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(54) DEVICE FOR THE SHAPING, FILLING AND SEALING OF CONTAINERS OF FLEXIBLE AND SOFT LAMINAR MATERIAL

VORRICHTUNG FÜR DAS FORMEN, FÜLLEN UND VERSCHLIESSEN VON BEHÄLTERN AUS FLEXIBLEM UND WEICHEM LAMINAREM MATERIAL

DISPOSITIF DESTINE A METTRE EN FORME, A REMPLIR ET A FERMER HERMETIQUEMENT DES RECIPIENTS CONSTITUES D'UN MATERIAU LAMINAIRE FLEXIBLE ET SOUPLE

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(73) Proprietor: **VOLPAK, S.A.**
E-08130 Santa Perpetua de Mogoda (ES)

(72) Inventor: **PORTOLES CEBRIA, Josep**
08172 Sant Cugat del Valles (ES)

(74) Representative: **SUGRANES - VERDONCES - FERREGÜELA**
304 Calle Provenza
08008 Barcelona (ES)

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Description

Technical field of the invention

[0001] The present invention relates to a device for the shaping, filling and sealing of containers of flexible and soft laminar material, which comprises a container preshaping station, followed by a shaping and filling chamber; a container sealing station and a container unloading station.

[0002] The invention also relates to a procedure for the shaping, filling and sealing of containers of flexible and soft material.

Background of the invention

[0003] There is a wide variety of containers on the market that contain products that must be packed in sterile conditions, such as, for example, liquid foodstuffs such as fruit juices, milk, etc. For this purpose, the devices for filling containers have been adapted so that they can also operate in sterile conditions. What is generally done is to keep all the stations of the packing devices in sterile conditions, starting by sterilizing the container.

[0004] In devices wherein the containers are shaped and filled in line, generally the container shaping station, it is already subjected to sterile conditions. Said operation entails the problem that, in the event of failure in the container shaping station, the sterile conditions are broken, with the consequent losses in time and material involved. For this, there are procedures wherein the sterile area of the device begins in the stage following the container shaping. Examples of this type of device are disclosed in Patents EP 481361 B1, DE 19945500 A1, US 4,992,247 and US 6,120,730.

[0005] There are many different variations for creating sterile conditions, such as, for example, high temperatures or the use of sterilizing fluids or solutions such as hydrogen peroxide solutions.

[0006] Patent US 4,992,247, discloses a sterilization system comprising a closed circuit which connects a sterile-air sprinkler to spray a mixture of air, hydrogen peroxide and water vapour maintained at 200°F, said sterilization system being adaptable to a device for the shaping, filling with products and sealing of containers. The mixture of hot air and 35% hydrogen peroxide comes into contact with the containers after they are shaped and before being filled with the product. The system provides for the mixture to be recirculated towards the aforementioned sprinkler.

[0007] Patent US 6,120,730 discloses an alternative sterilization method for cardboard containers or plastic bottles, especially for containing products which, due to their high acidity level, may be stored without refrigeration. The containers are processed in a shaping, filling and sealing station, and are sterilized once they have been preshaped via successive and alternating stages of hot air injection and gas-phase hydrogen peroxide. The working temperatures needed in the sterilizing tunnel range from between 40°C and 150°C, it being understood that the temperature of hot air injected is between 200°C and 300°C. The high temperatures used, which entail high production costs, are needed to prevent the gas-phase hydrogen peroxide from condensing inside the containers. For this same reason, the concentration of gas-phase hydrogen peroxide is kept below 53%.

[0008] In all the cases mentioned, the container to be sterilized is of a plastic bottle or aluminized cardboard type. EP1245493 discloses an apparatus for forming, filling and sealing of flexible containers according to the preamble of claim 1. No effective solutions are known for sterilizing containers made of a flexible laminar material, which is folded and generally soldered by thermofusion to shape the container. The present invention forms a proposal to solve the problems raised above and brings numerous advantages to the state of the art.

Explanation of the invention

[0009] The device for the shaping, filling and sealing of containers of flexible and soft laminar material, with a container preshaping station, followed by a filling chamber; a container sealing station and an unloading station for filled containers, is characterized by the features according to claim 1.

[0010] In an aspect of the invention the temperature in the sterilizing antechamber is equal to or lower than 70°C, and therefore the temperature of the preshaping station, filling tunnel, sealing station and unloading station of the containers is kept at ambient temperature.

[0011] According to another characteristic of the invention, the temperature of the sterilizing antechamber is preferably between 40°C and 70°C.

[0012] According to another characteristic of the invention, the temperature in the sterilizing antechamber is preferably between 40°C and 70°C.

[0013] The device is also characterized in that the pressure in the sterilizing antechamber is greater than the pressure in the preshaping station and lower than or equal to the pressure in the sterile filling tunnel.

[0014] According to another characteristic of the invention, the pressure in the sterilizing antechamber is lower than the pressure in the preshaping station and the filling tunnel in sterile conditions.

[0015] According to another aspect of the invention, the preshaping station and, at least, the sterile filling tunnel, have means for supplying air which provide a vertical air flow, perpendicular to the direction in which the containers move.

[0016] Another characteristic of the invention is that the concentration of gas-phase hydrogen peroxide is equal to or lower than 30,000 parts per million (ppm).

[0017] The device according to the invention is also characterized in that the concentration of gas-phase hydrogen peroxide is equal to or lower than 1,500 parts per million (ppm).

[0018] The procedure for the shaping, filling and sealing of containers of soft and flexible material being the object of the invention, is characterized by a process according to claim 11.

[0019] The procedure being the object of the invention is also characterized in that the container sterilization stage b) is performed at a temperature equal to or lower than 70°C, preferably between a range of 40°C and 70°C, and more preferably between 45°C and 55°C.

[0020] The procedure being the object of the invention is also characterized in that in the preshaping stage a), the filling stage c), the sealing stage d) and the unloading stage e), the containers are kept at ambient temperature.

[0021] According to another characteristic of the procedure of the invention, the sterile air of the sterilizing antechamber, enriched with hydrogen peroxide, is evacuated into the atmosphere prior to transformation of the peroxide into water and oxygen via catalysis.

Brief description of the drawings.

[0022] The attached drawings illustrate, as a non-restrictive example, a device for the shaping, filling and sealing of containers of flexible and soft laminar material, according to the invention. They also demonstrate the stages of the procedure according to the invention. In said drawings:

Fig. 1 corresponds to a diagram of the device for the shaping, filling and sealing of containers of flexible and soft laminar material according to the invention, wherein the components that characterize it can be seen.

Detailed description of the drawings.

[0023] In Fig. 1 is a diagrammatic representation of a device 1, of the type usually used for the shaping, filling and sealing of containers of flexible and soft material (101, 102, 103, 104), and wherein the characteristic parts of the invention are represented. In order to simplify the representation, the device 1 has been shown truncated, not accounting for the usual, known elements used to perform the shaping, filling and sealing of the containers. It can be seen how the device 1 has a container preshaping station 2, followed by a filling chamber 3; a container sealing station 4 and a container unloading station 5. The filling chamber 3 is divided into two clearly-defined areas, the first consisting in a first sterilizing antechamber 6 and the second in a filling tunnel 7 in sterile conditions.

[0024] In the preshaping station 2, the flexible and soft laminar material 15 coming from a reel 16, is folded and cut accordingly to form a preshaped container 101, which defines a cavity suitable for receiving the product. Specifically in this area of the device 1, the laminar material 15 of the base 12 and walls 11 of the containers 101 is soldered by using pressure and heat, consequently forming the watertight cavity which will be filled with the produce in question in the filling tunnel 7 in sterile conditions. In the preshaping station, means for supplying air 91 are foreseen, which provide a flow (F) of air, vertical and perpendicular with respect to the direction (G) in which the containers 101 move.

[0025] In the case represented, the sterilizing chamber 6 contains nozzles 8 for injecting, inside the preshaped containers 101 from the preshaping station 2, hot sterile air and gas-phase hydrogen peroxide. Sterile containers 102 are produced in this operation. In Fig. 1, three nozzles 8 are shown. The first and third nozzles 81, 83, inject air inside the preshaped containers 101 from the preshaping station 2, to form the sterile containers 102. Said air, shown by a dotted arrow (H), is drawn from the atmosphere and filtered by conventional filters 18, such as HEPA filters, and is then heated by normal heating means 17, such as, for example, an electrical resistance. The nozzle 82 injects gas-phase hydrogen peroxide inside the preshaped containers 101, with a concentration that varies according to the relative humidity and temperature of the sterilizing antechamber 6.

[0026] PHV-type ("Vaporized Hydrogen Peroxide) equipment 24, by STERIS, is used to inject hydrogen peroxide gas which, via specific sensors, not shown here, sends humidity and temperature data to a control terminal which, in accordance with said data, carries out the order to inject hydrogen peroxide in non-saturated gas conditions. For this, ambient air is drawn beforehand, which is dehumidified in a drier 19.

[0027] The temperature inside the sterilizing antechamber 6 is between 40°C and 70°C, and preferably between 45°C and 55°C. Said temperature is what comes from the sterile air injected by the nozzles 81 and 83.

[0028] The combined effect of the temperature from the soldering equipment used in the preshaping station 2 and the hot air injected from the sterilizing antechamber 6, mean that the antechamber 6 can work up to a range of temperatures of up to 70°C, while also ensuring that the containers 102 are sterilized and made watertight. This is a very important aspect because, in a container type such as the one described, the folded areas of material are critical areas for contamination. Due to the sequence of hot air injection, followed by gas-phase hydrogen peroxide injection, and finally another hot air injection, condensation of the gas-phase hydrogen peroxide is prevented and is eliminated from the inside of the containers 102.

[0029] As a consequence of this combined effect of soldering temperature and sequence of injections, the preshaping station 2, the filling tunnel 7, the sealing station 4 and the unloading station 5 of the containers, can be kept at ambient temperature without compromising the organoleptic qualities of the product.

[0030] The sterilizing antechamber 6 has an evacuating device 20 which comprises a hydrogen peroxide catalyst which transforms the residual hydrogen peroxide in the antechamber 6 into water and oxygen, which can be

released into the atmosphere.

[0031] As can be seen in Fig. 1, the filling tunnel in sterile conditions 7, the sealing station 4 and the unloading station 5 have, like the preshaping station 2, means for supplying air 92. These means 92 provide a flow (F) of sterile air, vertical and perpendicular with respect to the direction (G) in which the containers 103 move in the filling tunnel 7, creating in this way a curtain of air which hinders the entry of any particles inside the antechamber of the filling tunnel 7. Added to these means for supplying sterile air 92, is that the resulting pressure in the sterilizing antechamber 6, in the filling tunnel 7 and in the sealing 4 and unloading stations 5 of the containers, is greater than the pressure in the preshaping station 2. More specifically, the pressure in the antechamber 6 is greater than the pressure in the preshaping station 2, but less than the pressure in the adjoining filling tunnel 7. In this way, any particle from the preshaping station 2 is prevented from entering the antechamber 6 and, at the same time, sterile air from the supply means 92 provided in the filling tunnel 7, enters the sterilizing antechamber 6, ensuring a sterile atmosphere. Obviously, the pressure in the different stations can be regulated in accordance with the pressure of the atmosphere.

[0032] Although in the case represented, the sealing station 4 and the unloading station 5 have means for injecting sterile air (F), in the same way as the filling tunnel in sterile conditions 7, there is the non-exclusive possibility that the sealing 4 and unloading stations 5 have other methods for ensuring a sterile atmosphere, such as ultraviolet radiation lamps, or any other method suitable for sterilizing.

[0033] The filling nozzles 21 are represented diagrammatically in the filling tunnel in sterile conditions 7. Once filled with a product, the containers 103 are transported to the sealing station 4 which is obviously also sterilized. In the case shown, sealing of the containers is done via heat fusion and pressure on the material on the upper part 13 of the filled containers 103 and a sterile lid 14 is also fitted from a dispenser 22. There are obviously alternative ways of sealing the containers 103 consisting in, for example, sealing by heat fusion and pressure on the material without a lid 14. Other sealing methods are also considered wherein the lid 14 is added before reaching the sealing station 4.

[0034] Once sealed, the containers 104 are collected in the unloading station 5 and taken to a normal packing station 23 for subsequent distribution.

[0035] With a device 1 according to the invention, which comprises a first container sterilizing antechamber 6 and a filling tunnel in sterile conditions 7, containers of soft and flexible material 101, 102, 103, 104 can be manufactured at an average rate of 60 cycles per minute, more than one container being processed in each cycle. As is usually the case in manufacturing this type of container 101, 102, 103, 104, each cycle of preshaping, first injection of sterile air, injection of hydrogen peroxide gas, filling, etc., runs at a rate of, for example, two containers 101, 102, 103, 104 per cycle. Said parameters correspond to the usual ones in this type of device and manufacturing process, in such a way that the added characteristic of sterilizing the containers 101, 102, 103, 104 does not affect their production.

[0036] Obviously, this technical solution of providing a first sterilizing antechamber 6 and a second filling tunnel in sterile conditions 7 which allows sterilization at relatively low temperatures and with controlled concentrations of gas-phase hydrogen peroxide, applies to any device 1 for the shaping, filling and sealing of containers of soft and flexible laminar material without moving away from the object of the invention. It can thus be considered for use with devices 1 and procedures that operate at different rates or which are complemented by a variety of accessories for improving the shaping, filling or sealing of containers 101, 102, 103, 104.

[0037] Prior to its use for the shaping, filling and sealing of containers of soft and flexible laminar material, the device 1 according to the invention must be completely conditioned and sterilized in those areas or regions requiring a sterile atmosphere. For this, the device must be washed according to the standard procedures, using, for example, disinfectant solutions and steam, but also, because it has many nozzles 8 for injecting gas-phase hydrogen peroxide, this gas is also used for the prior sterilization of the device stations which must be kept in sterile conditions during operation, which includes, the sterilizing antechamber 6, the filling tunnel 7 and the sealing station 4.

[0038] A variation of the present invention, consists in a device 1 made up by a filling chamber 3, a container sealing station 4 and an unloading station 5, and is a device 1 without the preshaping station 5, but wherein the filling chamber 3 consists in a first sterilizing antechamber 6 and a second filling tunnel in sterile conditions 7. In this type of device 1, in fact, it is relatively easy to separate the different modules or stations.

[0039] In this variation of the device 1, without a preshaping station 2 and applicable for containers of soft and flexible material 101 which are already shaped, provision is made for the pressure in the sterilizing antechamber 6 to be negative or lower than ambient pressure, while the pressure in the filling tunnel in sterile conditions 7 has a positive value or one greater than atmospheric pressure. This relationship between pressures in the different chambers of stations ensures that the gas-phase hydrogen peroxide injected in the sterilizing antechamber is not lost by the previous part of the device 1, which would cause deterioration via its oxidation. In addition, in this way, the device 1 made up by a filling chamber 3, a container sealing station 4 and an unloading station 5, can be situated in an adjacent position in any area or room, ensuring that the hydrogen peroxide will be taken to the evacuating catalyser device 20 and will not be leaked in the room wherein the device 1 is located.

[0040] Although this pressure relationship may itself be applied to a device 1 which comprises a preshaping

station 2, this causes the pressure in the sterilizing antechamber 6 to be lower than atmospheric pressure, the preshaping station 2 being joined to the sterilizing antechamber 6 acting as a means of protection against leakage of the gas-phase hydrogen peroxide into the room and, therefore, while it ensures that the pressure in the filling tunnel in sterile conditions 7 is higher than that in the sterilizing antechamber 6, this makes no difference if the pressure in the antechamber 6 is or is not lower than the atmospheric pressure in the preshaping station 2.

Claims

1. Device (1) for the shaping, filling and sealing of containers of flexible and soft laminar material, which comprises a container preshaping station (2), followed by a filling chamber (3); a container sealing station (4) and a station for unloading (5) filled stations, **characterized in that** the filling chamber consists of a first sterilizing antechamber (6) and a second filling tunnel in sterile conditions (7); and **in that** said sterilizing antechamber (6) contains several nozzles (8) for injecting hot air and gas-phase hydrogen peroxide inside the preshaped containers (101), the hydrogen peroxide being in a concentration that varies according to the relative humidity and temperature of the sterilizing antechamber, in order to avoid condensation of the hydrogen peroxide inside the containers.

2. Device (1) according to claims 1, **characterized in that** the temperature in the sterilizing antechamber (6) is equal to or lower than 70°C, keeping the preshaping station (2), the filling tunnel (7), the sealing station (4) and the container unloading station (5) at ambient temperature.

3. Device (1) according to claim 2, **characterized in that** the temperature in the sterilizing antechamber (6) is between 40°C and 70°C.

4. Device (1) according to claim 3, **characterized in that** the temperature in the sterilizing antechamber (6) is between 45°C and 55°C.

5. Device (1) according to any of the previous claims, **characterized in that** the pressure in the sterilizing antechamber (6) is greater than the pressure in the preshaping station (2) and lower than or equal to the pressure in the sterile filling tunnel (7).

6. Device (1) according to any of the previous claims 1 to 4, **characterized in that** the pressure in the sterilizing antechamber (6) is lower than the pressure in the preshaping station (2) and the filling tunnel in sterile conditions (7).

7. Device (1) according to any of the previous claims, **characterized in that** the preshaping station (2) and, at least, the filling tunnel in sterile conditions (7) have means for supplying air (91, 92) which provide a flow (F) of air vertical and perpendicular to the direction (G) in which the containers (101, 102, 103, 104) move.

8. Device (1) according to any of claims 1 to 3, **characterized in that** the concentration of gas-phase hydrogen peroxide is equal to or lower than 30,000 parts per million (ppm).

9. Device (1) according to any of claims 1 to 3, **characterized in that** the concentration of gas-phase hydrogen peroxide is equal to or lower than 1,500 parts per million (ppm).

10. Device (1) according to any of the previous claims, **characterized in that** the sterilizing antechamber (6) contains an unloading device (20) with a catalyser which catalyzes the decomposition reaction of the hydrogen peroxide to water and oxygen.

11. Procedure for the shaping, filling and sealing of containers of soft and flexible material, **characterized in that** it comprises the following stages:

    a) container preshaping (11) using a laminar material, said material being folded and cut to produce a container;
    b) container sterilization (102) in a sterilizing antechamber (6), situated prior to a filling chamber in sterile conditions (7), said container sterilization consisting on the injection of hot sterile air, followed by the injection of gas-phase hydrogen peroxide through several nozzies with a concentration of hydrogen peroxide which varies according to the temperature and relative humidity of the sterilizing antechamber, in order to avoid condensation of the hydrogen peroxide inside the containers;
    c) container filling (103) in sterile conditions;
    c) container sealing (104) in sterile conditions; and
    e) container unloading (105).

12. Procedure according to claim 11, **characterized in that** the container sterilizing (102) stage b) is performed at a temperature equal to lower than 70°C.

13. Procedure according to claim 12, **characterized in that** the container sterilizing (102) stage b) is done at a temperature of between 40°C and 70°C.

14. Procedure according to claim 13, **characterized in that** the container sterilizing (102) stage b) is done at a temperature of between 45°C and 55°C.

15. Procedure according to any of claims 11 to 14, **characterized in that** in the preshaping stage a), the filling stage c), the sealing stage d) and the unloading stage e), the containers (101, 103, 104) are kept at ambient temperature.

16. Procedure according to any of claims 11 to 15, **characterized in that** the sterile air of the sterilizing antechamber (6), enriched with hydrogen peroxide, is evacuated into the atmosphere prior to transformation of the peroxide into water and oxygen.

Patentansprüche

1. Vorrichtung (1) zum Formen, Füllen und Abdichten von Behältern von biegsamem und weichem laminarem Material, welche eine Behältervorformungsstation (2) umfasst, an die sich eine Füllkammer (3) anschließt; eine Station (4) zur Abdichtung des Behälters und eine Station (5) zum Entladen der gefüllten Behältern, **dadurch gekennzeichnet, dass** die Füllkammer aus einer ersten sterilisierenden Vorkammer (6) und einem zweiten Fülltunnel (7) unter sterilen Bedingungen besteht; und dass die genannte sterilisierende Vorkammer (6) mehrere Düsen (8) zur Injektion von heißer Luft und Hydrogenperoxid in Gasphase innerhalb den vorgeformten Behältern (101), wobei das Hydrogenperoxid in einer Konzentration vorliegt, die nach der relativen Feuchtigkeit und Temperatur der sterilisierenden Vorkammer variiert, um die Kondensation des Hydrogenperoxids innerhalb der Behälter zu verhindern.

2. Vorrichtung (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Temperatur in der sterilisierenden Vorkammer (6) 70º C oder weniger beträgt, wobei die Vorformungsstation (2), der Fülltunnel (7), die Station (4) zur Abdichtung und die Station (5) zum Entladen des Behälters auf Umgebungstemperatur gehalten werden.

3. Vorrichtung (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die Temperatur in der sterilisierenden Vorkammer (6) zwischen 45ºC und 70ºC beträgt.

4. Vorrichtung (1) nach Anspruch 3, **dadurch gekennzeichnet, dass** die Temperatur in der sterilisierenden Vorkammer (6) zwischen 45ºC und 55ºC beträgt.

5. Vorrichtung (1) nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** der Druck in der sterilisierenden Vorkammer (6) höher ist als der Druck in der Vorformungsstation (2) und geringer oder gleich dem Druck in dem sterilen Fülltunnel (7).

6. Vorrichtung (1) nach einem der vorherigen Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** der Druck in der sterilisierenden Vorkammer (6) geringer ist als der Druck in der Vorformungsstation (2) und dem Fülltunnel (7) unter sterilen Bedingungen.

7. Vorrichtung (1) nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die Vorformungsstation (2) und zumindest der Fülltunnel (7) unter sterilen Bedingungen Mittel (91, 92) zur Förderung von Luft haben, welche einen vertikalen Luftstrom (F) senkrecht zur der Richtung (G) liefern, in welcher sich die Behälter (101, 102, 103, 104) bewegen.

8. Vorrichtung (1) nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Konzentration von Hydrogenperoxid in Gasphase gleich oder kleiner als 30000 Teile pro Million ist.

9. Vorrichtung (1) nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Konzentration von Hydrogenperoxid in Gasphase gleich oder kleiner als 1500 Teile pro Million ist.

10. Vorrichtung (1) nach einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** die sterilisierende Vorkammer (6) eine Entladungsvorrichtung (20) mit einem Katalysator enthält, welcher die Zerfallsreaktion des Hydrogenperoxids zu Wasser und Sauerstoff katalysiert.

11. Verfahren zur Formung, Füllen und Abdichtung von Behältern von weichem und flexiblem Material, **dadurch gekennzeichnet, dass** es die folgenden Schritte umfasst:

a. Vorformen (11) des Behälters unter Verwendung eines laminarem Materiales, wobei das genannte Material geknickt und geschnitten wird, um einen Behälter herzustellen;
b. Sterilisieren (102) des Behälters in einer sterilisierenden Vorkammer (6), die vor einer Füllkammer (7) unter sterilen Bedingungen gelegen ist, wobei die genannte Behältersterilisation aus der Injektion von heißer steriler Luft besteht, gefolgt von der Injektion von Hydrogenperoxid in Gasphase durch mehrere Düsen mit einer Konzentration an Hydrogenperoxid, welche je nach Temperatur und der relativen Feuchtigkeit der sterilisierenden Vorkammer (6) variiert, um eine Kondensation des Hydrogenperoxids innerhalb der Behälter zu verhindern;
c) Füllen (104) des Behälters unter sterilen Bedingungen;
d) Abdichten (104) des Behälters unter sterilen Bedingungen; und
e) Entladen (105) des Behälters.

12. Verfahren nach Anspruch 11, **dadurch gekennzeichnet, dass** der Schritt b) zum Sterilisieren (102) des Behälters bei einer Temperatur gleich oder unterhalb von 70ºC ausgeführt wird.

13. Verfahren nach Anspruch 12, **dadurch gekennzeichnet, dass** der Schritt b) zum Sterilisieren (102) des Behälters bei einer Temperatur zwischen 40ºC und 70ºC ausgeführt wird.

14. Verfahren nach Anspruch 13, **dadurch gekennzeichnet, dass** der Schritt b) zum Sterilisieren (102) des Behälters bei einer Temperatur zwischen 45ºC und 55ºC ausgeführt wird.

15. Verfahren nach einem der Ansprüche 11 bis 14, **dadurch gekennzeichnet, dass** bei dem Vorformungsschritt a), dem Füllschritt c), dem Abdichtungsschritt d) und dem Entladeschritt e) die Behälter (101, 103, 104) auf Umgebungstemperatur gehalten werden.

16. Verfahren nach einem der Ansprüche 11 bis 15, **dadurch gekennzeichnet, dass** die sterile Luft der sterilisierenden Vorkammer (6), mit Hydrogenperoxid angereichert, in die Atmosphäre unter Umwandlung des Peroxids zu Wasser und Sauerstoff ausgelassen wird.

Revendications

1. Dispositif (1) pour le façonnage, remplissage et étanchéisation de conteneurs de matière laminaire flexible et molle, qui comprend un poste (2) de pré-façonnage de conteneurs suivi d'une chambre (3) de remplissage ; un poste (4) d'étanchéisation de conteneurs et un poste pour décharger (5) les conteneurs remplis, **caractérisé en ce que** la chambre de remplissage consiste en une première préchambre de stérilisation (6) et un second tunnel de remplissage dans des conditions stériles (7) ; et **en ce que** ladite préchambre de stérilisation (6) contient diverses buses (8) pour injecter de l'air chaud et du peroxyde d'hydrogène en phase gazeuse à l'intérieur des conteneurs pré-façonnés (101), le peroxyde d'hydrogène étant à une concentration qui varie selon l'humidité relative et la température de la préchambre de stérilisation, afin d'éviter la condensation du peroxyde d'hydrogène à l'intérieur des conteneurs.

2. Dispositif (1) selon la revendication 1, **caractérisé en ce que** la température dans la préchambre de stérilisation (6) est égale ou inférieure à 70ºC, en maintenant le poste de pré-façonnage (2), le tunnel de remplissage (7), le poste d'étanchéisation (4) et le poste de décharge de conteneurs (5) à température ambiante.

3. Dispositif (1) selon la revendication 2, **caractérisé en ce que** la température dans la préchambre de stérilisation (6) est entre 40ºC et 70ºC.

4. Dispositif (1) selon la revendication 3, **caractérisé en ce que** la température dans la préchambre de stérilisation (6) est entre 45ºC et 55ºC.

5. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la pression dans la préchambre de stérilisation (6) est supérieure à la pression dans le poste de pré-façonnage et inférieure ou égale à la pression dans le tunnel de remplissage stérile (7).

6. Dispositif (1) selon l'une quelconque des revendications précédentes 1 à 4, **caractérisé en ce que** la pression dans la préchambre de stérilisation (6) est inférieure à la pression dans le poste de pré-façonnage et dans le tunnel de remplissage dans des conditions stériles (7).

7. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le poste de pré-façonnage (2) et, au moins, le tunnel de remplissage dans des conditions stériles (7) ont des moyens pour fournir de l'air (91, 92), qui offrent un écoulement (F) d'air vertical et perpendiculaire à la direction G dans lequel se déplacent les conteneurs (101, 102, 103, 104).

8. Dispositif (1) selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** la concentration de peroxyde d'hydrogène en phase gazeuse est égale ou inférieure à 30000 parties par million (ppm).

9. Dispositif (1) selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** la concentration de peroxyde d'hydrogène en phase gazeuse est égale ou inférieure à 1500 parties par million (ppm).

10. Dispositif (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la préchambre de stérilisation (6) contient un dispositif de décharge (20) avec un catalyseur qui catalyse la réaction de décomposition du peroxyde d'hydrogène en eau et oxygène.

11. Procédé pour le façonnage, remplissage et étanchéisation de conteneurs de matière laminaire flexible et molle, **caractérisé en ce qu'**il comprend les étapes suivantes :

a) pré-façonnage de conteneurs (11) utilisant une matière laminaire, ladite matière étant pliée et coupée pour produire un conteneur ;

b) stérilisation de conteneurs (102) dans une préchambre de stérilisation (6) située avant une chambre de remplissage dans des conditions stériles (7), ladite stérilisation de conteneurs consistant à l'injection d'air chaud stérile, suivie par l'injection de peroxyde d'hydrogène en phase gazeuse à travers diverses buses avec un concentration de peroxyde d'hydrogène qui varie selon la température et l'humidité relative de la préchambre de stérilisation, afin d'éviter la condensation du peroxyde d'hydrogène à l'intérieur des conteneurs ;
c) remplissage de conteneurs (103) dans des conditions stériles ;
d) étanchéisation de conteneurs (104) dans des conditions stériles ; et
e) décharge de conteneurs (105).

12. Procédé selon la revendication 11, **caractérisé en ce que** l'étape b) de stérilisation de conteneurs (102) est exécutée à une température égale ou inférieure à 70ºC.

13. Procédé selon la revendication 12, **caractérisé en ce que** l'étape b) de stérilisation de conteneurs (102) est réalisée à une température entre 40ºC et 70ºC.

14. Procédé selon la revendication 13, **caractérisé en ce que** l'étape b) de stérilisation de conteneurs (102) est réalisée à une température entre 45ºC et 55ºC.

15. Procédé selon l'une quelconque des revendications 11 à 14, **caractérisé en ce que** dans l'étape de préfaçonnage a), l'étape de remplissage c), l'étape d'étanchéisation d) et l'étape de décharge e), les conteneurs (101, 103, 104) sont maintenus à température ambiante.

16. Procédé selon l'une quelconque des revendications 11 à 15, **caractérisé en ce que** l'air stérile de la préchambre de stérilisation (6) enrichi avec du peroxyde d'hydrogène, est évacué à l'atmosphère avant la transformation du peroxyde en eau et oxygène.

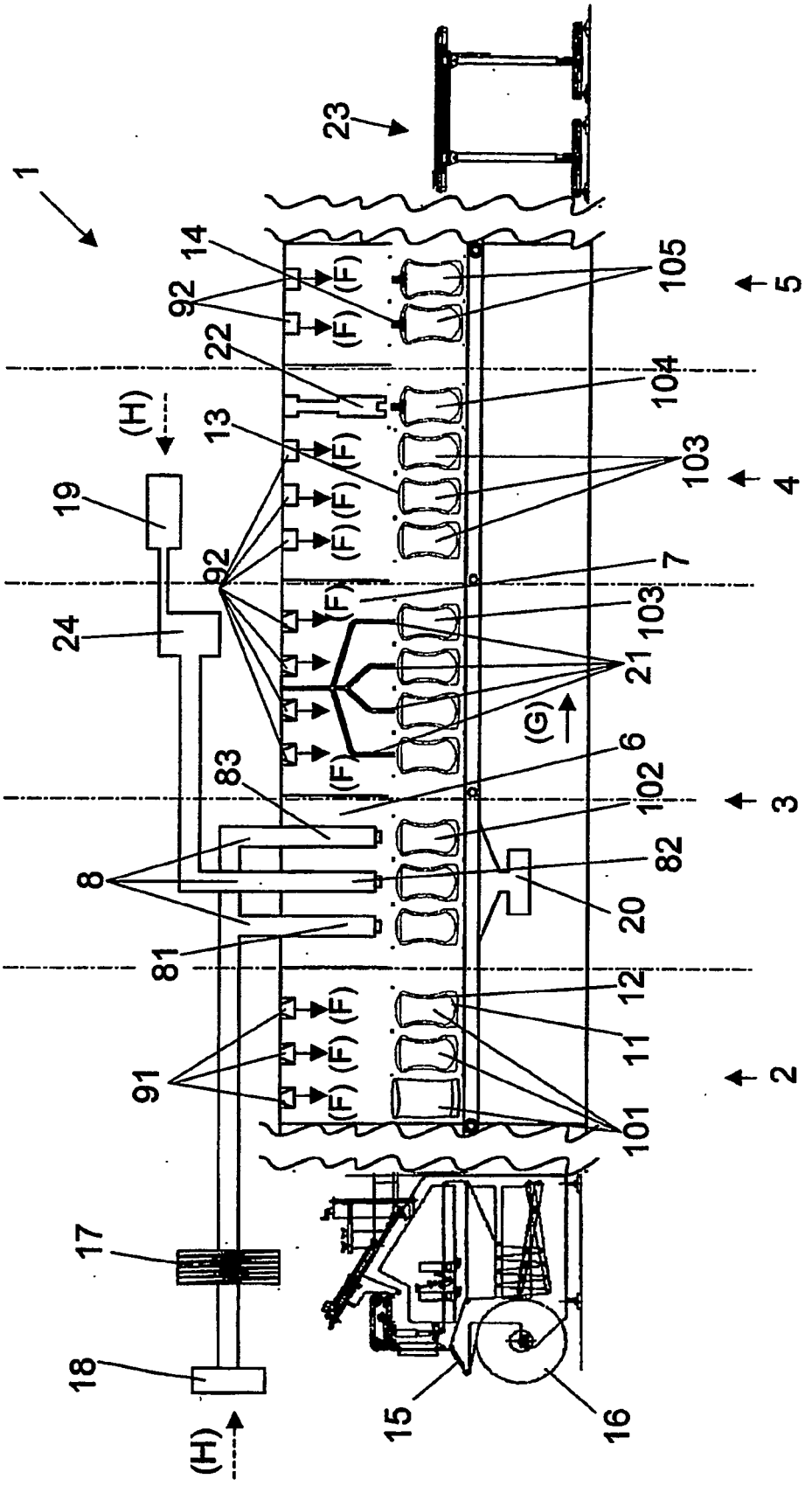
1
23
14
92
22
(H)
13
19
92
24
83
8
81
91
17
18
(H)
15
16
(F)
(G)
105
104
103
7
21
6
102
82
20
12
11
101
5
4
3
2

Fig. 1

REFERENCES CITED IN THE DESCRIPTION

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