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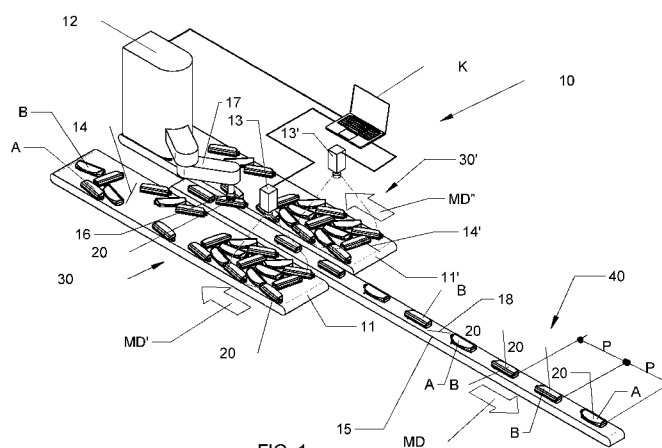


FIG. 1

(57) Abstract: Device configured for realizing a continuous and ordered flow (40) of containers (20), having respective filling openings (22) and a main axis (X-X), comprising - at least one feed transport system (11, 11'), configured for advancing, along a feed direction (MD', MD''), a respective flow (30, 30') of containers (20) with the respective main axes (X-X) randomly oriented, - an output transport system (15), arranged for advancing said continuous and ordered flow (40) of said containers (20) along an output direction (MD) parallel to the feed direction (MD', MD''), - at least one control means (13, 13') capable of detecting the position and orientation of the main axis (X-X) of each container (20) lying on the surface (14) of said at least one feed transport system (11, 11'), at least one gripping means (12, 12') controlled by said at least one control means (13, 13') and capable of picking up (16, 16') said containers (20) from said at least one feed transport system (11, 11') and to release them on said output transport system (15) in said continuous and ordered flow (40) with the respective main axes (X-X) parallel to each other.

**"Method and apparatus for realizing a continuous and
ordered flow of containers"**

5 **TEXT OF THE DESCRIPTION**

Field of the invention

The present invention relates to a method capable of realizing a continuous and ordered flow of containers

10 The invention has been developed particularly for organizing plastic containers of any shape, intended to be filled with viscous liquids, such as cleaning agents, detergents, cosmetics, food substances, etc.

The invention can, however, be applied, in
15 general, to any field wherein a continuous flow of containers is supplied to the successive labeling, and/or filling and/or closing stations.

Description of the prior art

The automatic machines suitable for labeling
20 and/or filling, and/or closing containers that present an opening for filling, such as bottles, flasks and the like, need a continuous and ordered flow of said containers, specifically they must be placed at a constant pitch from each other, i.e. they must be
25 equidistant from each other, and they must all have the filling opening facing in the same direction.

However, in many cases this is not sufficient as the shape of the containers complicates said labeling, filling and closing (capping) operations, and can be
30 far more sophisticated and complex than the traditional cylindrical shape, with the neck portion aligned with the central main axis of the body. In fact, in many cases these pieces of machinery are required to process containers with particular morphological features, such
35 as, for example, a flattened shape, sides with

different profiles and/or the neck portion arranged in an irregular way, and thus -in order to automatically proceed to the labeling, filling, closing (capping), or boxing operations- it is necessary to previously order the containers into a flow of containers that are all in the same position (for example with the part of the neck facing upwards) and with the same orientation (for example with each of the larger faces arranged on a predetermined side with respect to the advancing direction).

The solutions capable of generating a continuous and ordered flow of containers with a complex shape, starting from a random and discontinuous feed system, able to feed the subsequent labeling, and/or filling, and/or closing machines, are generally complex and expensive, since they are composed of a series of pieces of equipment placed in a cascade arrangement and in phase with the accumulation systems of containers interposed between each piece of apparatus. Specifically, the containers are randomly loaded, with bags or baskets into a first machine known as the sorting bowl comprising a cup-shaped rotary hopper, wherein the containers, randomly loaded in the center of the hopper, accumulate together and gradually go back up along the periphery wall, and output from the edge of the cup mouth in a series of selection trays appended to one another. A structure of this type is described, for example, in EP-A-0 374 107.

Each of the selection trays is provided with detection means, which identify the orientation of the container which has been received within it, and an unloading system, which can be activated on both the longitudinal ends of the tray according to the orientation of the container that has been acquired

from the detecting means, so as to eject the containers with the filling openings facing upwards.

Each container, which is slid from the selection trays, is inserted into the corresponding compartment
5 of a first star wheel located downstream of each tray of the sorting bowl. This first star wheel is used to take out the vertically placed containers from the sorting bowl.

Then, by means of a subsequent transfer star
10 wheel, the containers are carried on an additional orientation wheel on which a series of motorized spindles is provided on its periphery, able to axially rotate each container and to release them all with the same position. All the containers are released by the
15 orientation wheel in a vertical position and with all the corresponding faces facing in the same direction.

To the skilled person, it is evident that the output flow of containers from the sorting bowl can be non-continuous. In fact, there may be moments wherein
20 no container is being oriented. The above results in a discontinuous feed flow of containers. To eliminate this discontinuity, it is necessary to add accumulation conveyors at the output of the sorting bowl.

The known solutions, such as the one just
25 described, are affected by several drawbacks. Firstly, the complexity and poor reliability of the sorting bowl. In addition, the conveyors that allow the accumulation of the containers between the various pieces of apparatus responsible for ordering the flow
30 of containers occupy a lot of space. Indeed, in the prior art, the system that generates a continuous and ordered flow of containers, generally envisages a series of machines that are independent from each other, each equipped with its own independent
35 accumulation system.

As already said, it should be added that said organizing systems are heavily influenced by the shape and dimensions of the containers, requiring significant changes to the individual machines when it becomes
5 necessary to change the shape of the container that requires processing.

To the skilled person, it is also evident that the sorting bowl types of apparatus are subject to frequent jamming, especially in the unloading trays, which
10 affect the efficiency of the whole production line.

As a consequence of what has previously been stated, the overall cost of the apparatus is high, its efficiency is conditioned by the correct operation of the sorting bowl, and a long and problematic setup is
15 required, to be carried out at the establishment of the user of the machinery, in non-optimal conditions for the testing activities, and an arduous setup for coordinating the speeds of the various machines with each other, and of the intermediate conveyors for each
20 container format.

Object and summary of the invention

The present invention aims to provide a device and a method that overcome the problems of the prior art and that are capable of providing, at the output, a
25 continuous and ordered flow of containers, that are equidistant between each other, to a subsequent piece of apparatus, in turn, capable of carrying out at least one of the operations of labeling, filling and closing of the containers.

30 According to the present invention, this object is achieved by a method and the relative apparatus, which have the features forming the subject of the claims.

The claims form an integral part of the disclosure provided in relation to the invention.

35 Brief description of the drawings

The present invention will now be described in detail with reference to the accompanying drawings, provided purely by way of non-limiting example, wherein:

- 5 - Figure 1 is a schematic perspective view of a preferred embodiment of the present invention,
- Figure 2 is a perspective view of an asymmetrical container that can be processed in a piece of equipment according to the present invention, and
- 10 - Figure 3 is a schematic perspective view of a further preferred embodiment of the present invention.

Description of preferred embodiments

In the following description, various specific details are illustrated aimed at providing a thorough understanding of the embodiments. The embodiments can be implemented without one or more of the specific details, or with other methods, components, materials etc. In other cases, known structures, materials, or operations are not shown or described in detail to avoid obscuring the various aspects of the embodiments.

The reference to "an embodiment" in the context of this description indicates that a particular configuration, structure or feature, described in relation to the embodiment, is comprised in at least one embodiment. Therefore, phrases such as "in an embodiment", possibly present in different places of this description do not necessarily refer to the same embodiment. Furthermore, particular conformations, structures, or features can be combined in any suitable manner in one or more embodiments.

The references used herein are for convenience only and therefore do not define the field of protection or the scope of the embodiments.

Figures 1 and 3 illustrate two preferred embodiments of the device 10, 10' for the organizing of

containers 20 represented, in the example considered here, by bottles or flasks of a flattened and irregular form.

To establish the ideas, but without interpreting this in a limitative sense of the embodiments, these can be bottles or flasks 20 of plastic material coming from a feed system with bags or baskets which deposits the containers randomly on a feed transport system 11, 11' capable of generating a feed flow 30, 30' of containers 20 that travels in the feed direction MD', MD''.

In the preferred embodiments, as is clearly shown in Figs. 1 and 3, the feed system is constituted by at least two feed transport systems 11, 11', which have been schematically represented as conveyor belts, so as to form two parallel flows 30 and 30' of containers 20. In general, all the transport systems 11, 11' and 15 of the devices 10 and 10' are schematically represented as conveyor belts and mentioned as such. The constructive features of conveyors 11, 11' are well known in the sector and do not require a more thorough description.

The containers 20 can be, for example, molded and/or blown plastic bottles or flasks intended for containing shampoo, liquid soap, detergents, or other products for cleaning and hygiene, or even food substances.

Hereinafter it will be assumed, by way of example, that the containers 20, as represented in Fig. 2 can present an overall flattened shape with a part of the neck or mouth 21 (intended to receive a closing cap) placed in an irregular position relative to the body 23 of the container. Each container 20 is provided with an opening for filling 22, which can normally be circular, with a main axis X-X, generally aligned with the largest dimension of the container 20, which can be,

typically, orthogonal to said filling opening 22 and passing through its center. In addition, each container 20 can present a bottom surface 24, which in turn can also commonly be perpendicular to said axis X-X.

5 Containers of this type, with an irregular shape, such as that illustrated in Fig. 2, are commonly known as asymmetric.

It is also possible to use the following method to determine when a container is asymmetric: once the main
10 axis X-X of a container 20 is defined, the container can be said to be asymmetric if it is possible to identify, in the collection of planes passing through the main axis X-X, at most a single plane of symmetry, namely a plane that identifies a symmetry in the
15 container 20 concerned.

In the specific case of the asymmetric container of Fig.2, to be precise, it is possible to identify just a single plane of symmetry X' in the collection of planes passing through the axis X-X, which defines a
20 first side face A and a second side face B situated at the sides of said plane of symmetry X' that connect said filling opening 22 to said bottom surface 24, said faces being also called larger or main surfaces. The two symmetrical surfaces (or larger, or main) A and B
25 are connected together by two connection (or side) surfaces (or faces) C and D which, in turn, are not symmetrical with respect to the plane Y' passing through the main axis X-X and perpendicular to the plane of symmetry X' because they present different
30 shapes from each other, or because they are situated at different distances with respect to aforesaid plane Y', or because both conditions occur, as clearly represented in Fig. 2.

In practice, the containers can present very
35 complex and irregular shapes, fruit of the designers'

inspiration. In cases of this kind, it is possible that no main axis X-X can be identified, as for example in the case of bottles with oblique and variously shaped necks.

5 For containers of this shape the main axis X-X can be made to coincide with any straight line passing through the inside of the container, parallel to its largest size.

10 It is also possible to find containers wherein one or both surfaces C and D are practically absent, i.e., reduced only to a simple connecting element between the two aforesaid main surfaces A and B; it is obvious that said connecting elements must be interpreted in the same way as surfaces.

15 In general, the main surfaces A and B and the side surfaces C and D, when present, or more generally the corresponding connecting elements, are essentially aligned with the main axis X-X, though not necessarily parallel to it, as shown for example in the container
20 20 illustrated in Figure 2.

Similarly, it is possible to find containers wherein the bottom surface 24 is absent; in this case, as well, said surface can be reduced to a simple connection between the two main surfaces A and B.

25 In the preferred embodiment shown schematically in Figures 1 and 3, the containers 20 are randomly fed on feed transport systems 11, 11' with the respective main axes X-X randomly oriented and they lie with one of the larger faces A or B on the surface 14, 14' of the
30 respective feed transport system 11, 11'.

The apparatus 10, 10' is provided with control means 13, 13' which are able to detect, for each container, its position on the surface 14, 14' of the respective feed transport system 11, 11', the

orientation of the main axis X-X and the position of the filling opening 22.

Suitable control means can be vision systems of the type IS7402-11 In-Sight 7402, 1280x1024 30fps
5 provided with objectives M118FM16 Megapixel, 16 mm f/1.4 produced and marketed by Univision S.r.l - Via Appiani, s.n.c. - 20831 Seregno (MB).

The information acquired by the control means 13, 13' on each container 20 are processed by a processor K
10 capable of controlling a gripping means 12, 12' which, in a preferred embodiment, can be an industrial robot of the type known as "fast picker" particularly suited to handling elements weighing less than 1kg, and of reduced dimensions, capable of picking up containers
15 20, previously analyzed by control means 13, 13' and the processor K, from the feed transport system 11, 11' and to deposit them in order on the surface 18 of the output transport system 15 one behind the other, generating a continuous and ordered flow 40 of
20 containers 20. Said gripping means 12, 12' lays said containers 20 on one of the two main faces A or B, i.e. in the position that can be typically horizontal, equidistant from one another, or spaced between each other by a constant pitch P along the output direction
25 MD, with the main axes X-X parallel to each other and, in addition, with the filling openings 22 all facing in the same direction.

The output transport system or output conveyor, 15 has been schematically represented as a conveyor belt.
30 The constructive features of the output transport system 15 are well known in the field and they do not require a detailed description.

In one example of an embodiment, the processor K can be constituted by a group of control elements
35 centered on a PLC (Programmable Logic Control) Siemens

S400. The processor K can contain accessory elements for current use intended to enable the correct interfacing between the control means 13, 13' and the gripping means 12, 12'. Among these elements, for example, a Cognex distribution block for I/O PLC-vision system exchange can be mentioned.

In the preferred embodiments illustrated in Figs. 1 and 3, the directions MD' and MD'' of the feed flows 30 and 30' of the containers 20 and the direction MD of the ordered output flow 40 are, typically, parallel to each other; while the directions of the two feed flows 30, 30' and the output flow 40 may be the same or different from each another. In the embodiments of Fig. 1 and 3, they are different.

In the preferred embodiments a gripping means 12, 12' particularly suitable for this type of apparatus is the "fast picker" model TP80 Industrial Robot produced and marketed by Stäubli International AG - PO Box 30 - CH-8808 Pfäffikon / Switzerland, provided with a gripper 16, 16' at the end of its arm 17, in turn equipped with a coupling system fitted with an apparatus for the generation of a vacuum of the type VGS3010.AB.01.BA and of a suction cap OB20x60P5E.G31M cpl both produced and marketed by Piab Italy S.r.l - Via Cuniberti, 58 - 10151 Torino - Italy.

It is evident to the skilled person that the processor K can be advantageously integrated into the control electronics of the gripping means 12, 12'.

On the output transport system 15, the containers 20 are ordered with a pitch selected in such a way that it is equal to the pitch in which the containers 20 must be supplied to the labeling, and/or filling, and/or closing stations situated downstream.

On the output transport system 15, the containers 20 of the flow 40 can be ordered with the main axis X-X

perpendicular to the advancing direction MD of the continuous and ordered flow 40 of the containers 20 or with the main axis X-X parallel to said advancing direction MD, in the latter case the main axes X-X of the containers 20, in addition to being parallel to each other, may also be coaxial, as shown in Fig.1 and Fig.3.

Located downstream of one of the pieces of apparatus 10 or 10', realized according to the embodiments described above, a transfer wheel can be advantageously combined, rotatable about an inclined axis with respect to said advancing direction MD and equipped with a plurality of gripping seats configured to pick up the containers 20, of the continuous and ordered flow 40 by said output transport system 15, arranged with said main axis X-X horizontal and to release the containers 20 with said main axis X-X vertical.

A structure of this type, called bevel wheel, is described in T02010A000965.

The bevel wheel facilitates the arranging of the containers 20 in a vertical position and automatically defines the pitch between the containers 20, in a vertical position, on the output conveyor connected to it, so that said containers 20, vertically oriented, can be supplied to the successive process station without the need for a further pitch setup prior to entering the immediately successive process station.

The solution according to the present invention is particularly advantageous due to the fact that it allows the accumulation of the containers 20 arranged in a horizontal position along the output transport system 15. In said horizontal position, the containers 20 are much more stable and eliminate machine stoppages due to jams arising, to be precise, from the

instability of the containers 20 placed vertically on transport accumulation systems.

The solution according to the present invention, is therefore, capable of realizing the time frequency and the pitch setup P of the containers 20 in the condition of maximum stability of the containers themselves, notably in the configurations, represented in Figs.1 and 3, wherein the containers 20 are placed with the respective main axes X-X coaxial to each other and parallel to the surface 18 of the output transport system 15. Another particularly important feature of the present invention is that the pitch setup system according to the present invention, for families of containers that have the same width (or thickness/height when they are lying in a horizontal position), can manage the change of format of the containers 20 only via software, by changing the speed ratios of the output transport system 15 and of the bevel wheel, without the need to carry out changes in the mechanisms and format exchange devices.

Downstream of the bevel wheel, the containers 20 are already in phase with the processes that follow (filling, capping, etc.) and it is therefore no longer necessary to change the pitch between the containers 20 after their vertical arrangement.

Again, the same configuration is also appropriate for dealing with asymmetrical containers.

Indeed, in the case of a continuous and ordered flow 40 of asymmetrical shaped containers 20, such as that shown in Fig.1, it may be necessary to place an orientation turret (or carousel, or wheel) downstream of the apparatus 10 and the relative bevel wheel.

The orientation turret, in this latter case, envisages the control, through appropriate detection means, of the position of each container, or rather

envisages detecting which of the two main faces A or B is facing outwards and which, consequently, is facing inwards of said orientation carousel; and then proceed to correct the orientation of those containers 20 that
5 present an incorrect position at the input, by rotating them by 180° around the respective main axis X-X, providing at the output an ordered flow of containers 20 with a vertical main axis X-X, equidistant between each other and all with the same position, namely with
10 the main surfaces A and B, and the side surfaces C and D, all facing in the same direction.

However, in a further particularly preferred configuration, in the case wherein the device 10, 10' is responsible for processing predominantly
15 asymmetrical containers, the control means 13, 13' in addition to detecting the features already mentioned, namely: the position on the surface of the belt 14, 14' of the respective feed transport system 11, 11', the orientation of the main axis X-X, the position of the
20 filling opening 22, can identify, for each container, which of the two main faces A or B lies on the surface 14, 14' of the feed transport system 11, 11' by deriving said information from the determination of the position of the side surfaces C and D with respect to
25 the filling opening 22 (or the neck 21) of the container 20 concerned.

Even in this particularly preferred configuration, the information acquired by the control means 13, 13' for each container 20 is processed by a processor K
30 which controls a gripping means 12, 12' which picks up the containers 20 from the feed transport systems 11, 11', appropriately selecting them, and depositing them on the surface 18 of the output transport system 15, generating an ordered flow of containers 20 that
35 present: either all with the main face A or all with

the main face B lying on the surface of the output transport system 15, with the connecting surfaces C and D of the containers 20 all facing in the same direction, all equidistant from each other, i.e. spaced
5 by a constant pitch P, with the longitudinal axes X-X aligned to the longitudinal axis of the conveyor 15 and with the mouths 21 all facing in the same direction as clearly represented in Fig. 3.

In said preferred configuration, the ordered flow
10 of containers 20 is particularly advantageous for subsequent handling operations, to which the individual containers 20 must be subjected. In this case as well, to the continuous and ordered flow 40 of containers 20, a transfer wheel is advantageously combined, rotatable
15 about an axis inclined with respect to said advancing direction MD, or bevel wheel, equipped with a plurality of gripping seats configured to pick up the containers 20 from said output transport system 15 arranged with said longitudinal axis X-X horizontal and to release
20 the containers 20 with said axis X-X vertical. The bevel wheel, in this case as well, facilitates the arranging of the containers 20 in a vertical position and automatically defines the pitch between the bottles on the output conveyor, connected to it, so that the
25 vertically oriented containers can be supplied to the subsequent process stations without the need for a further pitch setup before entering into one of the said process stations.

It is evident that in the latter preferred
30 configuration, clearly highlighted in Fig.3 the need for a possible orientation turret is also removed, regardless of the type of container handled, both that present a symmetrical shape, and in the case of an asymmetric shape, further reducing the cost and

complexity of the apparatus and of the format exchange which is, thus, to be realized mainly by software.

Further salient aspects of the present invention are related to the architecture of the feed transport system 11, 11' and the output transport system 15. In the preferred embodiments, as highlighted in Figures 1 and 3, the random feed of the containers from bags or baskets is carried out on two feed transport systems 11 and 11', which can be simple belts, placed at the sides of the output transport system 15. This configuration provides important advantages compared to the classical configuration that only envisages a single feed transport system, i.e. only one belt, of greater dimensions, typically placed at the side of the output transport system 15.

For this reason it should be noted that the dimensioning of the feed transport system (or belt), or rather, the choice of its width and its linear speed, is made according to the size and number of containers that it has to carry in the unit of time. Experience has shown that the optimal speed for the feed belts of a piece of apparatus realized according to any of the preferred embodiments is comprised in a range from 0.5 to 1.16 m/s (30-70 m/min).

It has also been noted, moreover, that in order to obtain a continuous and homogeneous ordered flow of containers 20, or rather a flow of containers wherein gaps caused by the absence of one or more components in the ordered output flow 40 are almost completely eliminated, it is necessary to have a feed flow 30, 30' of randomly supplied containers at the input of the organizer that is roughly three times more than that required by the downstream apparatus, i.e. by the apparatus capable of carrying out the labeling, filling and closing operations of said containers 20. Indeed,

especially in the case wherein the only containers 20 to be picked up are those that are laid on the input belts on one of the two main faces, A or B, it is evident that, statistically, half of the containers
5 randomly deposited on each feed belt will be lying on the main face A, while the other half will have the main face B in contact with the surface of the relative feed belt, therefore, the gripping means 12, 12' will be able to consider only half of the feed flow 30, 30',
10 envisaging both the subsequent recycling of the excess supply of containers 20 and those lying on the surfaces of the feed belts on the opposite main face to the preselected one.

Therefore, if an ordered feed flow of 400
15 containers/1' to the labeling, filling and closing apparatus is desired, it is necessary to provide a random feed of about 1,200 containers/1' to the input conveyor belts. Combining these aforesaid data and taking into account the average size of the present
20 containers on the market designed to contain, for example, shampoo, liquid soap, detergent or other cleaning and hygiene products, it has been determined that for organizing machines able to accommodate 400 containers per minute, in the case of only one feed
25 conveyor, it may typically be equipped with a belt having a width of about 1,000 mm (1 meter). Alternatively, if two feed transport systems are opted for, these can each be equipped with a belt 11, 11' that is 500 mm wide.

30 The fact of separating the feed flow 30, 30' into two and of placing the output transport system 15 between the two feed belts 11 and 11' allows the gripping means 12, 12', also placed between the two feed belts, to make the shortest paths. Indeed, if the
35 organizing machine 10 of the preferred embodiment of

Fig.1 is examined, it can be observed that the at least one gripping means 12 is placed between the two feed belts 11, 11', therefore it can be appreciated that the gripper 16 placed on the end of the arm 17 of the at least one gripping means 12 follows paths which are approximately half of the magnitude of the paths that they would have to follow in the case that the feed occurred with a single belt. The above is independent of the location of the gripping means 12, 12' or rather it is separate from the fact that it is placed exactly between the two feed belts 11, 11', i.e. alongside the output transport system 15, as represented in Fig.1, or is arranged laterally to the aforesaid output transport system 15, in particular in the vicinity of the feed transport system 11, 11', as is clearly shown in the apparatus 10' of Fig.3, where each feed conveyor 11, 11' is provided with at least one of its own gripping means 12, 12', and where said gripping means 12 and 12' are placed above the respective feed conveyors 11, 11'. In other words, considering that each container 20 must be deposited at the centerline of the output transport system 15, it is obvious that, in the worst case wherein the initial position of the container 20 is in the vicinity of the edge of the feed belt 11, 11' furthest away from the output transport system 15, the distance that said container 20 must travel in a transverse direction to reach the final position coinciding with the centerline of the output transport system 15 is equal to the sum of the width of the feed belt 11, 11' from which it has been picked up plus the half of the width of the output transport system 15 where it is laid, and it is obvious that in the case wherein the feed is carried out with only one belt, said distance is almost double with respect to the case

wherein the feed is carried out with two belts of a width equal to half the width of a single belt.

It is evident to the skilled person that the preferred configurations of Figures 1 and 3, wherein
5 the containers are lying with the longitudinal axis coaxial to the axis of the output transport system 15 give a further advantage linked to the fact that the width of the output conveyor is further reduced with respect to the case wherein the containers 20 were
10 aligned with the longitudinal axes perpendicular to the longitudinal axis of the output transport system 15, allowing a further increase in the performance of the system.

It is evident to the skilled person, that,
15 especially in the configuration of Figure 3 where each feed conveyor 11, 11' is provided with its own at least one gripping means 12, 12', it is possible to realize a multiplicity of apparatus configurations, without departing from the scope of this invention. Indeed, in
20 addition to the configurations already shown in Figures 1 and 3, it is possible to have the feed belts 11, 11' still at the sides of the feed belt, but completely offset with each other, or it is possible to have both the feed belts 11, 11' on the same side of the output
25 belt 15 seats placed in tandem one behind the other. It is also possible to have in each of said configurations opposite directions for the two feed flows MD' and MD''. Therefore, without prejudice to the principle of the invention, the details of construction and the
30 embodiments may vary widely with respect to those described and illustrated without departing from the scope of the invention as defined by the claims that follow .

CLAIMS

1. Device configured for realizing a continuous and ordered flow (40) of containers (20), wherein said containers (20) present respective filling openings (22) and a main axis (X-X), said device comprising:
- 5 (22) and a main axis (X-X), said device comprising:
- at least one feed transport system (11, 11'), configured for advancing, along a feed direction (MD', MD''), a respective flow (30, 30') of containers (20) lying on the surface (14) of said at least one feed transport system (11, 11') with the respective main axes (X-X) randomly oriented,
 - 10 - an output transport system (15), arranged for advancing said continuous and ordered flow (40) of said containers (20) along an output direction (MD) parallel to the feed direction (MD', MD''), said output transport system (15) being adjacent to said at least one feed transport system (11, 11'),
 - 15 - at least one control means (13, 13') capable of detecting the position and orientation of the main axis (X-X) of each container (20) lying on the surface (14) of said at least one feed transport system (11, 11'),
 - 20 - at least one gripping means (12, 12') controlled by said at least one control means (13, 13') and capable of picking up (16, 16') said containers (20) from said at least one feed transport system (11, 11') and to release them on said output transport system (15) in said continuous and ordered flow (40) with the respective main axes (X-X) parallel to each other.
 - 25 30 other.
2. Device according to claim 1 comprising at least two feed transport systems (11, 11') parallel to each other, with said output transport system (15) placed between said at least two feed transport systems (11, 11').
- 35 (11, 11').

3. Device according to claim 2 wherein said at least two feed transport systems (11, 11') are offset with each other.

4. Device according to claim 1 comprising at least two feed transport systems (11, 11') placed one behind the other in the feed direction and an output transport system (15) placed adjacent to said at least two feed transport systems (11, 11').

5. Device according to any of the preceding claims, characterized in that the at least one gripping means (12, 12') releases, on said output transport system (15), a continuous and ordered flow (40) of containers (20) equidistant from one another (P) and with the respective main axes (X-X) aligned to the advancing direction (MD).

6. Device according to any one of claims 1 to 4, characterized in that the at least one gripping means (12, 12') releases, on said output transport system (15), a continuous and ordered flow (40) of containers (20) equidistant from one another (P) and with the respective main axes (X-X) perpendicular to the advancing direction (MD).

7. Device according to any of the preceding claims, characterized in that said at least one gripping means (12, 12') releases, on said output transport system (15), a continuous and ordered flow (40) of containers (20) that present the filling openings (22) all facing in the same direction.

8. Device according to any of the preceding claims, wherein said containers (20) present faces (A, B, C, D) essentially aligned to said main axis (X-X), characterized in that said at least one gripping means (12, 12') releases, on said output transport system (15), said continuous and ordered flow (40) of

containers (20) with the faces (A, B, C, D) of each containers all facing in the same direction.

9. Device according to any of the preceding claims, characterized in that it has at least one gripping means (12, 12') for each feed flow (30, 30').

10. Device according to any of the preceding claims, characterized in that said at least one gripping means (12, 12') is an industrial robot.

11. Method for realizing a continuous and ordered flow (40) of containers (20), wherein said containers (20) have respective filling openings (22) and a main axis (X-X), said method comprising the steps of:

- transporting (11, 11') along respective advancing directions (MD', MD'') at least one feed flow (30, 30') of containers (20) lying on said at least one feed transport system (11, 11') and arranged with their respective main axes (X-X) randomly oriented,

- detecting in said at least one feed flow (30, 30') the position of each container (20) and the orientation of its main axis (X-X),

- picking up (12, 12') said containers (20) from said at least one feed flow (30, 30') and releasing said containers (20) in said continuous and ordered flow (40) with the respective main axes (X-X) parallel to each other, and

- transporting (15) said continuous and ordered flow (40) of containers (20) along the output direction (MD) adjacent and parallel to said advancing direction (MD', MD'') of said at least one feed flow (30, 30').

12. Method according to claim 11, characterized in that it is designed for picking up (12, 12') said containers (20) from said at least one feed flow (30, 30') and releasing said containers (20) in said continuous and ordered flow (40) equidistant from one

another (P) and with the respective main axes (X-X) aligned to the advancing direction (MD).

13. Method according to claim 11, characterized in that it is designed for picking up (12, 12') said
5 containers (20) from said at least one feed flow (30, 30') and releasing said containers (20) in said continuous and ordered flow (40) equidistant from one another (P) and with the respective main axes (X-X) perpendicular to the advancing direction (MD).

10 14. Method according to any one of claims 11 to 13, characterized in that in said continuous and ordered flow (40) of containers (20) the respective filling openings (22) are all facing in the same direction.

15 15. Method according to any one of claims 11 to 13, wherein said containers (20) present faces (A, B, C, D) essentially aligned to said main axis (X-X), characterized in that in said continuous and ordered
20 flow (40) of containers (20) the faces (A, B, C, D) of each container are all facing in the same direction.

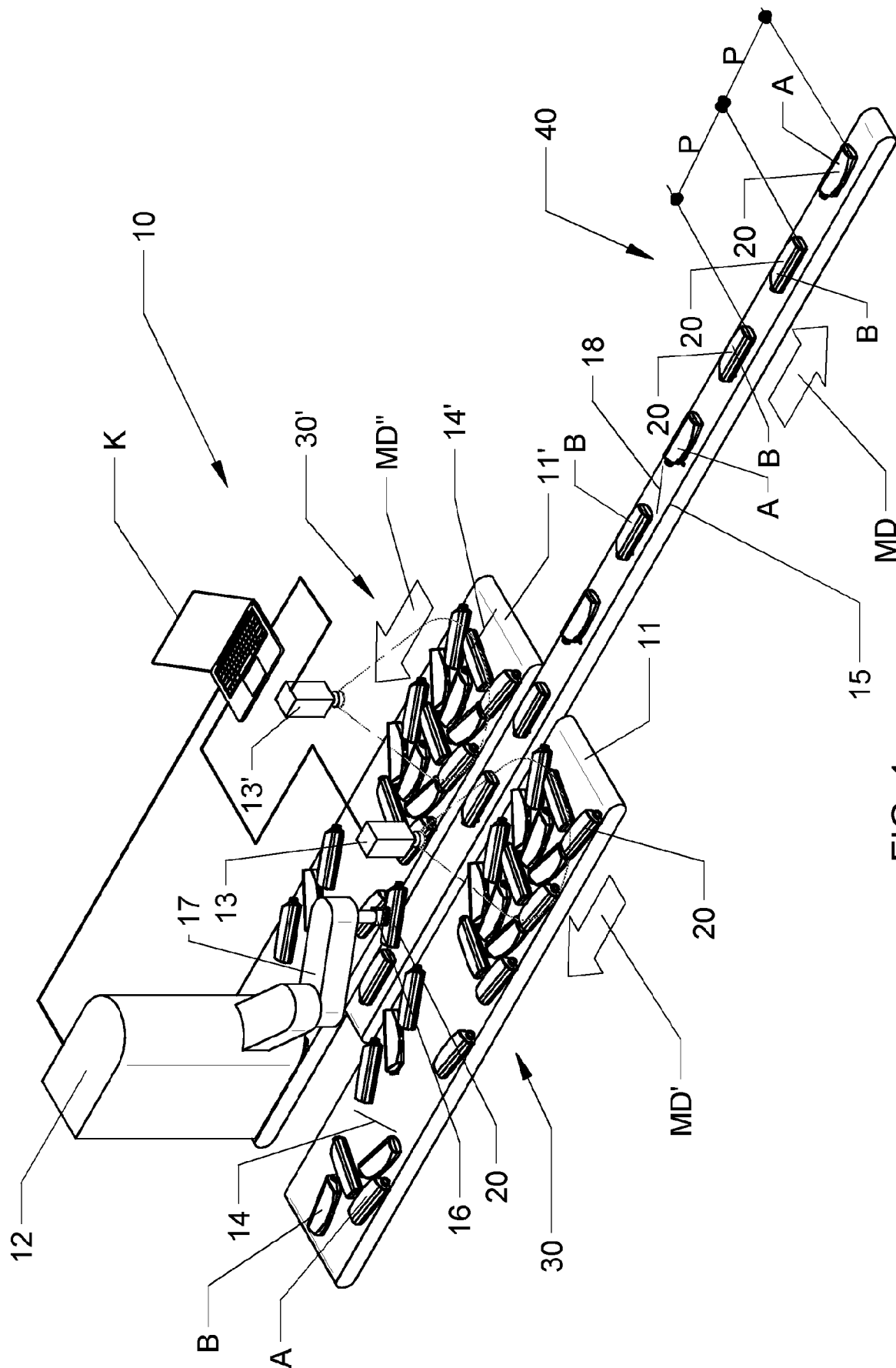


FIG. 1

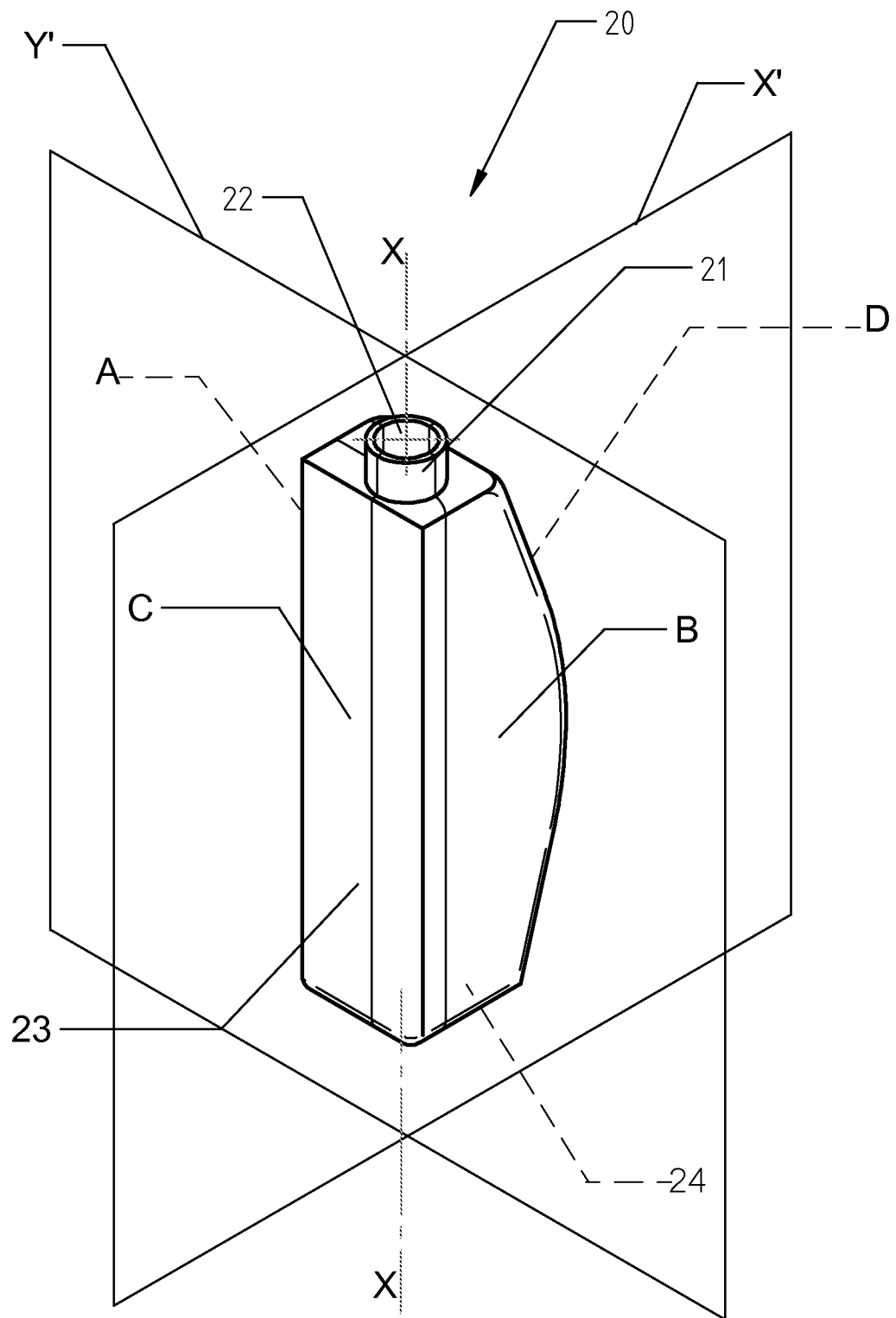


FIG. 2

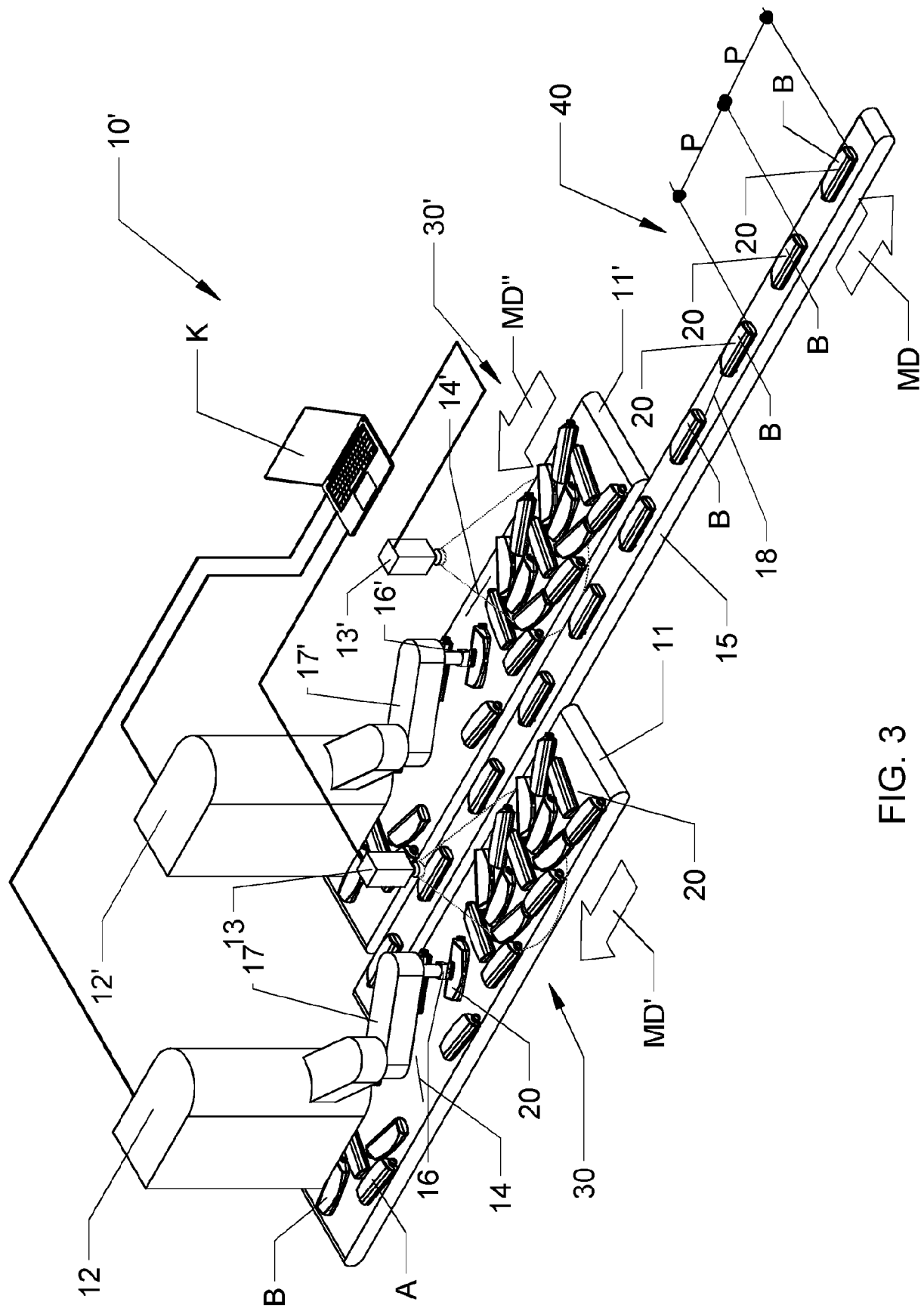


FIG. 3