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(54) Carousel filling machine

(57) Small containers (6) spaced at equal angular intervals are fixed on the periphery of the carousel (5) of the filler at equal angular intervals with respect to each other, each of these containers being provided in its lower part with a valve means (G) for filling the bottles to a constant level and having its lower part designed for connection to at least one pipe (9) for supplying the liquid product, the other end of the pipe communicating with a small distribution chamber (11) fixed coaxially on the shaft (1) of the said carousel and connected by a rotary joint (C) to the known means (E) which supply the liquid to be bottled to the said chamber and to the said containers. The upper ends of the peripheral containers (6) are designed for connection, by means of corresponding pipes (15), to a rotary joint (16-20) positioned on the shaft of the carousel, which is connected to the source (27) of supply of the pressurized gas and from which there also runs a pipe (25) for the pressurization of the upper part of the said distribution chamber (11).

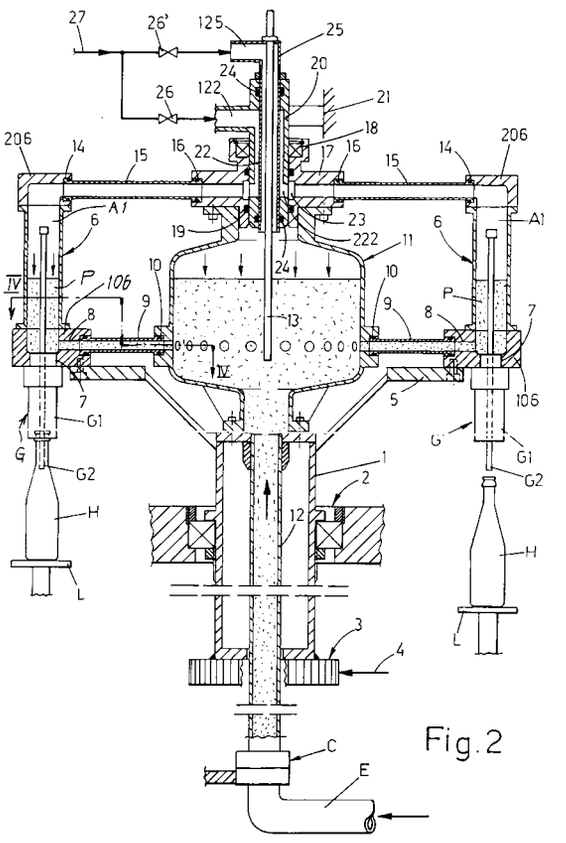

Fig. 2

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Description

[0001] The invention relates to carousel fillers for the automatic packaging of liquid products in bottles or other containers. In particular, the invention relates to all those fillers of a known type which, as illustrated schematically in Figure 1 of the attached drawings, at present carry on board the carousel and coaxially therewith an annular or toroidal reservoir A to which the liquid product P to be packaged is supplied through one or more radial pipes B connected to a rotary joint C which is located on the shaft D of the said carousel and whose fixed part is connected to a pipe E with the pump and the valve means F which supply the said liquid product to the reservoir A, to keep the liquid therein at a constant level, controlled by suitable means which are not illustrated. Under the reservoir A there are positioned and usually fixed at equal angular intervals the valve means G on which the necks of the bottles H bear, these bottles being raised by suitable means L, and means of various types are provided to ensure that, when the bottle is raised and touches the said valve means, the latter opens and subsequently closes automatically, to fill the said bottle with product to a predetermined constant level.

[0002] In what are known as isobaric (counter-pressure) or pressure fillers, of the constant pressure type, particularly suitable for packaging gassy liquids or those tending to evolve gases, such as wines, sparkling wines, minerals, beers or others, the inner part A1 of the reservoir A, which lies above the level of the liquid to be packaged, is occupied by pressurized gas, usually CO_2 supplied through at least one radial pipe M connected to a fixed pipe N by means of a rotary joint Q which is also located on the shaft of the carousel. Each valve means G has two concentric tubes, of which the outer one G1 communicates with the lower part of the reservoir A, to make the liquid P flow into the bottle, while the inner tube G2 passes through the head of the said liquid P and with its upper end communicates with the upper part A1 of the reservoir A, occupied by the pressurized gas, while the lower end of the said tube G2 penetrates by a precise amount into the neck of the bottle H. Each valve means G is provided with shut-off means which, during the rotation of the filler, when the bottle is raised for the filling stage, initially open the inner tube G2 to permit instantaneous pressure balancing between the gas chamber A1 of the reservoir A and the inside of the bottle which is still empty, and then open the outer tube G1 to discharge the liquid which fills the bottle up to the level determined by the lower end of the inner tube G2. When the liquid touches the lower end of the tube G2, the aforesaid valve means are designed in such a way that they close the two tubes G1 and G2 in succession, and depressurize the upper part of the bottle which is not occupied by the liquid, so that the said full bottle can then be lowered and removed from the filler.

[0003] In high-capacity fillers, the reservoir A has significantly large dimensions, and its walls have a considerable thickness, in order to impart self-supporting characteristics to this component, and also because the said component has to contain significant quantities of product and has to contain gas at a sufficiently high pressure, usually up to approximately seven atmospheres. The reservoir A is therefore characterized by a considerable weight, and for its intended use in the food industry it must be made from unreactive materials, usually stainless steel. The cost of this component of the machine is therefore significant, and the time required for its manufacture is also long. If we also consider the fact that the reservoir can have different dimensions according to the production characteristics of the machine for which it is intended, it will be easy to understand the objective difficulties encountered at present in producing carousel fillers at competitive prices and in delivering them to meet tight deadlines, simply because it is impossible to maintain advance stocks of these bulky and expensive reservoirs, with their different dimensional characteristics, and because, since the reservoirs have to operate under pressure, they must be certified by appropriate inspection authorities in respect of their suitability for their intended use.

[0004] In addition to these drawbacks of the known art, there are drawbacks due to the large quantity of liquid which has to be placed in the machine before operation and which subsequently remains in the said machine at the end of each operating cycle. Other drawbacks are caused by the large contact surface between the liquid and the pressurizing gas, entailing the possible oxidation of the said liquid by the air initially contained in the empty bottles and drawbacks of a dynamic and functional nature at the stages of stopping and starting the machine. This is because acceleration and deceleration can cause turbulence and wave motions in the liquid contained in the reservoir, which may reach the upper end of the gas tube G2, and which, as a result of the said turbulence, is agitated, degassed and stressed, which are undesirable conditions when the liquid consists, for example, of a high-quality aged wine. The centrifugal force due to the rotation of the reservoir also agitates the liquid contained in the said reservoir.

[0005] The invention is designed to overcome all of these drawbacks and other drawbacks of the known art with the following proposed solution. The aforesaid valve means G are not fixed on a single annular or toroidal reservoir, as stated with reference to Figure 1, but each of these means is associated with a small fixed container on the periphery of a simple carousel, the lower part of each container being designed for connection to at least one liquid product supply pipe, the other end of which communicates with a small distribution chamber which is positioned on the shaft of the said carousel and which is connected by a rotary joint to the known means for supplying the liquid. Each of the said peripheral containers has its upper end designed for connected, by means of corresponding pipes, to a rotary joint

positioned on the shaft of the carousel, this joint being connected to the source of supply of the pressurized gas and having a pipe running from it for pressurizing the upper part of the said distribution chamber positioned on the shaft of the said carousel. The peripheral containers and the axial distribution chamber are small, contain a small quantity of liquid and gas, and can therefore be self-certified as suitable for withstanding the operating pressures and are inexpensive; consequently, stocks of these components can be maintained, since a change in the operating capacity of the carousel to be constructed will simply require a change in the number of the said containers mounted in sequence on the periphery of a simple carousel which is constructed from time to time with the necessary diameter. The axial distribution chamber can also be made in a constant size, or can be made in two or three different sizes to meet all the various operating requirements, without the problems of cost and certification which are encountered in the known art, since these chambers are also small.

[0006] Further characteristics of the invention and the advantages derived therefrom will be made clearer by the following description of a preferred embodiment of the invention, illustrated purely by way of example and without restrictive intent in the figures of the attached sheets of drawings, in which, in addition to Figure 1 described above, it will be seen that:

- Fig. 2 shows a side view, with parts in section, of a carousel filler according to the improvements described herein;
- Fig. 3 shows, in a view identical to that of Figure 2 and with further details of construction, a filler of the isobaric type which uses the improvements described herein;
- Fig. 4 is a plan view of a portion of the filler of Figure 2, in a section taken through the line IV-IV.
- Fig. 5 shows some variations to the embodiment according to Figure 3.

[0007] In Figure 2, the number 1 indicates schematically the shaft of the carousel, supported rotatably by any kind of supports with bearings 2, and having a drive system 3 for connection to the rotation unit shown schematically by the arrow 4. The circular horizontal plate 5 of the carousel, which is characterized by different diameters on different occasions according to the operating capacity of the filler, is fixed coaxially on the shaft 1, and the bases 106 of small vertical containers 6, of cylindrical shape for example, made from any opaque and/or transparent materials suitable for use with foodstuffs, are fixed on the periphery of this plate so that they project and are spaced at equal angular intervals. The lower part of each base 106 is designed with a discharge hole 7 which can be closed by a valve means G of a known type, such as that described with reference to Figure 1, orientated downwards, with the external tube G1 communicating with the lower inner part of the container 6 and with the upper portion of the inner tube G2 reaching the upper part of the said container 6. The base 106 of each peripheral container 6 is also provided with at least one lateral hole 8 for the introduction of the liquid to be bottled into the said container, through a tube 9 of suitable cross section, whose other end is connected, again with a lateral seal, to the lateral holes 10 provided in the lower lateral part of a distribution chamber 11 which has a small capacity and is made for example in the form of a small barrel, fixed coaxially on the shaft 1 of the carousel and made from any opaque and/or transparent materials suitable for the purpose.

[0008] To the lower end of the chamber 11 there is fixed, coaxially for example, a vertical tube 12 which passes through the column 1 and whose lower end is connected to the rotary joint C connected to the fixed pipe E which in turn is connected to the known means F (Fig. 1) for supplying the liquid, these means being controlled by a level sensor 13 which penetrates axially with a seal from above into the chamber 11, as specified above, to maintain a substantially constant liquid level in this chamber. The chamber 11 is positioned substantially at the same height as, or slightly lower than, the peripheral containers 6, in such a way that these components are substantially half-filled with liquid, even after allowance for the effects of the centrifugal force which inevitably tends to push the said liquid towards the outside. The remaining parts of the containers 6 and of the axial chamber 11 are occupied by the pressurized gas.

[0009] The top of each container 6 has a cover 206 with a lateral hole 14 to which is connected, with a lateral seal, a tube 15 of suitable cross section, which in turn has its other end connected to one of the radial holes 16 of a manifold 17 flanged on to the upper mouth of the chamber 11 in such a way as to close this mouth. An axial plug 20 fixed externally to a fixed support structure 21 passes rotatably with the aid of one or more bearings 18 through the manifold 17 and is sealed by means of the seals 19, this plug being provided axially with a channel 22 with an upper mouth 122 opening radially and having radial holes 222 in its lower part which communicate with an annular recess 23 of the manifold 17, to which recess are connected the said holes 16 for connection to the containers 6. A fixed tube 25 passes axially through the plug 20 and is sealed by means of the seals 24, this fixed tube opening into the upper part of the chamber 11, having the fixed level sensor 13 passing axially through it with the correct clearance and having a lateral mouth 125 at its top. The mouths 122 and 125 are connected by means of suitable valves 26, 26' to the source of supply of pressurized gas indicated schematically by the arrow 27, which acts at identical levels of pressure in the upper part of the axial chamber 11 and in the upper parts of the peripheral containers 6.

[0010] The peripheral containers 6 and the axial chamber 11 are pressurized through corresponding gas supply channels, in order to ensure the correct execu-

tion of the initial stages of washing and sterilizing the machine. The washing and sterilizing products can be supplied from below through the pipe E and can be discharged alternatively through the mouths 122 and 125, the gas supply circuit being set to discharge. When the mouth 125 is closed by the valve means 26', the washing and sterilizing fluid partially enters the chamber 11, leaves through the tubes 9, passes through the peripheral pipes 6 and the valve means G associated with these, for the operation of known means, not shown here, and finally exits from the upper tubes 15 and from the channel 22, 122. Conversely, when the valve 26 is closed, the washing and sterilizing fluid passes reliably through the whole of the axial chamber 11 and exits through the channel 25, 125.

[0011] The simplicity of construction of the filler described herein is evident, as is the considerable advantage derived from the possibility of keeping stocks of the peripheral containers 6, since, when the diameter of the carousel 5 and the production characteristics of the machine are changed, it is simply necessary to change the quantity of these containers distributed over the perimeter of the said carousel. Purely by way of example and without restrictive intent, good results have been obtained by using containers 6 having a diameter of approximately 50-80 mm, for example approximately 60 mm, with heights of approximately 200-300 mm, for example approximately 250 mm. The axial distribution chamber 11 can also be kept in stock, for example in at least two versions with which virtually the whole range of fillers usually required by the market can be made. Purely by way of example and without restrictive intent, good results have been obtained by making the two versions of the distribution chamber 11 with an equatorial diameter of approximately 350 mm and approximately 500 mm, and with a mean useful height substantially equal to those of the peripheral containers 6. Another major advantage is derived from the possibility of self-certifying the characteristics of withstanding pressure of the peripheral containers 6 and the axial chambers 11, since all these containers are of limited size.

[0012] With reference to Figures 3 and 4, a more detailed description will now be given of a isobaric filler made with the improvements described herein. The axial chamber 11 consists, for example, of an equatorial ring 111 made in one or two pieces, with the distribution holes 10 for the connection to the tubes 9, to which the opposing domes for completing the said chamber 11 are fixed in a sealed way, for example by flanging or by welding. The holes 10 can all be open with their outer parts designed for connection to the said tubes 9, these parts being precisely machined in advance if required for interaction with the sealing gaskets, while the inner parts 110 of the said holes can all be blind and can be opened from time to time in the necessary quantities and with the mutual angular spacing required for making the filler with the characteristics required on each occasion. The numbers 211 and 311 indicate the end flanges by means of which the axial chamber 11 can be fixed to the upper flange 17 and to the support column 1 respectively.

[0013] Figure 4 shows that the aforesaid holes 10 have an angular orientation at a small distance from the axis of the chamber 11, and that the tubes 9 and the holes 8 have an orientation which is substantially tangential to the inner cavities of the bases 106 of the peripheral containers 6, in order to limit the turbulence of the liquid when it enters the containers 6, and also because the said tubes 9 must not interfere with a hollow attachment connector 28 which, for example, fixes under the carousel 5, next to each container 6 and parallel to it, the rod 129 of a single-acting cylinder and piston unit 29, the body 229 of which is constantly stressed upwards by air at precise levels of pressure which enters the chamber 30 through a channel 31 formed longitudinally in the fixed rod 129, whose lower end communicates with the said chamber through at least one radial hole 131 and whose upper end is connected to the hollow connector 28. At the lower end of the cylinder 229 there is fixed a plate of a known type L which supports the bottle H in the stage when it is supplied to the filler, the said cylinder being prevented from rotating about its axis by the interaction of a lateral extension 329 of the cylinder with a vertical guide bar 32 whose upper end is fixed to the carousel 5 and whose lower end is fixed to a ring 33 which is integral with the rotatable frame of the filler. The downward movement of the assembly 29 with the plate L, for collecting the empty bottles and discharging the full ones, is provided by the interaction of a lateral roller 34 of the body 229 with a cam sector 35 of a known type, integral with the fixed frame of the filler. The connector 28 is connected in a circuit to the outlet branch 136 of a rotary distributor which uses as its rotor the flange 17 described with reference to Figure 2 and which uses as its stator the plug 20 in which is formed the fixed branch 236 which connects the longitudinal delivery channel 36 to the fixed source of compressed air indicated schematically by the arrow 37. The said rotary distributor described above can be provided with other internal circuits, similar to that described, for connection to other pneumatic systems with which a rotary carousel filler is normally provided.

[0014] At the start of the elevation stage, the mouth of the bottle H interacts with a centring and stabilizing device of a known type 38, associated with a non-rotating vertical telescopic assembly 39, pushed downwards by elastic means and fixed for example under the base 106 of each peripheral container 6 or under the carousel 5. Finally, Figure 3 shows the known means which usually make up the valve G of a isobaric filler. The valve is provided with external lever means 40 which, during the rotation of the carousel, interact with fixed stops which change the position of the said lever, which by means of the transmission 41 causes the elevation of a stopper 42 which closes the upper end of the tube G2 and which reduces the axial thrust on springs by means of which the said stopper pushes down the conical plug 43 which

remains in the closed position until the pressure of the gas in the bottle reaches the same value, by passage through the tube G2, as that of the upper part of the containers 6, after which the said plug 43 opens and allows the liquid to enter the bottle. When the bottle is full and the liquid closes the lower end of the tube G2, the said liquid ceases to enter the bottle and the lever 40 is then made to interact with stops which move it to cause the closing of the plug 43 and the closing of the upper stopper 42. In the next stage, the chamber of the valve G which is positioned under the plug 43 and which communicates with the upper part of the bottle neck, which is not occupied by the liquid, is depressurized by the activation of a valve of a known type 44, after which the cam 35 acts to make the plate L descend with the bottle and with the centring and opposing means 38 which stops in a fixed position in which it does not interfere with the mouth of the said bottle which can thus be removed from the carousel by means of an star-shaped extractor which rotates in phase with the carousel in question and which is not illustrated because it is also known.

[0015] Figure 5 shows a constructive variation according to which the previous lower tubes 9 for connecting the peripheral containers 6 to the axial chamber 11 are substituted by bores 109 obtained by machining and with substantially radial arrangement at the interior of a flat ring 311, onto the inner circumference of which there is placed and welded the lower rim of a metallic bell which alone constitutes the said chamber 11 and which in the example as shown is provided with a small lateral portlight 45 for the optical inspection of its median lower portion. The bell 11 is closed at its bottom by a flat and co-axial disc 46, secured for example by screws and tight seal means under the ring 311 and said disc 46 is provided at its centre with a bore 146 to which there is connected and secured the duct 12 for feeding the liquid products to be bottled. The upper face 246 of the disc 46 is preferably machined with a small conicity converging towards the bore 146, in order to ensure, among others a perfect cleaning of the chamber 11 during the phase of washing and sterilisation. The bores 109 of the ring 311 are closed on their outer extremities by plugs 47 and at the said outer extremities of the bores 109, on the same ring 311 there are obtained the vertical bores 7, in order to connect to the lower portion of same the filling head G and to the upper portion of the said bores the bottom portion of the peripheral containers 6 which, for example as in the preceding cases, are closed at their top by covers 206 connected to the ducts 15 of the gas circuit. Similarly as in the preceding solutions, the upper flange 211 of the chamber 11 is secured to the manifold 17 which is rotatably mounted onto the fixed hub 20 with the feeding conduit 25 for the gas and the level sensors 13. It is to be understood that according to a further variation, not illustrated, also the covers 206 of the peripheral containers 6 can be formed by a flat ring coaxially secured by its inner edge to the manifold 17 and inside which there are obtained by means of axial boring and plugging of the outer ends, the conduits 15 which communicate with the containers 6 through perpendicular end bores.

[0016] It is to be finally understood that the improvements described are to be considered as protected even if applied to fillers other than isobaric fillers in which a valid use can be made of the said improvements.

Claims

1. Equipment for supplying fluid products to carousel fillers of the isobaric type or of other types which have similar requirements and which are designed to package the said products in bottles or other containers, **characterized in that** small containers (6) spaced at equal angular intervals are fixed on the periphery of the carousel (5) of the filler, each of these containers being provided in its lower part with a valve means (G) for filling the bottles to a constant level and having its lower part designed for connection to at least one pipe (9) for supplying the liquid product, the other end of the pipe communicating with a small distribution chamber (11) fixed coaxially on the shaft (1) of the said carousel and connected by a rotary joint (C) to the known means (E) which supply the liquid to be bottled to the said chamber and to the said containers, the upper ends of the said peripheral containers (6) being designed for connection, by means of corresponding pipes (15), to a rotary joint (16-20) positioned on the shaft of the carousel, which is connected to the fixed source (27) of supply of the pressurized gas and from which there also runs a pipe (25) for the pressurization of the upper part of the said distribution chamber (11).

2. Equipment according to Claim 1, in which the peripheral containers (6) and/or the axial distribution chamber (11) can be made wholly or partially from transparent materials, at least with respect to the lateral walls.

3. Equipment according to Claim 1, in which the peripheral containers (6) are, for example, of cylindrical shape, are positioned vertically and are of identical and constant size even when the operating capacity of the filler is varied.

4. Equipment according to Claim 3, in which each of the peripheral containers (6) has a diameter of approximately 50-80 mm, for example approximately 60 mm, and a height of approximately 200-300 mm, for example approximately 250 mm.

5. Equipment according to Claim 1, in which each of the peripheral containers (6) comprises a base

(106) which is designed to be fixed to the periphery of the carousel (5) of the filler, and to be fixed to the lower edge of the lateral wall of the said container, this base being provided with a lateral hole (8) for connection to the liquid supply pipe (9), the said container being completed by an upper cover (206) which is designed to be fixed to the upper edge of the lateral wall of the container and which is provided with a lateral hole (14) for connection to the pressurized gas supply pipe (15).

6. Equipment according to Claim 5, in which the lateral hole (8) of the base (106) of each peripheral container (6), designed for connection to the liquid supply pipe (9), opens in a substantially tangential way with respect to the inner cavity of the said container (6).

7. Equipment according to Claim 1, in which the axial distribution chamber (11) can be made in at least two versions for use in fillers having different operating capacities required by the market, for example with an equatorial diameter of approximately 350 mm and approximately 500 mm and with a mean useful height substantially equal to that of the peripheral containers (6).

8. Equipment according to Claim 1, in which the axial distribution chamber (11) consists of equatorial ring (111) made in one or two pieces with the distribution holes (10) for connection to the tubes (9) supplying the peripheral containers (6), and the opposing domes or shells for completing the said chamber (11) are fixed in a sealed way, for example by flanging or by welding, to the said ring.

9. Equipment according to Claim 1, in which the axial distribution chamber (11) is fixed coaxially on the shaft (1) of the carousel, and a vertical tube (12) is fixed to its lower end, coaxially for example, this tube passing through the said shaft (1) and having its lower end connected to the rotary joint (C) connected to the fixed pipe (E) with the known means (F) which supply the liquid product and which are controlled by a level sensor (13) which penetrates axially with a seal from above into the said chamber (11), to maintain a substantially constant liquid level in this chamber.

10. Equipment according to Claim 1, in which the axial distribution chamber (11) is positioned substantially at the same height as, or slightly lower than, the peripheral containers (6), in such a way that these components are substantially half-filled with liquid, while their other halves are occupied by the pressurized gas.

11. Equipment according to Claim 1, in which the axial distribution chamber (11) carries a manifold (17) fixed coaxially on its upper flange, this manifold having radial holes (16) to which are connected in a sealed way the pipes (15) which supply the gas to the covers (206) of the peripheral containers (6).

12. Equipment according to Claim 11, in which an axial plug (20) fixed externally to a fixed support structure (21) passes rotatably with the aid of bearings (18) through the manifold (17) and is sealed by means of seals (19), this plug being provided axially with a channel (22) with an upper mouth (122) opening radially and having a plurality of radial holes (222) in its lower part which communicate with an annular recess (23) of the said manifold (17), to which recess are connected the said holes (16) for connection to the peripheral containers (6), the said plug (20) having a fixed tube (25) passing axially through it and sealed by means of suitable seals (24), this fixed tube opening into the upper part of the distribution chamber (11) and having the fixed level sensor (13) passing axially through it with the correct clearance, and having a lateral mouth (125) at its top, the said mouths (122, 125) being connected by means of suitable valves (26, 26') to the source (27) of supply of pressurized gas, which acts at identical levels of pressure in the upper part of the said axial chamber (11) and in the upper parts of the peripheral containers (6).

13. Equipment according to Claim 12, **characterized in that**, in the stage of washing and sterilizing the filler, means are provided for supplying the cleaning products from below, through the pipe (E) normally used to supply the liquid to the axial distribution chamber (11), and the said products are alternatively discharged through the two different circuits which normally supply the pressurized gas to the peripheral containers (6) and to the said distribution chamber (11).

14. Equipment according to Claim 12, in which the said manifold (17) and the said plug (20) can be used, respectively, as the rotor and stator for the circuits (136, 36, 236) of a rotary distributor for connecting the pneumatic systems with which a filler can usually be provided to fixed supply and/or control sources, for example in order to connect to the supply source the telescopic assembly (29) which is usually designed for interaction with a fixed cam (35) and which raises and lowers the bottles in the stages of supply to the filler, filling, and discharge from the filler.

15. Equipment according to claim 1, in which the axial distribution chamber (11) is formed by a bell secured at its bottom, with lateral tight seal, to the inner edge of a flat ring (311) and closed at its bottom

by a flat disc (46) presenting an upper surface which is preferably conical and converging towards a central bore (146) by means of which said disc is secured to the duct (12) for feeding the liquid product to be bottled, in said flat ring (311) there being obtained substantially radial bores (109) closed by a plug on their outer end, the said ducts (9) which connect the inner portion of the said axial chamber (11) to the lower portion of the peripheral containers (6) secured inferiorly onto the periphery of said flat ring (311), so as to communicate with a respective vertical bore (7) connected to a respective radial bore (109) and inside which there is connected a fixed inferiorly the filling head (G), the upper extremity (211) of the said bell being secured to the rotary joint (16-20) connected to the fixed source of supply of the pressurized gas both to the upper extremity of the said peripheral containers (6) and to the axial chamber (11).

16. Equipment according to Claim 15, in which also the covers (206) of the peripheral containers (6) are formed by a flat ring secured co-axially with its inner edge to the rotary joint (16-20) and inside which ring there are obtained by means of radial boring and by plugging of the outer extremities, the ducts (15) which connect the said joint to the upper extremity of the said peripheral containers.

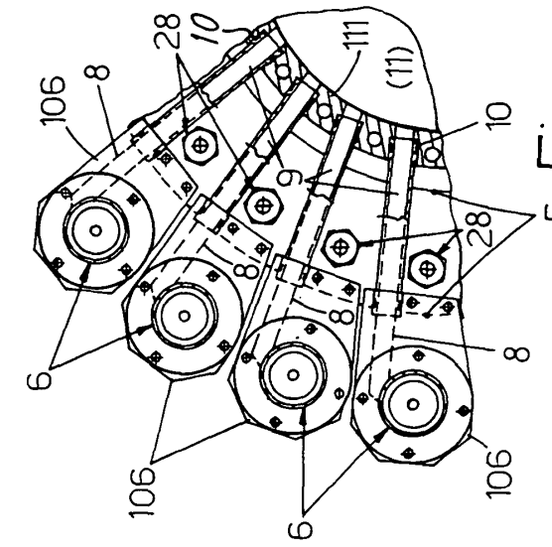

Fig.4

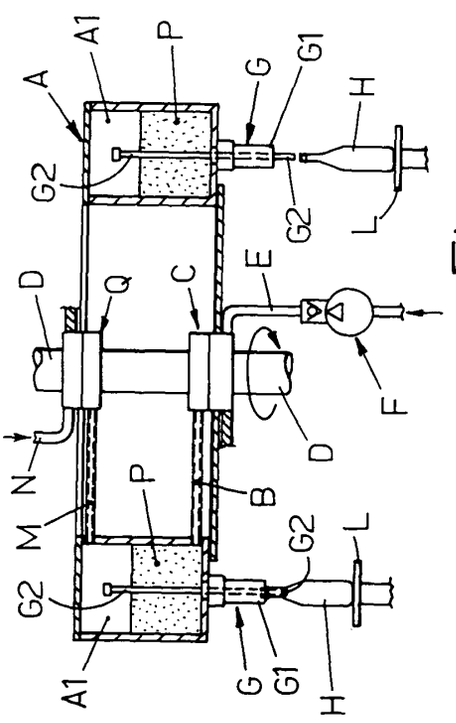

Fig.1

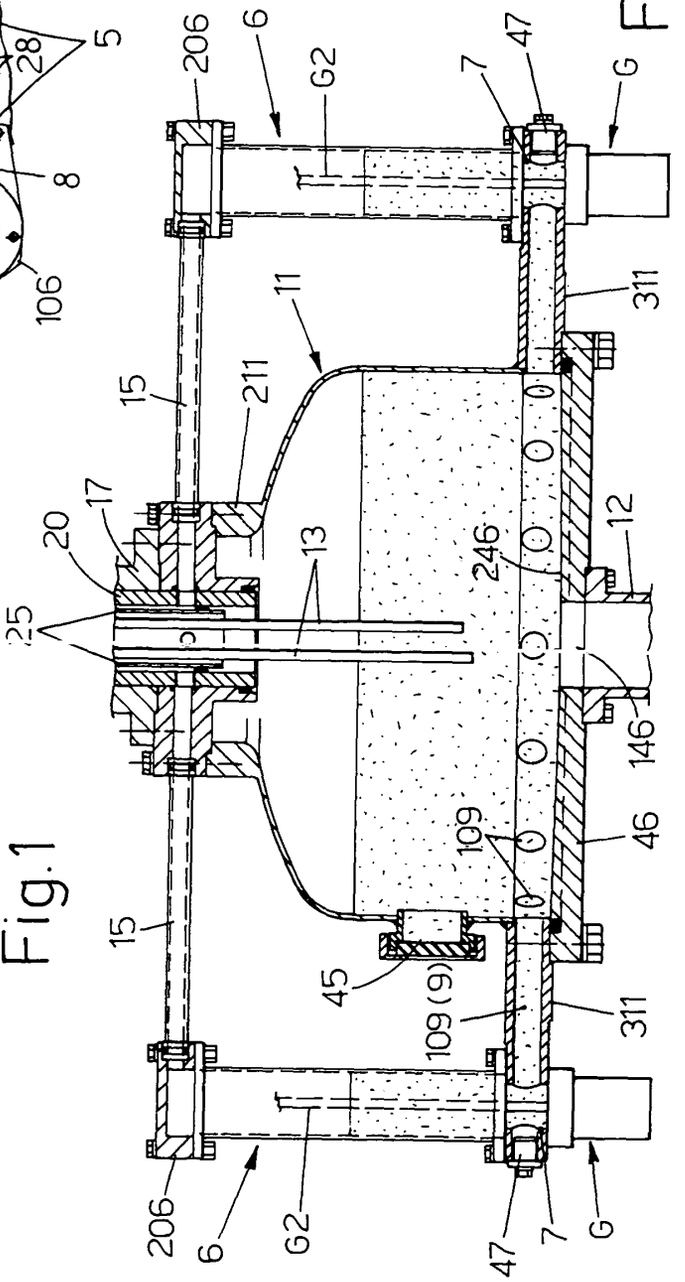

Fig.5

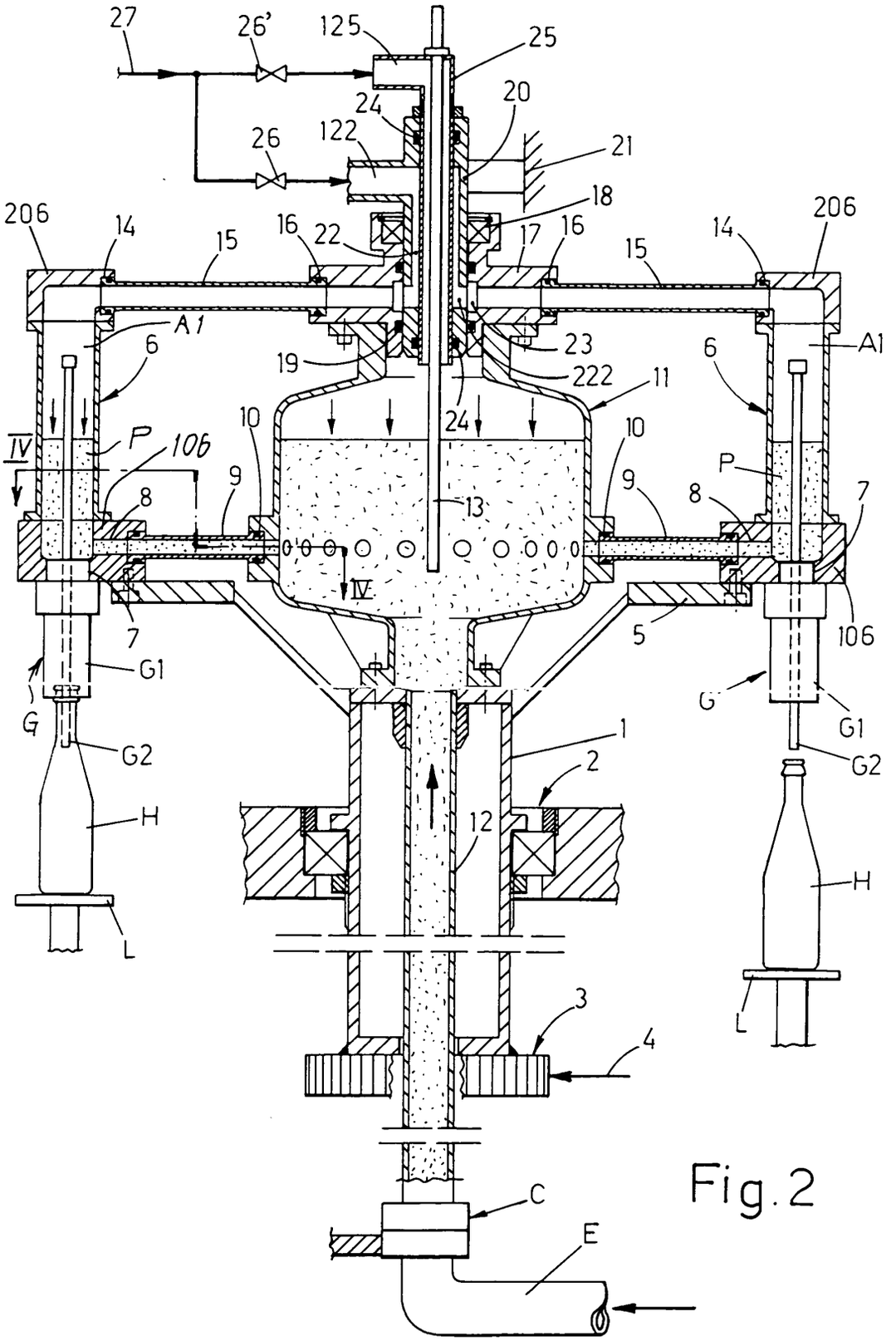
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Fig.2

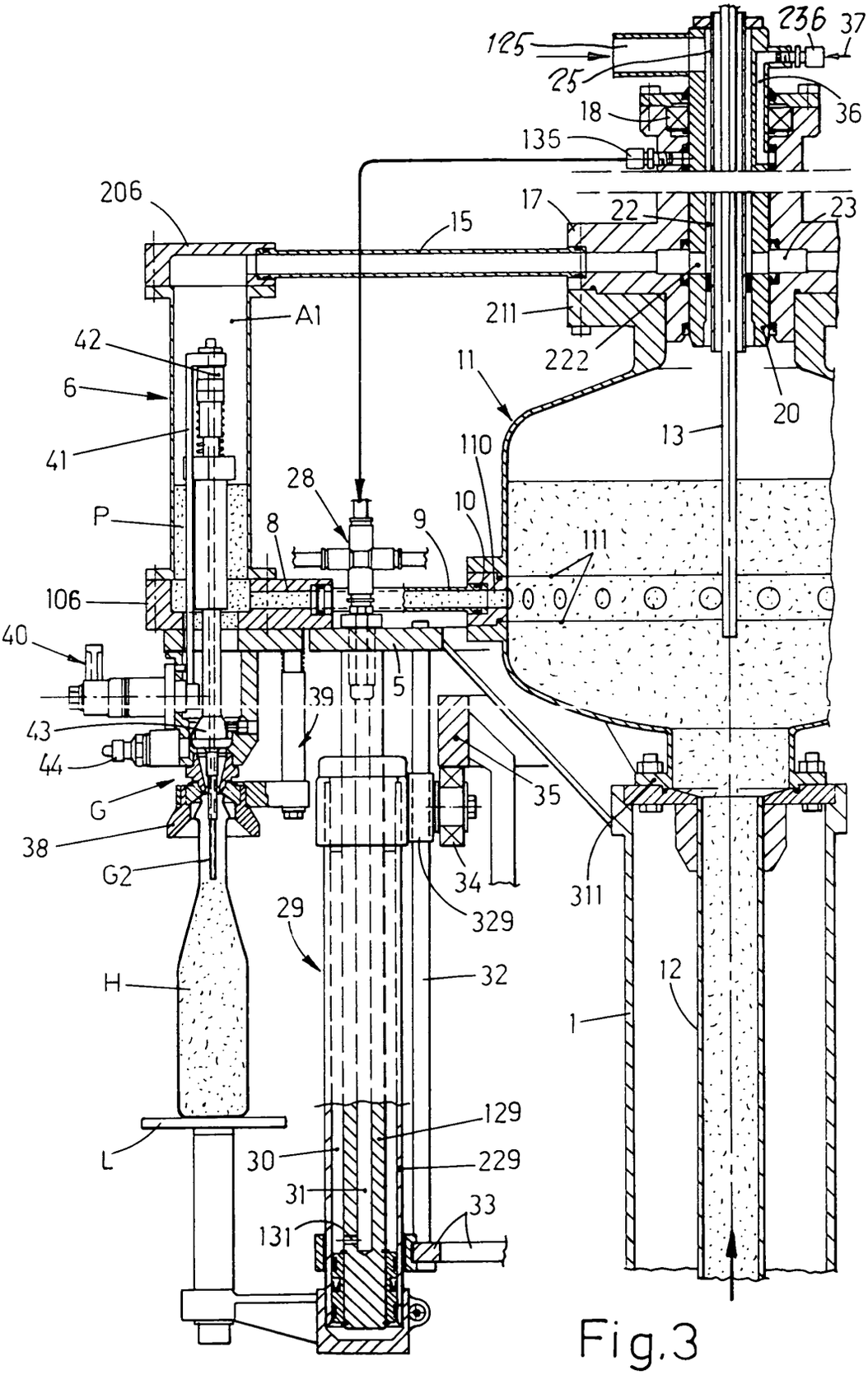
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Fig.3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 01 2879

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 2 548 589 A (LOUIS CHELLE PAUL) 10 April 1951 (1951-04-10) * column 4, line 33 - column 5, line 63 * * column 6, line 64 - column 7, line 73; figures 1-11 *	1-5,7-11	B67C3/06 B67C3/26 B67C3/24
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B67C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 August 2004	Wartenhorst, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 04 01 2879

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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