflektor af et anlæg til kontaktfri identifikation af en returvare, der er anbragt i indgangsområdet, er anbragt på stemplet.

13. Transportør ifølge et hvilket som helst af de foregående krav 1 - 12, hvor transportøren yderligere omfatter en returblokade (170), der er anbragt ved udgang (263) af transportøren for at forhindre en i det væsentlige returbevægelse af en returvare, der er blevet tvunget ud gennem udgangen.

14. Transportør ifølge et hvilket som helst af de foregående krav 1 - 13, hvor huset (160) ved en anden ende har en anden udgang (264), der er indrettet til at blive anbragt ved siden af en anden tilførselsåbning (142) i et andet lagerrum (112), og hvor transportøren er anbragt således, at en returvare, der er blevet modtaget i indgangsområdet, vil:

a) falde gennem indgangsåbningen (262) og ind i det indre rum (261), når stemplet (270) er anbragt i den anden position, og

b) blive tvunget ud af huset gennem den anden udgang (264) og mod den anden tilførselsåbning (142) i det andet lagerrum (113) af stemplet, når stemplet drives fra den anden position og til den første position.

15. Transportør ifølge et hvilket som helst af de foregående krav 1 - 14, hvor huset (260) er forsynet med en tredje udgang (265), som kan lukkes, og som er anbragt modsat

til og under indgangsåbningen (262), hvorved transportøren tilvejebringer en fri passage fra indgangsområdet (210) til den tredje udgang, når stemplet er anbragt i en position, som er forskellig fra den tredje position, og den tredje udgang, som kan lukkes, er i åben tilstand.

16. Transportørmiddel ifølge et hvilket som helst af kravene 1 - 15, der yderligere omfatter en returstrømningsblokade, som er anbragt proksimalt til en udgang, og som er indrettet til at tilvejebringe en returbevægelsesblokering af en returvare, som er blevet tvunget mod udgangen.

17. Transportørindretning ifølge et hvilket som helst af kravene 1 - 6, der yderligere omfatter en kompressor, som er anbragt proksimalt til en udgang.

18. Transportørindretning ifølge krav 17, hvor kompressoren er i form af et sæt dorn-forsynede kæder i et kileformet arrangement, og er indrettet til gradvist at fladgøre og punktere en returvare.

DRAWINGS

Fig. 1a.

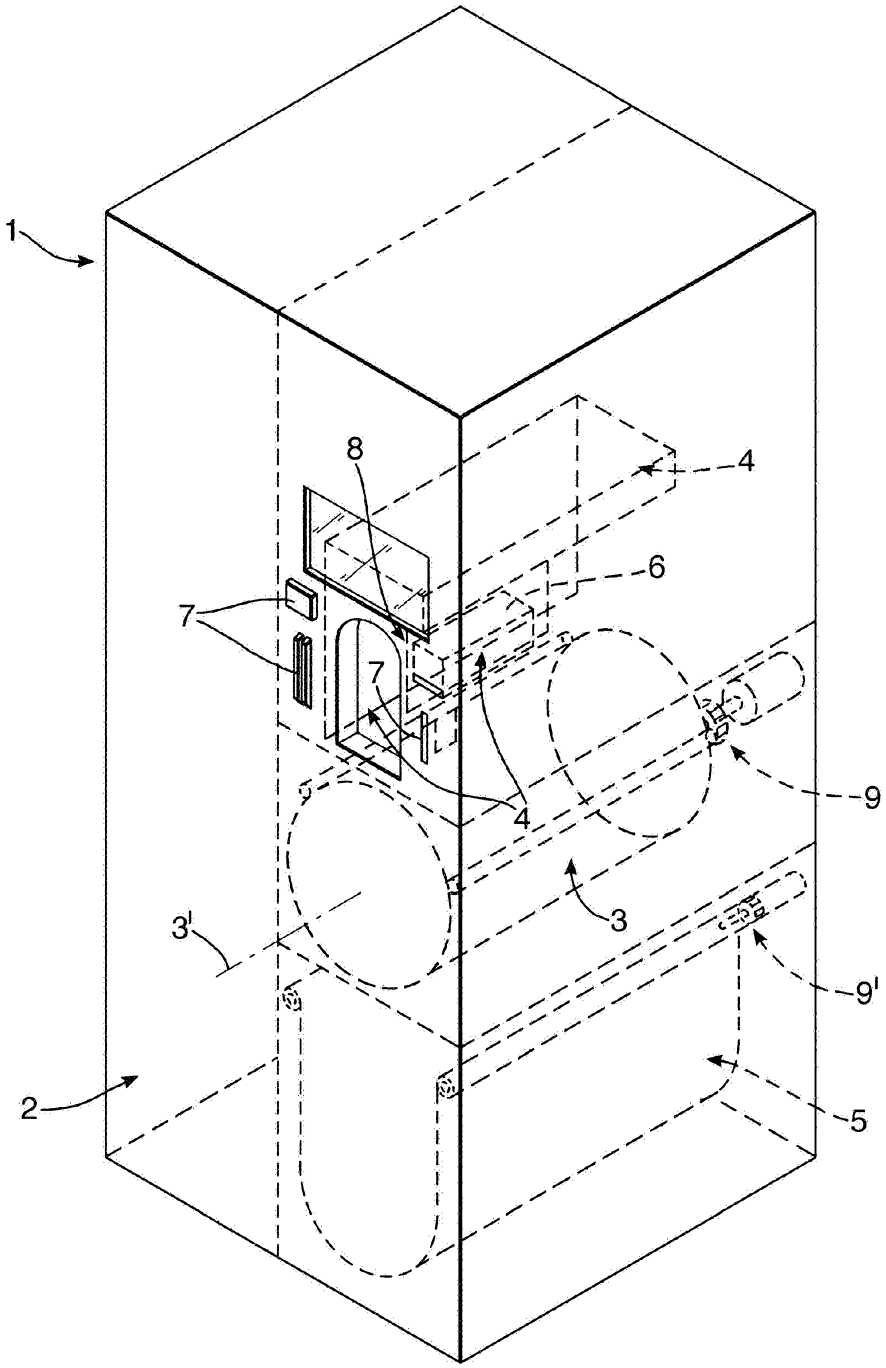


Fig. 1b.

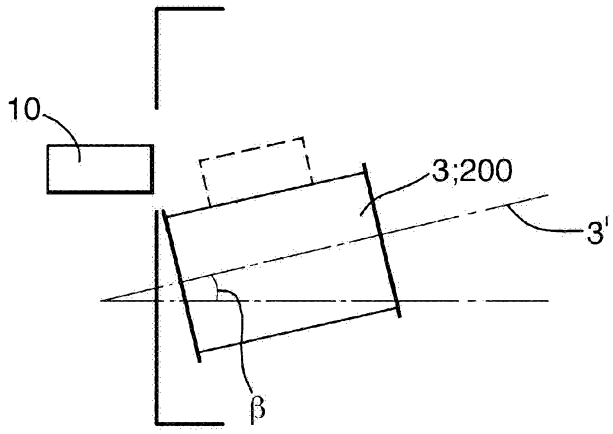


Fig. 1c.

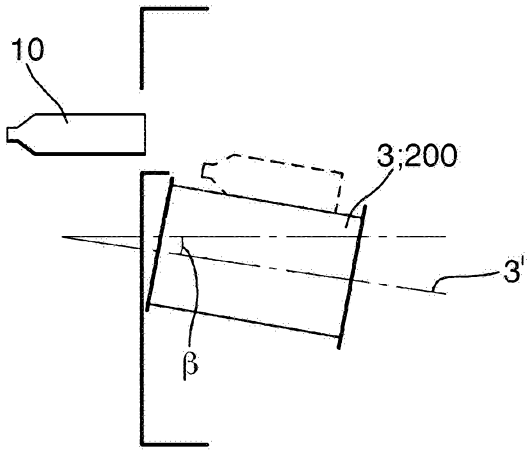


Fig. 2a.

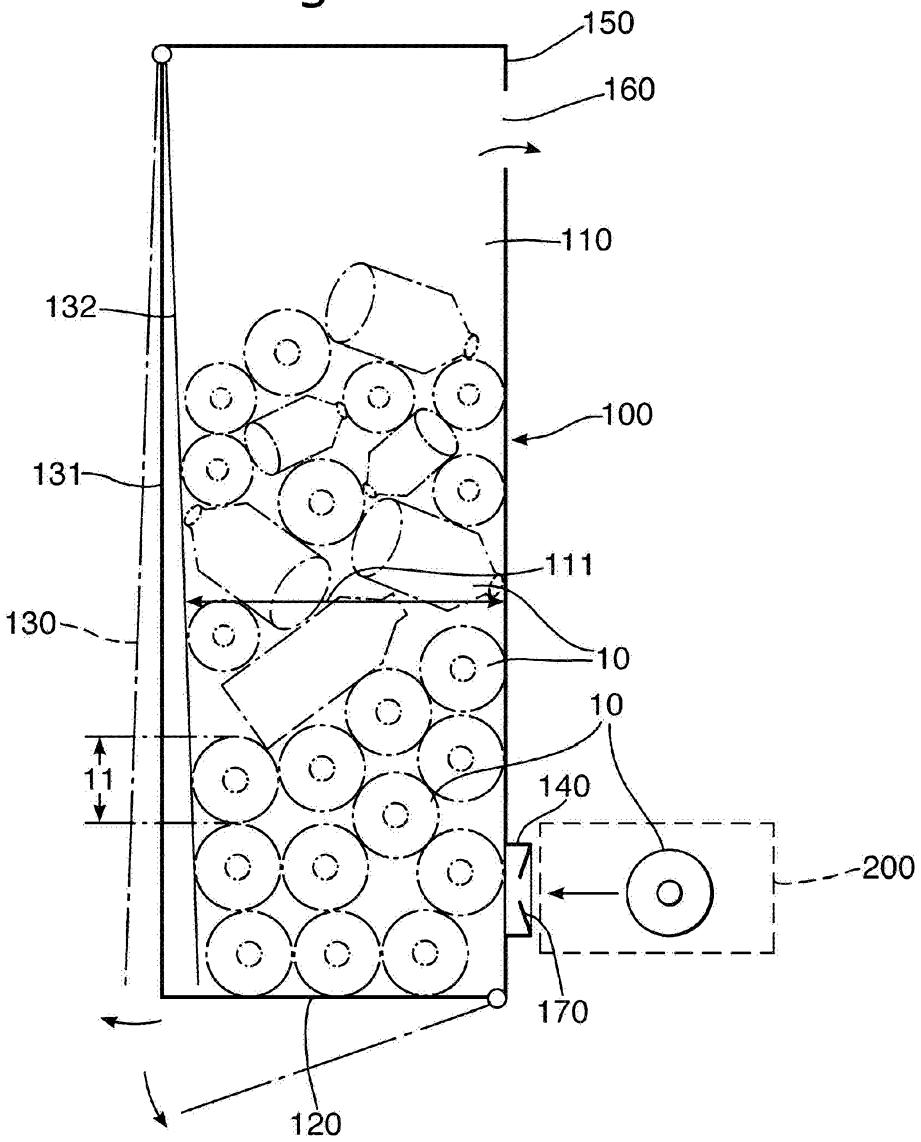


Fig. 2b.

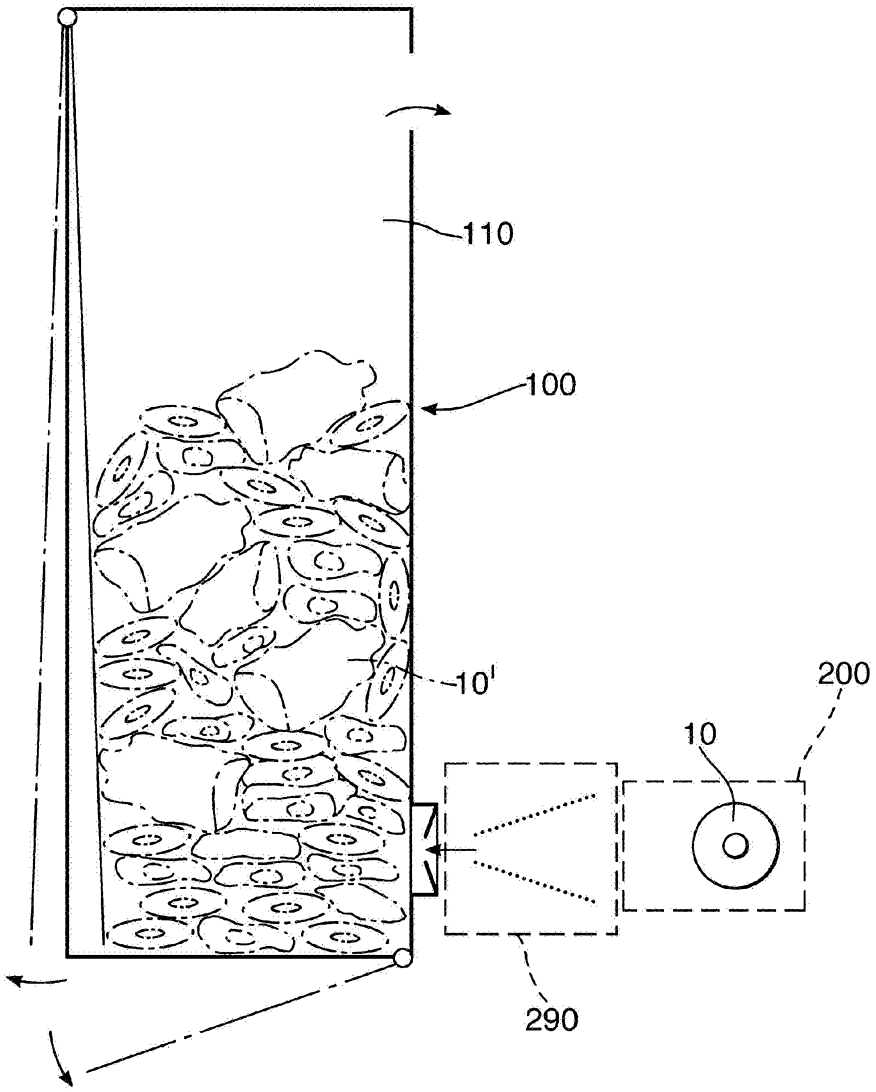


Fig. 2c.

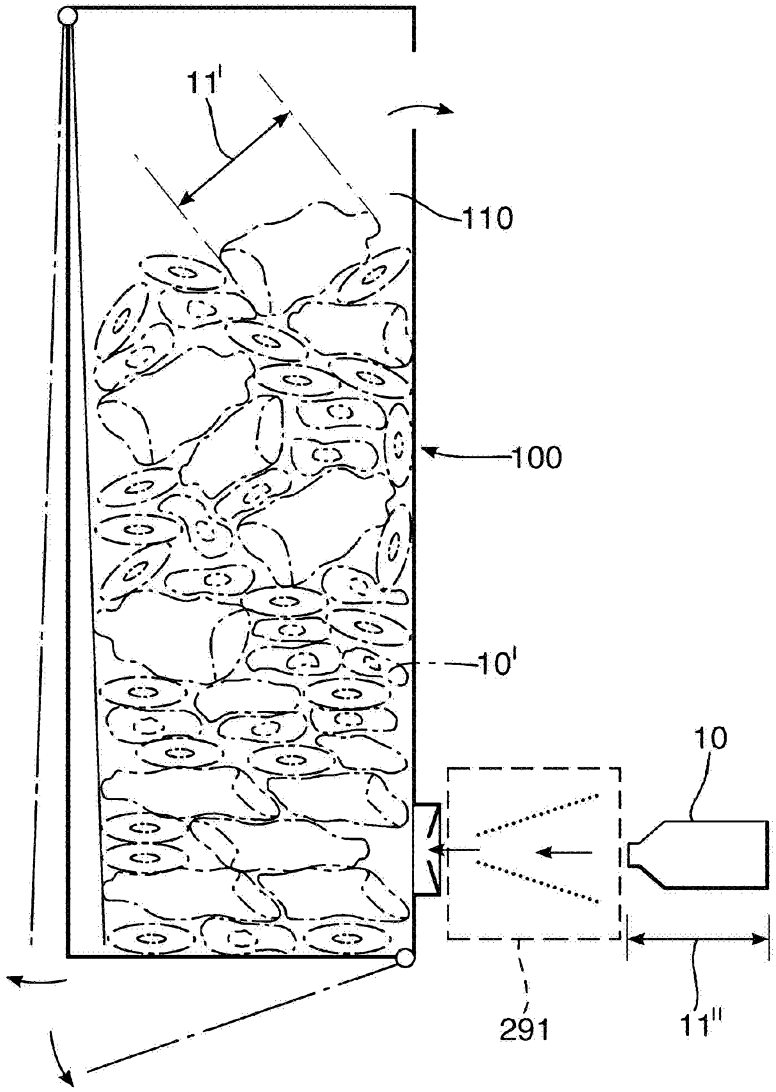
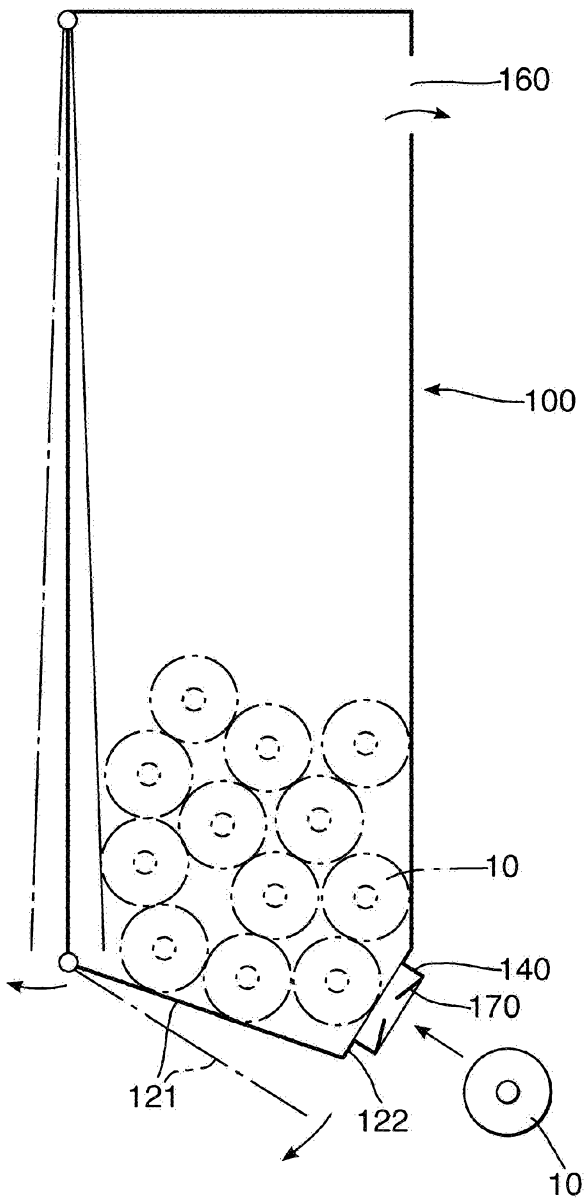


Fig. 3



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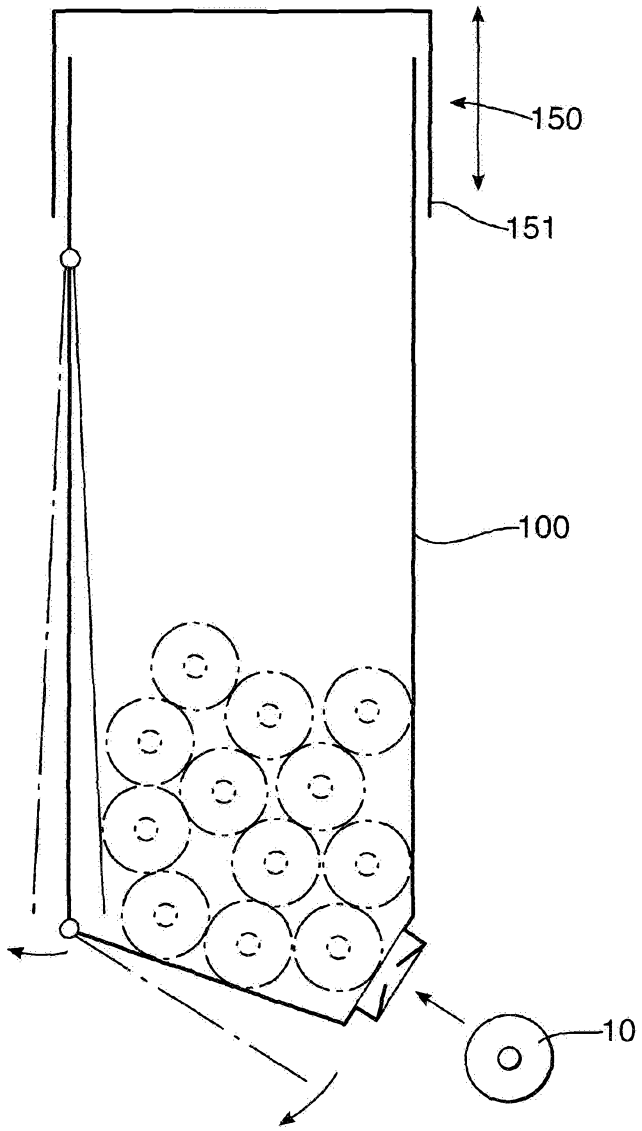
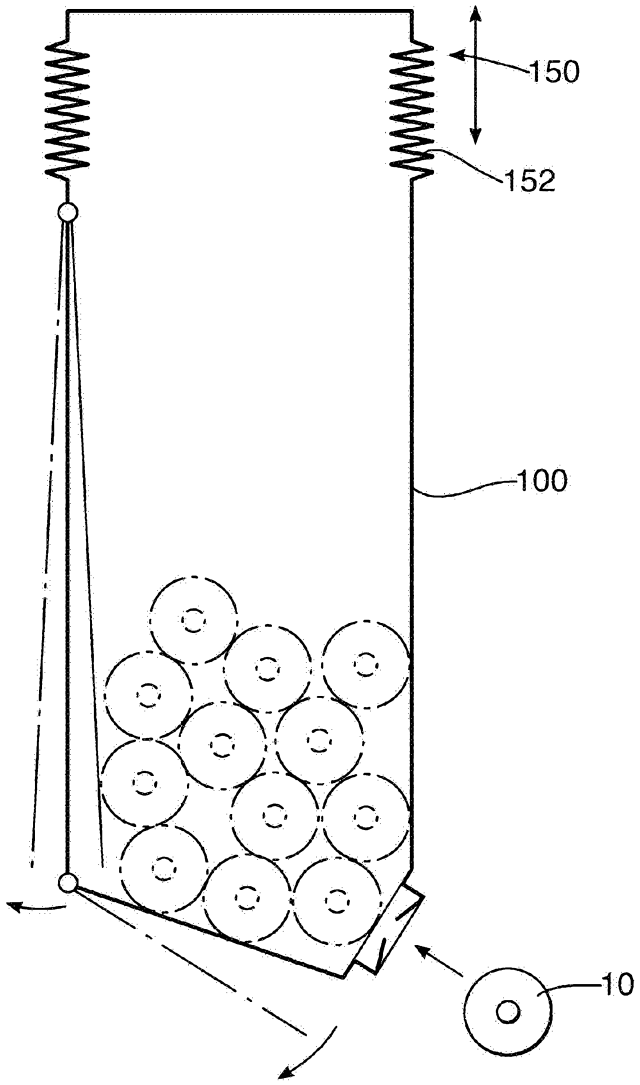


Fig. 5



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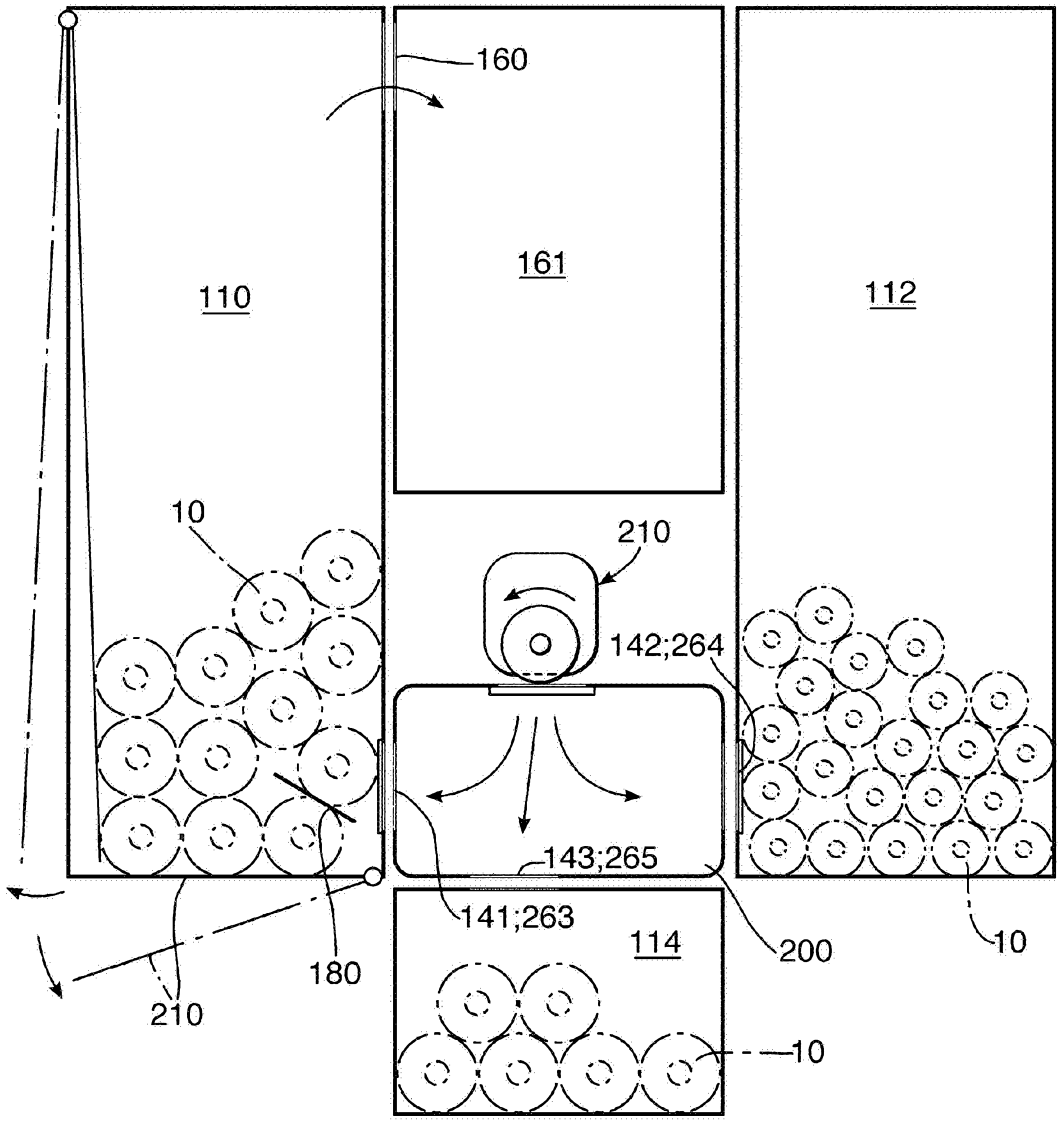
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Fig. 7

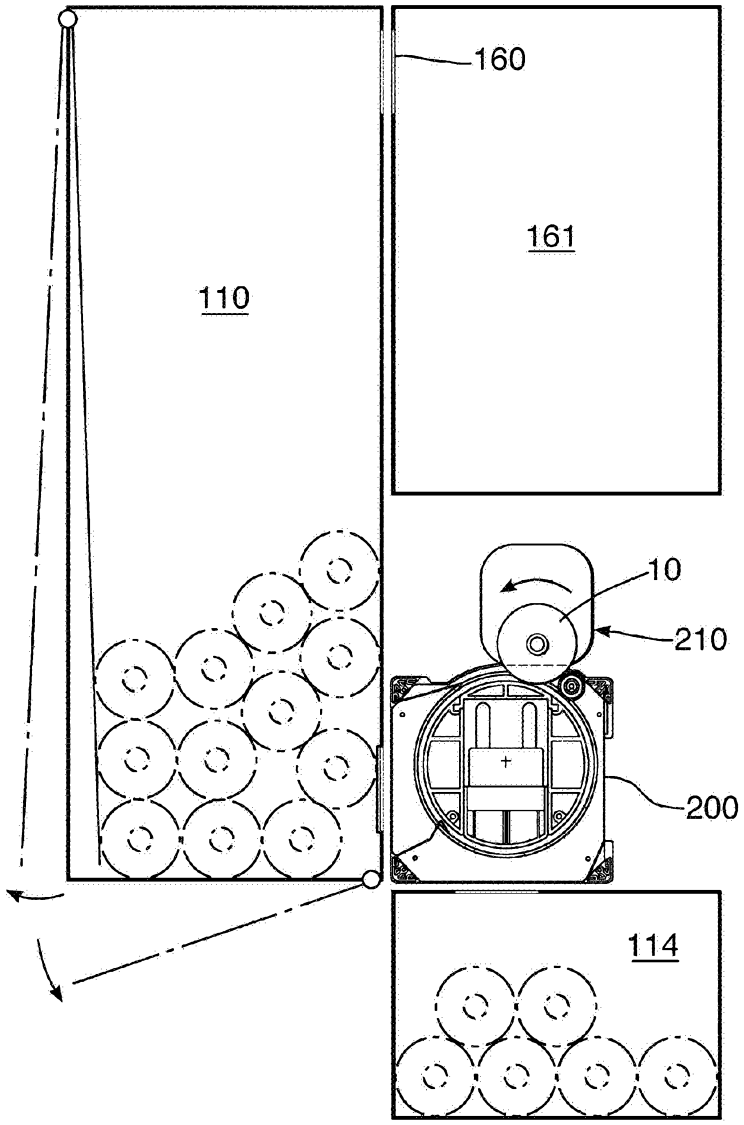
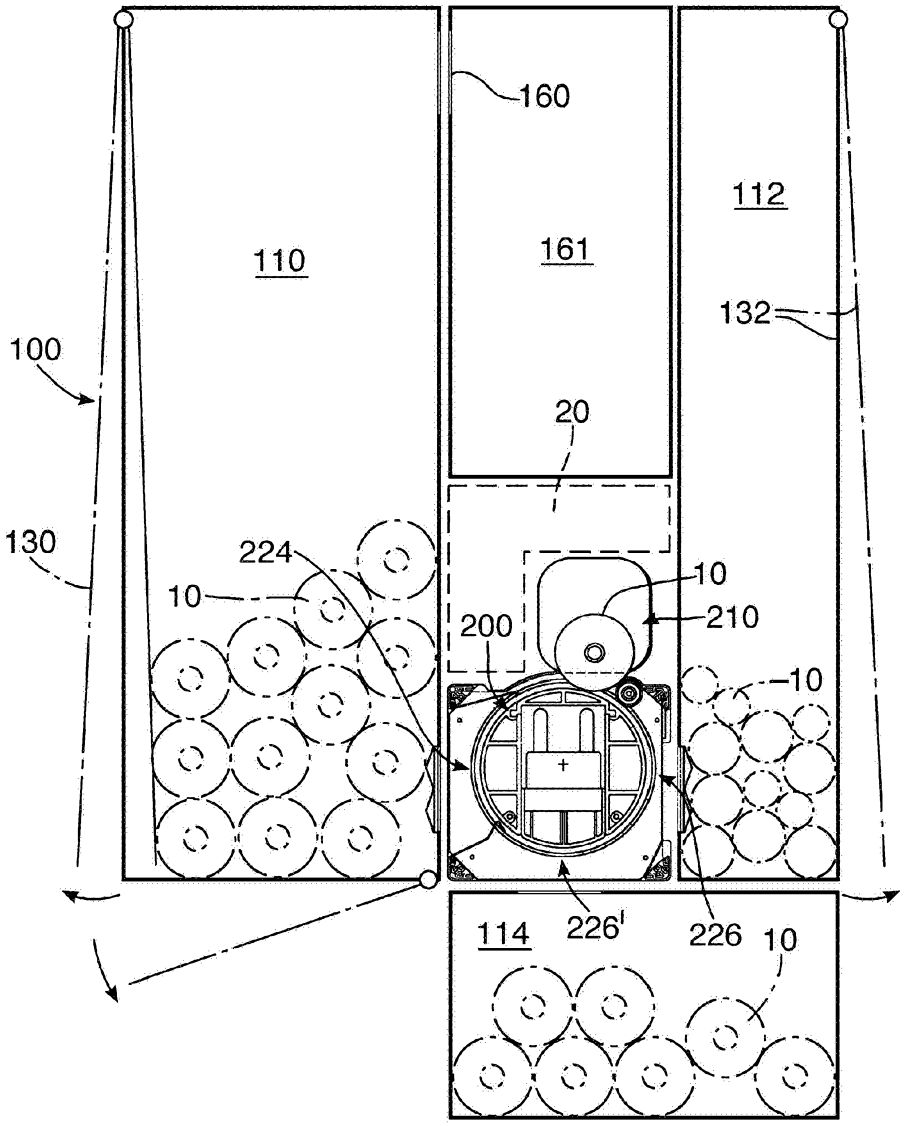


Fig. 8



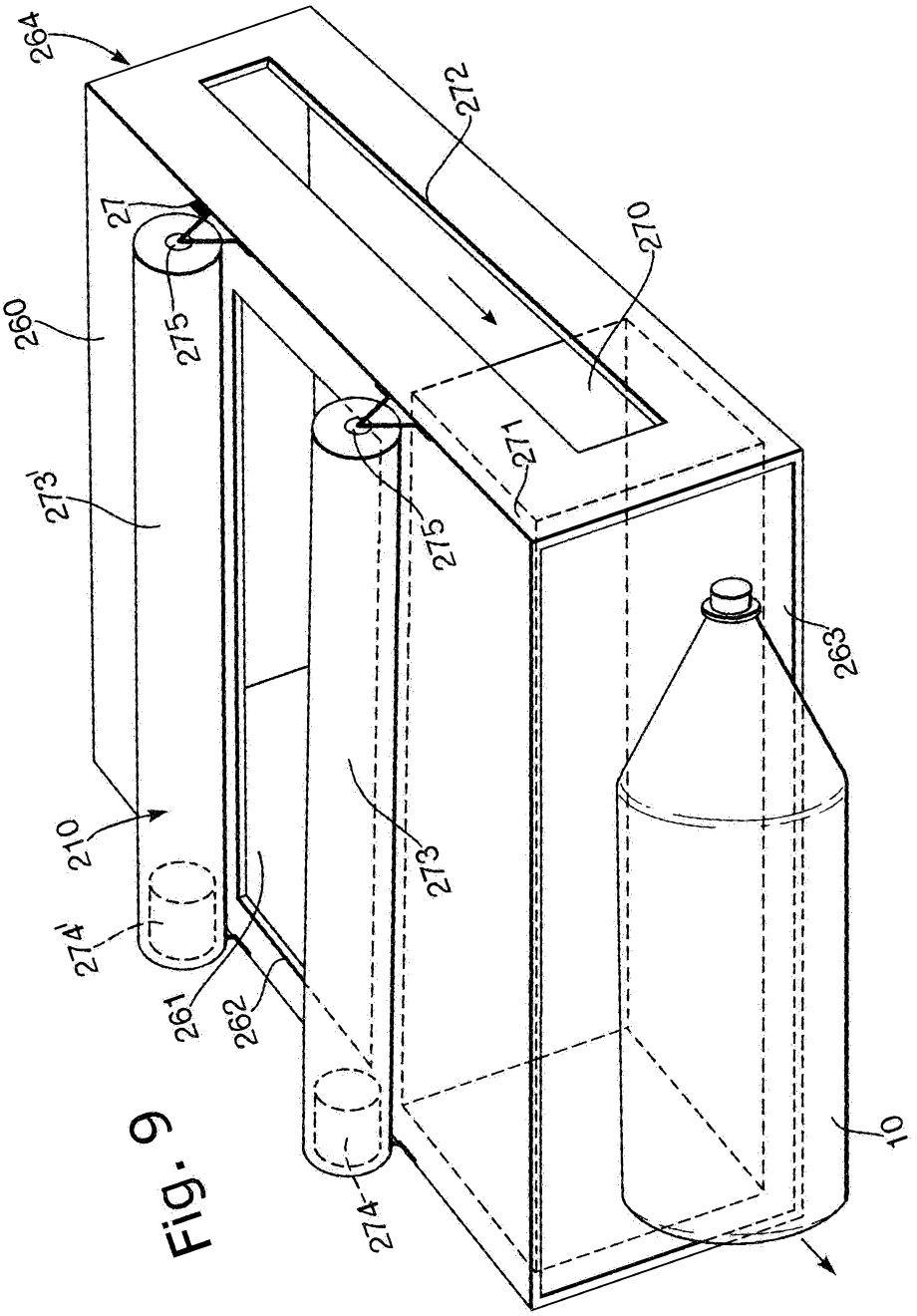


Fig. 9

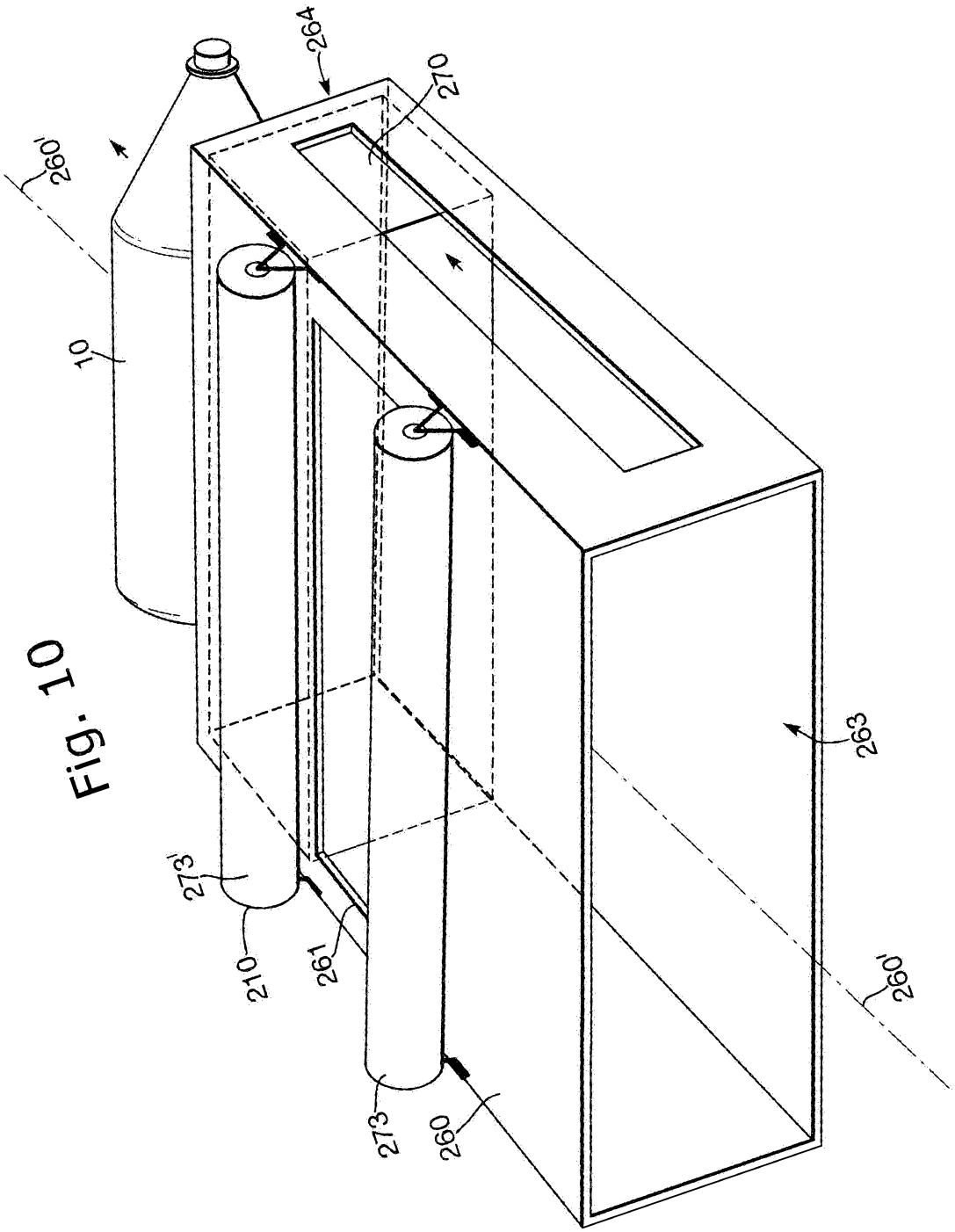


Fig. 10

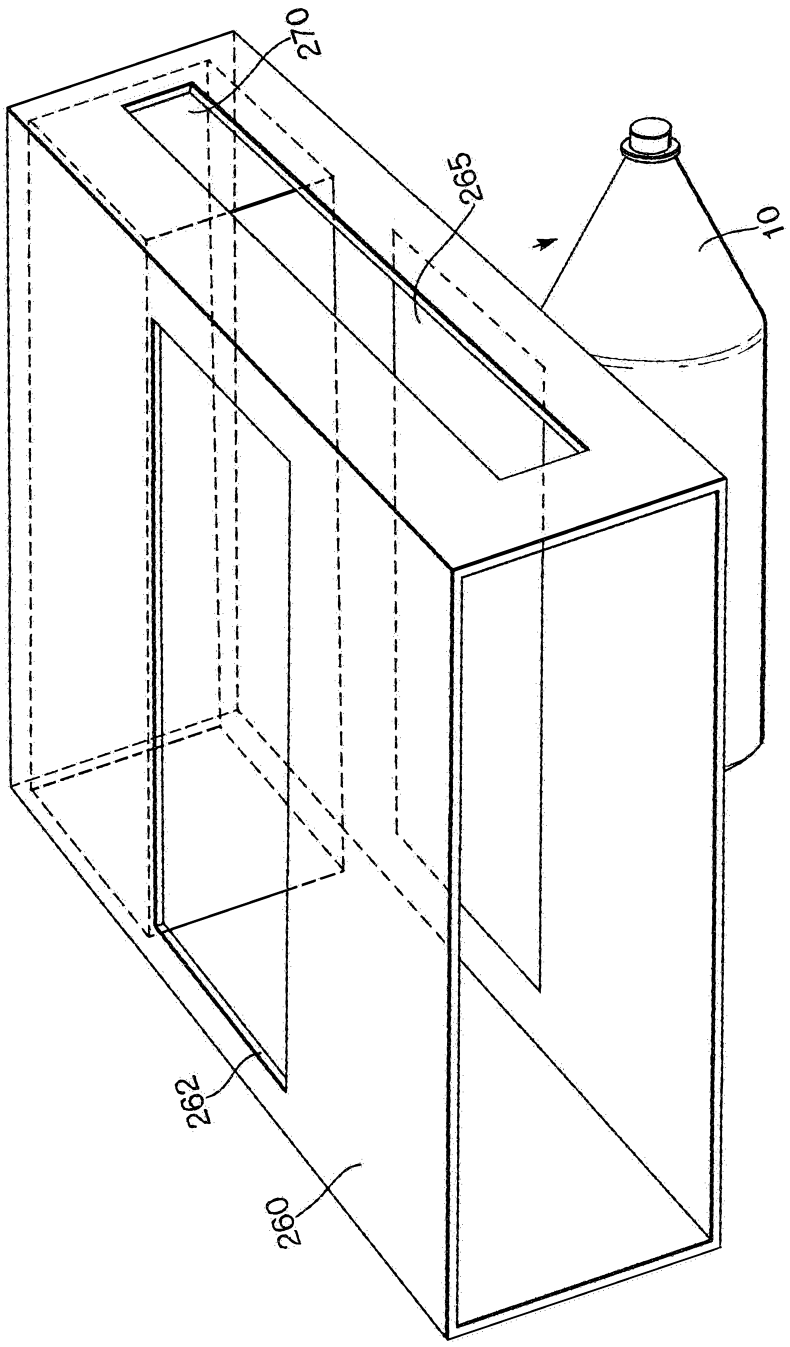


Fig. 11

Fig. 12

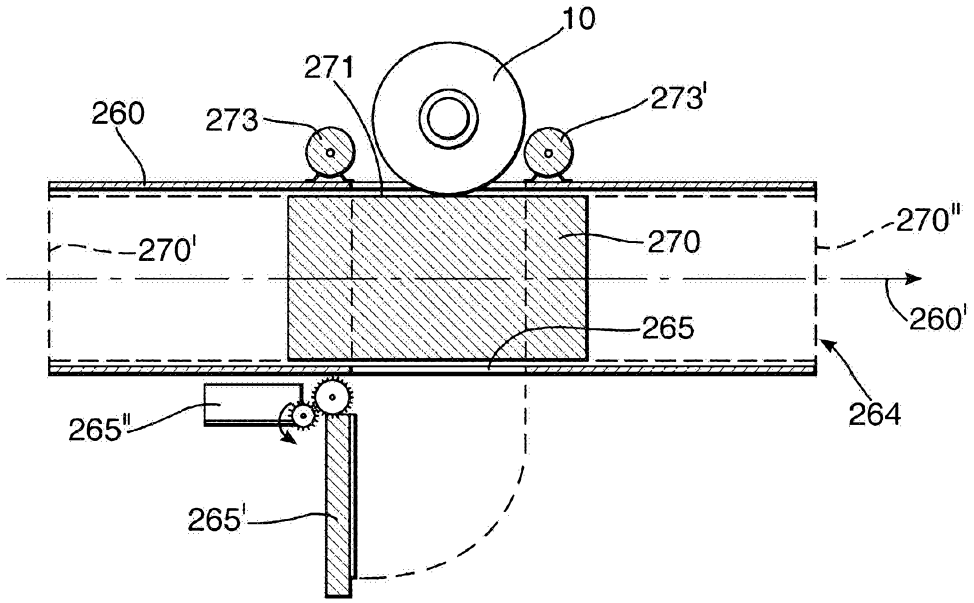


Fig. 13

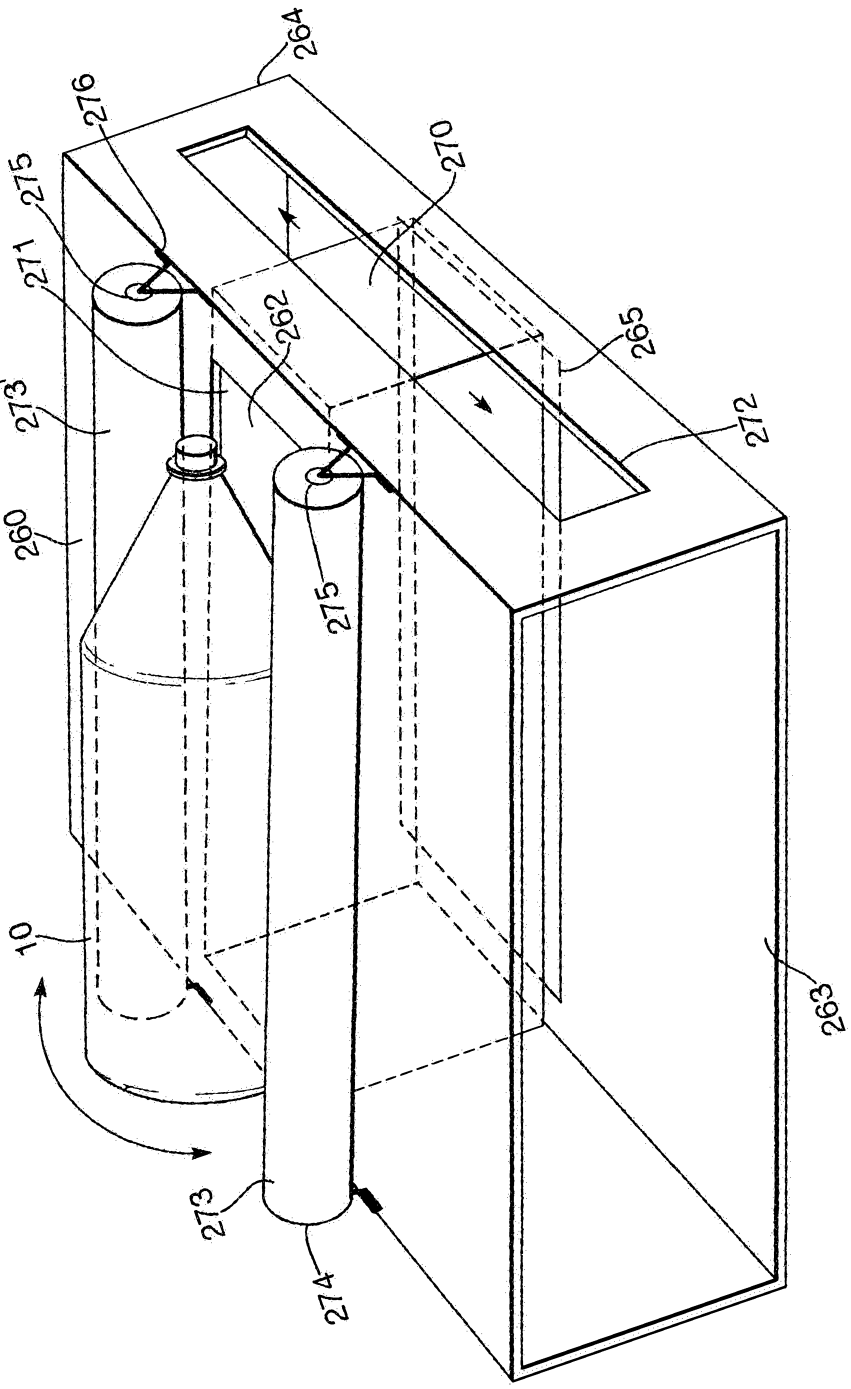


Fig. 14

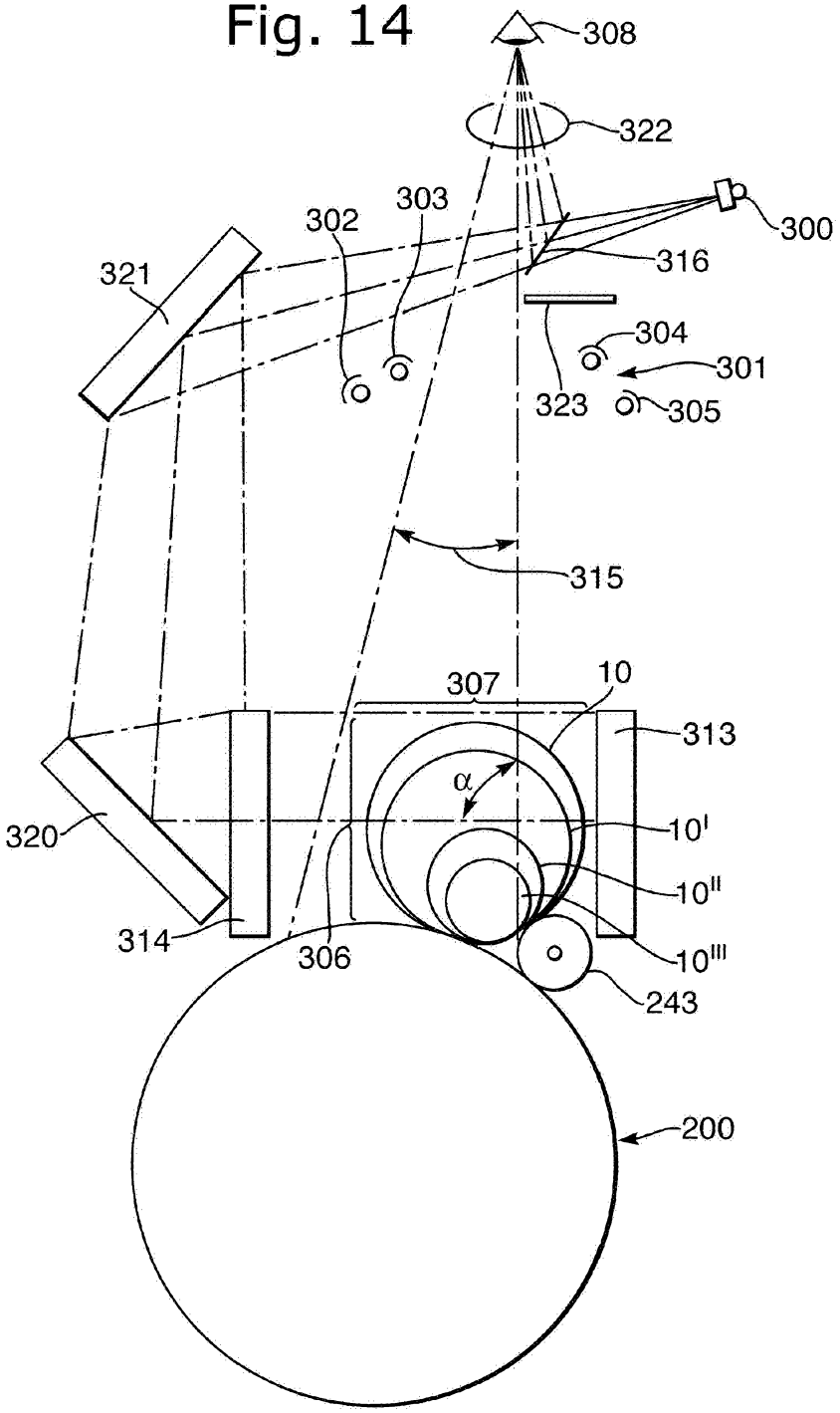

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Fig. 15

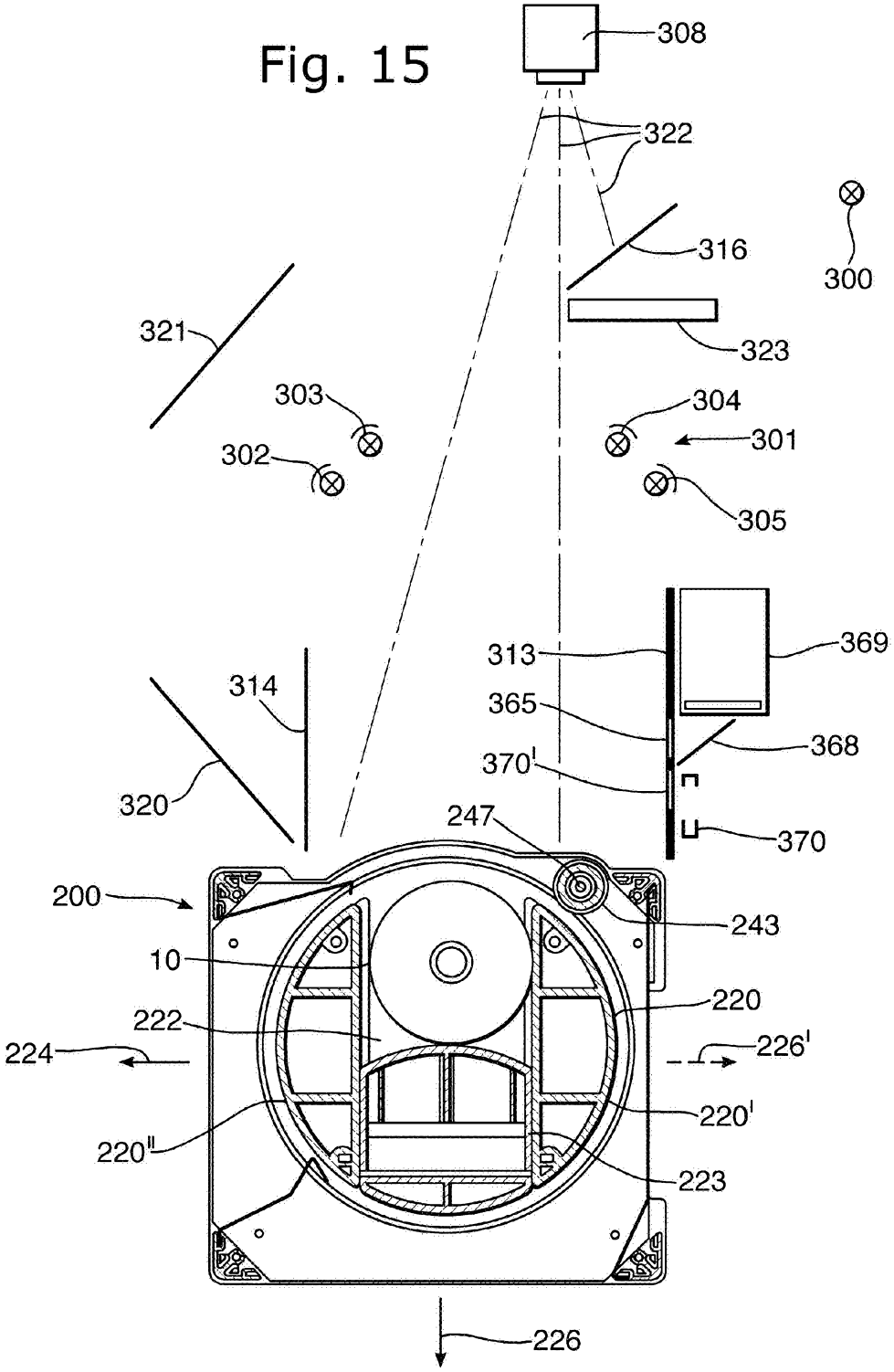
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Fig. 16

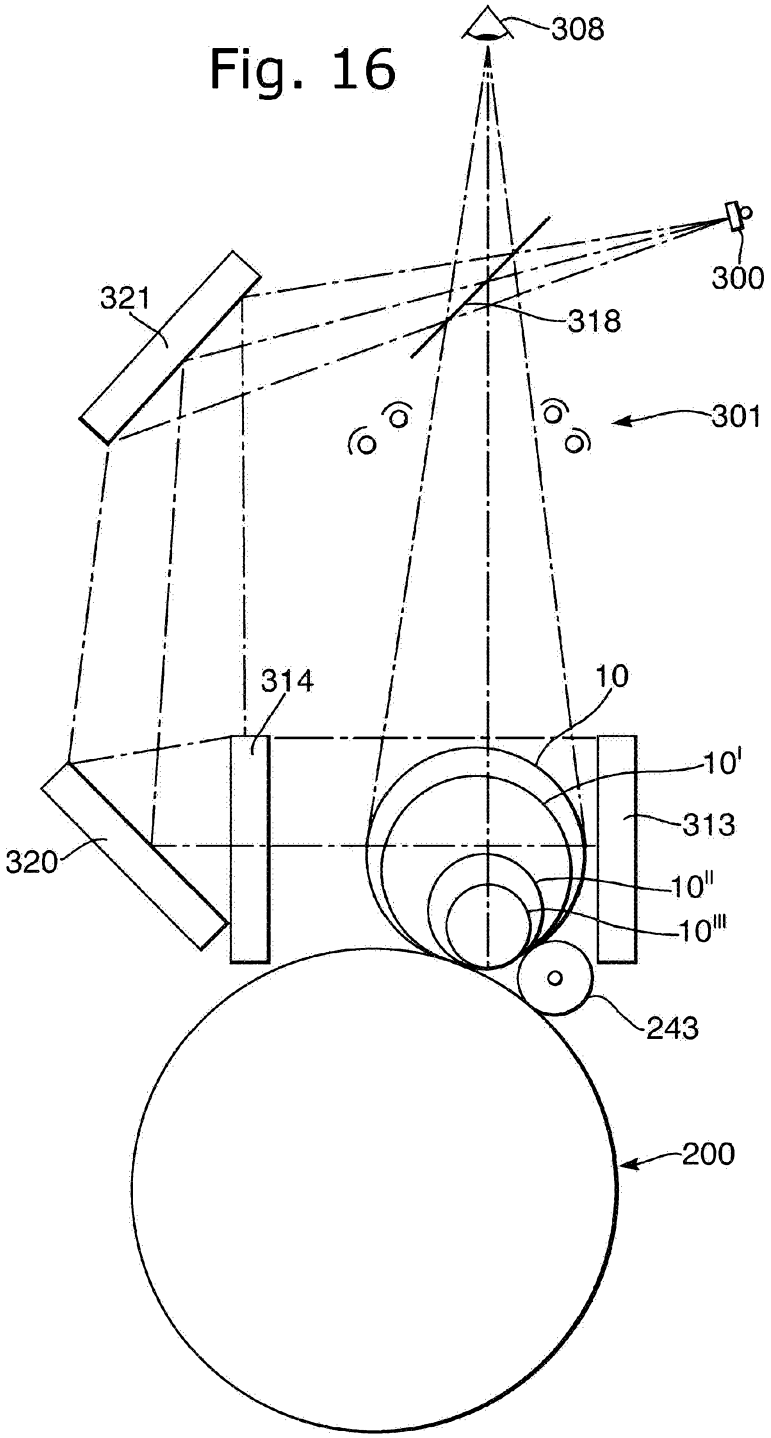


Fig. 17

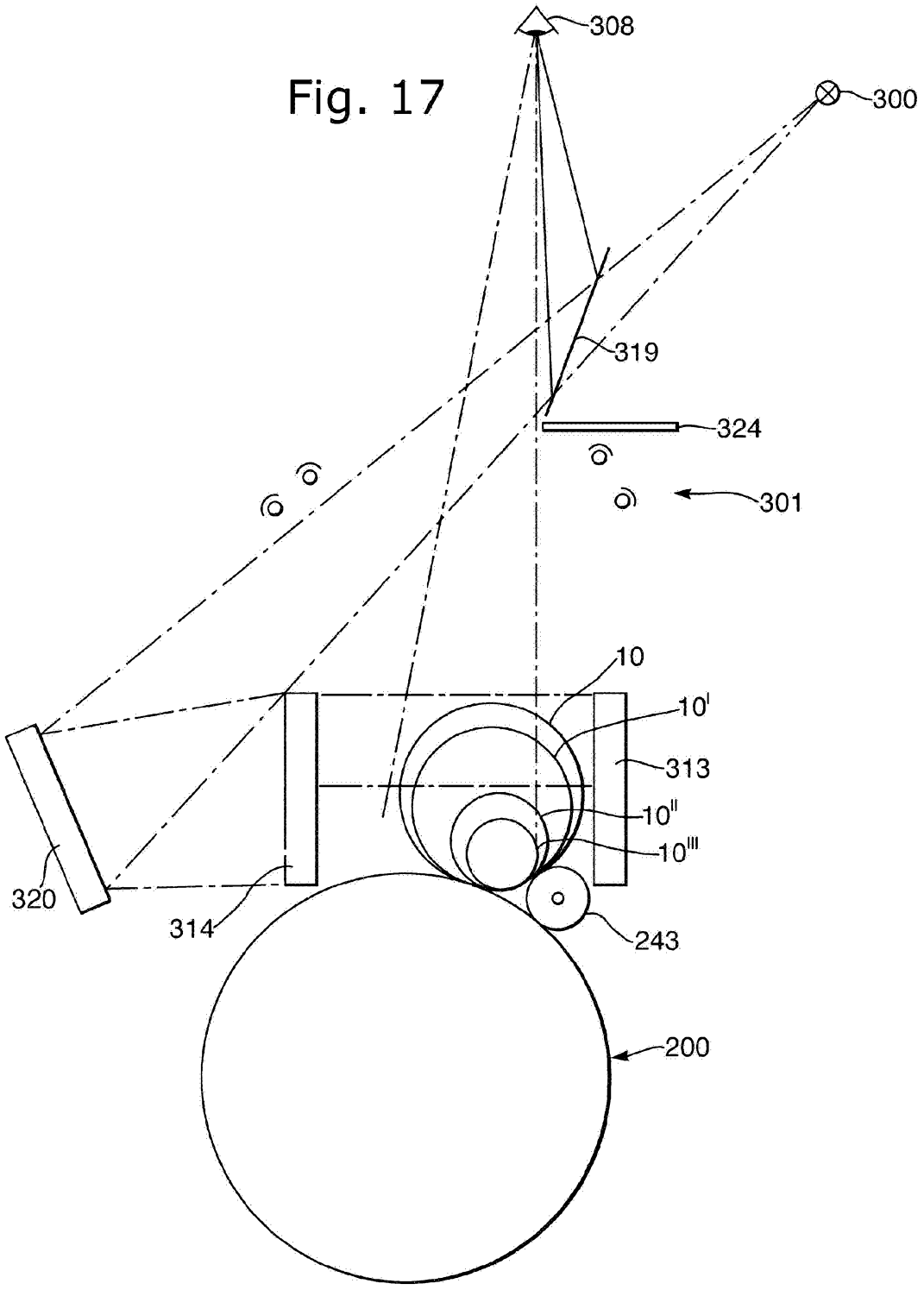


Fig. 18

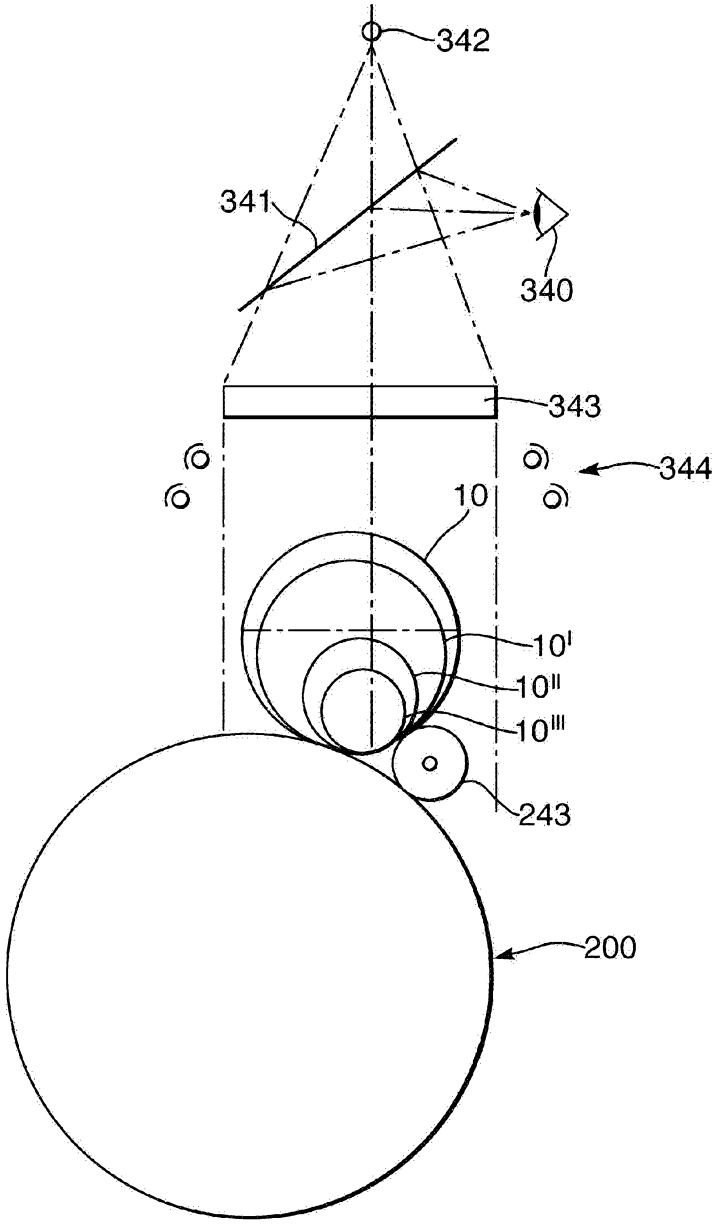


Fig. 19

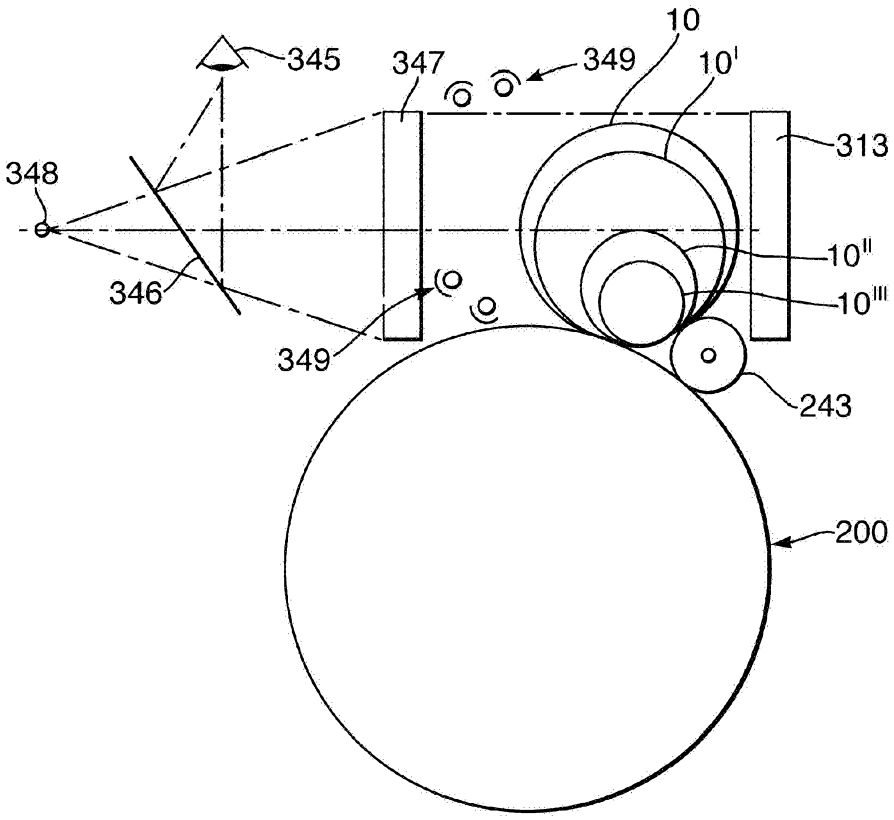


Fig. 20

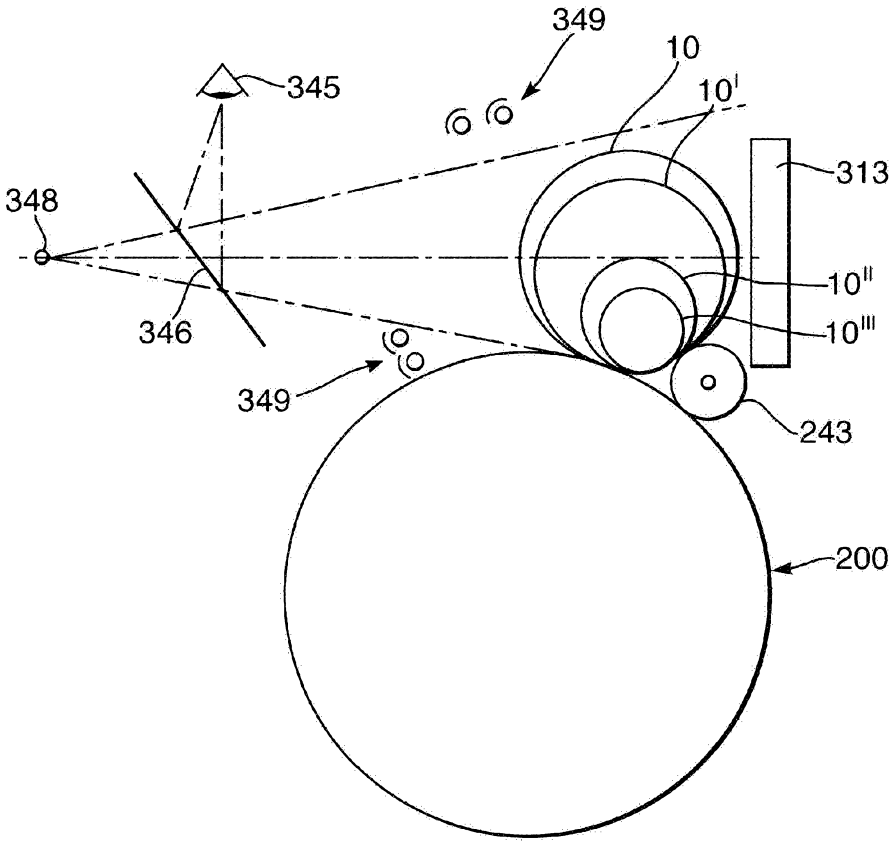


Fig. 21

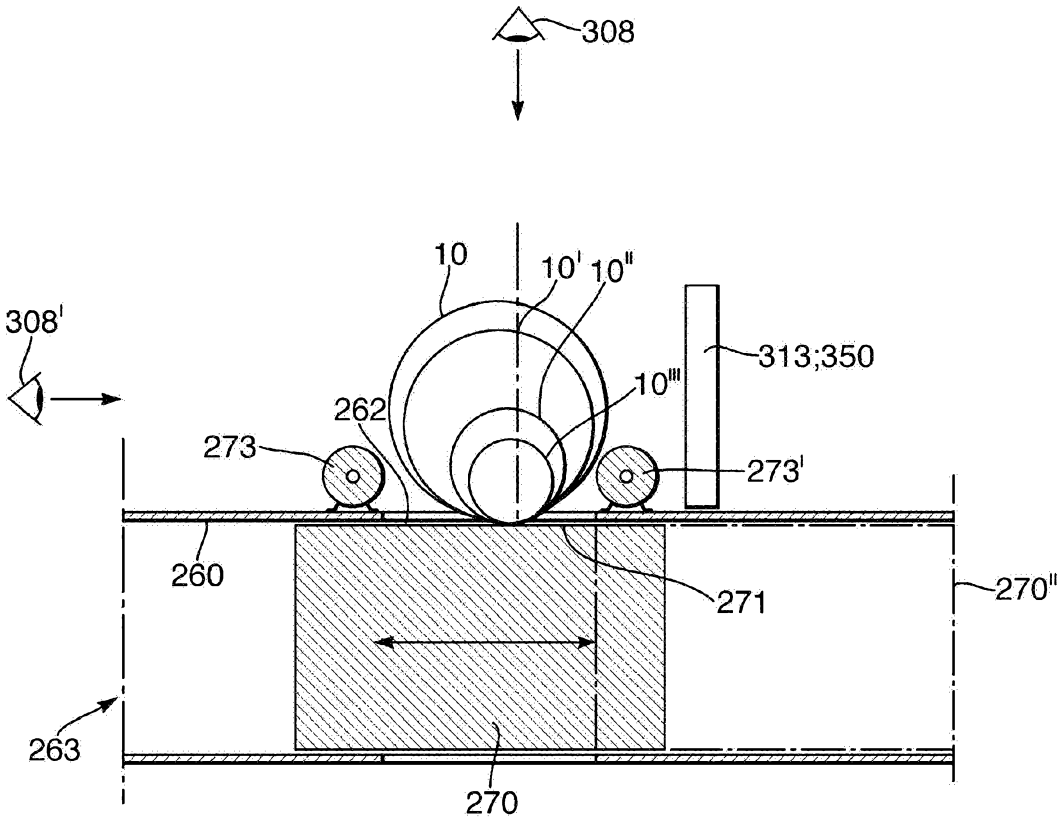
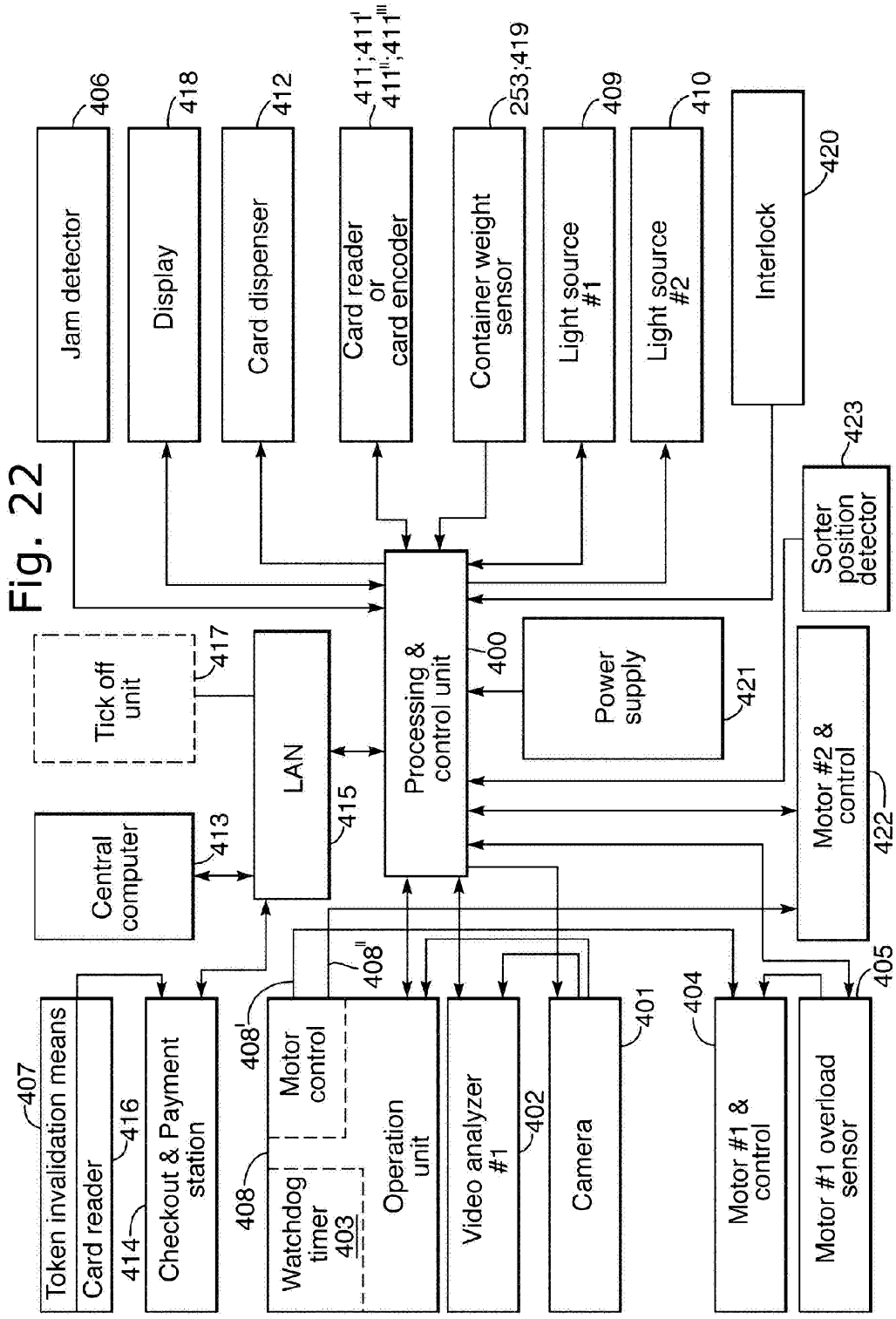


Fig. 22


Jam detector
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Display
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Card dispenser
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Card reader or card encoder
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Container weight sensor
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Light source #1
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Light source #2
410
Interlock
420
Sorter position detector
423
Tick off unit
417
LAN
415
Processing & control unit
400
Power supply
421
Motor #2 & control
422
Central computer
413
Token invalidation means
407
Card reader
416
414
Checkout & Payment station
408'
Motor control
408''
Watchdog timer 403
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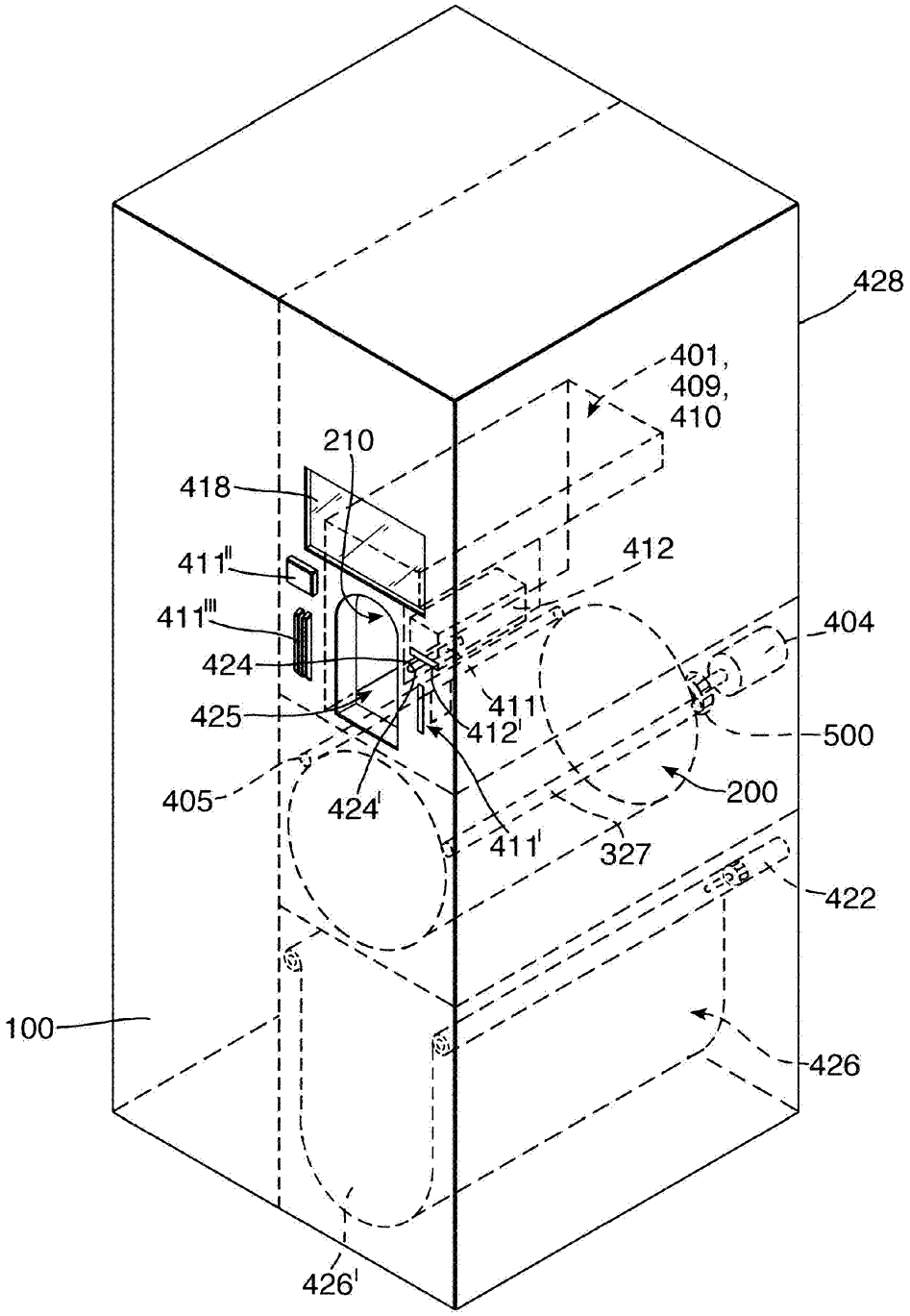
Operation unit
Video analyzer #1
402
Camera
401
Motor #1 & control
404
Motor #1 overload sensor
405

Fig. 23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