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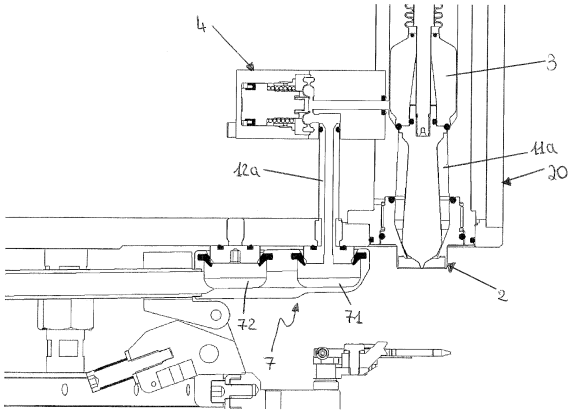
(54) DEVICE FOR HOT FILLING OF A CONTAINER

(57) Device for hot filling (1) of a container (100), comprising: a first fluid path (11) ending with a dispensing nozzle (2); a first valve (3) situated along said first fluid path (11) and upstream of said dispensing nozzle (2); a second fluid path (12) branching off from said first fluid path (11) at said first valve (3); a second valve (4) situated along said second fluid path (12); a first tank (5) communicating with said first fluid path (11); sanitisation means (7) of the dummy bottle type movable at least between a first position in which they are beneath said dispensing nozzle (2) and the outlet of said second fluid path (12) so as to receive the fluids coming from the first fluid path (11) and form the second fluid path (12), and a second position in which they are set away from said dispensing nozzle (2) and are beneath the outlet of said second fluid path (12); said hot filling device (1) being at least configurable in:

- a filling status in which the first tank (5) contains a food fluid, the sanitisation means (7) are in the second position, the first valve (3) is open so as to allow the food fluid coming from the first tank (5) to arrive at the dispensing nozzle (2) and the second valve (4) is closed;
- a sanitisation status in which the first tank (5) contains a sanitisation fluid, the sanitisation means (7) are in the first position, the first valve (3) is open and the second valve (4) is open so as to allow the sanitisation fluid coming from the first tank (5) to arrive at the sanitisation means (7) both via the dispensing nozzle (2) and via the outlet of the second fluid path (12); and
- a recirculation status in which the first tank (5) contains the food fluid, the sanitisation means (7) are in the second position, the first valve (3) is closed and the second valve (4) is open so that the food fluid returns to the first tank (5) via a closed path passing through the sanitisation means (7) and a further fluid path (13, 14) developing from said sanitisation means (7) to said first tank (5).

FIG. 6



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Description

[0001] The present invention relates to a device for hot filling of a container.

[0002] In this context, hot filling means a process of filling of containers with a fluid product maintained at a temperature higher than room temperature, for example around 75°-100°C.

[0003] Generally, this process can be used in the field of bottling "sensitive" food products, i.e. products that are particularly susceptible to bacteriological contamination and oxidation, such as, for example, isotonic drinks, juices, nectars, soft drinks, teas, milk-based drinks, coffee-based drinks, etc. for which it becomes fundamental to avoid, during all phases of packaging, possible microbiological contaminations.

[0004] Maintaining the product and components of the filling apparatus at high temperatures throughout the entire process makes it possible to obtain an adequate shelf life, avoiding the need to provide for specific steps of sterilising the containers and the closures thereof.

[0005] In this context, therefore, it becomes fundamental to assure the continuity of filling.

[0006] In fact, any interruptions in the process due, for example, to glitches upstream or downstream, cause undesirable dwells of the product to be dispensed, with a consequent cooling of the latter. As they no longer have a hot product passing through them, the components of the apparatus also tend to cool, with a consequent risk of contamination of the final product. This problem is sometimes solved by providing a suitable recirculation path, into which the product is diverted if dispensing to the container is suddenly interrupted.

[0007] A solution of this type is described in patent US 7243483, wherein, upon an interruption in filling, the fluid product dispensed from the valve is intercepted by a dedicated conduit that conveys it back to the tank containing the hot product, so it will go into recirculation.

[0008] The main disadvantage of the known solutions is tied to the increase in structural complexity due to construction of the recirculation path.

[0009] In this context, the technical task at the basis of the present invention is to propose a device for hot filling of a container which overcomes the aforementioned drawbacks of the prior art.

[0010] In particular, it is an object of the present invention to provide a device for hot filling of a container which is structurally simpler and less costly than the known solutions.

[0011] The stated technical task and specified objects are substantially achieved by a device for hot filling of a container in accordance with the appended claims.

[0012] Additional features and advantages of the present invention will become more apparent from the indicative and thus non-limiting description of a preferred, but non-exclusive, embodiment of a device for hot filling of a container, as illustrated in the appended drawings, in which

- figures 1, 2 and 3 illustrate an equal number of diagrams of a device for hot filling of a container, according to the present invention, respectively in a filling status, in a sanitisation status and in a recirculation status;
- figure 4 is a sectional view of a part of the device schematically illustrated in figure 1;
- figure 5 is a sectional view of a part of the device schematically illustrated in figure 2;
- figure 6 is a sectional view of a part of the device schematically illustrated in figure 3.

[0013] With reference to the figures, the number 1 indicates a device for hot filling of a container 100, comprising:

- a first fluid path 11 ending with a dispensing nozzle 2;
- a first valve 3 situated along the first fluid path 11 and upstream of the dispensing nozzle 2;
- a second fluid path 12 branching off from the first fluid path 11 at the first valve 3;
- a second valve 4 situated along the second fluid path 12;
- a first tank 5 communicating with the first fluid path 11 ;
- sanitisation means 7 of the dummy bottle type;
- a further fluid path 13, 14 extending from the sanitisation means 7 to the first tank 5.

[0014] In particular, the sanitisation means 7 is movable at least between:

- a first position in which they are beneath the dispensing nozzle 2 and the outlet of the second fluid path 12 so as to receive the fluids coming from the first fluid path 11 and the second fluid path 12, and
- a second position in which the sanitisation means 7 are set away from the dispensing nozzle 2 and are beneath the outlet of the second fluid path 12.

[0015] The first tank 5 can contain a food fluid or a sanitisation fluid, depending on the status of the filling device 1.

[0016] In the embodiment described and illustrated here, the sanitisation means 7 comprise a first dummy bottle recess 71 and a second dummy bottle recess 72 in fluid communication with each other.

[0017] Preferably, the first recess 71 and the second recess 72 have a substantially circular cross section.

[0018] The further fluid path 13, 14 is preferably made up of two sections:

- a third fluid path 13 extending from the sanitisation means 7 to a second tank 6;a fourth fluid path 14 extending from the second tank 6 to the first tank 5.

[0019] In particular, the third fluid path 13 is in fluid communication with the recesses 71, 72.

[0020] In an alternative embodiment (not illustrated), the sanitisation means 7 comprises a single dummy bottle recess dimensioned so as to extend from beneath the dispensing nozzle 2 to below the outlet of the second fluid path 12 when the sanitisation means 7 takes on the first position. Preferably, the single dummy bottle recess has a substantially ellipsoid cross section.

[0021] In particular, the third fluid path 13 originates from the dummy bottle recess.

[0022] The device for hot filling 1 can be configured in at least three operating statuses, namely:

- a filling status
- a sanitisation status
- a recirculation status.

[0023] In the filling status (illustrated in figures 1 and 4), the first tank 5 contains a food fluid (e.g. a beverage) and the first valve 3 is open so as to allow the food fluid coming from the first tank 5 to arrive at the dispensing nozzle 2 (via the first fluid path 11). Positioned under the dispensing nozzle 2 there is a container 100 to be filled, which receives, precisely, the food fluid. The container 100 can be in contact with the dispensing nozzle 2 or at a distance from the latter.

[0024] The sanitisation means 7 are in the second position, i.e. below the outlet of the second fluid path 12. Given that in the filling status the second valve 4 is closed, the food fluid does not arrive in the second fluid path 12 (nor, therefore, at the sanitisation means 7).

[0025] In the sanitisation status (illustrated in figures 2 and 5), the first tank 5 contains a sanitisation fluid. The first valve 3 is open so as to allow the sanitisation fluid coming from the first tank 5 to arrive at the dispensing nozzle 2 (via the first fluid path 11).

[0026] The second valve 4 is open as well, so that the sanitisation fluid also reaches the second fluid path 12.

[0027] The sanitisation means 7 is in the first position, i.e. both beneath the dispensing nozzle 2 and below the outlet of the second fluid path 12. Therefore, the sanitisation means 7 receives the sanitisation fluid coming both from the first fluid path 11 and the second fluid path 12.

[0028] In the embodiment described and illustrated herein, the third fluid path 13 receives the sanitisation fluid from the two recesses 71, 72 (in fluid communication with each other).

[0029] In particular, the first recess 71 is below the dispensing nozzle 2, whereas the second recess 72 is below the outlet of the second fluid path 12.

[0030] The sanitisation fluid thus arrives at the second tank 6. In this manner one obtains a complete sanitisation of the first fluid path 11, the second fluid path 12, the two recesses 71, 72, the third fluid path 13 and the second tank 6.

[0031] Analogously, in the variant embodiment (one recess only), the third fluid path 13 receives the sanitisation fluid from the sole recess. The sanitisation fluid thus arrives at the second tank 6. In this manner one obtains a complete sanitisation of the first fluid path 11, the second fluid path 12, the sole recess, the third fluid path 13 and the second tank 6.

[0032] In the recirculation status (illustrated in figures 3 and 6), the first tank 5 contains the food fluid. The first valve 3 is closed; therefore, the food fluid does not arrive at the dispensing nozzle 2. The second valve 4, by contrast, is open, so the food fluid passes into the second fluid path 12 and flows into the sanitisation means 7, which is in the second position.

[0033] In the embodiment described and illustrated here, the third fluid path 13 receives the food fluid from the two recesses 71, 72 (in fluid communication with each other). The food fluid then arrives at the second tank 6.

[0034] The fourth fluid path 14 comprises a pump 8.

[0035] In the recirculation status, the pump 8 is running in order to convey the food fluid from the second tank 6 to the first tank 5. In this manner, the food fluid circulates along a closed path that goes from the first tank 5 to the first fluid path 11 to the second fluid path 12 to the sanitisation means 7 to the third fluid path 13 to the second tank 6 to the fourth fluid path 14 (then returning to the first tank 6).

[0036] Preferably, there are other elements along the fourth fluid path 14, such as, for example, a heat exchanger and a proportional valve (not illustrated).

[0037] The filling device 1 proposed here may be used in a container filling apparatus comprising a rotating carousel 20 provided with a plurality of filling stations.

[0038] Situated at each filling station there is a device for hot filling 1 in accordance with the present invention.

[0039] In particular, for each filling device 1, the first fluid path 11 and the second fluid path 12 are obtained in the rotating carousel 20.

[0040] The first fluid path 11 has a terminal portion 11a which extends from the first valve 3 to the dispensing nozzle 2. The terminal portion 11a is parallel to a terminal portion 12a of the second fluid path 12, which extends from the second valve 4 to the outlet of the second fluid path 12.

[0041] In particular, the first fluid path 11 extends more externally than the second fluid path 11 within the rotating carousel 20.

[0042] From the description provided, the features of the device for hot filling of a container, according to the present invention, are clear, as are the advantages thereof.

[0043] In particular, the recirculation of the food fluid is assured by an already existing closed path, i.e. a path that does not increase the structural complexity of the device, as it exploits conduits, valves and other elements already present. Above all, the recess (or double recess) for the dummy bottle plays a key role in that it makes it possible both to perform a traditional sanitisation and to recirculate the food fluid when undesirable interruptions occur during the filling process.

Claims

1. Device for hot filling (1) of a container (100), comprising:

   a first fluid path (11) ending with a dispensing nozzle (2);
   a first valve (3) situated along said first fluid path (11) and upstream of said dispensing nozzle (2);
   a second fluid path (12) branching off from said first fluid path (11) at said first valve (3);
   a second valve (4) situated along said second fluid path (12);
   a first tank (5) communicating with said first fluid path (11);
   sanitisation means (7) of the dummy bottle type movable at least between a first position in which they are beneath said dispensing nozzle (2) and the outlet of said second fluid path (12) so as to receive the fluids coming from the first fluid path (11) and form the second fluid path (12), and a second position in which they are set away from said dispensing nozzle (2) and are beneath the outlet of said second fluid path (12);
   said hot filling device (1) being configurable at least in:

      a filling status in which the first tank (5) contains a food fluid, the sanitisation means (7) are in the second position, the first valve (3) is open so as to allow the food fluid coming from the first tank (5) to arrive at the dispensing nozzle (2) and the second valve (4) is closed;
      a sanitisation status in which the first tank (5) contains a sanitisation fluid, the sanitisation means (7) are in the first position, the first valve (3) is open and the second valve (4) is open so as to allow the sanitisation fluid coming from the first tank (5) to arrive at the sanitisation means (7) both via the dispensing nozzle (2) and via the outlet of the second fluid path (12);
      a recirculation status in which the first tank (5) contains the food fluid, the sanitisation means (7) are in the second position, the first valve (3) is closed and the second valve (4) is open so that the food fluid returns to the first tank (5) via a closed path passing through the sanitisation means (7) and a further fluid path (13, 14) developing from said sanitisation means (7) to said first tank (5).

2. Device for hot filling (1) according to claim 1, wherein said sanitisation means (7) comprise a first dummy bottle recess (71) and a second dummy bottle recess (72) in fluid communication with each other, said further fluid path (13, 14) being in fluid communication with said recesses (71, 72).

3. Device for hot filling (1) according to claim 2, wherein both of said dummy bottle recesses (71, 72) have a substantially circular cross section.

4. Device for hot filling (1) according to claim 1, wherein said sanitisation means (7) comprise a single dummy bottle recess dimensioned so as to extend from beneath the dispensing nozzle (2) to below the outlet of the second fluid path (12) when said sanitisation means (7) take on the first position, said further fluid path (13, 14) originating from said dummy bottle recess.

5. Device for hot filling (1) according to claim 4, wherein said dummy bottle recess has a substantially ellipsoid cross section.

6. Filling apparatus for containers, comprising:

   a rotating carousel (20) provided with a plurality of filling stations;
   a plurality of devices for hot filling (1) according to any one of the preceding claims, each of said filling devices (1) being situated at one of the filling stations of the rotating carousel (20).

7. Filling apparatus according to claim 6, wherein the first fluid path (11) and second fluid path (12) of each filling device (1) are obtained in said rotating carousel (20), said first fluid path (11) having an end portion (11a) extending from the first valve (3) to the dispensing nozzle (2), which is parallel to an end portion (12a) of the second fluid path (12), which extends from the second valve (4) to the outlet of the second fluid path (12).

FIG. 1

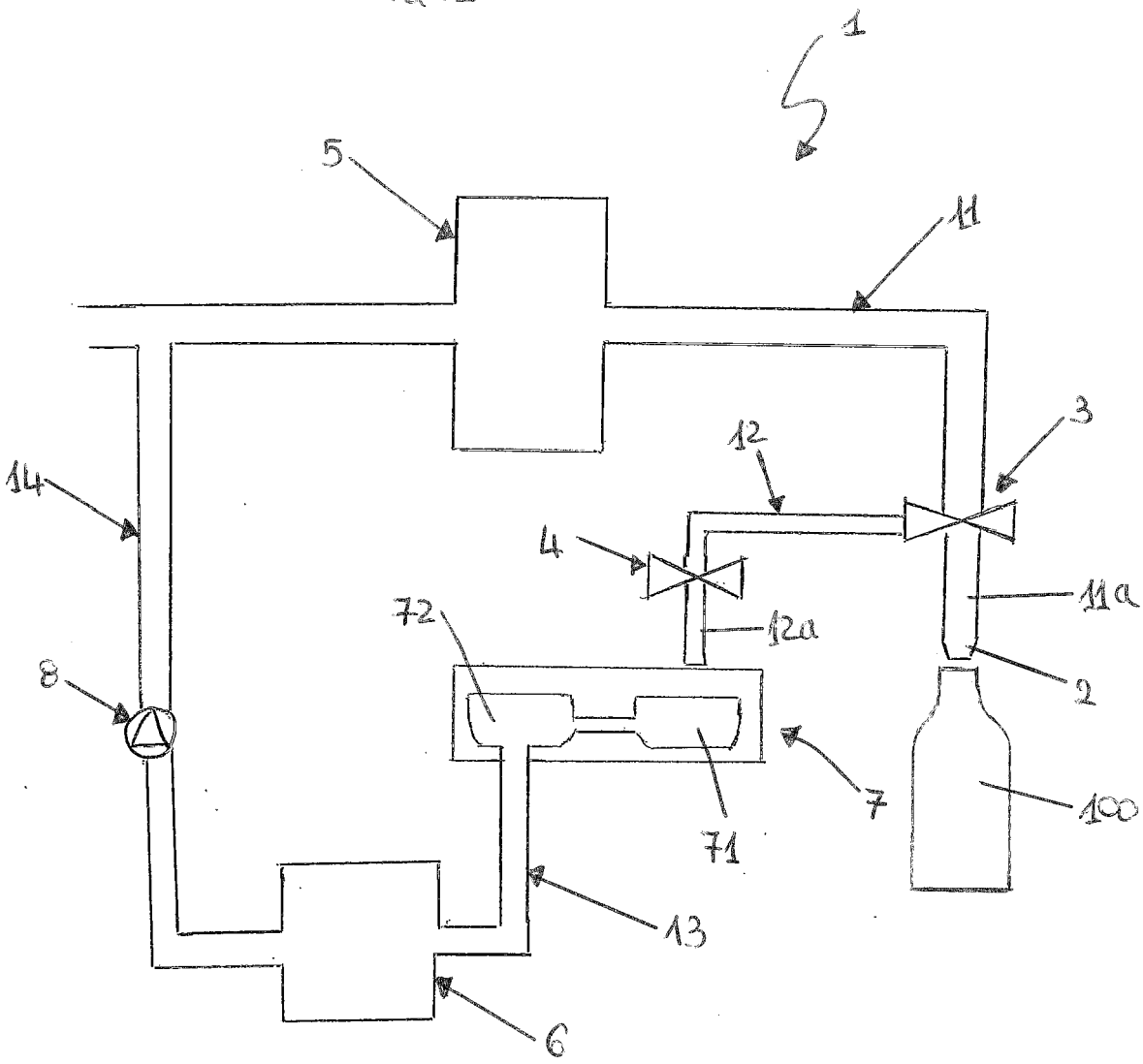


FIG. 2

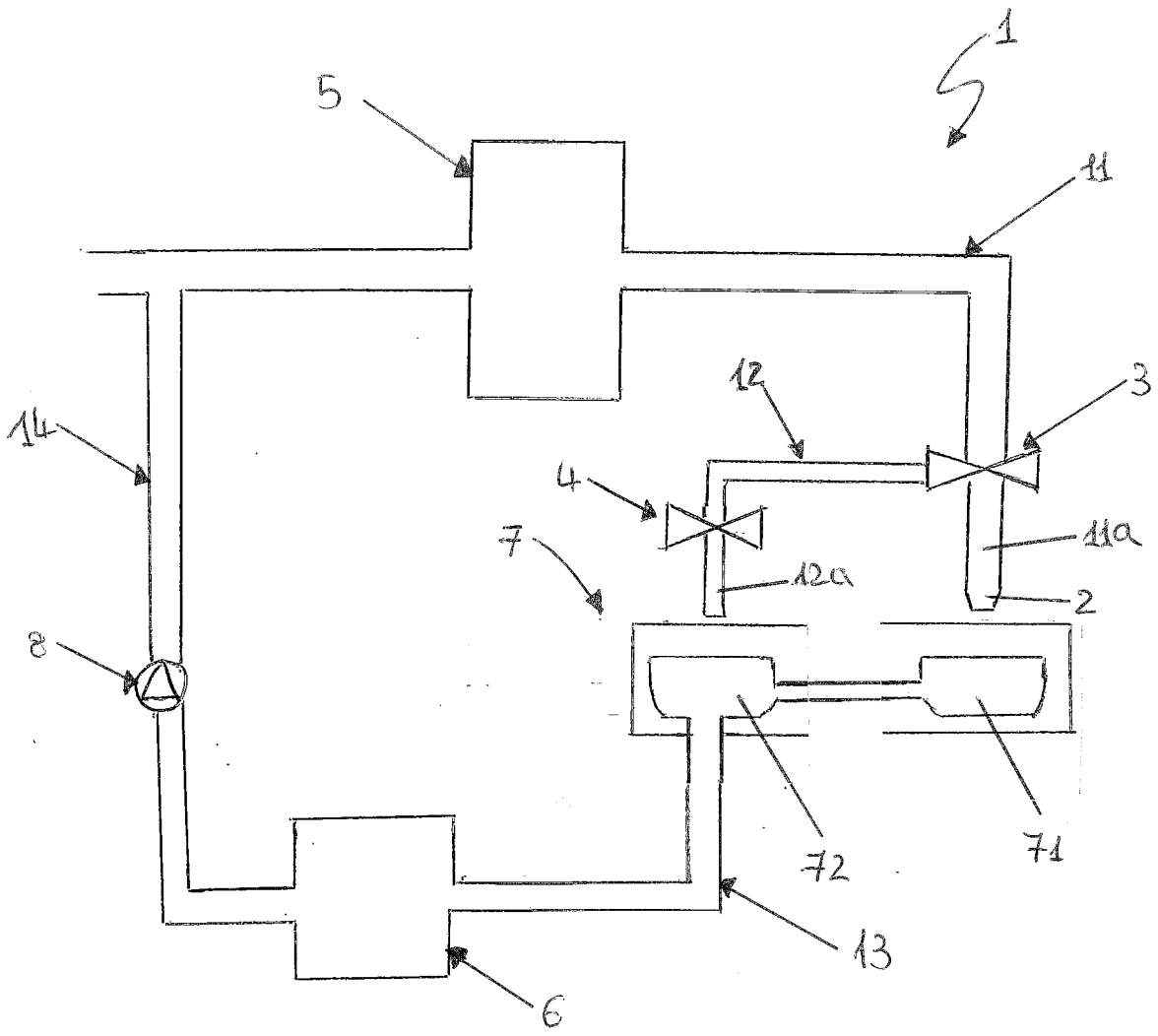


FIG. 3

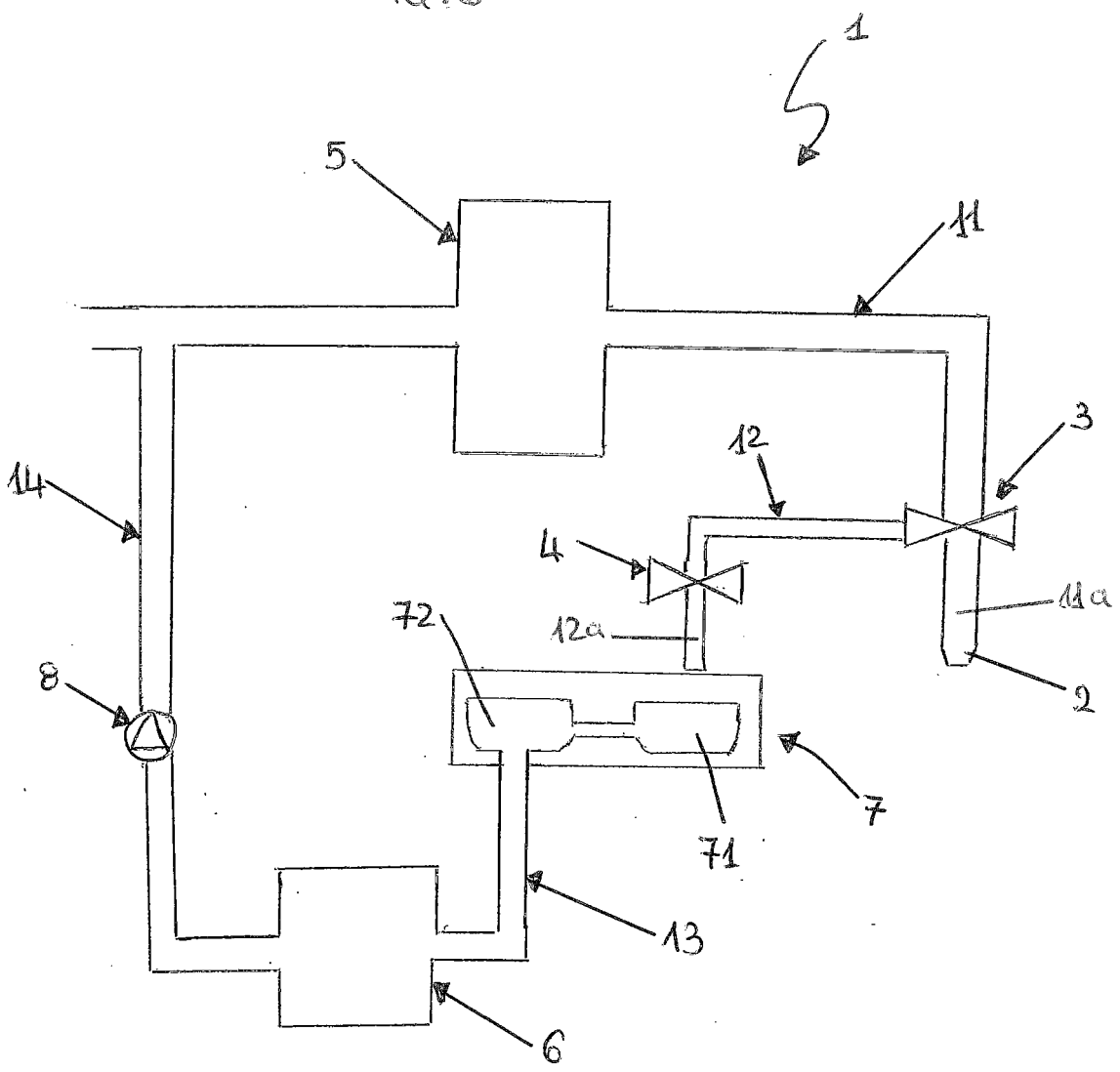


FIG. 4

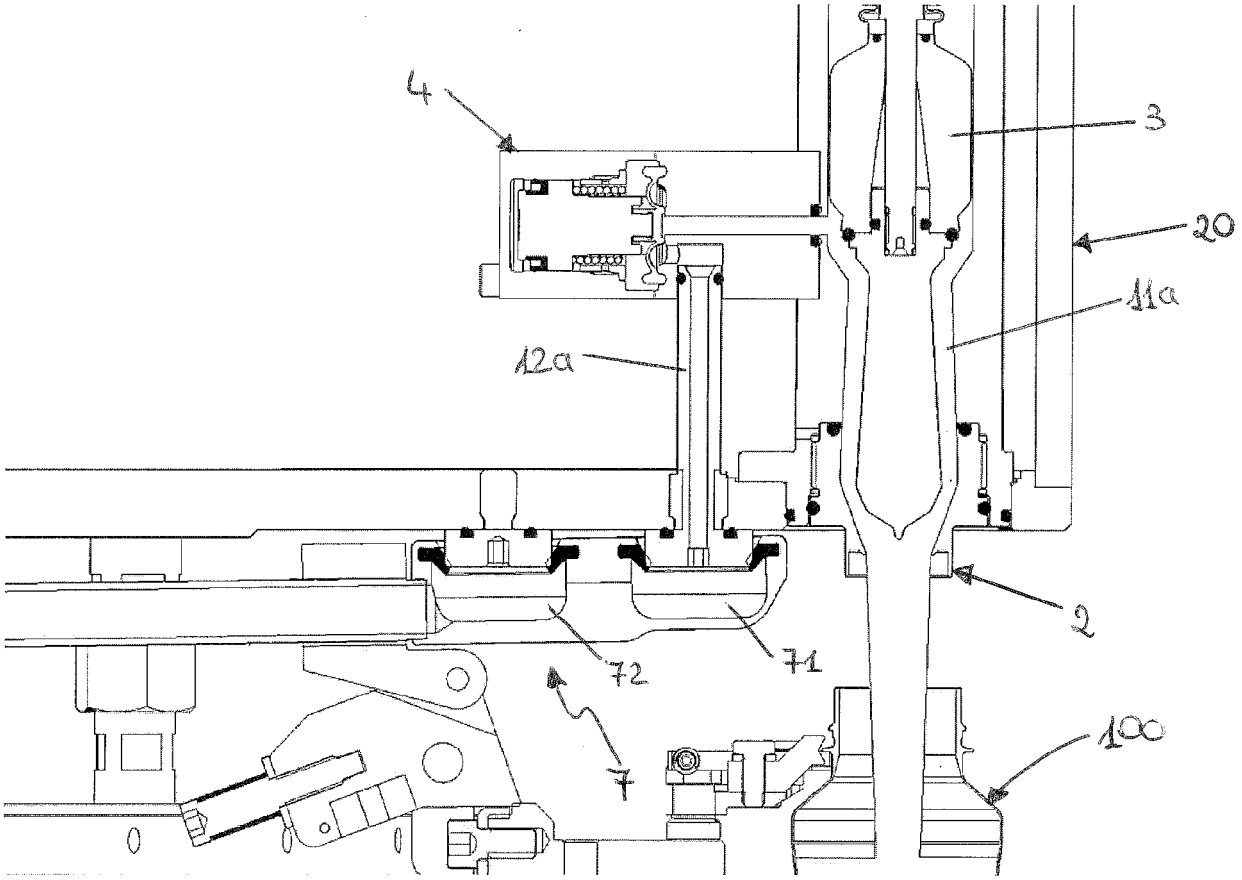


FIG. 5

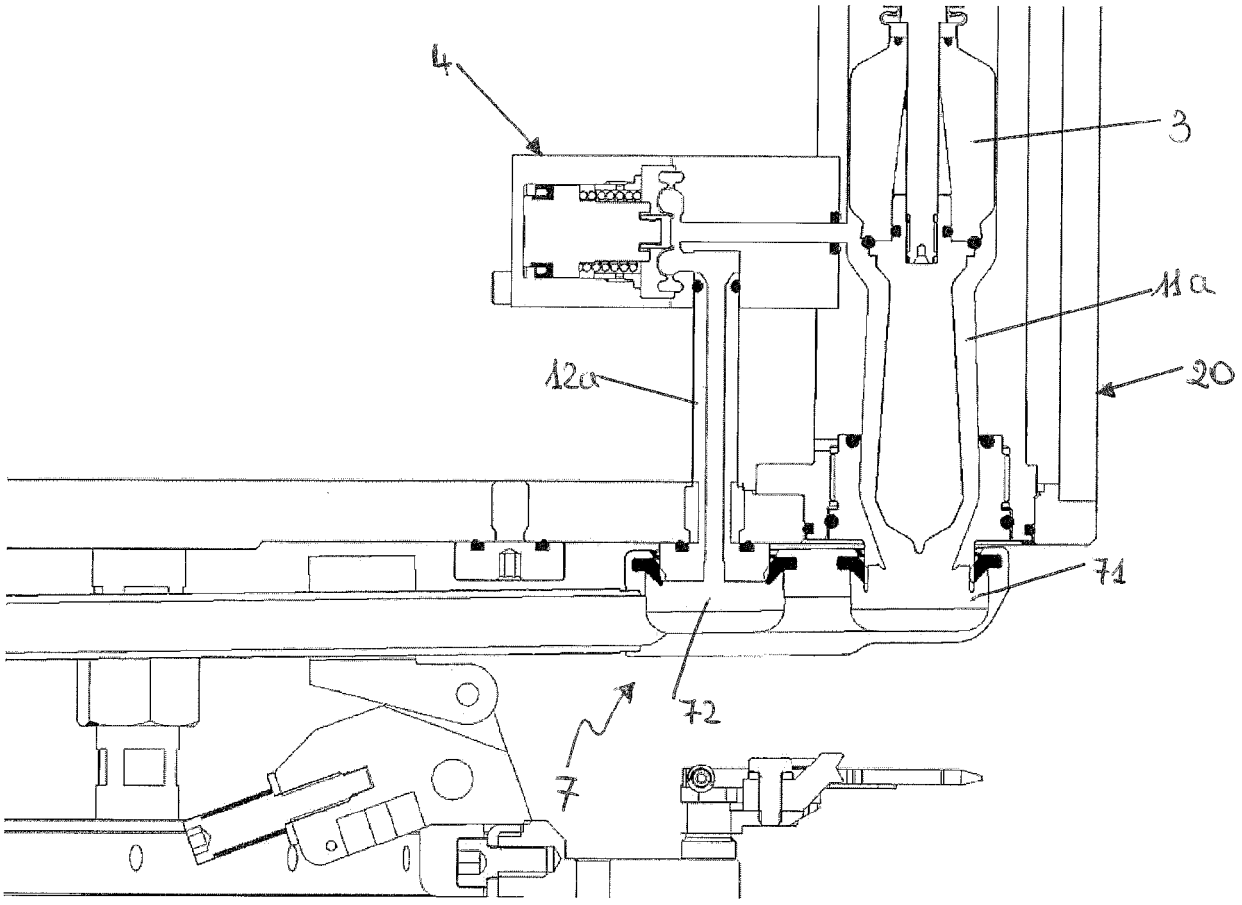
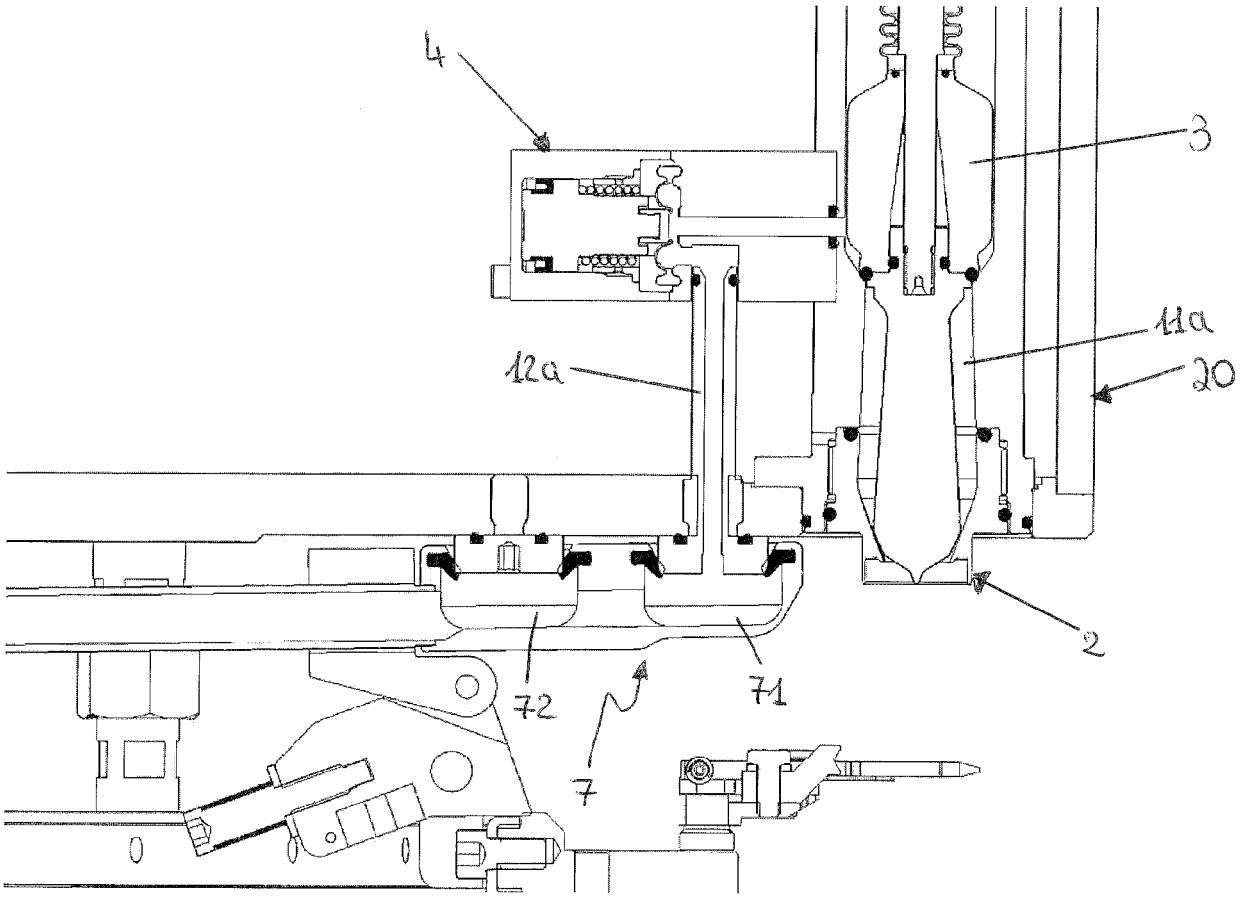


FIG. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 3867

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 610 210 A1 (SIDEL SPA CON SOCIO UNICO [IT]) 3 July 2013 (2013-07-03) * columns 63-67 * * paragraphs [0077] - [0079] * * paragraphs [0089] - [0104]; figures 1-6 * -----	1-7	INV. B67C3/00 B67C3/04
A	CN 202 829 550 U (GUANGZHOU TECH LONG PACKAGING MACHINERY CO LTD) 27 March 2013 (2013-03-27) * abstract; figures 1,2 * -----	1-7	

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	16 April 2018	Wartenhorst, Frank

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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16-04-2018

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2610210 A1	03-07-2013	CN 103183300 A	03-07-2013
		EP 2610210 A1	03-07-2013
CN 202829550 U	27-03-2013	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

- US 7243483 B **[0007]**