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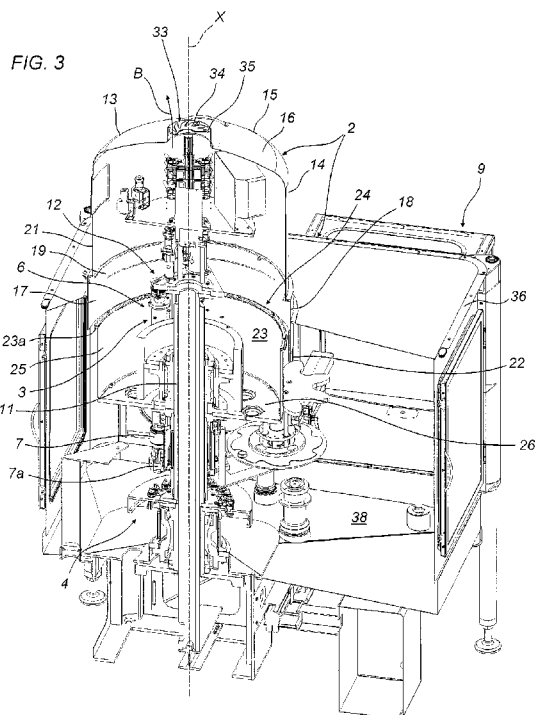
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(54) Title: AN ENCLOSING STRUCTURE FOR CONTAINER PACKAGING MACHINES AND/OR MACHINE UNITS, IN PARTICULAR CAPPING MACHINES.



(57) Abstract: A packaging machine or machine unit, as used in particular for capping containers (5), is enclosed by a structure (1) that comprises a casing (2) positioned at least in part around the active components (3) of a packaging unit (4) supplied with open containers (5). The casing (2) comprises a fixed cowl (13) encompassing the components (3) of the packaging unit (4), and a movable cowl (23) furnished with at least one sealing element (4). The movable cowl (23) is capable of movement between an open configuration, in which a gap (23a) is created between the fixed cowl (13) and the movable cowl (23) so as to place the fixed cowl (13) in fluid communication with the surrounding atmosphere, and a closed configuration in which the sealing element (24) of the movable cowl (23) engages the fixed cowl (13), occluding the gap (23 a) and consequently isolating the interior of the fixed cowl (13) from the surrounding atmosphere.



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Description

An enclosing structure for container packaging machines and/or machine units, in particular capping machines

Technical Field

The present invention relates to an enclosing structure for container packaging machines and/or machine units, and in particular for capping machines.

The present invention finds application to advantage in the art field of
5 carousel type machines such as fillers, cappers, sterilizers and the like, generally handling open containers intended to hold food products of both liquid and powder consistency, or indeed any product that needs to be protected from external contaminants.

Background Art

In the case of cappers, the prior art embraces machines consisting in a
10 carousel rotatable about a vertical axis, which comprise a drum furnished peripherally with a set of capping units distributed circumferentially about the vertical axis of rotation. Each capping unit comprises a hollow shaft centred on a vertical axis and carrying a relative capping head at the lower end, equipped with a respective gripper mechanism.

15 Located below the drum, generally, will be a disc or a set of pedestals on which to stand respective open containers. The disc or pedestals are supplied with containers from a corresponding infeed station. At the same time, the capper is supplied from a feeder station with single caps positionable on each of the incoming containers. Containers capped by the carousel are
20 released ultimately, by the disc or by the pedestals, to a corresponding outfeed station.

During the passage of the containers from the infeed station to the outfeed station, a single cap is picked up from the aforementioned feeder station by each capping head and fitted to a respective container standing on the disc or on the relative pedestal. In order to accomplish this sequence of steps, each capping head is able to rotate while remaining vertically aligned above the corresponding container, as well as being translatable vertically toward or away from the selfsame container. The containers can be closed with the aforementioned caps by applying a twisting action or a forcing action, or a combination of the two, depending on the type of closure specified.

In greater detail, the capping units and the disc or pedestals are caused to rotate as one about the vertical axis of the capping machine by means of a vertical shaft that is common to both.

Both the capping units and the disc or pedestals carrying the containers are connected to the vertical shaft in such a way that all must necessarily rotate together about the vertical axis of the capping machine.

The translational movement of the capping units is induced by respective follower mechanisms engaging in a groove that constitutes the active profile of a cylindrical cam positioned between the rotating vertical shaft and the capping units.

The cylindrical cam does not rotate about the vertical axis of the machine but remains stationary, so that when the capping units are set in rotation about the vertical axis, each will descend or ascend as a result of the interaction between the respective follower mechanism and the cam profile.

To ensure that the capper can be used with different types of containers, the operating distance between the capping units and the disc or pedestals supporting the containers will be adjustable between presettable maximum and minimum values.

To this end, the capping units are coupled captively and slidably to the rotating vertical shaft and the cylindrical cam is coupled captively and

slidably to respective fixed mountings.

Capping machines of the type described above may also be equipped with a casing, cowl or similar structure, placed over the machine and enclosing the capping units at least in part. The casing in question is fixed in relation to the moving parts of the machine, which normally will be enclosed within the casing. In this way, most of the motion-inducing components in the capping units of carousel type machines can be protected from unwanted infiltrations of dust and/or dirt.

Notwithstanding the fact that with a casing fitted to machines for handling open containers, such as the capping machine described above, it becomes possible to protect moving parts from the infiltration of unwanted dust and particles, and similarly to protect operators from these same moving parts, the applicant observes nonetheless that the assembly of machine and casing is affected by certain drawbacks, connected principally with the infiltration of liquids and/or cleansing substances utilized at high pressures when the machines are washed down, and with the need to maintain the aseptic integrity of the containers both when empty and when filled with the product being packaged.

In particular, it has been noted that in the course of washing operations, which normally include a preliminary step of spraying foamable substances onto exposed working parts of the packaging machine, followed by a step of rinsing these same parts with high pressure jets, the washing liquids utilized can find their way undesirably into the space enclosed by the protective casings. Such infiltrations can damage motion-inducing components of the capping heads, with the result that these same parts may require servicing more than once to restore their correct operation, and may even need replacing. Self-evidently, these servicing operations impact heavily on production and running costs generated by the machines in question, incurred both through the purchase of replacement parts and the payment of labour charges, and as a result of maintenance stoppages.

It will be appreciated also that when carousel machines of the
aforementioned type are in operation, there is the risk that contaminant
particles and/or substances can escape from the bottom of the casing and
drop into the open containers; such contaminants include oils, grease and
5 other lubricants on the motion-inducing components of the capping heads,
or rust and other particles shed by parts of these components engaged in
sliding contact, all of which will inevitably spoil the product, whether
already in the container or yet to be batched.

Disclosure of the Invention

10 The object of the present invention, accordingly, is to overcome the
drawbacks associated with prior art machines.

A first object of the present invention, in particular, is to provide an
enclosing structure for container packaging machines and/or machine units,
in particular capping machines, by which motion-inducing components of
15 the various operating mechanisms will be protected when the machine is
washed and rinsed periodically.

A further object of the present invention is to ensure that when the
machine by which containers are packaged is in operation, there will be no
possibility of contaminant particles and/or substances dropping from the
20 motion-inducing components of machine units into the containers being
processed.

Another object of the invention is to ensure that any pulverulent material
transported and/or set in motion by the conveyors at the infeed and outfeed
stations, or deposited on the outer surfaces of the containers being
25 processed, will not circulate above the open tops of the containers.

The stated objects and others besides are substantially realized in an
enclosing structure for container packaging machines and/or machine units,
in particular capping machines, as recited in the appended claims.

Brief Description of the Drawings

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- figure 1 is a perspective illustration of an enclosing structure according to the present invention, applicable to packaging machines and/or machine units for packaging containers, and in particular to capping machines;
- figure 2 is an elevation view of the structure illustrated in figure 1;
- figure 3 is a section taken on cutting plane A-A in figure 1, which shows a machine for packaging containers equipped with an enclosing structure according to the present invention, illustrated in a first operating position;
- figure 4 is an enlarged detail of figure 3.

Detailed description of the preferred embodiments of the invention

With reference to the accompanying drawings, numeral 1 denotes an enclosing structure, in its entirety, for container packaging machines and/or machine units, and in particular for capping machines.

More specifically, albeit implying no limitation in scope of the present invention, the structure disclosed is applicable to carousel machines of whatever type, for example fillers, cappers, sterilizers, etc., utilized for processing open containers in which liquid and/or powdered products are to be packaged, such products consisting preferably in food products.

As discernible from the accompanying drawings, the enclosing structure 1 comprises at least one isolation casing 2, extending at least in part around at least one motion-inducing component 3 (see figures 3 and 4) of a packaging unit 4 operating on open containers 5.

Preferably, the isolation casing 2 will encompass a plurality of motion-inducing components 3 presented by the packaging unit 4, by which one or more operations are performed on the open containers 5 in the process of capping and releasing the finished article.

Applied to a capping machine, or indeed to any machine of generally

similar type, the isolation casing 2 extends at least partially around the motion-inducing components 3 of the packaging unit 4, which is equipped with a plurality of capping units 6 distributed circumferentially about a common vertical axis X. Each capping unit 6 is equipped with an appropriate capping head 7 that operates by activating a relative gripper mechanism 7a designed to take up and apply successive caps of familiar design (not illustrated) supplied to the machine by way of a respective feeder station (not illustrated).

The capping units 6 are carried by a drum 8 positioned above a plurality of pedestals (not illustrated) on which the open containers 5 are supported while being capped.

With reference in particular to figures 1 and 2 of the drawings, the pedestals supporting the containers 5 are supplied from a respective infeed station 9 with open containers, singly and in succession. In a preferred embodiment, these same pedestals are designed to release the containers 5, closed with respective caps by the aforementioned capping units 6, to an outfeed station 10.

To advantage, the containers 5 advance from the infeed station 9 to the outfeed station 10 following a substantially circular path, along which each capping head 7 is caused to rotate while remaining above and in vertical alignment with the relative container 5 and, in controlled sequence, to translate toward and/or away from the selfsame container 5. In this way, each gripper mechanism 7a is made to pick up a single cap from the relative feeder station and place it on a respective container 5 directed onto the carousel from the infeed station 9.

The nature of the motion induced in the cap by the capping unit 6 will depend entirely on the type of cap specified for the containers 5 in production.

To ensure that the capping units 6 and the pedestals supporting the containers 5 revolve as one on the carousel, both are coupled to a common

vertical shaft 11.

The translational movement of the capping units 6 is induced through the agency of respective follower mechanisms (conventional in embodiment) engaging in a groove that constitutes the active profile of a cylindrical cam
5 positioned between the common vertical shaft 11 and the capping units 6.

The position of the cylindrical cam remains unchanged during operation, whereas the capping units 6 revolve around the vertical shaft 11 and will also ascend or descend, as dictated by the cam profile.

The distance between the capping units 6 and the respective pedestals
10 supporting the containers 5 can be adjusted to suit containers of different heights received from the infeed station. In particular, the entire superstructure of the packaging unit 4, that is to say the plurality of capping units 6 and all of the mechanisms by which motion is induced in these same units, are capable of movement along the common vertical shaft 11 between
15 an upper limit position, in which the capping units 6 are placed at a maximum distance from the respective pedestals, and a lower limit position (figures 3 and 4), in which the capping units 6 are placed at a minimum distance from the respective pedestals.

As illustrated in the drawings, the aforementioned isolation casing 2
20 comprises at least one fixed cowl 13 extending at least partially around the motion-inducing components 3 of the packaging unit 4, that is to say around the capping units 6, in this particular instance.

The fixed cowl 13 comprises a substantially cylindrical body 14 presenting a first end 15 at least partially enclosed by a relative wall 16,
25 preferably of rounded profile, and a second end 17 located opposite to the first end 15 and consequently remote from the enclosing wall 16.

As discernible in figure 3, the second end 17 of the fixed cowl 13 is directed downwards, facing toward the capping heads 7 and toward the pedestals carrying the containers 5 being capped.

30 Still referring to figure 3, the body 14 of the fixed cowl 13 comprises at

least one circular rib 18 projecting internally from an inside wall 19 of the selfsame cowl 13 and serving to create a stop 20 (figure 4) directed toward the common vertical shaft 11.

More specifically, the body 14 of the fixed cowl 13 comprises a first module 21 and a second module 22 connected one to another and presenting dissimilar diametral dimensions.

To advantage, the diameter of the second module 22 is greater than the diameter of the first module 21, and accordingly, the fixed cowl 13 presents a cross section that reduces in width progressing from the second end 17 to the first end 15.

The circular internal rib 18 is positioned preferably between the first module 21 and the second module 22 of the fixed cowl 13.

As illustrated in the accompanying drawings, the isolation casing 2 also comprises at least one movable cowl 23 furnished internally with at least one sealing element 24. The movable cowl 23 is associated operationally with the fixed cowl 13 and affords a passage to each of the capping units 6, these being the components of the packaging unit 4 by which the containers 5 fed onto the carousel are effectively handled.

Advantageously, the movable cowl 23 is capable of movement between an open configuration (figures 3 and 4) assumed with the structure 1 in a first operating position, in which at least one gap 23a is created between the fixed cowl 13 and the movable cowl 23, thereby placing the fixed cowl 13 in fluid communication with the surrounding environment, and a closed configuration, assumed with the structure 1 in a second operating position, in which the sealing element 24 registers against the stop 20 presented by the fixed cowl 13, in such a way as to isolate the selfsame fixed cowl hermetically from the surrounding atmosphere and from the exposed parts of the capping units 6.

In the preferred embodiment illustrated, the movable cowl 23 comprises a substantially cylindrical body 25 of which one end is attached to a rotating

disc 26 of the packaging unit 4 rigidly associated with the common vertical shaft 11 and positioned at least in part over the pedestals carrying the containers 5. Thus, the movable cowl 23 rotates as one with the capping units 6 about the aforementioned vertical axis X and is slidable together
5 with the selfsame units on the vertical shaft 11 between the upper limit position and the lower limit position.

Referring in particular to figures 3 and 4, the movable cowl 23 is hermetically sealed at bottom by the rotating disc 26, which presents a plurality of openings 26a furnished with suitable seals 26b proportioned to
10 accommodate the capping units 6.

As discernible in figures 3 and 4, the end of the movable cowl 23 farthest from the rotating disc 26 carries the sealing element 24, which is interfaceable with the aforementioned stop 20 when the movable cowl 23 assumes the closed configuration.

15 To establish the communicating gap 23a between the fixed cowl 13 and the surrounding environment when the movable cowl 23 presents the open configuration, the diametral dimension of the movable cowl 23 is advantageously less than the diametral dimension presented by the first module 21 of the fixed cowl 13. The gap 23a, accordingly, is of substantially
20 circular geometry, being delimited between the first module 21 of the fixed cowl 13 and the outermost part of the movable cowl 23.

Still referring to figures 3 and 4, the sealing element 24 presents a substantially circular appearance, considered overall.

In particular, the sealing element 24 projects outwardly in cantilever
25 fashion from the movable cowl 23 toward the first module 21 of the fixed cowl 13, in such a way as to interact radially with the stop 20 and isolate the fixed cowl 13 hermetically when the movable cowl 23 assumes the closed configuration.

More exactly, the sealing element 24 presents a circumferential mounting
30 portion 27 designed to engage an annular edge 28 of the movable cowl 23

directed toward the fixed cowl 13, and a circumferential sealing portion 29 positioned on the side opposite to the circumferential mounting portion 27.

The circumferential mounting portion 27 is secured to the annular edge 28 through the agency of a respective retaining ring 30 by which the
5 selfsame portion 27 of the sealing element 24 is forced vertically down against the annular edge 28.

To advantage, as discernible in the sectional illustration of figure 4, the circumferential sealing portion 29 presents at least one circumferential groove 31 engageable by the stop 20 when the movable cowl 23 assumes the
10 closed configuration, in the second operating position.

The circumferential groove 31 of the sealing portion 29 is delimited preferably by two superposed circumferential projections 32 of the sealing element 24, which extend radially toward the first module 21 of the fixed cowl 13.

15 Advantageously, in accordance with the present invention, the isolation casing 2 comprises ventilation means 33 associated operationally with the fixed cowl 13 and serving, when the movable cowl 23 is in the first operating position, to generate at least one flow of air B entering through the gap 23a and exiting at the end of the fixed cowl remote from the gap.

20 The ventilation means 33 in question will preferably comprise an extractor fan 34, installed and operating in an opening 35 afforded by the top enclosing wall 16 of the fixed cowl 13.

In detail, the extractor fan 34 can be set in rotation in such a way as to draw air through the gap 23a when the movable cowl 23 assumes the open
25 configuration, and will be disabled when the movable cowl 23 assumes the closed configuration, that is to say with the gap 23a occluded by the sealing element 24.

As illustrated in the drawings, the isolation casing 2 comprises a frame 36 by which the fixed cowl 13 is surrounded and at least partially enclosed
30 together with the movable cowl 23 and the packaging unit 4. The enclosing

frame 36 also houses conveyor means 37 (figure 2) operating on the infeed and the outfeed side of the packaging unit 4, serving to transport the containers 5 and consisting for example in belts or similar conveying systems.

5 It will be seen in the drawings that the enclosing frame 36 delimits an enclosure 38 protected from external elements and in fluid communication with the surrounding environment by way of an infeed channel 36a and an outfeed channel 36b. More exactly, the conveyor means 37 carrying open containers 5 toward the capping units 6 of the carousel are housed at least in part by the infeed channel 36a, whilst the conveying means 37 carrying capped containers 5 away from the capping units 6 are housed at least in part by the outfeed channel 36b.

To advantage, the ventilation means 33 are associated operationally with the enclosing frame 36 in such a way as to generate at least one flow of air C within the enclosure 38, directed from a top portion of the frame 36 to a bottom portion of the frame, where the conveyor means 37 transporting the containers 5 are located. In other words, the flow C is forced by the ventilation means 33 from top to bottom, in such a manner that the air will be expelled through the infeed channel 36a and the outfeed channel 36b, as well as through other outlets (not illustrated) located at the bottom of the enclosing frame 36.

To this end, the ventilation means 33 comprise a first blower fan 39 occupying and operating within a first opening 40 afforded by a top wall 41 of the enclosing frame 36 in a position alongside the fixed cowl 13. To advantage, ambient air drawn in by the first fan 39 is filtered before being directed into the infeed channel 36a admitting open containers 5.

The ventilation means 33 also comprise a second blower fan 42 occupying and operating within a second opening 43 afforded by the top wall 41 of the enclosing frame 36 in a position alongside the fixed cowl 13.

30 Similarly, ambient air drawn in by the second fan 42 is filtered before

being directed into the outfeed channel 36b.

The first and second blower fans 39 and 42 are set in rotation to generate respective flows of air C during normal operation of the packaging unit 4.

It will be appreciated however that the first and second blower fans 39
5 and 42 can also be activated during situations other than the normal operation of the packaging unit 4, such as when the equipment is being washed, for example.

In the event that the packaging unit 4 is equipped with capping units 6, it will be preferable to set up the ventilation means in such a way that the air
10 flow produced by the first blower fan 39 is gentler than the air flow produced by the second blower fan 42. Adopting this expedient, it becomes possible to ensure that the air flow directed through the infeed channel 36a will not encroach on the operating space of an upstream machine operating in a protected atmosphere, such as a filler.

15 To protect the enclosure 38 accommodating the packaging unit 4 from the introduction of undesirable contaminant particles, the first opening 40 and the second opening 43 are equipped each with a respective filter element.

The drawbacks associated with the prior art are overcome by the present
20 invention, which provides numerous advantages.

Firstly, the enclosing structure of the present invention affords complete protection to the mechanical components by which motion is induced in assemblies such as the capping units, in the course of washing operations on a machine or a packaging unit of the type described and illustrated.

25 In particular, the isolation casing is able to accompany the elevating movement of the entire packaging unit, and thus shield the mechanical parts when the unit is exposed to foamable substances and rinsing liquids applied by means of high pressure jets. In this situation, the interaction between the sealing element and the relative stop presented by the fixed cowl will
30 prevent washing liquids from penetrating the fixed cowl and investing the

motion-inducing components of the packaging unit, thereby causing damage.

In addition, the inclusion of the ventilation means helps to preserve the aseptic integrity of the containers and/or the product held in the containers
5 given that, on the one hand, contaminant particles and/or substances attached to the motion-inducing components of the packaging unit are prevented from falling onto the containers while still open, during the operation of the machine, and on the other, pulverulent material present on the conveyor belts and on the containers entering the machine are prevented
10 from rising above the level of the container mouths.

In effect, the extractor fan operating on the fixed cowl removes air from inside this cowl and creates a protective barrier at the gap between the fixed and movable cowls, whilst the first and second blower fans ensure that any dust or powder particles present in the infeed and outfeed channels will stay
15 tight against the bottom of the enclosure.

Claims

- 1) An enclosing structure for container packaging machines and/or machine units, and in particular capping machines, comprising at least one isolation casing (2) extending at least in part around at least one motion-inducing component of a packaging unit (4) operating on initially open containers (5),
- 5 characterized in that the isolation casing (2) of the structure (1) comprises:
- at least one fixed cowl (13) extending at least in part around the at least one motion-inducing component (3) of the packaging unit (4),
 - at least one movable cowl (23) operationally associated with the fixed cowl (13), furnished with at least one sealing element (24), affording a passage to
- 10 at least one working part (3) of the packaging unit (4) and capable of movement between an open configuration assumed with the structure (1) in a first operating position, in which at least one gap (23a) is created between the fixed cowl (13) and the movable cowl (23), thereby placing the fixed cowl (13) in fluid communication with the surrounding environment, and a
- 15 closed configuration, assumed with the structure (1) in a second operating position, in which the sealing element (24) registers against a stop (20) afforded by the fixed cowl (13), in such a way as to isolate the selfsame fixed cowl hermetically from the surrounding atmosphere and from an exposed portion of the working part (3).
- 20 2) A structure as in claim 1, wherein the fixed cowl (13) comprises a substantially cylindrical body (14) presenting a first end (15) enclosed at least in part by a wall (16) preferably of rounded appearance, also a second end (17) located opposite to the first end (15) and directed toward the movable cowl (23).
- 25 3) A structure as in claim 2, wherein the cylindrical body (14) of the fixed cowl (13) presents at least one circular rib (18) projecting internally from an inside wall (19) of the selfsame cowl (13) and serving to create a stop (20)

such as will engage the sealing element (24) of the movable cowl (23) when this same cowl (23) assumes the closed configuration.

4) A structure as in claim 2 or 3, wherein the cylindrical body (14) of the fixed cowl (13) comprises a first module (21) and a second module (22) connected one to the other and presenting dissimilar diametral dimensions.

5) A structure as in claim 4, wherein the diametral dimensions presented by the second module (22) of the fixed cowl (13) are greater than the diametral dimensions presented by the first module (21).

6) A structure as in claim 4 or 5, where claim 4 is dependent on claim 3, wherein the internal circular rib (18) is located between the first module (21) and the second module (22) of the fixed cowl (13).

7) A structure as in preceding claims, wherein the movable cowl (23) comprises a substantially cylindrical body (25) of which one end is attached to a rotating disc (26) of the packaging unit (4) positioned at least partly over the containers (5) being processed by this same unit, and the other end carries the sealing element (24), the movable cowl (23) being closed hermetically by the rotating disc (26) and revolving as one with the selfsame disc about a common vertical axis (X) relative to the fixed cowl (13).

8) A structure as in claim 7 where dependent on claims 4 to 6, wherein the diametral dimensions of the movable cowl (23) are smaller than the diametral dimensions presented by the first module (21) of the fixed cowl (13), and the gap (23a) is of substantially circular geometry, created between and delimited by the movable cowl (23) and the first module (21) of the fixed cowl (13).

9) A structure as in claims 4 to 8, wherein the sealing element (24) presents a substantially circular appearance, and extends from the movable cowl (23) toward the first module (21) of the fixed cowl (13).

10) A structure as in claims 4 to 9, wherein the sealing element (24) presents:

- a circumferential mounting portion (27) designed to engage an annular edge (28) of the movable cowl (23) directed toward the fixed cowl (13);
- a circumferential sealing portion (29), positioned on the side opposite to the circumferential mounting portion (27) and presenting at least one circumferential groove (31) engageable by the stop (20) when the movable cowl (23) assumes the closed configuration.

11) A structure as in claims 2 to 10, comprising ventilation means (33) associated operationally with the fixed cowl (13) and serving, when the movable cowl (23) assumes the open configuration, to generate at least one flow of air (B) entering the fixed cowl (13) through the gap (23a) and exiting at the end of the selfsame cowl (13) remote from the gap (23a).

12) A structure as in claim 11, wherein ventilation means (33) comprise an extractor fan (34), installed and operating in an opening (35) afforded by the enclosing wall (16) of the fixed cowl (13), which can be set in rotation in such a way as to draw air through the gap (23a) when the movable cowl (23) assumes the open configuration, and is disabled when the movable cowl (23) assumes the closed configuration.

13) A structure as in claim 12, wherein the isolation casing (2) comprises a frame (36) by which the fixed cowl (13) is surrounded and at least partially enclosed together with the movable cowl (23), the packaging unit (4), and respective conveyor means (37) by which containers (5) are transported into and away from the packaging unit (4), wherein the enclosing frame (36)

delimits an enclosure (38) in fluid communication with the surrounding environment by way of an infeed channel (36a) at least partially accommodating the conveyor means (37) by which containers (5) are transported into the packaging unit, and an outfeed channel (36b) at least
5 partially accommodating the conveyor means (37) by which containers (5) are transported away from the packaging unit.

14) A structure as in claim 13, wherein ventilation means (33) are associated operationally with the enclosing frame (36) in such a way as to generate a flow of air (C) internally of the enclosure (38), directed from a top portion of
10 the frame (36) toward a bottom portion of the selfsame frame occupied by the conveyor means (37) on which the containers (5) are transported.

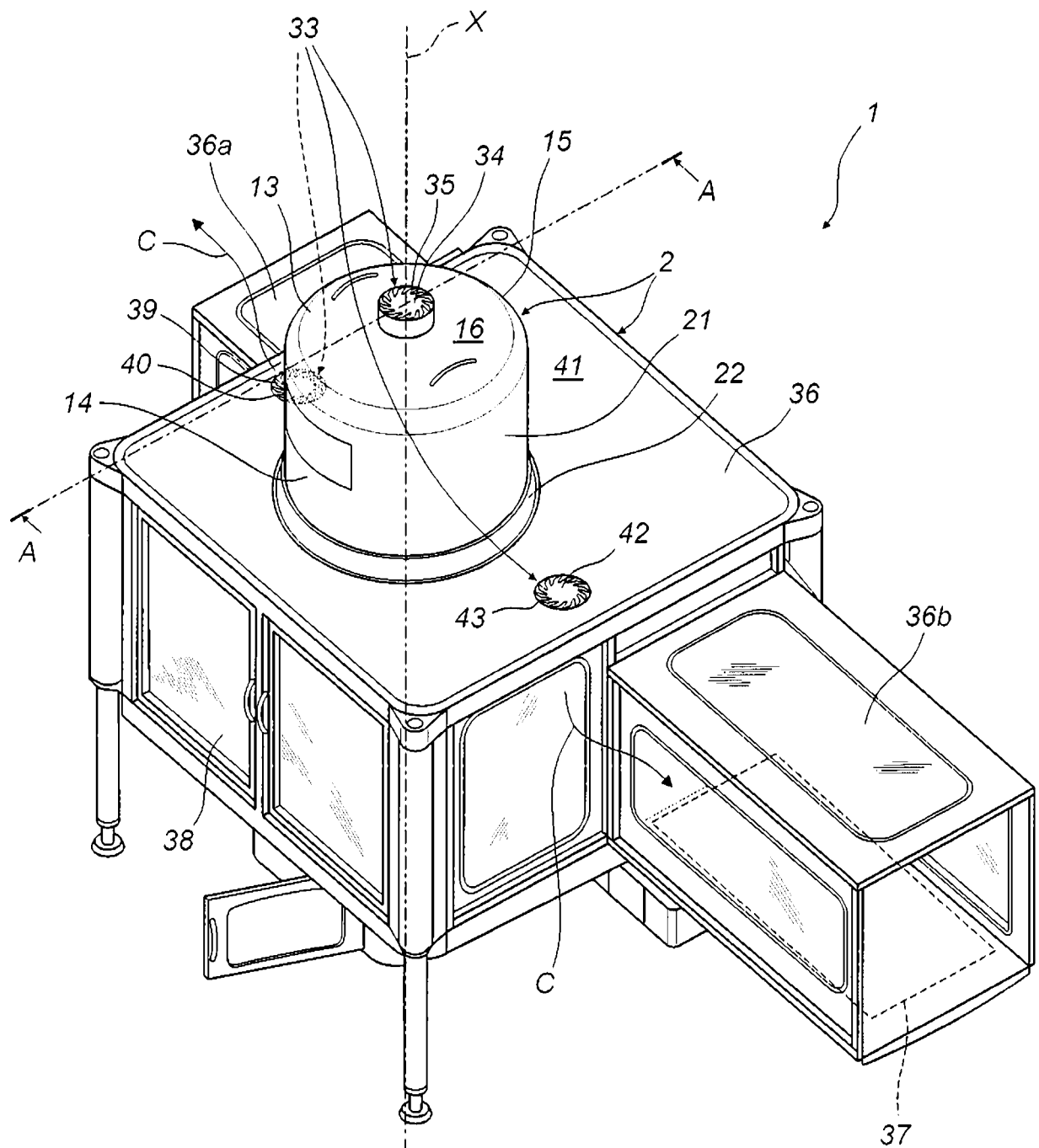
15) A structure as in claim 14, wherein the ventilation means (33) comprise:
- a first blower fan (39) occupying and operating within a first opening (40) afforded by a top wall (41) of the enclosing frame (36), in a position
15 alongside the fixed cowl (13), by which ambient air is drawn in and filtered before being directed toward the channel (36a) through which containers (5) are admitted to the packaging unit;
- a second blower fan (42) occupying and operating within a second opening (43) afforded by the top wall (41) of the enclosing frame (36), in a position
20 alongside the fixed cowl (13), by which ambient air is drawn in and filtered before being directed toward the channel (36b) through which containers (5) leave the packaging unit.

16) A structure as in claim 15, wherein the first and second blower fans (39, 42) are set in rotation in such a way as to generate respective flows of air (C) during the operation of the packaging unit (4) processing the containers (5),
25 of which the air flow (C) produced by the first blower fan (39) is gentler than the air flow (C) produced by the second blower fan (42).

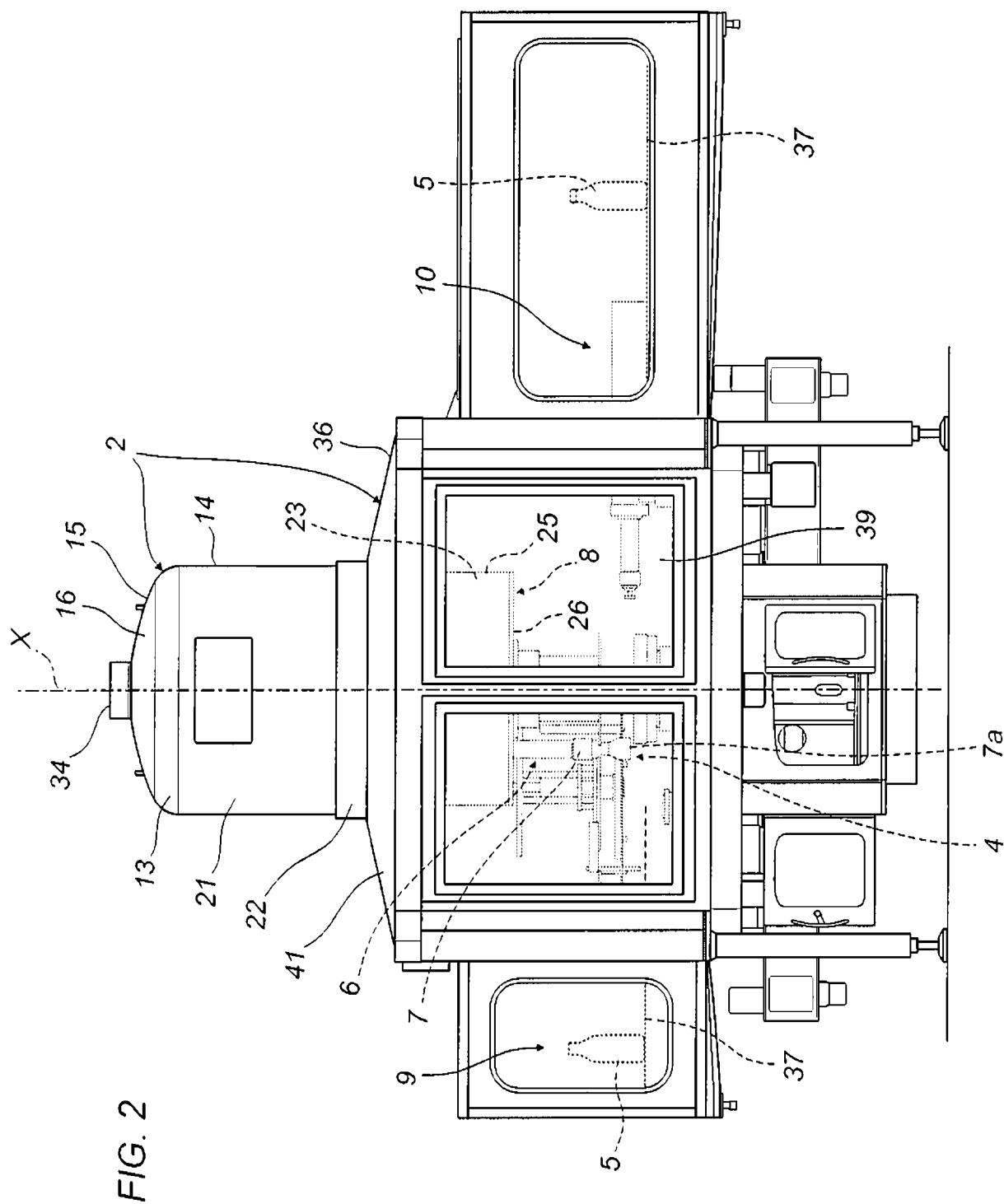
17) A structure as in claim 16, wherein the first opening (40) and the second opening (43) are equipped each with a respective air filter element.

$\frac{1}{4}$

FIG. 1

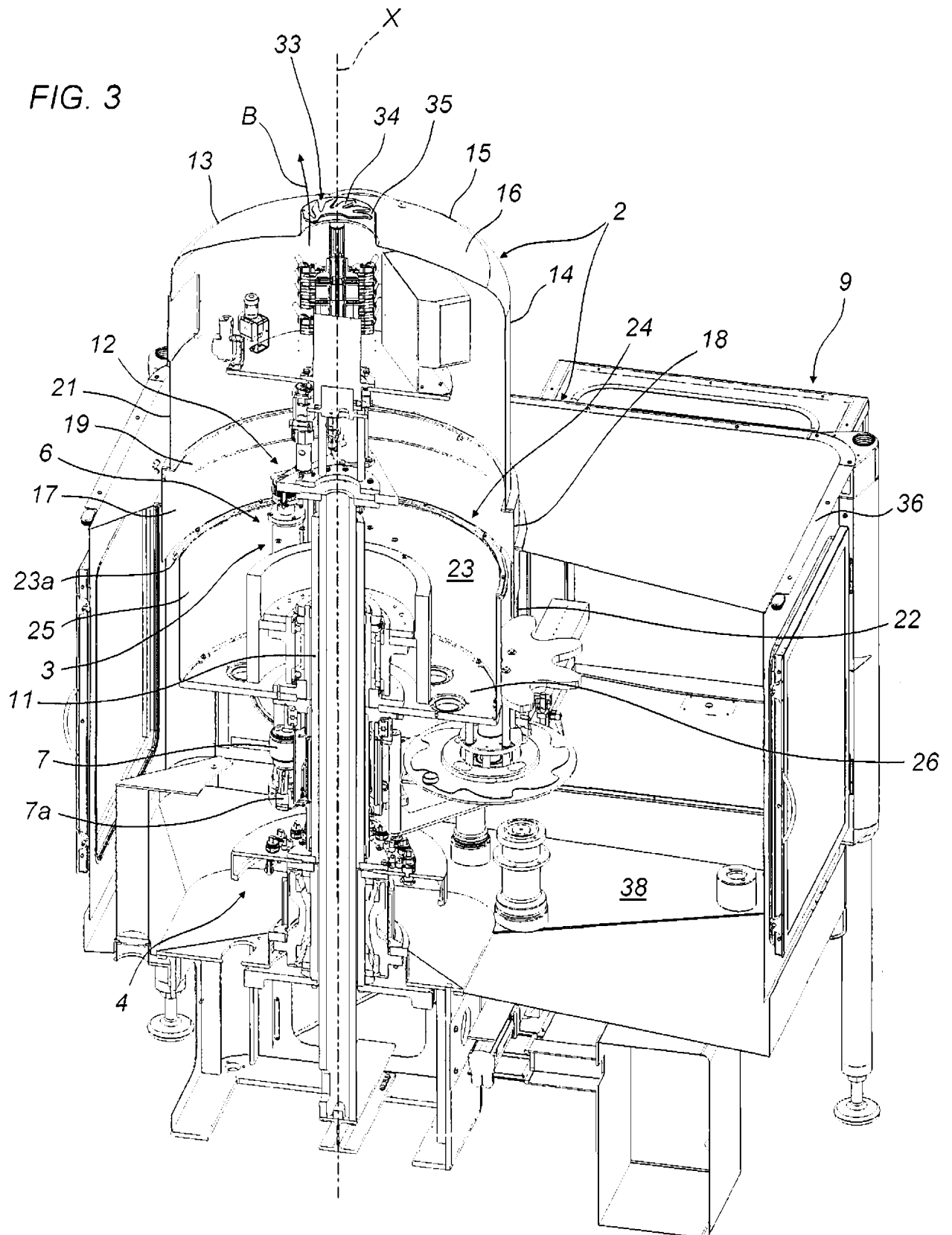


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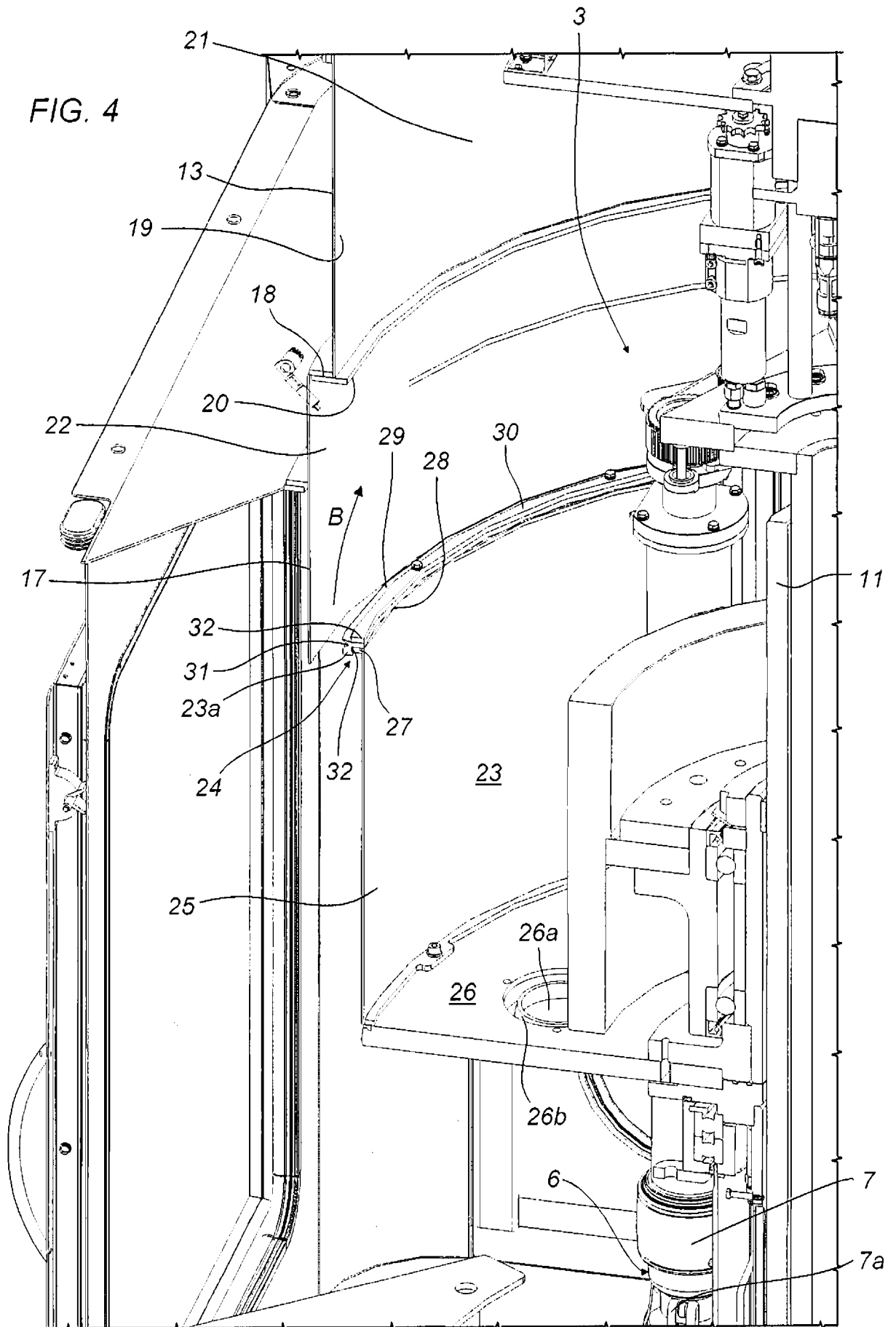


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FIG. 3



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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/051618

A. CLASSIFICATION OF SUBJECT MATTER

INV. B67B3/00 B67C3/22 B67C7/00

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B67B B67C

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2007/132339 A1 (AZIONARIA COSTRUZIONI ACMA SPA [IT]; ZANINI GIANPIETRO [IT]; BARONI MA) 22 November 2007 (2007-11-22) abstract; figures 1-5	1
A	EP 1 529 751 A1 (KHS MASCH & ANLAGENBAU AG [DE] KHS AG [DE]) 11 May 2005 (2005-05-11) paragraph [0024] - paragraph [0026]; figures 1-3	1
A	EP 0 758 624 A1 (ROSSI & CATELLI SPA [IT] TETRA PAK PLASTICS LTD [CH]) 19 February 1997 (1997-02-19) abstract; figure 2	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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

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

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Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

G document member of the same patent family

Date of the actual completion of the international search

10 August 2009

Date of mailing of the international search report

18/08/2009

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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