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(21) International Application Number: PCT/IT92/00111 (22) International Filing Date: 8 September 1992 (08.09.92) (30) Priority data: PR91A000037 10 September 1991 (10.09.91) IT (71) Applicant (for all designated States except US): MANZINI COMACO S.P.A. [IT/IT]; Via Paradigna, 94/A, I-43100 Parma (IT). (72) Inventor; and (75) Inventor/Applicant (for US only) : DALL'ARGINE, Franco [IT/IT]; Via Spezia, 77, I-43100 Parma (IT). (74) Agent: DALLAGLIO, Fabrizio; Bugnion S.p.A., Via Gari- baldi, 22, I-43100 Parma (IT).		(81) Designated States: US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the</i> <i>claims and to be republished in the event of the receipt of</i> <i>amendments.</i>
(54) Title: FILLING MACHINE WITH AUTOMATIC STERILISATION AND CLEANING OF THE NOZZLES UNDER ASEPTIC CONDITIONS		
(57) Abstract <p>The invention relates to a filler machine (1) equipped with an automatic and aseptic nozzle (3) sterilisation and cleaning device (16). The filler machine (1) comprises a rotating filler head (2) equipped with one or more delivering nozzles (3), to deliver a product into a container (4) arranged inferiorly to the nozzle (3) and supported on a plate (9). The rotating filler head (2) incorporates a tank (5) containing the product to be introduced, which tank (5) is connected to one or more batching cylinders (6) and command organs for the various components of the filler machine (1). The filler machine (1) further comprises a sterile chamber (12) to house the tank (5), the batching cylinders (6) and the mechanical parts of the rotating filler head (2); a tunnel (13) arranged internally to the sterile chamber (12) and separated from it hermetically in which the filling of the containers (4) is effected in aseptic conditions.</p> <div data-bbox="884 1294 1390 2002" data-label="Image"> </div>		

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Filling machine with automatic sterilisation and
cleaning of the nozzles under aseptic conditions.

Description.

The invention relates to a filler machine having automatic nozzle sterilisation and cleaning under aseptic conditions. In particular, the filler machine is of the positive-displacement type.

05 As is known, filling machines are not equipped with sterilising devices inasmuch as the use of sterile containers is not generally requested and there is no problem with regard to aseptic conditions: it is generally after the filling of
10 the containers that the operations of sterilisation and pasteurisation of the filled container is proceeded to.

Similarly, there are no automatic cleaning devices for the filling pipes since the cleaning is done
15 manually.

Furthermore, at present the different container packing operations are made in free, and therefore polluted conditions, for which reason, once the filling of the containers has been effected,
20 sterilisation operations are necessary which can

be performed at high temperature and for long periods.

Such procedures imply however the alteration of the characteristics of the packed product, both as regards the conservation of the vitamin contents and as regards the exterior aspect of the product. In the continuous and constant research for improvements in the conserved products, while maintaining their characteristics, including looks, taste, colour, vitamin content, proteins etc., the need to effect the filling operation under sterile conditions has been affirmed, so as to obtain a perfect and optimal conservation of the packed products without needing to effect energy sterilising processes downstream of the packing.

Aim of the present invention is substantially to solve the problems existing in the prior art by means of a filler machine equipped with an automatic sterilisation and cleaning system of the nozzles under aseptic conditions.

A further aim is to provide a filler machine equipped with delivering nozzles able to operate in a sterile atmosphere completely separated from all the other mechanical movement organs.

A further aim to to equip the delivering nozzles with a steam-cleaning system for the said nozzles during operation, at the end of each filling phase.

05 These aims and others besides, which will better emerge during the course of the present description, are fully attained by the filler machine, object of the present invention, having automatic nozzle sterilisation and cleaning under
10 aseptic conditions, of the type comprising:

- a rotating filler head equipped with one or more delivering nozzles, each of which nozzles is predisposed to deliver a product into a container arranged inferiorly to the nozzle;

15 - one or more plates, each of which is arranged coaxially and inferiorly to the said nozzle to hold the container during the filling operation, said plates being supported by a rotating platform which is synchronised with the rotating filler
20 head;

- a support shaft for the rotating head, which shaft incorporates a tank containing the product to be delivered into the container, which tank is connected to one or more positive-displacement
25 batching cylinders;

- command organs for the nozzles and cylinders and movement organs for the plates (9) and the inlet and outlet stars of the containers, characterised by the fact of comprising:

05 - a sterile chamber to house the filler heads with the tank, the batching cylinders, the mechanical organs for the closing and opening of the nozzles and for the command of the cylinders of the said filler head;

10 - a tunnel arranged internally to the said chamber and separated hermetically from it, at least in its superior part, in which the delivering nozzles are housed and also the support plates (9) of the containers, the said tunnel being under higher
15 pressure than the chamber, which is in its turn at a higher pressure than the surrounding atmosphere. The said filler machine also comprises an automatic nozzle sterilising and cleaning device.

Further advantages and characteristics of the
20 present invention will better emerge from the detailed description that follows, made with reference to the accompanying drawings, which represent a preferred embodiment here illustrated in the form of a non-limiting example, and in
25 which:

- figure 1 shows the filler machine partially in section;

- figure 2 shows a particular in enlarged scale and in section, of the nozzle sterilising and
05 cleaning device of the filling machine.

With reference to the drawings, 1 denotes a filler machine comprising a rotating filler head 2 equipped with one or more delivering nozzles 3 to deliver a product into a container 4 arranged
10 inferiorly to a corresponding delivering nozzle 3. The rotating filler head 2, substantially of known type, comprises a central tank 5 containing the product to be delivered into the containers 4. The tank 5 is connected with a plurality of positive-
15 displacement batching cylinders 6 predisposed to effect the batching of the product to be delivered into each container 4 by means of relative connecting conduits 7 leading to the delivering nozzles 3. The rotating filler head 2 is
20 inferiorly closed by a separating disc 8 out of which the delivering nozzles 3 project.

The filler machine 1 comprises one or more plates 9, each of which is arranged coaxially and inferiorly to a relative delivering nozzle 3 and
25 is predisposed to receive a container 4 during the

filling operation. The plates 9 are supported on a platform 10 rotating in synchronisation with the rotating filler head 2. The filler machine 1 also exhibits a supporting shaft 11 of the rotating

05 filler head 2 and movement organs of the plates 9 (for the lifting and rotation of the said plates 9) and further exhibits inlet and outlet stars for the containers 4, not described herein since of known type.

10 Originally, the filler machine 1 comprises a sterile chamber 12 to house the tank 5, batching cylinders 6 and mechanical organs for opening and closing the delivering nozzles 3 and command organs for the batching cylinders 6, and a tunnel

15 13 arranged internally to the sterile chamber 12 and separated from the same sterile chamber 12 hermetically, at least in its superior part, by means of gaskets 14 made in elastomer material.

According to the present embodiment, the sterile

20 chamber 12 is situated under a sterile laminar flow cap and is separated and isolated from the tunnel 13 by the separating disc 8. The only components of the rotating filler head 2 in contact and in the same atmosphere as the

25 container 4 are the delivering nozzles 3.

Furthermore, in the tunnel 13, apart from the delivering nozzles 3 which effect the filling of the containers 4, there are the plates 9 supporting the containers 4 and a portion of the shaft 11 supporting the rotating filler head 2.

In addition to the above-described, the tunnel 13 is inferiorly isolated from the sterile chamber 12 by the rotating platform 10 and, further, by steam jets. The tunnel 13 further exhibits internally a pressure which is higher with respect to the sterile chamber 12 which, in its turn, is kept at a pressure which is slightly higher than that of the surrounding atmosphere, so that any passage of air can occur only from the inside towards the outside of the filling machine.

In these conditions, the tunnel 13 permits of realising the filling of the containers 4 under aseptic conditions.

The filler machine 1 also exhibits an automatic sterilisation and cleaning device 16 for the delivering nozzles 3, comprising an influx conduit 29 of steam jets on the delivering nozzles 3 to clean them at the end of each filling phase, when the container 4 is still below the corresponding delivering nozzle 3.

The filler machine 1 also comprises an automatic cleaning circuit for the machine itself, comprising a delivery conduit 17 of a cleansing fluid which, at the end of production of the filler machine 1 (for example the end of the working day), is introduced in to the tank 5 and flows up to the delivering nozzles 3, through the tank 5, the cylinders and the conduits 7. This circuit comprises a closing cone 18 arranged on the plate 9 and having the function of plugging the delivering nozzles 3, creating a connection with a flexible tube 19 which connects with the hollow supporting shaft 11 enabling the residual substance of the cleaning operation to escape. The tunnel 13 is equipped inferiorly with escape zones for the steam, condensation and residues of the product, not illustrated. The said escape zones coincide substantially with zones in which there are clearance spaces between moving and fixed organs. The steam jets maintain the separation between tunnel 13 and sterile chamber 12. 21 denotes a lifting and closing device arranged in the sterile chamber 12 and separated from the tunnel 13. This lifting and closing device 21, which is

activated during the cleaning phase of the filler machine 1, comprises movement means 22 which activate a lifter 23 which brings the plate 9 up to the delivering nozzle 3 so as to close the said
05 delivering nozzle 3 during the cleaning operation.

In particular, the movement means 22 comprise a geared motor 24 whose shaft, by means of a pinion which meshes with a chain, moves a cogged wheel causing the lifting of the plate 9 and the closing
10 cone 18 towards the delivering nozzle 3. The lifting and closing device 21 thus is closed and separated from the remaining movement organs.

As regard the functioning, when the filling operation is effected, the product is taken from
15 the tank 5 and passed into the batching cylinders 6, which pistons 30 effect the volumetric batching of the product into the containers 4. Both in the conduits 7 and in the delivering nozzles 3 product residues remain.

20 Between one filling phase of a container 4 and the next there is an interval which is necessary for the filling of the relative batching cylinder 6.

In this interval, while the delivering nozzle 3 is
25 still above the container 4 and before the product

is newly introduced into the conduit 7, a passage of steam is enacted which cleans and sterilises the delivering nozzle 3 through the delivery conduit 17. In this phase the container 4 remains
05 below the delivering nozzle 3, so that the product residues fall into the container itself permitting thus of reaching a greater precision with regard to the batching, in that the said residues do not stay attached to the delivering nozzle 3.

10 At this point the filling of a successive container 4 or group of containers can be proceeded to.

At the end of the work cycle of the machine, for example daily, a general automatic cleaning of the
15 machine is effected, during which the plate 9, activated by the movement means 22, rises up until the closing cone 18 closes the delivering nozzle 3. At this point, the cleaning is effected by means of a circulation of water or other cleaning
20 liquid which passes through the pistons, the conduits, the nozzles, the closing cone the flexible tube and is then removed into the hollow shaft, realising thus a circuit. There follows a sterilisation phase through the circulation of
25 steam which continues even when the plates have

returned into their initial position so as to keep the slightly higher pressure of the tunnel atmosphere, which otherwise would diminish with the unloading of the condensation through the unloading zones of the tunnel 13.

All of the above-described operations are effected in aseptic conditions, but in particular, in order to obtain better sterility conditions, only the delivering nozzle 3 which delivers the product has been introduced into the tunnel 13, while all the rest of the rotating filler head 2 stays out of the tunnel 13, and furthermore, when the lifting and closing device 21 is lifted to close the delivering nozzle 3 there is no contact between the sterile chamber 12 and the tunnel 13 thanks to the closed conformation of the device.

The originality of the invention consists in having used and combined components which, though substantially of known type, realise a machine with totally new characteristics able to realise the filling of containers under sterile conditions and also able to sterilise and clean the nozzles automatically after each filling operation.

The present invention reaches thus the proposed aims. It is able to perform a filling operation in

sterile conditions, permitting the excellent conservation of the natural characteristics of the packed product, that is, vitamins, proteins, looks and colour.

05 Furthermore, a delivering nozzle 3 can be brought into contact with the container which nozzle operates in an aseptic tunnel, while the remaining mechanical parts of the machine are kept in a different environment, separated however also from
10 the outside.

All of the preceding brings to a better efficiency of the machine, which requires no manual cleaning interventions.

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Claims.

1. A filler machine having automatic nozzle sterilisation and cleaning under aseptic conditions, of the type comprising:
 - a rotating filler head (2) equipped with one or more delivering nozzles (3), each of which nozzles (3) is predisposed to deliver a product into a container (4) arranged inferiorly to the nozzle (3);
 - one or more plates (9), each of which is arranged coaxially and inferiorly to the said nozzle (3) to hold the container (4) during the filling operation, said plates (9) being supported by a rotating platform (10) which is synchronised with the rotating filler head (2);
 - a support shaft (11) for the rotating head (2), which shaft (11) incorporates a tank (5) containing the product to be delivered into the container (4), which tank (5) is connected to one or more positive-displacement batching cylinders (6);

- command organs for the nozzles (3) and cylinders (6) and movement organs for the plates (9) and the inlet and outlet stars of the containers (4), characterised by the fact of comprising:

- a sterile chamber (12) to house the filler head (2) with the tank (5), the batching cylinders (6), the mechanical organs for the closing and opening of the nozzles (3) and for the command of the cylinders (6) of the said filler head (2);

- a tunnel (13) arranged internally to the said chamber (12) and separated hermetically from it, at least in its superior part, in which the delivering nozzles (3) are housed and also the support plates (9) of the containers (4), the said tunnel (13) being under higher pressure than the chamber (12), which is in its turn at a higher pressure than the surrounding atmosphere.

2. A filler machine of the type comprising:

- a rotating filler head (2) equipped with one or more delivering nozzles (3), each of which nozzles (3) is predisposed to deliver a product into a container (4) arranged inferiorly to the nozzle (3);

- one or more plates (9), each of which is

arranged coaxially and inferiorly to the said nozzle (3) to hold the container (4) during the filling operation, said plates being supported by a rotating platform (10) which is synchronised with the rotating filler head (2);

- a support shaft (11) for the rotating head (2), which shaft (11) incorporates a tank (5) containing the product to be delivered into the container (4), which tank (5) is connected to one or more positive-displacement batching cylinders (6);

- command organs for the nozzles (3) and cylinders (6) and movement organs for the plates (9) and the inlet and outlet stars of the containers (4), characterised by the fact of comprising an automatically-operating sterilisation and cleaning device (16) for the delivering nozzles (3) 3.

3. A filler machine of the type comprising:

- a rotating filler head (2) equipped with one or more delivering nozzles (3), each of which nozzles (3) is predisposed to deliver a product into a container (4) arranged inferiorly to the nozzle (3);
- one or more plates (9), each of which is

arranged coaxially and inferiorly to the said nozzle (3) to hold the container during the filling operation, said plates (9) being supported by a rotating platform (10) which is synchronised with the rotating filler head (2);

- a support shaft (11) for the rotating head (2), which shaft (11) incorporates a tank (5) containing the product to be delivered into the container (4), which tank (5) is connected to one or more positive-displacement batching cylinders (6);

- command organs for the nozzles (3) and cylinders (6) and movement organs for the plates (9) and the inlet and outlet stars of the containers (4), characterised by the fact of comprising an automatic cleaning circuit of the filler machine (1).

4. A filler machine according to claim 1, characterised by the fact that the tunnel (13) is equipped with gaskets (14) in elastomer material for the hermetic separation of the tunnel (13) from the sterile chamber (12) superior part.

5. A filler machine according to claim 2,

characterised by the fact that the said nozzle sterilisation and cleaning device (16) comprises an influx conduit (29) of jets of steam jetting on to the said delivering nozzles (3) to clean and sterilise them at the end of each filling phase, during the functioning of the filler machine (1).

6. A filler machine according to claim 3, characterised by the fact that the said automatic cleaning circuit of the machine comprises:

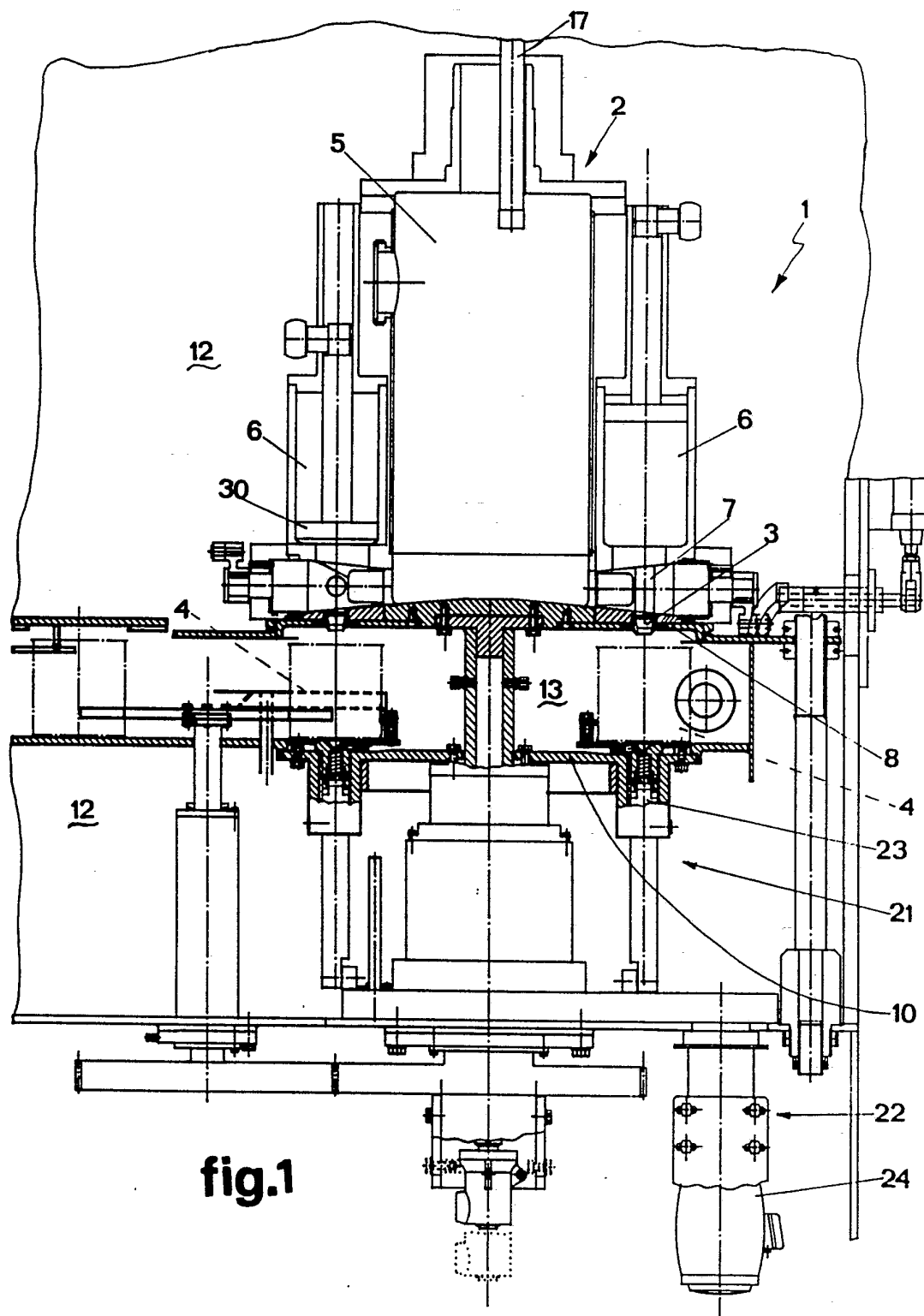
- a delivery conduit (17) of a cleansing fluid which is introduced into the tank (5) and flows in the delivering nozzles (3) through the cylinders (6) and the conduits (7);
- a closing cone (18) arranged on the plate (9) and having the function of plugging the delivering nozzles (3), creating a connection with a flexible tube (19) which connects with the hollow supporting shaft (11) enabling the residual substance of the cleaning operation to escape.

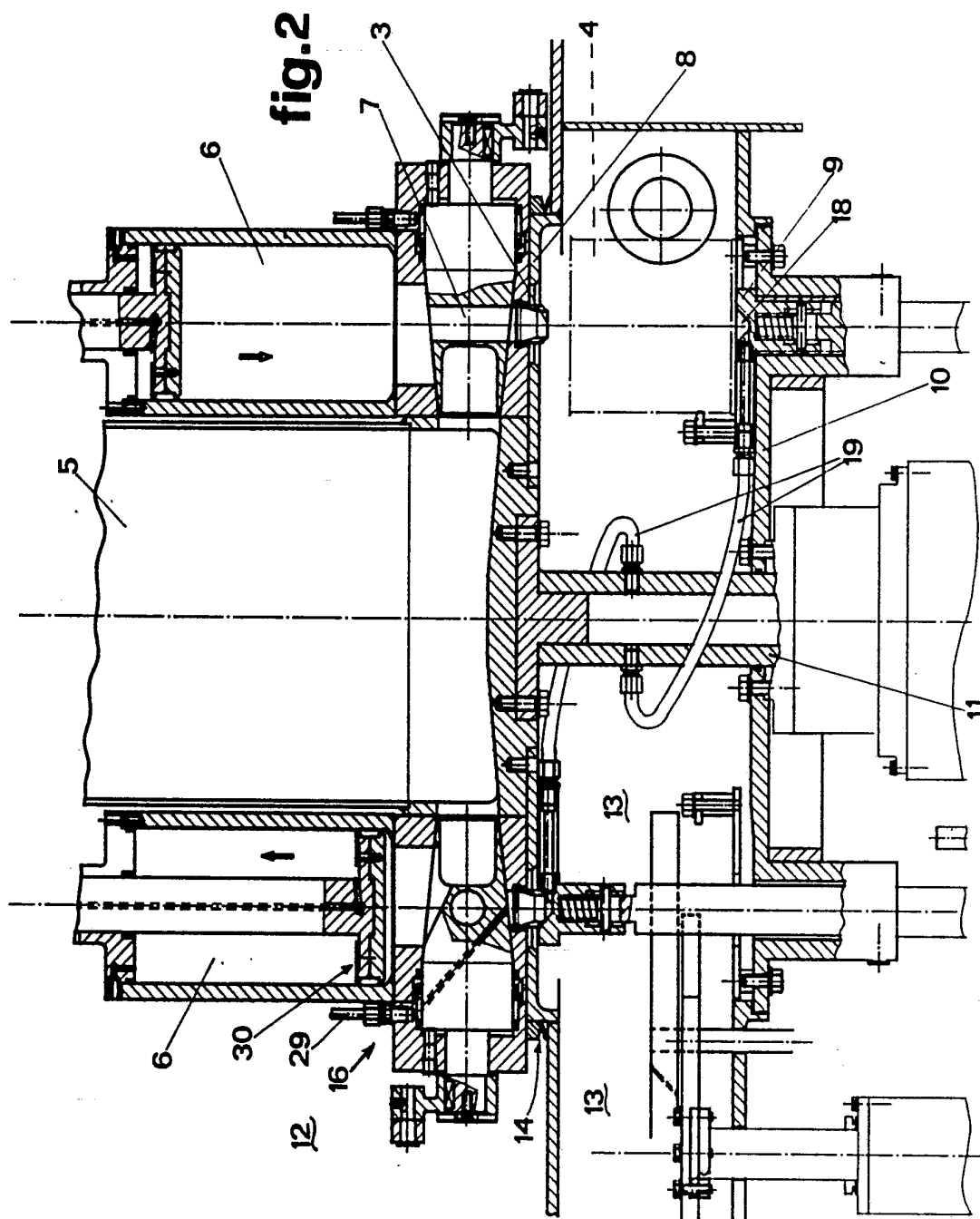
7. A filler machine according to claims 1 and 6, characterised by the fact of comprising a lifting and closing device (21) arranged in the sterile chamber (12) and separated from the tunnel (13),

to bring the closing cone (18) up to the delivering nozzles (3).

8. A filler machine according to claim 1, characterised by the fact that the delivering nozzle (3) or nozzles (3) are the only component of the rotating filler head (2) in contact with and in the same environment as the container (4).
9. A filler machine according to claim 1, characterised by the fact that the tunnel (13) is equipped inferiorly with steam, condensation and product residue escape zones.
10. A filler machine according to claim 1, characterised by the fact that the sterile chamber (12) is situated under a sterile laminar flow cap.
11. A filler machine according to claim 7, characterised by the fact that the said lifting and closing device (21) is closed and separated from the remaining movement organs and comprises a rotating platform (10) on which the plate (9) is arranged, and movement means (22) which activate a

lifter (23) which brings the plate (9) and the closing cone (18) up to the delivering nozzles (3) so as to close it.





INTERNATIONAL SEARCH REPORT

PCT/IT 92/00111

International Application No

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B67C3/00

II. FIELDS SEARCHEDMinimum Documentation Searched⁷

Classification System	Classification Symbols
Int.Cl. 5	B67C ; B65B

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸**III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹**

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	EP,A,0 405 402 (TOYO SEIKAN KAISHA LTD) 2 January 1991 see column 10, line 4 - column 15, line 43 see figure 1 ----	1-6,8,9
A	DE,U,8 708 670 (GRONINGER & CO GMBH) 20 August 1987 see page 6, line 6 - page 10, line 9 see figure 1 ----	1-3,6
A	DE,A,3 722 495 (HOLSTEIN UND KAPPERT AG) 19 January 1989 ----	
A	FR,A,2 593 490 (E. DARDAINE) 31 July 1987 -----	

¹⁰ Special categories of cited documents:

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¹¹ "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention¹² "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step¹³ "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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IV. CERTIFICATION

Date of the Actual Completion of the International Search 07 JANUARY 1993	Date of Mailing of this International Search Report 22. 01. 93
International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer SMOLDERS R.C.H.

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

IT 9200111
SA 65164

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
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15/01/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0405402	02-01-91	JP-A- 3029702 JP-A- 3029703	07-02-91 07-02-91
DE-U-8708670	20-08-87	None	
DE-A-3722495	19-01-89	None	
FR-A-2593490	31-07-87	None	