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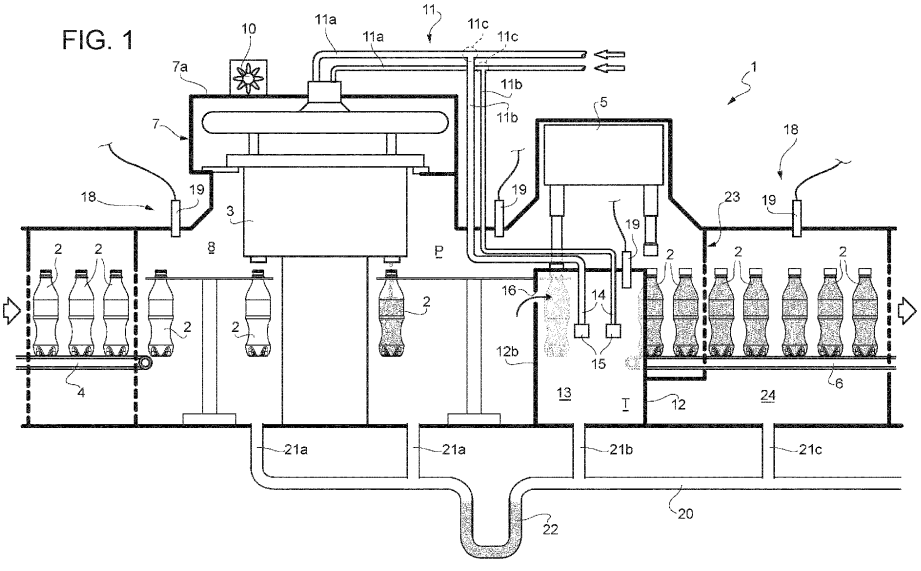
(54) APPARATUS FOR PACKAGING A POURABLE PRODUCT

(57) An apparatus for packaging a pourable product (1) is described comprising: a first housing (7) delimiting therein an isolation chamber (8) configured to contain a controlled atmosphere in sterile and/or aseptic conditions; a packaging unit (3) for packaging the pourable product housed in the isolation chamber (8); and a fluidic circuit (11) comprising a main duct (11a) for feeding a working fluid into the isolation chamber (8); wherein the apparatus (1) further comprises a second housing (12) delimiting therein a test chamber (13) operatively separated from the isolation chamber (8) and configured to contain a controlled atmosphere in sterile and/or aseptic conditions; wherein the isolation chamber (8) is external with respect to the test chamber (13); and wherein the fluidic circuit (11) comprises a branch (11b) extending from the main duct (11a) to the test chamber (8) to convey the working fluid therein and allow sampling thereof inside the test chamber (13).

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to apparatus for packaging a pourable product, preferably a pourable food product.

[0002] In particular, the present invention will refer, without loss of generality, to an apparatus for filling containers, for example plastic or glass bottles, with a pourable product, preferably a pourable food product.

STATE OF THE ART

[0003] Apparatuses are known for packaging pourable products, preferably a pourable food product such as, for example, water, wine, milk, beer, fruit juices, yoghurt, emulsions, sport drinks, tea, granular products like sugar or salt, or powder products like cocoa or ground coffee.

[0004] In particular, apparatuses are known configured to fill containers such as bottles, jars or similar with a predetermined quantity of pourable product and subsequently seal them by applying respective stoppers or caps.

[0005] For said purpose, a packaging apparatus of the above-mentioned type comprises at least a packaging unit for packaging the pourable product; in particular, a typical apparatus comprises:

- a filling unit receiving at the inlet the containers to be filled, preferably sterilized, and configured to fill them with the pourable product; and
- a capping unit, receiving at the inlet the full containers from the filling unit and configured to apply a cap to each single container and to feed the containers thus filled and closed to an outlet device for any subsequent labelling, packaging and storage operations.

[0006] The need to ensure adequate asepticity of the containers during the packaging process, in order to guarantee the established consumer quality and safety standards, is known in the sector.

[0007] Consequently, the apparatuses of the above-mentioned type further comprise an isolation chamber housing, at least partially, the filling unit and the capping unit and configured to contain therein a controlled atmosphere, so that the filling and capping units can operate in sterile and/or aseptic conditions.

[0008] The isolation chamber therefore defines a sterile and/or aseptic environment of the packaging apparatus, necessary to guarantee the above-mentioned operating conditions.

[0009] In the apparatus of the above-mentioned type, it is known to feed to the isolation chamber, and more in particular to the filling unit, working fluids such as, for example, pressurization or flushing fluids used in or in correlation with the container filling process, like carbon dioxide, nitrogen, air or other gases, or washing or rinsing or sterilization fluids such as, for example, water. Said working fluids must necessarily be sterile and/or aseptic, so as to guarantee the above-mentioned operating conditions.

[0010] Consequently, the need to carry out controls on the above-mentioned working fluids in order to guarantee the above quality and safety standards (namely, the asepticity or sterility standards usually required by the competent authorities in the sector) is also known in the sector.

[0011] It is therefore necessary to carry out periodic tests on the working fluids, typically performed manually by an operator by sampling the working fluids inside the isolation chamber by means of known sampling devices, which generally comprise a filter on which an initially sterile culture medium is arranged configured to support and host one or more microbiological cultures.

[0012] More precisely, during the sampling each filter is positioned inside the isolation chamber, in sterile conditions, in order to be lapped (crossed) by the working fluid/s to be tested.

[0013] After a certain period of time, the filter is removed and analysed to determine the degree of sterility/asepticity of the working fluid.

[0014] These periodic tests therefore entail stoppage of the entire packaging apparatus, emptying of the relative production batch from the isolation chamber, opening of the isolation chamber, with relative interruption of the asepticity/sterility, and the transitional period following the controls necessary for recalibrating optimal operating conditions for resumption of the packaging process.

[0015] The Applicant has therefore observed that said apparatuses for packaging pourable products can be further improved, in particular as regards reducing stoppages of the apparatus, simplifying the architecture thereof and generally improving the conditions of hygiene thereof.

OBJECT AND SUMMARY OF THE INVENTION

[0016] The object of the present invention is to provide an apparatus for packaging a pourable product, which is highly dependable and has a limited cost, and meets at least some of the needs specified above connected with the apparatuses of a known type.

[0017] According to the invention, this object is achieved by an apparatus for packaging a pourable product as claimed in the appended independent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] For a better understanding of the present invention, a preferred non-limiting embodiment thereof is described below, purely by way of example and with the aid of the attached drawings, wherein:

- figure 1 is a schematic lateral view with parts removed for clarity of an apparatus for packaging a

pourable product, produced according to the present invention;

- figure 2 is a perspective view, with parts removed for clarity, of the apparatus of figure 1;
- figure 3 is a perspective view with parts removed for clarity of a detail of the apparatus of figure 1; and
- figure 4 is a schematic overhead view, with parts removed for clarity, of the apparatus of figure 1.

DETAILED DISCLOSURE

[0019] With reference to the attached figures, the number 1 indicates overall an apparatus for packaging a pourable product, preferably a pourable food product such as, for example, water, wine, milk, beer, fruit juices, yoghurt, emulsions, sport drinks, tea, granular products like sugar or salt, or powdered products like cocoa or coffee.

[0020] In particular, the present invention will refer, without loss of generality, to an apparatus 1 for filling containers 2, for example plastic or glass bottles, small bottles, jars and similar, with a predetermined quantity of pourable product.

[0021] In this regard, the apparatus 1 comprises at least one filling machine 3 (known per se and not described in detail) which receives, in use, the containers 2 to be filled from a feeding device 4 thereof and configured to fill said containers 2 with the pourable product.

[0022] The filling machine 3 is configured to fill containers 2 with the pourable product.

[0023] Preferably, the apparatus 1 further comprises a capping machine 5 (known per se and not described in detail) which receives, in use, the containers 2 filled by the filling machine 3. The capping machine 5 is configured to apply a cap to each single container 2 and to feed said filled and closed containers 2 to an outlet conveyor 6.

[0024] In particular, after being capped, the containers 2 are fed to the outlet conveyor 6 to be conveyed towards any subsequent labelling, packaging and storage operations.

[0025] In one embodiment, the apparatus 1 may not comprise the capping machine 5.

[0026] In order to guarantee that the packaging process is carried out according to pre-established food quality and safety standards, the apparatus 1 comprises a first housing 7. The first housing 7 delimits therein an isolation chamber 8. The isolation chamber 8 is configured to contain a controlled atmosphere in a sterile and/or aseptic condition. The apparatus 1 is configured so that the isolation chamber 8 contains said controlled atmosphere. The first housing 7 houses the filling machine 3 and, where provided, the capping machine 5.

[0027] The filling machine 3 is housed in the isolation chamber 8. The capping machine 5 is housed in the isolation chamber 8.

[0028] In use, the isolation chamber 8 contains the controlled atmosphere and, therefore, defines a sterile and/or aseptic production area P. The production area P houses the filling machine 3 and if necessary, the capping machine 5. Therefore, the isolation chamber 8 defines a sterile and/or aseptic environment of the apparatus 1. In this way, the filling machine 3 and the capping machine 5 can operate in sterile and/or aseptic conditions, to guarantee the above-mentioned standards.

[0029] In detail, the housing 7 comprises a delimitation wall 7a which surrounds, separates and seals the isolation chamber 8, and therefore the filling machine 3 and if necessary, the capping machine 5, from the external environment.

[0030] The apparatus 1 comprises at least a feeding unit 10 configured to feed a sterile and/or aseptic barrier gas, preferably sterile air, into the isolation chamber 8. Said feeding of the barrier gas is functional to maintaining the condition of sterility and/or asepticity of the controlled atmosphere of the isolation chamber 8. Said feeding therefore serves to protect said controlled atmosphere of the isolation chamber 8. For the purposes of protecting said controlled atmosphere, the barrier gas could be fed so as to also generate an overpressure condition in the controlled atmosphere of the isolation chamber 8.

[0031] In detail, the feeding unit 10 is preferably fixed to the wall 7a of the housing 7 and includes known filtering and forced ventilation means to convey the sterile barrier gas into the chamber 8 and, therefore, to the production area P.

[0032] For example, the feeding unit 10 comprises a HEPA or ULPA filter configured to filter air coming from the external environment, sterilize it and/or make it aseptic, and feed it into the isolation chamber 8.

[0033] Since the isolation chamber 8 is sealed, it is configured to operate in conditions of overpressure with respect to the external environment.

[0034] As can be seen schematically in figure 1, the apparatus 1 comprises a fluidic circuit 11. The fluidic circuit is configured to feed at least a working fluid into the isolation chamber 8 and, more in particular, into the filling machine 3.

[0035] In particular, in the present description a pressurization or flushing fluid which is used in, or in correlation with, the filling process of the containers 2 such as, for example, carbon dioxide, nitrogen, air or other gases, is indicated as "working fluid". Said working fluid could be a fluid for rinsing at least a part of each container, for example sterile water. Alternatively, said working fluid could be for example sterile air. The working fluid is fed in a sterile and/or aseptic condition.

[0036] According to this preferred and non-limiting embodiment, the circuit 11 comprises two main conduits or ducts 11a configured to feed two working fluids into the isolation chamber 8, more precisely to the filling machine 3.

[0037] Said working fluids must necessarily be sterile and/or aseptic, so as to guarantee the above-mentioned operating conditions.

[0038] Therefore, the need to carry out checks on the

above-mentioned working fluids in order to guarantee the above-mentioned quality and safety standards (asepticity standards usually required by the competent authorities in the sector) is known in the sector. It is therefore necessary to carry out periodic tests on the working fluids.

[0039] For said purpose, the apparatus 1 comprises a second housing 12. The second housing 12 delimits therein a test chamber 13. The test chamber 13 is operatively separated from the isolation chamber 8. The test chamber 13 is configured to contain a controlled atmosphere in a sterile and/or aseptic condition. The apparatus 1 is configured so that the test chamber 13 contains said controlled atmosphere of the test chamber 13.

[0040] In use, the test chamber 13 contains the controlled atmosphere and, therefore, defines a sterile and/or aseptic test area T.

[0041] According to the invention, the isolation chamber 8 is external to the test chamber 13 and the circuit 11 comprises at least a branch 11b, in the example described two branches 11b extending from the respective main ducts 11a to the test chamber 13 to convey therein the relative working fluids, so as to allow sampling of the latter inside the test chamber 13.

[0042] In particular, the production area P defined by the isolation chamber 8 is external to the test area T. Consequently, each branch 11b is configured to convey the relative working fluid into the test area T, to allow sampling of said working fluid inside the test area T and externally of the production area P.

[0043] More in particular, each branch 11b comprises a terminal 14 arranged in the test area T (and therefore positioned in fluidic terms externally of the production area P). The terminal 14 is configured to receive in coupling a test or sampling device 15. The coupling between the test or sampling device 15 and the terminal 14 is functional to allow sampling of the respective working fluid inside the test area T, and externally of the production area P. In this way, a user can couple the test or sampling device 15 to the terminal 14 during production, without accessing the production area P, and therefore without having to re-sterilize the production area P. Having to re-sterilize the production area P would require the user to halt production, with consequent loss of productivity. Therefore, sampling of the working fluid for the purposes of a working fluid sterility test can be carried out during production, avoiding any loss of productivity. In this way the productivity of an apparatus 1 for packaging a pourable product in aseptic conditions is increased, said apparatus being configured to allow a user to sample the working fluid for the purposes of testing the sterility of the working fluid.

[0044] The first housing 7 contains the second housing 12. In this way the test chamber 13 is defined and/or delimited at least partly also by the first housing 7, so that the apparatus 1 can be more compact. In this case the first housing 7 defines an outer casing of the apparatus 1.

[0045] The second housing 12 comprises an opening 16 which arranges the test chamber 13 in fluidic communication with the isolation chamber 8, or the test area T with the production area P, to determine a flow of the barrier gas from the isolation chamber 8 to the test chamber 13, and therefore from the production area P to the test area T, thus also protecting the controlled atmosphere of the test chamber 13.

[0046] In this way, the first housing 7 can contain the second housing 12, thus obtaining a more compact apparatus, and the barrier gas can be used to protect both the isolation chamber 8 and the test chamber 13. Furthermore, the branch 11b can in this way branch off from the main duct 11a in a position closer to the isolation chamber 8.

[0047] Said barrier gas flow from the isolation chamber 8 to the test chamber 13 can be unidirectional. In particular, since the isolation chamber 8 is fed, in use, with the barrier gas by means of the feeding unit 10, a barrier gas flow is established through the opening 16, from the isolation chamber 8 to the test chamber 13.

[0048] Thanks to the presence of the opening 16, the architecture of the apparatus 1 is simplified, since only one feeding unit 10 is required.

[0049] The second housing 12 and the first housing 7 have in common a common wall 12a. The common wall 12a allows access to the test chamber 13 from the external environment. The common wall 12a is operatively interposed between the test chamber 13 and the external environment.

[0050] In further detail, the wall 12a comprises a door or bulkhead 17 for access by the operator to the test chamber 13.

[0051] Due to said configuration, the architecture of the apparatus 1 is compact and simplified. Furthermore, since the bulkhead 17 is positioned in the wall 12a, which faces the external environment, the test chamber 13 can be easily accessed independently from the isolation chamber 8. In other words, to access the test chamber 13, a user does not have to pass through the isolation chamber 8.

[0052] In one embodiment, at least one glove (not illustrated) configured to extend inside the test chamber 13 is fixed in a fluid-tight manner to the common wall 12a for allowing the handling of objects therein in sealed conditions with respect to the external environment.

[0053] In detail, the above-mentioned glove is expediently fixed to the bulkhead 17 of the wall 12a and is configured to allow handling of the sampling devices 15 inside the test chamber 13, without it being necessary to open the bulkhead 17, and therefore in sealed conditions with respect to the external environment.

[0054] In further detail, in use the operator opens the bulkhead 17 and arranges one or more previously sterilized sampling devices 15 inside the test chamber 13.

[0055] The operator then closes the bulkhead 17 and waits for sterile and/or aseptic conditions to re-form inside the test chamber 13. After this, he couples each sampling device 15 with a respective terminal 14 by means of the above-mentioned glove and therefore without re-opening

the bulkhead 17 and without accessing the test chamber 13.

[0056] Said operations are carried out, in use, by the operator preferably during the production in progress in the production area P.

[0057] In practice, the second housing 12 thus defines a glovebox for sampling the working fluids in conditions isolated from the external environment.

[0058] Each branch 11b is in fluidic communication with the main duct 11a through a hydraulic node 11c. The hydraulic node 11c is arranged externally to the isolation chamber 8 and to the test chamber 13. Preferably, each hydraulic node 11c is defined by an elbow or "T" joint.

[0059] This results in a general improvement of the hygiene conditions of the apparatus 1, since said types of hydraulic nodes constitute "dirty" areas of accumulation of dirt and bacteria, and therefore areas with high contamination risk if positioned inside the sensitive production area P.

[0060] The apparatus further comprises a sterilization system 18. The sterilization system 18 is configured to sterilize the isolation chamber 8 and the test chamber 13 independently of each other during a process of cleaning and sterilization of the apparatus 1.

[0061] In particular, the sterilization system 18 comprises a plurality of nozzles 19 configured to feed a sterilization fluid into the isolation chamber 8 and the test chamber 13, separately.

[0062] More in particular, at least one nozzle 19 is arranged inside the test chamber 13 to sprinkle it with the sterilization fluid during a sterilization step at least of the test area T.

[0063] As can be seen in particular in figure 3, the opening 16 is defined by a slot having elongated shape obtained in a wall 12b of the second housing 12 which separates the isolation chamber 8 from the test chamber 12.

[0064] The opening 16 is obtained in a wall 12b which is interposed between the isolation chamber 8 and the test chamber 13. The opening 16 is positioned with respect to the nozzle 19 so as to avoid the sterilization fluid, which flows out of the nozzle 19 of the test chamber 13, coming into contact with the containers. After the user has positioned the sampling device 15 in the test chamber 13, the test chamber 13 must be sterilized, but the production can continue thanks to the presence of the test chamber 13. The positioning of the opening 16 with respect to the nozzle 13 avoids the risk of undesired contact between the sterilization fluid and the containers 2. Said undesired contact could otherwise occur due to the fact that sterilization of the test chamber 13 can be advantageously carried out during production.

[0065] Advantageously, to further reduce the risk of contact between the sterilization fluid and the containers 2, the opening 16 could be arranged with respect to the above-mentioned nozzle 19 of the test chamber 13 so as to also prevent the sterilization fluid that flows out of the nozzle 19 from passing through the opening 16.

[0066] In other words, the opening 16 is positioned with respect to the nozzle 19 so as to at least prevent the sterilization fluid that flows out of the nozzle 19 lapping the containers 2 arranged in the production area P.

[0067] In this way, it is possible to carry out sterilization of the test chamber 13 and therefore of the test area T while production is in progress and without the risk of the sterilization fluid coming into contact with the containers.

[0068] As can be seen schematically in figure 1 and, in a perspective view, in figures 2 and 3, the apparatus 1 comprises a discharge collector duct 20. The collector duct 20 is in fluidic communication with the isolation chamber 8 and with the test chamber 13, by means of respective discharge channels 21a and 21b. In this way the collector duct 20 can receive the sterilization fluid from the isolation chamber 8 and from the test chamber 13, and discharge said sterilization fluid outside the latter.

[0069] The collector duct 20 comprises a siphon 22. The siphon 22 is hydraulically interposed between the discharge channel 21a of the isolation chamber 8 and the discharge channel 21b of the test chamber 13.

[0070] In particular, the siphon 22 is configured to receive and to fill with the sterilization fluid flowing out of the nozzle 19 of the isolation chamber 8 and/or out of the nozzle 19 of the test chamber 13.

[0071] The sterilization fluid fills the siphon 22, following the sterilization phase of the test chamber 13 and/or of the isolation chamber 8. In this way the sterilization fluid that has entered the siphon 22 subsequently protects the isolation chamber 8 from the test chamber 13, to further protect the controlled atmosphere in the isolation chamber 8.

[0072] Due to this configuration, the architecture of the apparatus 1 is further simplified, since only one discharge collector is used for the entire apparatus 1, at the same time reducing the risk of contamination of the isolation chamber 8.

[0073] Expediently, the collector duct 20 is also configured to receive from the test chamber 13, in particular through the relative discharge channel 21b, the working fluid sampled therein. The collector duct 20 can therefore discharge the working fluid outside the test chamber 13. According to the example described, the apparatus 1 comprises a third housing 23. The third housing 23 delimits therein an outlet chamber 24. The outlet chamber 24 is operatively separated from the test chamber 13. The outlet chamber 24 is in communication with the isolation chamber 8 to receive the packaged pourable product. The outlet chamber 24 is in communication with the external environment to convey the packaged product outside the apparatus 1. By packaged pourable product we mean, for example, a sequence of filled containers or a sequence of filled and capped containers.

[0074] In particular, the outlet chamber 24 houses the outlet conveyor 6 and is configured to be depressurized with respect to the isolation chamber 8 and the test chamber 13. The apparatus 1 is configured so that the outlet chamber 24 is depressurized.

[0075] In practice, the depressurized outlet chamber 24 defines a "grey zone" which the operator can access without having to re-sterilize the isolation chamber 8, and is depressurized to extract substances potentially harmful to humans. The outlet chamber 24 is positioned in communication with the external environment to allow the filled containers 2 to be conveyed outside the apparatus 1.

[0076] Advantageously, the first housing 7 contains the third housing 23.

[0077] In this way, the architecture of the apparatus 1 is further simplified and more compact.

[0078] The outlet chamber 24 is in fluidic communication with the collector duct 20 by means of a respective discharge channel 21c. The discharge channel 21a of the isolation chamber 8 can be considered a first discharge channel 21a. The discharge channel 21b of the test chamber 13 can be considered a second discharge channel 21b. The discharge channel 21c of the outlet chamber 24 can be considered a third discharge channel 21c.

[0079] The siphon 22 is positioned hydraulically on the opposite side of the second discharge channel 21b, with respect to the third discharge channel 21c. The third discharge channel 21c and the siphon 22 are positioned hydraulically on opposite sides of the second discharge channel 21b.

[0080] In this way the sterilization fluid that has filled the siphon 22 ensures that the barrier fluid, once it has entered the test chamber 13 following passage through the opening 16, is conveyed into the outlet chamber 24. In particular, the barrier gas flows through the second discharge channel 21b, through the part of the collector duct 20 which is arranged on the opposite side of the second discharge duct 21b with respect to the siphon 22, and through the third discharge channel 21c. This part of the collector duct 20 and the siphon 22 are positioned on mutually opposite sides of the second discharge duct 21b. In the figures the reference 20 indicates said part of the collector duct.

[0081] In further detail, and following the collector duct 20, the second discharge channel 21b is arranged hydraulically downstream of the first discharge channel 21a, and hydraulically downstream of the siphon 22. The third discharge channel 21c is arranged in turn hydraulically downstream of the second discharge channel 21b.

[0082] This favours flushing of the barrier gas from the isolation chamber 8 to the test chamber 13 and from the test chamber 13 to the outlet chamber 24, thus facilitating maintenance of the condition of asepticity and/or sterility of the isolation chamber and of the test chamber 13, also exploiting the depressurization of the outlet chamber 24.

[0083] From an examination of the characteristics of the apparatus 1 produced according to the present invention the advantages it offers are evident.

[0084] Any operations conducted inside the test chamber 13, or in the test area T, substantially do not have fluidic repercussions on the controlled atmosphere of the isolation chamber 8, or in the production area P.

[0085] In use, if it is necessary to carry out sampling of the working fluids, the operator accesses the test chamber 13 by opening the bulkhead 17, and places one or more sampling devices 15 inside the test chamber 13.

[0086] Subsequently, the test chamber 13 is sterilized. The operator then couples each sampling device 15 with the respective terminal 14 by means of the glove and without opening the bulkhead 17.

[0087] Once a certain time interval has elapsed, the operator accesses the test chamber 13 again to withdraw the devices 15 and subsequently analyse them.

[0088] After withdrawal of the devices, the test chamber 13 is re-sterilized.

[0089] All the operations described above are carried out only inside the test chamber 13 and the test area T and therefore externally of the production area P. More precisely, said operations are carried out in an environment, corresponding to the test area T which is defined by the test chamber 13, from which the isolation chamber 8 is protected. The unidirectional flow from the isolation chamber 8 to the test chamber 13 contributes to protecting the isolation chamber 8.

[0090] Therefore, said sampling operations can be carried out simultaneously with production, which corresponds to the packaging process of the pourable product.

[0091] Due to this configuration, the tests or samplings of the working fluids can be carried out during the packaging process of the pourable product, without having to stop the apparatus 1 and without having to reconstitute the controlled atmosphere in the isolation chamber 8 and in the production area P. In fact, this will have to be done only inside the test area T and the test chamber 13. In other words, the apparatus 1 is configured so that the test mode is simultaneous with the production mode.

[0092] According to an alternative embodiment of the present invention not illustrated, the isolation chamber 8 and the test chamber 13 are not in fluidic communication with each other.

[0093] In other words, in this case the second housing 12 does not comprise any opening 16 and the isolation chamber 8 and the test chamber 13, and therefore the production area P and the test area T, are not in fluidic communication with each other.

[0094] Consequently, the feeding unit 10 may also be configured to feed barrier gas into the second housing 12 independently of the first housing 7.

[0095] Also according to said alternative configuration, execution of sampling of the working fluids (according to the method described above) inside the test area T and externally of the production area P has no effects on the controlled atmosphere within the latter.

[0096] It is clear that modifications and variations can be made to the apparatus 1 described and illustrated here without thereby departing from the scope defined by the claims.

Claims

1. Apparatus (1) for packaging a pourable product, comprising:

   - a first housing (7) delimiting therein an isolation chamber (8) configured to contain an atmosphere controlled in a sterile and/or aseptic condition;
   - a filling machine (3) for filling containers with said pourable product, said machine being housed in the isolation chamber (8); and
   - a fluidic circuit (11) comprising a main conduit (11a) configured to feed a working fluid into the isolation chamber (8);

   wherein the apparatus (1) further comprises a second housing (12) delimiting therein a test chamber (13), said test chamber (13) being operatively separated from the isolation chamber (8) and configured to contain an atmosphere controlled in sterile and/or aseptic condition;
   wherein the isolation chamber (8) is external with respect to the test chamber (13);
   and wherein the fluidic circuit (11) comprises a branch (11b) extending from the main duct (11a) to the test chamber (13) for conveying the working fluid therein and allowing a sampling of the working fluid inside the test chamber (13);
   wherein the isolation chamber (8) defines a sterile and/or aseptic production area (P), the filling machine (3) being arranged in the production area (P);
   wherein the test chamber (13) defines a test area (T) for the working fluid, said test area (T) being sterile and/or aseptic and operatively separated from the production area (P), the production area (P) being external to the test area (T);
   and wherein the branch (11b) is configured to convey the working fluid to the test area (T), for allowing a sampling of the working fluid inside the test area (T) and externally relative to the production area (P);
   wherein the branch (11b) comprises a terminal (14) arranged in the test area (T) and configured to receive in coupling a test device (15), for the sampling of the working fluid inside the test area (T) and externally relative to the production area (P).

2. Apparatus as claimed in claim 1, wherein the first housing (7) contains the second housing (12);

   wherein the apparatus comprises a feeding unit (10) configured to feed a sterile and/or aseptic barrier gas inside the isolation chamber (8), for protecting said controlled atmosphere of the isolation chamber (8);
   wherein the second housing (12) comprises an opening (16) which arranges the test chamber (13) in fluid communication with the isolation chamber (8), for causing a flow of said barrier gas from the isolation chamber (8) to the test chamber (13), so as to protect the controlled atmosphere of the test chamber (13).

3. Apparatus as claimed in claim 2, wherein the second housing (12) and the first housing (7) have in common a common wall (12a), said common wall (12a) allowing access to the test chamber (13) from an environment external with respect to the apparatus (1).

4. Apparatus as claimed in claim 3, comprising a glove which is fluid-tightly fixed to said common wall (12a), so as to extend inside the test chamber (13), for allowing the manipulation of objects therein, the second housing (12) thus defining a glovebox.

5. Apparatus as claimed in claim 2 or 3 or 4, comprising a nozzle (19) arranged inside the test chamber (13) for sprinkling the test chamber (13) with a sterilization fluid;
   and wherein said opening (16) is formed in a wall (12b) which is interposed between the isolation chamber (8) and the test chamber (13), said opening (16) being positioned with respect to the nozzle (19) so as to avoid contact between the containers and the sterilization fluid exiting the nozzle (19).

6. Apparatus as claimed in any one of the preceding claims, wherein the branch (11b) is in fluid communication with the main duct (11a) through a hydraulic node (11c) arranged externally with respect to the isolation chamber (8) and with respect to the test chamber (13).

7. Apparatus as claimed in any one of the preceding claims, and comprising:

   - a sterilization system (18) for sterilizing the isolation chamber (8) and the test chamber (13) independently of one another and apt to supply a sterilization fluid inside the isolation chamber (8) and the test chamber (13), separately; and
   - a discharge collector duct (20), which is in fluid communication with the isolation chamber (8) and with the test chamber (13), by means of respective discharge channels (21a, 21b), to receive the sterilization fluid from the isolation chamber (8) and/or from the test chamber (13), and discharge said sterilization fluid;

wherein the collector duct (20) comprises a siphon (22) hydraulically interposed between the discharge channel (21a) of the insulation chamber (8) and the discharge channel (21b) of the test chamber (13).

8. Apparatus as claimed in claim 7, wherein the collector duct (20) is also configured to receive from the test chamber (13) the working fluid sampled therein and to discharge the working fluid out of the test chamber (13) .

9. Apparatus as claimed in claim 7 or 8, and comprising a third housing (23) delimiting therein an outlet chamber (24), said outlet chamber (24) being operatively separated from the test chamber (13);

wherein the outlet chamber (24) is in communication with the isolation chamber (8) to receive the packaged pourable product, and to convey said packaged product outside the apparatus (1);
the outlet chamber (24) being configured to be depressurized with respect to the isolation chamber (8) and to the test chamber (13), and being in fluid communication with the collector duct (20) by means of a respective discharge channel (21c);
wherein the discharge channel (21c) of the outlet chamber (24) and the siphon (22) are hydraulically positioned on mutually opposite sides of the discharge channel (21b) of the test chamber (13).

10. Apparatus as claimed in claim 9, wherein the first housing (7) contains the third housing (23).

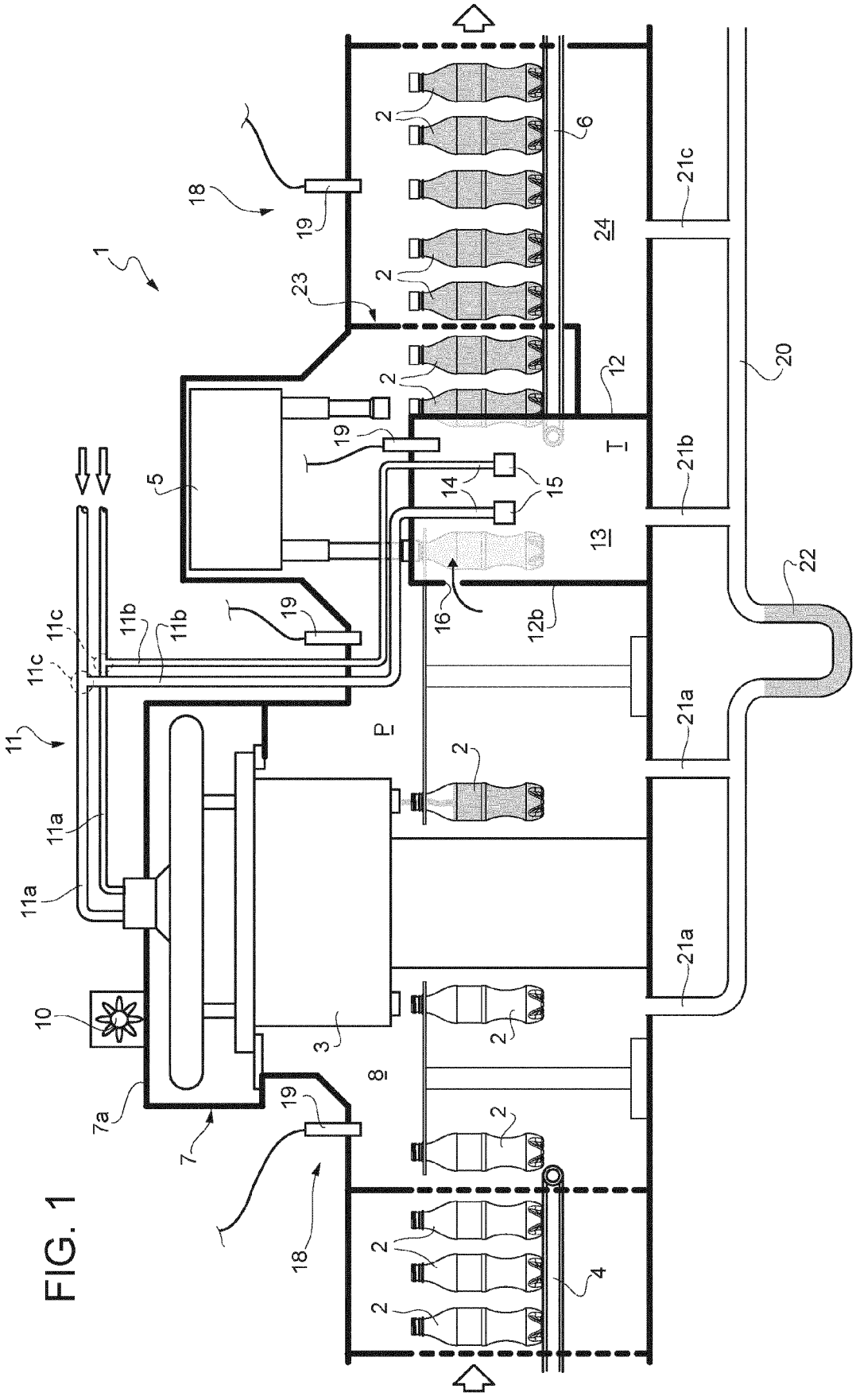
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FIG. 1

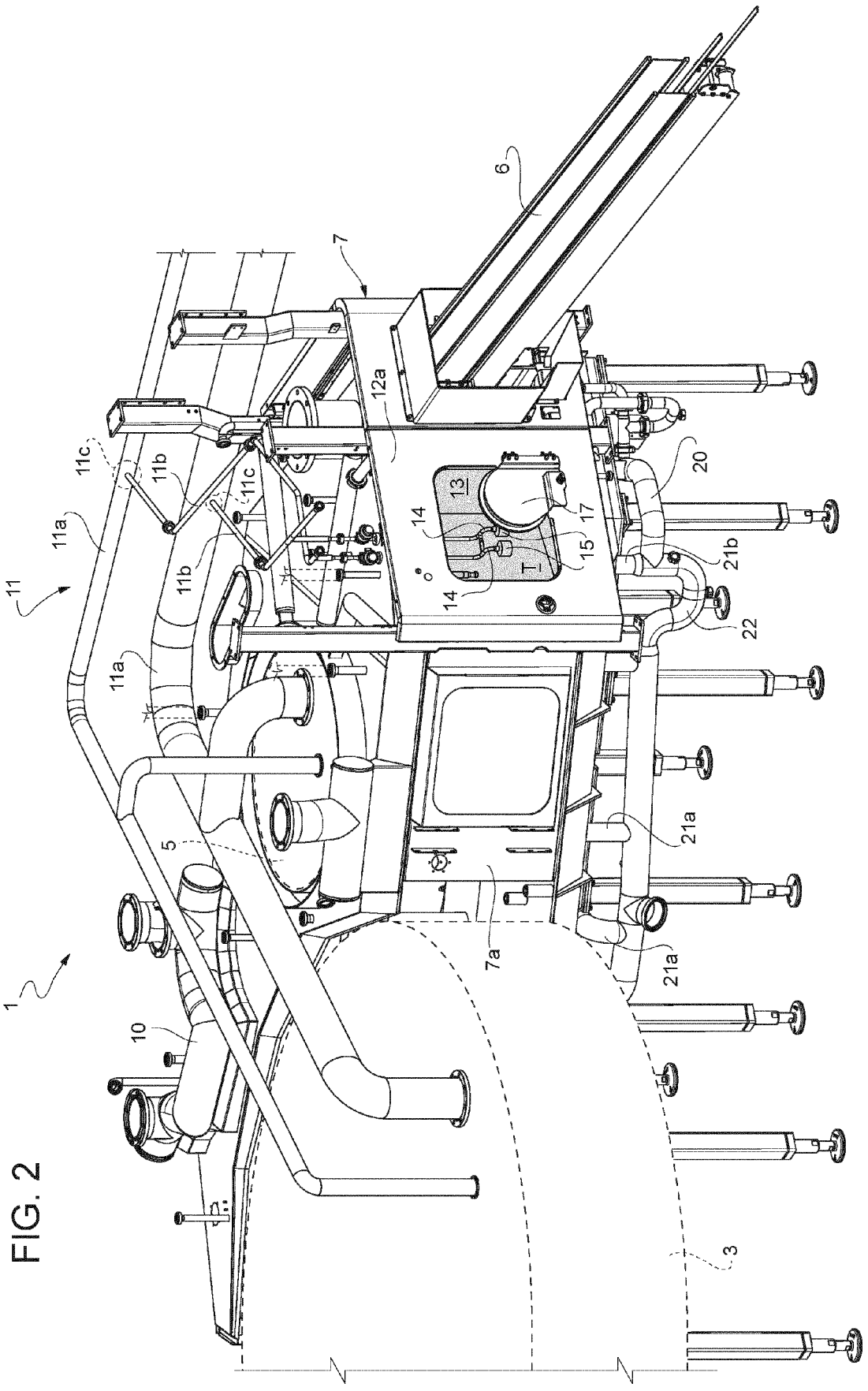


FIG. 2

FIG. 3

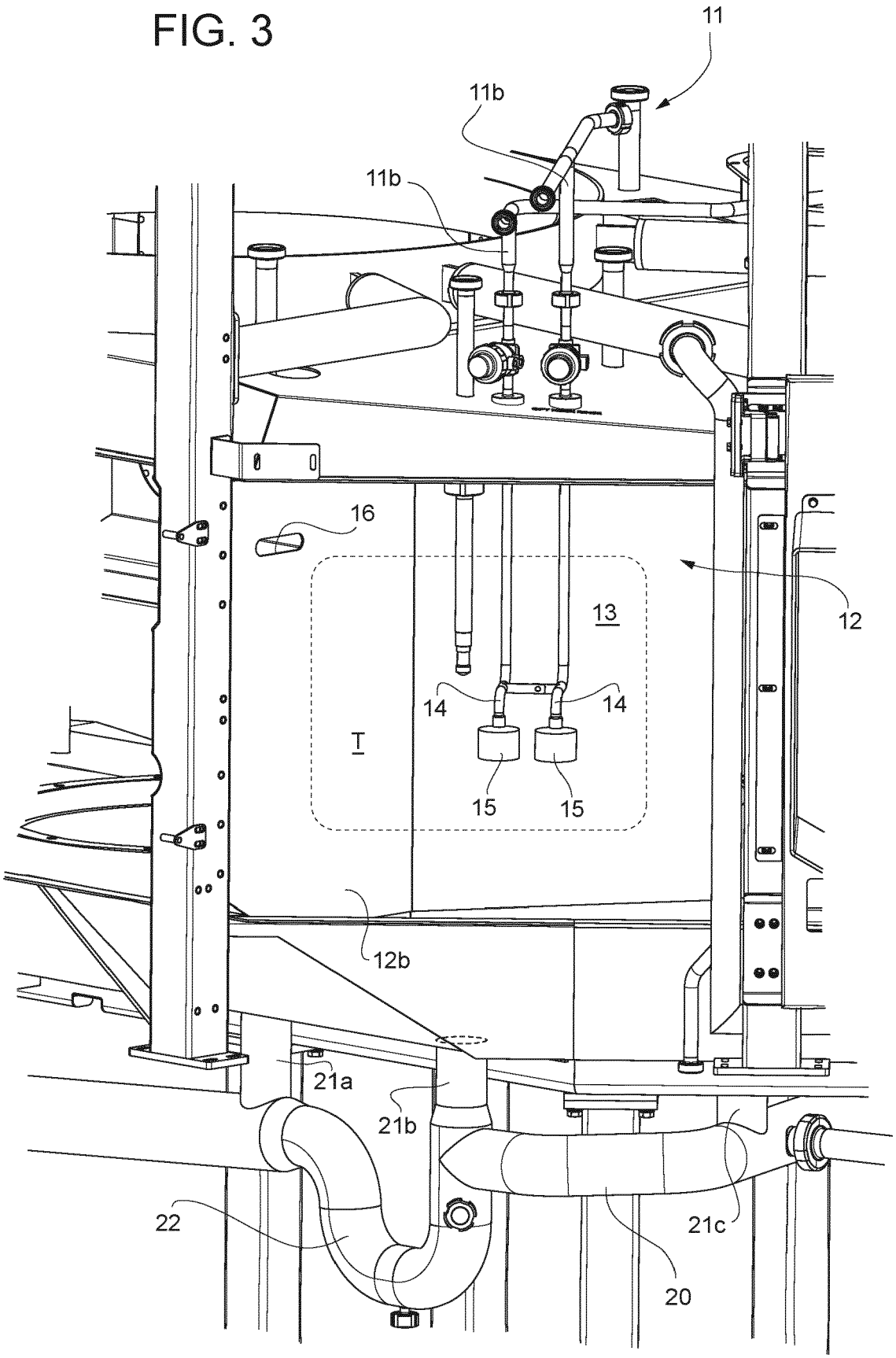
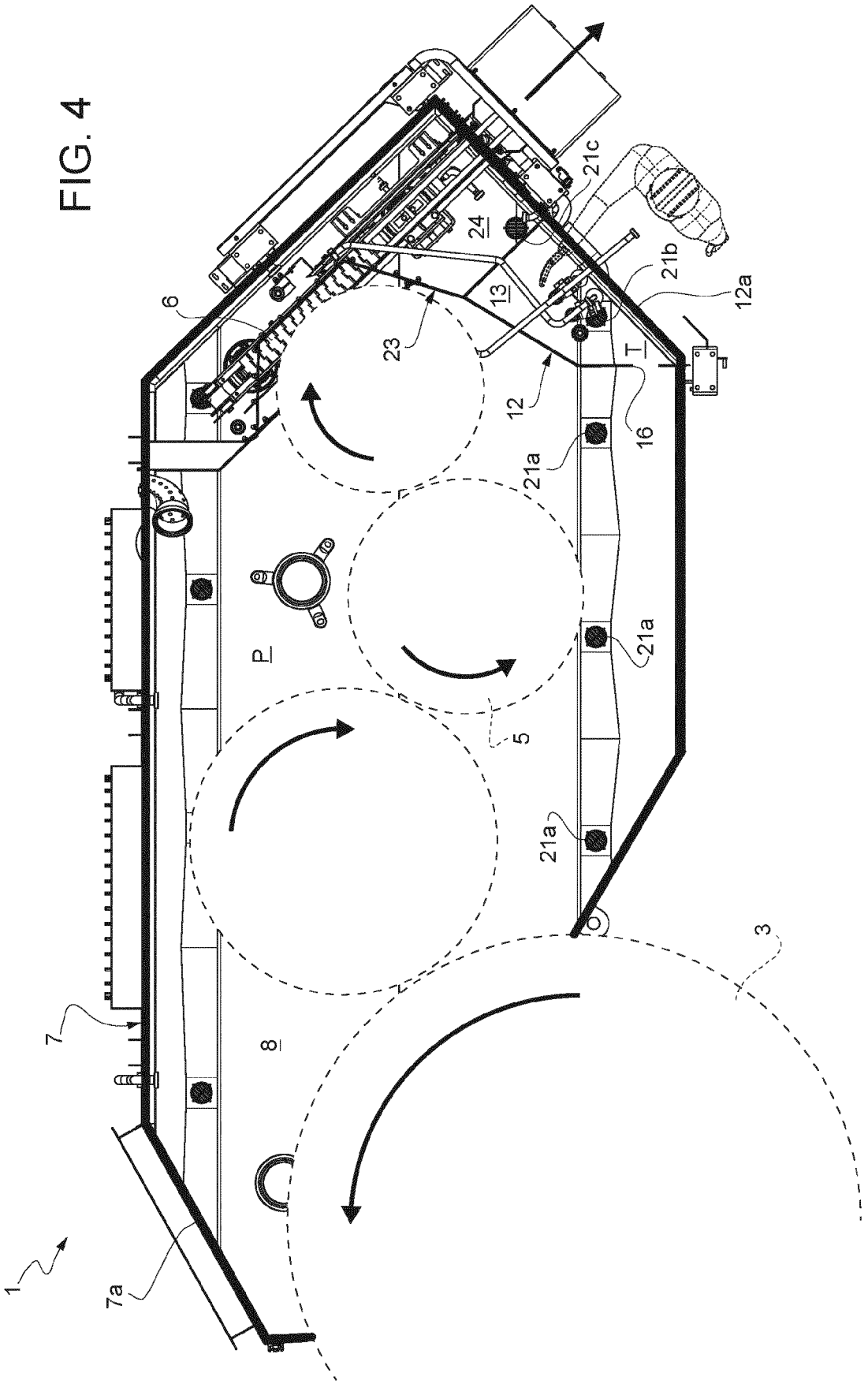


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 22 16 7792

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 10 2011 122853 A1 (KRONES AG [DE]) 14 February 2013 (2013-02-14) * paragraphs [0041], [0042], [0048] - [0051], [0079] - [0083]; figures 1-3 *	1-10	INV. B67C7/00 B67C3/00
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TECHNICAL FIELDS SEARCHED (IPC)

B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 October 2022	Wartenhorst, Frank

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11-10-2022

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