METHOD FOR THE STERILIZING A PRODUCT THAT IS PACKAGED IN A PACKAGING MATERIAL

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Appl. No.: 10/503,963
PCT Filed: Feb. 7, 2003
PCT No.: PCT/EP03/01223

Foreign Application Priority Data
Feb. 8, 2002 (DE).................. 102 05 458.4

Publication Classification
Int. Cl.7............................... B65B 55/02

U.S. Cl............................... 53/425; 422/26

ABSTRACT

Illustrated and described are a method and an apparatus for the sterilisation of a product packaged in a packing, where the package (1) comprising the product and the packing is subjected to a heat treatment at a specific temperature and for a specific duration. For protection of the packages (1), that would usually not be able to withstand the conditions in an autoclave, the following steps are used:

Introduction of at least one package (1) into a protective casing (2),

Evacuation of the space between protective casing (2') and package (1),

Closing of the protective casing (2) hermetically, and

Autoclaving of the protective casing (2) and package (1) in an autoclave.

The corresponding apparatus is provided with one of each of the following units downstream of the filling unit: one repackaging unit, one evacuation unit, one autoclave unit and, if required, one unpacking unit.
METHOD FOR THE STERILIZING A PRODUCT THAT IS PACKAGED IN A PACKAGING MATERIAL

[0001] The invention relates to a method and an apparatus to sterilize a product packaged in a packing, where the package comprising the product and the packing is subjected to a heat treatment at a specific temperature and for a specific duration.

[0002] It has been known for a long time to subject products packaged in portions, such as food to a so-called autoclave method. Cans, for example, that have been filled with a food product, are hereby exposed to a specific temperature in an autoclave for a specific duration to safely kill the germs in the package. Cans have particularly proven themselves for this purpose as they are insensitive to the conditions in the autoclave (high temperature, high humidity).

[0003] If, however, food products, or other products that require sterilization, are not packaged in cans but in a different packing, the packing must first be sterilized—requiring a relatively high amount of additional efforts—then the product must be filled into the packing and eventually the packing must be closed aseptically.

[0004] The carton or plastic composite packages are also able to hold products such as milk or mashed vegetables for a longer period of time.

[0005] The object of the invention is to enhance and develop this method and the corresponding apparatus to sterilize a package in order to also allow the use of packages that would usually not be able to withstand the conditions in an autoclave.

[0006] In regards to the method, the object is solved by means of the following steps:

[0007] Introduction of at least one package into a protective casing,

[0008] Evacuation of the space between protective casing and package,

[0009] Closing of the protective casing hermetically, and

[0010] Autoclaving of the protective casing and package in an autoclave

[0011] In regards to the apparatus, the object is solved with one of each of the following units downstream of the filling unit: one repackaging unit, one evacuation unit, one autoclave unit and, if required, one unpackaging unit.

[0012] According to the invention, the repackaged product to be sterilized, such as a carton composite package filled with food products to be sterilized, and sensitive to water, is protected from the penetration of water and gas. The protective casing prevents any negative impact of the carton composite package due to the autoclave water. The additional packing of the protective casing ensures that neither water nor gas can penetrate into the packing material of the package. This ensures that neither the form of the package nor the quality of the product is impaired.

[0013] Thanks to the adaptable form of the protective casing and the creation of a low pressure (vacuum) between the product to be sterilized and the protective casing, the protective casing wraps itself very closely around the product to be sterilized. The very close “protective skin” enables a good heat transmission from the energy carrier, the autoclave hot water, or the autoclave steam, to the protective casing, and, due to the heat conduction through the protective casing, to the product to be sterilized, or to its packing. A good heat transmission increases the efficiency of an autoclave through the reduction of the autoclave cycle time.

[0014] Flexible or semi-flexible packages to be sterilized such as carton/plastic composite packages (for example for food products), bags (for example for infusion solutions or other pharmaceutical products), aluminum trays, food trays etc require a so-called counterpressure (dependant on the product that is packaged in the packing) during the autoclave method to prevent crushing and deformation or even bursting. This counterpressure is also called holding pressure or supporting pressure. According to the invention, the protective casing is capable of creating the required counterpressure on the package to be sterilized and thereby prevents a damage to the package.

[0015] An additional teaching of the invention provides a separate protective casing for each package. The protective casing can either be removed from the package after the autoclaving, or can remain on the packaged product—for example as a protection during transport, or from humidity, gents, aromas etc.

[0016] Another embodiment of the invention provides a protection system comprising a protective casing and a base plate to receive multiple packages for the following autoclaving. In this solution according to the invention, a protective casing with respective dimensions also ensures at the same time the protection of multiple packages that have been positioned at a distance to each other. According to a further teaching of the invention, such a protection system comprises at least one base plate to receive multiple packages and at least one protective casing that wraps the packages, wherein the space between base plate and protective casing(s) can be evacuated.

[0017] In the following, the phrase “base plate” not only comprises elements with the form of a plate, but includes all elements formed like a frame or a rack, which carry the weight of the packages to be sterilized, but also ensure their distance to each other.

[0018] A preferred embodiment of the invention provides that the base plate is metal plate. This ensures a good heat transmission also in the area where the package has direct contact to the base plate.

[0019] Another teaching of the invention provides that the base plate is essentially positioned horizontally and that the packages are placed on top of the base plate with a distance to each other. When, as described in a further embodiment of the invention, the base plate has multiple openings for the reception of packages, and the packages in the base plate are held by the at least one protective casing, the base plate in the protection system can essentially have a horizontal or vertical orientation.

[0020] In a horizontal orientation, the protective casing must ensure that the packages to be sterilized are held reliably below the openings. In this case, a part of the protective casing, or an additional casing, or a “cover”, ensures the required counterpressure in the area of the base
plate’s openings above the packages to be sterilized. In this embodiment, the packages can be wrapped completely with the protective casing, without being in immediate contact with the base plate.

[0021] In a vertical orientation of the base plate, the protective casing only needs to support the packages, which are placed in the openings of the base plate, from the side, while the weight of the packages is essentially held by the base plate.

[0022] The protective casing can be made from various materials or material combinations. The material of the protective casing must essentially be impermeable to water, water steam and gas, and, preferably, a flexible foil is used. In addition, the protective casing must have a certain mechanic solidity under autoclave conditions. Preferably, the protective casing comprises a plastic foil with a barrier layer. The protective casing can consist of polypropylene (PP), polyethylene terephthalate (PETP), or another copolymer or a mixture thereof. According to another teaching of the invention, the protective casing consists of a thin duro-plastic foil. It is also possible to use rubber for the protective casing. A barrier against gas or water can be achieved through a metallic coating.

[0023] Following, the invention is described in more detail by means of a drawing that only shows the preferred embodiments. In the drawing shows

[0024] FIG. 1 in perspective, a package to be sterilized, in a protective casing that has not been closed yet,

[0025] FIG. 2 the package from FIG. 1, in a closed protective casing after the evacuation,

[0026] FIG. 3A schematically, multiple packages to be sterilized, on a base plate,

[0027] FIG. 3B the packages to be sterilized from FIG. 3A, in a protective casing before the evacuation,

[0028] FIG. 3C the packages to be sterilized from FIG. 3B, after the evacuation,

[0029] FIG. 4A another embodiment of the protection system according to the invention, schematically in cross-section,

[0030] FIG. 4B the protection system from FIG. 4A, schematically, in top view,

[0031] FIG. 4C the protection system from FIG. 4A, schematically, containing the packages to be sterilized, after the evacuation,

[0032] FIG. 5A another embodiment of the protection system according to the invention before the evacuation, schematically in cross-section and,

[0033] FIG. 5B the protection system from FIG. 5A after the evacuation, schematically side-view.

[0034] FIGS. 1 and 2 show a package 1 to be sterilized, in this preferred embodiment, a rectangular carton/plastic composite package, that is being prepared for the autoclave process in a single protective casing 2. To achieve this, the protective casing 2, as shown in FIG. 2, is closed, and evacuated by means of a line 3 comprising a valve (not shown). The protected package 1 can now be autoclaved without damaging its form or content, the protective casing can then be removed from the package 1, or remain wrapped around the package 1 to be removed by the reseller or end consumer.

[0035] FIGS. 3A and 3C show an embodiment of the protection system according to the invention, wherein a base plate 4 and at least one protective casing 2 are aligned in such a way that multiple packages 1 to be sterilized are held within this protection system. In this embodiment, the base plate 4 consists of material that transfers heat well, such as metal, to ensure sufficient heat introduction/exchange from below to the packages 1 during the autoclave treatment. The protective casing 2 and the base plate 4 are connected with each other in a pressure-tight manner by at least one closure 5, that might, for example, go all around the casing. The combination of protective casing 2 and base plate 4 creates sufficient counterpressure, so that the packages are not deformed or damaged during the autoclaving. FIG. 3C shows, in a dashed line, that such a protection system can also have several lines 3 for evacuation.

[0036] An alternative embodiment of the protection system according to the invention is shown in FIGS. 4 and 5. The base plate 4 provides multiple openings 6 of about the size of a package cross-section. In FIG. 4, the base plate 4 is positioned horizontally and the protective casing 2 is led through the openings 6, creating separate, bag-like chambers 7 for the reception of the packages 1. FIG. 4C shows that in this embodiment, the packages 1 are no longer in contact with the base plate 4 after the evacuation. In addition, a cover 8 with noses 9 of about the same size as the openings 6, is put on the base plate 4 from above.

[0037] Finally, FIGS. 5A and 5B show an additional embodiment of the invention, where a vertically positioned base plate 4 provides openings 6 for the reception of the packages 1, and a protective casing 2, enclosing the complete base plate 4, ensures the sealing of the packages against the environment, as well as their secure hold in the base plate 4. This embodiment provides itself as a preferred solution since the closing, evacuation, opening, and removal of the protective casing is particularly easy and fast.

1. A method for the sterilisation of a product packaged in a packing, where the package comprising the product and the packing is subjected to a heat treatment at a specific temperature and for a specific duration, characterized by the following steps:

   Introduction of at least one package into a protective casing,

   evacuation of the space between protective casing and package,

   closing of the protective casing, and

   autoclaving of the protective casing and package in an autoclave:

2. A method for the sterilization of a product packaged in a packing, where the package comprising the product and the packing is subjected to a heat treatment at a specific temperature and for a specific duration, characterized by the following steps:

   Introduction of at least one package into a protective casing,
Closing of the protective casing,
Evacuation of the space between protective casing and
package, and
Autoclaving of the protective casing and package in an
autoclave.
3. The method according to claim 1 or 2, characterized by
a separate protective casing for each package.
4. The method according to claim 3, characterized in that
the protective casing is removed from the package after the
autoclaving.
5. The method according to claim 3, characterized in that
the protective casing remains on the package after the
autoclaving.
6. The method according to claim 1 or 2, characterized in
that a protection system comprising a protective casing and
a base plate can receive multiple packages.
7. Apparatus for performing the method according to one
of the claims 1 to 5, characterized by one of each of the
following units downstream of the filling machine, namely
a repackaging unit, an evacuation unit, an autoclave unit,
and, if required, an unpacking unit.
8. Apparatus for performing the method according to
claim 6, characterized in that a protection system comprising
at least one base plate for the reception of multiple packages
and at least one protective casing covering the packages,
wherein the space between base plate and protective casing
can be evacuated.
9. Apparatus according to claim 8, characterized in that
the base plate is a metal plate.
10. Apparatus according to claim 8 or 9, characterized in
that the base plate is essentially positioned horizontally, and
the packages are placed on the top of the base plate at a
distance to each other.
11. Apparatus according to claim 8 or 9, characterized in
that the base plate has multiple openings for the reception of
packages, and the packages are held in the base plate by
means of the at least one protective casing.
12. Apparatus according to claim 11, characterized in that
the base plate in the protection system is essentially posi-
tioned horizontally.
13. Apparatus according to claim 11, characterized in that
the base plate in the protection system is essentially posi-
tioned vertically.
14. Apparatus according to claim 7 to 13, characterized in
that each protective casing consists of a flexible foil.
15. Apparatus according to claim 14, characterized in that
the foil is a plastic foil comprising a barrier layer.
16. Apparatus according to claim 14 or 15, characterized
in that the protective casing consists of polypropylene (PP).
17. Apparatus according to claim 14 or 15, characterized
in that the protective casing consists of polyethylene tere-
phthalate (PETP).
18. Apparatus according to claim 14 or 15, characterized
in that the protective casing consists of a thin duroplastic
foil.
19. Apparatus according to claim 14, characterized in that
the protective casing consists of rubber.
20. Apparatus according to one of the claims 14 to 19,
characterized in that the protective casing consists of a
shrinking foil.
21. Apparatus according to one of the claims 14 to 20,
characterized in that the protective casing has a metallic
coating.
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