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(54) **Method for filling of toothpaste**

(57) This invention relates to a method for filling of toothpaste into tubes and the use of hydrogen peroxide as disinfectant in the filling of toothpaste.

EP 2 641 834 A1

Description

TECHNICAL FIELD

[0001] This invention relates to a method for filling of toothpaste into tubes and the use of hydrogen peroxide to treat the tubes and the filling zone in order to disinfect the packaging material thereby minimizing the addition of preservative in the toothpaste.

STATE OF THE ART

[0002] Aseptic packaging can be defined as the filling of a sterile product into a sterile package under aseptic conditions and hermetically sealing the packages so that re-infection is prevented. This results in a product, which is shelf-stable at ambient conditions. Ultraclean packaging is defined as the filling of a non sterile product, but a product with minimized bacterial content, in a disinfected packaging to increase its natural shelf-life.

[0003] Aseptic or ultraclean packaging requires special treatment and handling of the product as well as of the equipment that contacts the product until it is hermetically sealed inside the package. Common sterilants employed in the process for treating the packaging to attain this commercial sterility or hygiene include steam, heated air, and chemicals. Products are also sterilized or disinfected using chemical or physical treatments.

[0004] Toothpaste generally requires a considerable amount of preservatives in order to make it shelf-stable at ambient conditions. For example, US 2012/0039822 A1 suggests a dentifrice which contains preservatives in addition to anti-bacterial agents. Also US 2012/0020898 A1 discloses dentifrice compositions containing anti-bacterial agents and preservatives.

[0005] Preservatives are not only undesirable in view of consumer's compliance but they are expensive additives which add to the total cost of toothpaste.

[0006] On the other hand, preservatives are required in toothpaste because toothpaste generally is filled into tubes in tube filling machines in a non-sterile environment.

DETAILED DESCRIPTION OF THE INVENTION

[0007] One object of the invention is to provide a packed toothpaste which is shelf-stable at ambient conditions without any preservative or with a reduced amount of preservative. Another object of the invention is to provide a method for filling of toothpaste into tubes that allows reduction or even elimination of preservative in the toothpaste.

[0008] It has now been found that these objects can be solved by a method for filling of toothpaste into tubes using hydrogen peroxide. The filling preferably is aseptic or ultraclean. In particular the method comprises the step of contacting prior to the filling of the tubes with toothpaste at least part of the tube unloading and feeding machine and/or at least part of the tube filling machine and/or the empty tubes with hydrogen peroxide.

[0009] The term "toothpaste" is used herein for any dentifrice composition in the form of a paste or gel.

[0010] The term "tube" is used herein for defining any dispensing container formed of metallic or plastic materials. Basically, a tube is a cylindrical, hollow piece with a round or oval profile. One end of the tube body generally is a round orifice which can be closed by caps and closures. The other end of the tube body is hermetically sealed after filling the product, such as toothpaste, into the hollow space.

[0011] Tubes are generally filled using a tube filling machine. Such machines are known in the art and provided for example by Oystar IWK or Gustav Obermeyer GmbH & Co. KG.

[0012] For filling tubes empty tubes, open tube ends facing upwards, are generally provided in boxes which are placed in the tube pick-up position of a tube unloading and feeding machine. As soon as the tubes are located in the appropriate position, mandrills on a pick-up rake are diving in the open tube ends and the tubes are lifted out of the box and striped off on a conveyer by a stripper rake from where the tubes are finally conveyed to the tube filling machine. Such tube unloading and feeding machines can pick up single tubes, single rows of tubes or several rows of tubes simultaneously from the boxes to be unloaded.

[0013] Tube filling machines are known to be semi-automatic or fully automatic. The target performance of tube filling machines can be up to 200 tubes per minute for smaller machines and even up to 5,000 tubes per minute in larger machines. The tube filling machines either have their own stock of empty tubes or they receive the tubes from the tube unloading and feeding machine described above. In the tube filling machine the tubes are filled and closed.

[0014] Depending on the equipment, tubes are feed manually or automatically on a tube feeding conveyer linking up with a transfer station where the tubes are placed into cups fitted to a rotary machine table. By this table the tubes are conveyed to the individual workstations for printing, filling, closing, coding and trimming. Filled tubes are discharged from the machine and being transferred for example to a cartoning machine for onward packaging.

[0015] The filling machine may comprise a gas purging unit for cleaning the tubes for example by pressurized air and an optical unit for controlling whether the tubes are correctly aligned and do not contain any particles, such as dust particles. The filling system is generally equipped with a dosing nozzle through which the toothpaste is pumped into the tube. After filling the tube ends are pressed and embossed or anyhow closed. Seals on plastic and laminated tubes are trimmed for best optical appearance. Filled and closed tubes are ejected from their cups and discharged from the machine.

[0016] During the above described process the empty

tubes prior to filling, the filled tubes prior to sealing and the toothpaste during the filling process come into contact with parts of the filling machine and with the surrounding air.

[0017] It has now been found that contamination of the toothpaste for example with undesired bacteria can be reduced to an extent that preservatives in the toothpaste can be reduced or even omitted if at least part of the tube unloading and feeding machine and/or at least part of the tube filling machine and/or the empty tubes are contacted with hydrogen peroxide prior to the filling of the tubes with toothpaste.

[0018] While it is possible to create a sterile filling zone within the machines, for example by providing a sterile environment in a sterile tunnel, such method is rather demanding and costly. In principle it is possible to create such sterile filling zone for example by continuous disinfection of the rotary machine table including the cups into which the tubes are placed. It has, however, been found that the method of the present invention provides sufficient disinfection if only those parts of the unloading and feeding machine and/or of the tube filling machine which come into direct contact with the tubes prior to their sealing and/or which come into direct contact with the toothpaste prior to its filling into the tubes are contacted with the hydrogen peroxide.

[0019] In this embodiment of the invention for example the mandrills on the pick-up rake of the tube unloading and feeding machine, the cups fitted to the rotary machine table in the tube filling machine, the gas purging unit in the tube filling machine and the dosing nozzle in the tube filling machine can be contacted with the hydrogen peroxide.

[0020] In addition to or alternatively to the contacting of the at least parts of the tube unloading and feeding machine and the tube filling machine it has proven advantageous to contact the inner space of the empty tubes with hydrogen peroxide prior to the filling with toothpaste.

[0021] The contacting of the inner space of the empty tubes with hydrogen peroxide can take place prior, during or after the feeding of the empty tubes to the tube filling machine.

[0022] In one embodiment of the method according to the invention the contacting of the inner space of the empty tubes with hydrogen peroxide takes place prior to the feeding of the empty tube to the tube filling machine. In this embodiment the empty tubes are contacted with the hydrogen peroxide prior to or while loaded in the boxes from which they are unloaded and fed to the tube filling machine either manually or by means of the tube unloading and feeding machine.

[0023] In a further embodiment the inner space of the empty tubes is contacted with the hydrogen peroxide during the feeding of the empty tubes to the tube filling machine. In this embodiment the contacting with hydrogen peroxide preferably takes place in the tube unloading and feeding machine or between this machine and the tube filling machine. For example, the contacting with hydrogen peroxide can take place while the tubes are lifted off the box by the pick-up rake and before stripped off by the stripper rake.

[0024] In a third embodiment of the method according to the invention the contacting of the inner space of the empty tubes with the hydrogen peroxide takes place in the tube filling machine. This contacting can be conducted for example by an additional workstation at the rotary machine table. Alternatively, the gas purging unit can for example be replaced or additionally equipped with a hydrogen peroxide discharging equipment.

[0025] The contacting of at least part of the tube unloading and feeding machine, at least part of the tube filling machine and/or the empty tubes with hydrogen peroxide can be conducted in a bath, by spraying or in vapor.

[0026] Conducting the contacting step in a bath means that the part of the machine or the empty tube is passed through or immersed in a liquid solution of hydrogen peroxide. Generally, this contacting takes place at temperatures in the range from ambient (such as about 23°C) up to about 90°C. In order to work effectively as a sterilant, hydrogen peroxide temperature, concentration, and contact time must all be maintained properly. For example, bath temperature can be increased to some extent to compensate for shorter contact time as required in a higher speed machine.

[0027] Hydrogen peroxide concentration in the sterilization bath should maintain a reasonably constant strength throughout a production run. If it falls too low, sterilization efficacy is reduced. If it becomes too high, the integrity of the tube or other material might be affected. A concentration of at least about 1 % (w/w) in water, preferably between about 15 % (w/w) and about 45 % (w/w) is typically desired. The combined exposure to UV rays can be applied to improve antimicrobial activity of hydrogen peroxide reducing contact times prior to its removal.

[0028] In a further embodiment of the method according to the invention the contacting with hydrogen peroxide is conducted by spraying. In this case a concentration between about 1 % (w/w) and about 40 % (w/w) is typically desired. In this embodiment the hydrogen peroxide is applied to the at least part of the tube unloading and feeding machine, at least part of the filling machine and/or the empty tubes by atomizing the hydrogen peroxide through a nozzle and onto the surface to be treated. The hydrogen peroxide is normally heated during atomization. Sterile air is then blown passed the surface to remove the residual hydrogen peroxide by evaporation. Generally the hydrogen peroxide is combined with heat and high concentration in order to be effective with short contact times. Preferably, pre-heated hydrogen peroxide is sprayed onto the surface to be treated and is then removed for example by evaporation, such as by heating, exposure to UV rays or exposure to infrared rays. UV rays can also be use in combination with hydrogen peroxide to improve antimicrobial activity.

[0029] In a third embodiment the contacting with hy-

drogen peroxide is conducted in vapor phase. Sterilization by hydrogen peroxide vapor can be conducted either in a "dry" system, where the chemical does not condense on any surface being treated, or wet vapor producing condensation on the treated surface. Hydrogen peroxide is vaporized separately from the surface and then applied, rather than sprayed onto the surface and then evaporated. This technique can be combined with exposure to UV rays to improve antimicrobial activity.

[0030] In a further embodiment of the method according to the invention the inner space of the empty tubes is either filled with hydrogen peroxide, the surface of the wall of the inner space of the empty tubes is contacted with hydrogen peroxide by spraying the hydrogen peroxide onto the surface of the wall or the inner space of the empty tubes is contacted with vapor of hydrogen peroxide. This technique can be combined with exposure to UV rays to improve antimicrobial activity.

[0031] The hydrogen peroxide to be used should have specific characteristics depending on the technique used for its application and provided that the concentration of the solution is sufficient for providing the desired sterilization effect. For vapor phase and spray techniques it is desired to use a specific high quality product with a minimal dry residue in order to avoid clogging of spray nozzles or precipitation of stabilizers onto the heating block or evaporating unit. This could give rise to a poor heat exchange not achieving the correct conditions for the disinfection/hygienisation to take place. Additionally serious problems in the maintenance of the machine may occur. In the case of immersion it is recommended to use a specific grade in order to guarantee the minimum dry residues combined with a suitable stabilizer to guarantee control of the concentration for a long period of time.

[0032] Preferably, the hydrogen peroxide is in the form of a solution containing water and at least about 1 % (w/w) of hydrogen peroxide, more preferably about 2 % (w/w) to about 45 % (w/w) of hydrogen peroxide and most preferably about 2 % (w/w) to about 35 % (w/w) of hydrogen peroxide.

[0033] Depending on the treated object, such as depending on the part of the machine being contacted with the hydrogen peroxide, and depending on the amount of the hydrogen peroxide on the surface of the object after contacting, it can be desirable to remove the remaining hydrogen peroxide prior to further processing, such as prior to filling the toothpaste into the tubes. In one embodiment of the method according to the invention the hydrogen peroxide is removed from the treated surface prior to filling of toothpaste into the tubes. This removal can for example be effected by evaporation, such as by heating.

[0034] Finally, the invention also relates to the use of hydrogen peroxide as disinfectant in the filling of toothpaste as well as to the use of hydrogen peroxide for disinfecting at least part of a tube unloading and feeding machine and/or at least part of a tube filling machine and/or empty tubes for toothpaste.

Claims

1. Method for filling of toothpaste into tubes using hydrogen peroxide.

2. Method according to claim 1, comprising the step of contacting prior to the filling of the tubes with toothpaste at least part of the tube unloading and feeding machine and/or at least part of the tube filling machine and/or the empty tubes with hydrogen peroxide.

3. Method according to claim 2, wherein those parts of the tube unloading and feeding machine and/or of the tube filling machine which come into direct contact with the tubes prior to their sealing and/or which come into direct contact with the toothpaste prior to its filling into the tubes are contacted with hydrogen peroxide.

4. Method according to claim 2, wherein the inner space of the empty tubes is contacted with hydrogen peroxide prior to the filling with toothpaste.

5. Method according to claim 4, wherein the contacting with hydrogen peroxide takes place prior, during or after the feeding of the empty tubes to the tube filling machine.

6. Method according to claim 5, wherein the contacting with hydrogen peroxide takes place during the feeding of the empty tubes to the tube filling machine.

7. Method according to claim 5, wherein the contacting with hydrogen peroxide takes place in the tube filling machine.

8. Method according to any of claims 2 to 7, wherein the contacting with hydrogen peroxide is conducted in a bath, by spraying or in vapor

9. Method according to any of claims 4 to 8, wherein the inner space of the empty tubes is filled with hydrogen peroxide or the surface of the wall of the inner space of the empty tubes is contacted with hydrogen peroxide by spraying the hydrogen peroxide onto the surface of the wall or the inner space of the empty tubes is contacted with vapor of hydrogen peroxide.

10. Method according to any of the preceding claims, wherein the hydrogen peroxide is in the form of a solution containing water and at least about 1 % (w/w) of hydrogen peroxide.

11. Method according to any of claims 2 to 10, wherein the hydrogen peroxide is removed from the treated surface prior to filling of the toothpaste into the tubes.

12. Method according to claim 11, wherein the removal is effected by evaporation.

13. Method according to claim 12, wherein the evaporation is effected by heating.

14. Use of hydrogen peroxide as disinfectant in the filling of toothpaste.

15. Use of hydrogen peroxide for disinfecting at least part of a tube unloading and feeding machine and/or at least part of a tube filling machine and/or empty tubes for toothpaste.

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EUROPEAN SEARCH REPORT

Application Number
EP 12 16 0952

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2007/142569 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]; OLSSON HAAKAN [SE]; JOSCELYNE CAM) 13 December 2007 (2007-12-13) * the whole document *	1-15	INV. B65B3/16 B65B55/10 ADD. B65B57/02
Y	DE 43 02 014 A1 (WECKERLE PETER [DE]) 11 August 1994 (1994-08-11) * column 2, line 23 - line 26 *	1-15	
Y	DE 43 05 478 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 25 August 1994 (1994-08-25) * column 2, line 48 - line 50 *	1-15	
A	WO 2008/149377 A1 (JOSHI HARISH PRABHAKAR [IN]) 11 December 2008 (2008-12-11) * the whole document *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 August 2012	Dick, Birgit

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 16 0952

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- US 20120020898 A1 **[0004]**