



(19)

Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 816 233 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.01.1998 Bulletin 1998/02

(51) Int. Cl.⁶: **B65B 55/10**

(21) Application number: **97201913.7**

(22) Date of filing: **23.06.1997**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**

(30) Priority: **24.06.1996 JP 162848/96**

(71) Applicant:
**Shikoku Kakoki Co., Ltd.
Itano-gun Tokushima (JP)**

(72) Inventors:
• **Ueta, Kei,**
c/o Shikoku Kakoki Co., Ltd.
Kitajimacho, Itano-gun, Tokushima (JP)

• **Iwano, Fumiuyuki,**
c/o Shikoku Kakoki Co., Ltd.
Kitajimacho, Itano-gun, Tokushima (JP)
• **Fujimoto, Akimasa,**
c/o Shikoku Kakoki Co., Ltd.
Kitajimacho, Itano-gun, Tokushima (JP)
• **Ueda, Michio,**
c/o Shikoku Kakoki Co., Ltd.
Kitajimacho, Itano-gun, Tokushima (JP)

(74) Representative:
Vollebregt, Cornelis Jacobus, Ir. et al
Algemeen Octrooibureau
World Trade Center
P.O. Box 645
5600 AP Eindhoven (NL)

(54) Method of sterilizing a chamber of a packaging machine

(57) In a packaging machine wherein a web (W) for making package containers (C) is moved in the interior of a chamber (1) by being guided by rollers (8-12), formed into a tubular shape, heated and sealed at opposite edges of the web longitudinally thereof to obtain a tubular web (T), and thereafter sealed transversely thereof outside the chamber to form the tubular web into containers, a method of sterilizing the chamber includes the step of presterilization by introducing an antiseptic into the chamber while moving the web to provide the antiseptic between the web and the rollers, and the step of main sterilization by introducing the antiseptic into the chamber again with the tubular web closed at a bottom portion as brought out the chamber.

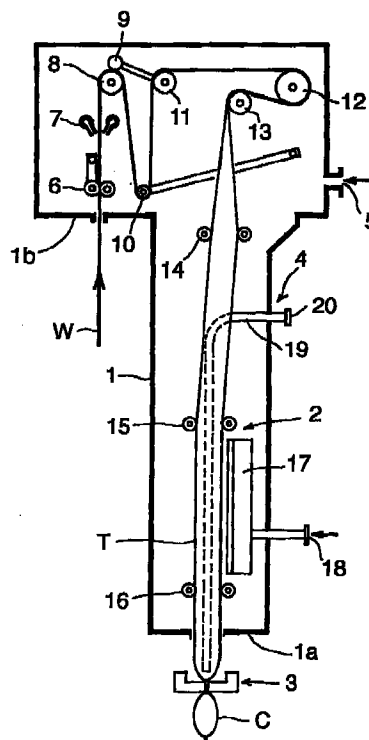


FIG.1

EP 0 816 233 A1

Description

BACKGROUND OF THE INVENTION

The present invention relates to a method of sterilizing a chamber in packaging machines for producing, for example, containers filled with milk or like fluid food, and more particularly to a sterilizing method for use in packaging machines for making a web into rectangular parallelepipedal containers filled with contents, the method being adapted to render an aseptic chamber, which is designed to separate a packaging work space from outside air, free from microorganisms before the machine is initiated into a packaging operation.

Conventional packaging machines of the type described include those comprising an aseptic chamber for separating a packaging work space from atmospheric air, a web guide device including rollers for guiding a web through the aseptic chamber, a tube forming device for making the web into a tubular shape with one edge of the web lapping over the other edge thereof and sealing the resulting lap longitudinally of the web while the web moves downward from above within the aseptic chamber to form a tube, a container forming device for withdrawing the tube downward from the aseptic chamber, sealing the withdrawn tube transversely thereof every time the tube is transported downward by a length corresponding to one container and cutting the transverse sealed portion to form and separate off a pillow-shaped container, and a filling device for filling contents into the tube before the sealed portion is cut.

The interior of the aseptic chamber of the packaging machine must be held aseptic and therefore needs to be sterilized before the start of the packaging operation by introducing an antiseptic such as an aqueous solution of hydrogen peroxide into the aseptic chamber. The aseptic chamber is thus sterilized conventionally in the following manner. The chamber is opened first, the web is led into the chamber, passed through the guide device and the tube forming device, brought out of the chamber and set in the container forming device, and the chamber is closed. Subsequently, the tube forming device and the container forming device are operated to form the web into a tube and then into containers. At this time, the web is not sealed transversely thereof but is merely cut to form unsealed containers. When the tubular web becomes satisfactorily sealed longitudinally thereof by the tube forming device, the tube forming device and the container forming device are stopped to halt the web and tube. The tube portion extending downward from the aseptic chamber at this time is completely closed by being longitudinally sealed and being nipped at its bottom by the container forming device. In this state, an aqueous solution of hydrogen peroxide is sprayed into the aseptic chamber to apply the atomized solution to the inner wall of the chamber, the surfaces of the web within the chamber, the inner surface of the tube portion brought out of the chamber and the sur-

faces of the devices and other components of the machine inside the chamber. Finally hot air is forced into the chamber to sterilize and dry the interior of the chamber and the interior of the tube.

To render the interior of the aseptic chamber completely aseptic, it is required to make aseptic also the portions of contact between the web and the rollers. However, when the aqueous solution of hydrogen peroxide is sprayed into the aseptic chamber by the conventional sterilizing method, the web is at rest, so that the portions of contact between the web and the rollers can not be thoroughly sterilized.

In order to diminish the portions contact between the web and the rollers, therefore, it has been attempted to reduced the number of rollers or to use rollers of reduced diameter, or to forcibly rotate the rollers relative to the web at rest, causing the antiseptic adhering to the rollers to sterilize the portions of contact between the web and the rollers. The reduction in the number of rollers or in the diameter of rollers nevertheless produces an adverse influence on the rollers in guiding the web such as zigzag travel of the web, while the forced rotation of the rollers entails the problem of marring the web or necessitating a device of more complex construction.

It has also been attempted to raise a dancer roller within the aseptic chamber, thereby reducing the tension on the web and forming a space between the web and the rollers to the front and rear of the dancer roller to sterilize the portions of contact between the web and the rollers, whereas the result obtained still remains to be improved.

SUMMARY OF THE INVENTION

An object of the present invention is to overcome the foregoing problems and to provide a method of sterilizing a chamber in packaging machines, whereby the portions of contact between a web and rollers can be reliably sterilized, with an antiseptic applied to the contact portions effectively.

The present invention provides a method of sterilizing a chamber in a packaging machine wherein a web for making package containers is moved in the interior of the chamber by being guided by rollers, formed into a tubular shape, heated and sealed at opposite edges of the web longitudinally thereof to obtain a tubular web, and thereafter sealed transversely thereof outside the chamber to form the tubular web into containers, the chamber sterilizing method being characterized in that the method includes the step of presterilization by introducing an antiseptic into the chamber while moving the web to provide the antiseptic between the web and the rollers, and the step of main sterilization by introducing the antiseptic into the chamber again with the tubular web closed at a bottom portion as brought out the chamber.

The step of presterilization is performed by introducing an antiseptic into the chamber while moving the

web to provide the antiseptic between the web and the rollers, so that the portions of contact between the web and the web guiding rollers can be reliably sterilized. This eliminates the need to reduce the number of rollers or the diameter of rollers. Further since the antiseptic is provided between the web and the rollers which are rotated by the movement of the web, the rotation of the rollers is unlikely to mar the web or to necessitate a device of more complex construction.

The antiseptic is, for example, in the form of a mist. In this case, it is desirable to execute the step of cooling the interior of the chamber prior to the step of main sterilization. The main sterilization step is then performed after the chamber has been cooled, consequently ensuring reliable application of the antiseptic to the surfaces of the various portions within the chamber.

The antiseptic may be in the form of a gas.

BRIEF DESCRIPTION OF THE DRAWING

The drawing is a diagram showing the arrangement of main components of a packaging machine for illustrating an embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will be described below with reference to the drawing.

The drawing shows the part of a packaging machine for performing some steps of the entire process, i.e., forming a web W for packaging containers into a tube (tubular web) end forming the tube into containers C filled with contents. Provided in this part of the machine are an aseptic chamber 1, tube forming device 2, container forming device 3 and filling device 4.

The aseptic chamber 1 is vertically elongated, and has an extension projecting laterally from one side of the upper portion of the chamber and an inlet 5 at the other side thereof. Although not shown, supply pipes for an antiseptic and aseptic air are connected to the inlet 5. The interior upper portion of the aseptic chamber 1 has arranged therein squeeze rollers (antiseptic removing rollers) 6, air knives (hot air nozzles for blowing the antiseptic away) 7, feed roller 8, holding roller 9, dancer roller 10 and guide rollers 11, 12, 13.

The tube forming device 2 comprises upper forming rollers 14, intermediate forming rollers 15 and lower forming rollers 16 which are arranged below the guide roller 13, and a vertically elongated heater 17 disposed between the intermediate rollers 15 and the lower rollers 16 at one side thereof, these components being arranged within the chamber 1. Although not shown a hot air supply pipe having heating means is connected to a hot air inlet 18 of the heater 17 which inlet is positioned outside the aseptic chamber 1.

The container forming device 3 is disposed under the aseptic chamber 1.

The filling device 4 has a filling pipe 19. The filling

pipe 19 extends into the aseptic chamber 1 at an intermediate level between the positions of the upper forming rollers 14 and the intermediate forming rollers 15, further extends downward inwardly of the rollers 15 and the lower forming rollers 16, then extends through a bottom wall 1a of the aseptic chamber 1 and terminates at a position above the container forming device 3. Although not shown, supply pipes for aseptic air and the contents are connected to an inlet 20 of the filling pipe 19 which inlet is positioned outside the aseptic chamber 1.

Although not shown, a web sterilizing bath is disposed under a lower wall 1b of the lateral extension of upper portion of the aseptic chamber 1 so as to be continuous with the wall. The web W is withdrawn from the sterilizing bath, led into the aseptic chamber 1 through the lower wall 1b, passed between the squeeze rollers 6, between the air knives 7 and between the feed roller 8 and the holding roller 9, reeved around the dancer roller 10 and the guide rollers 11, 12, 13, passed between the forming rollers 14, 15, 16 inwardly thereof and then through the bottom wall 1a, withdrawn from the aseptic chamber 1 and set in the container forming device 3. As will be described later, the container forming device 3 further transports the web by a length corresponding to one container C at a time. The web W is gradually formed into a tubular shape while moving inwardly of the upper and intermediate forming rollers 14, 15, and almost completely formed into the tubular shape between the intermediate and lower forming rollers 15, 16, with one edge thereof lapping over the other edge. The lap is heated with hot air applied thereto by the heater 17 and thereafter longitudinally sealed by the lower forming rollers 16 to form a tube T (with a longitudinal seal). By means of the container forming device 3, the tube T is withdrawn downward from the aseptic chamber 1, transported downward by a length corresponding to one container C at a time, sealed transversely thereof at the portion between adjacent portions each corresponding to the container C (to form a transverse seal) and cut at the middle of the transverse seal portion every time the tube is thus transported, whereby pillow-shaped separate containers C are formed. The filling pipe 19 extends into the tube T through a portion of the web W which is not completely made tubular and terminates at a position slightly above the transverse seal portion serving as the bottom of the tube T. The contents supplied via the filling pipe 19 are filled into the tube T before it is cut at the seal portion. Subsequently, the filled portion is sent downward and cut at an upper portion where it is sealed. Thus, pillow-shaped containers C filled with the contents are formed one after another.

Before the machine is initiated into the packaging operation described, the aseptic chamber 1 is sterilized, for example, in the following manner.

First, the door (not shown) of the chamber 1 is opened, the web W as passed through the sterilizing

bath is led through the chamber 1 as previously stated, withdrawn therefrom and set in the container forming device 3, and the door is closed to close the chamber 1 (web loading step). This web loading step is performed manually. At the location of the tube forming device 2, the web W is gradually made tubular by hand at this time, passed inwardly of the forming rollers 14, 15, 16 and set in the container forming device 3. Next, an aqueous solution of hydrogen peroxide serving as an antiseptic is sprayed in the form of a mist into the chamber 1 through the inlet 5 for a predetermined period of time (presterilizing step). During the presterilizing step, the container forming device 3 is operated, transporting the web W. The presterilizing step is performed automatically, for example, by manipulating a switch on the operation panel. During the presterilizing step, the web is not sealed transversely thereof. The heater 17 Of the tube forming device 2 and the filling device 4 are held out of operation, and the tubular web W is not sealed longitudinally, so that the lapping edges of the tubular web W withdrawn downward from the chamber 1 are not intimately joined. Accordingly, the aqueous solution of hydrogen peroxide, even if sprayed, fails to completely sterilize the interior of the chamber 1, but the transport of the web while the solution is being sprayed permits application of the solution to the portions of contact between the web W and the rollers 6, 8 to 16. On completion of the presterilizing step, the tube forming device 2 and the container forming device 3 are operated for a specified period of time, forming the web W into a tube T and producing containers from the tube T one after another (tube forming step). This tube forming step is executed automatically subsequent to the presterilizing step. At this time, the tube is not sealed transversely but only cut by the container forming device 3. With the filling device 4 held out of operation, empty containers not sealed transversely are formed. On completion Of the tube forming step, the tube forming device 2 and the container forming device 3 are automatically brought out of operation to halt the web W and the tube T. Aseptic air is then supplied to the interior of the chamber 1 through the inlet 5 for a predetermined period of time to cool the interior of the chamber 1 (cooling step). On completion of the tube forming step, the operator checks the containers having no transverse seal for the longitudinal seal portions. When the seal portions are found satisfactory, the cooling step is performed automatically, for example, by turning on a switch. If the seal portions are found unacceptable, the tube forming step is performed again, and when the resulting seal portions are found acceptable, the cooling step follows. Next, the aqueous solution of hydrogen peroxide is sprayed in the form of a mist into the chamber 1 via the inlet 5 for a predetermined period of time while holding the tube forming device 2 and the container forming device 3 out of operation, with the web W at rest (main sterilizing step). This main sterilizing step is performed automatically subsequent to the cooling step. Although

the bottom portion of the tube T is not sealed transversely at this time, it is held closed by being nipped by the container forming device 3. The part of the tube T extending downward from the chamber 1 is held completely closed by the nipped portion and the longitudinal seal portion. The aqueous solution of hydrogen peroxide sprayed into the closed chamber 1 is applied to the inner surface of the chamber 1, the surfaces of the web W within the chamber 1, the inner surface of the tube T positioned outside the chamber 1 and the surfaces of the devices and components within the chamber 1. Subsequently, hot air is supplied to the interior of the chamber 1 through the inlet 5 for a predetermined period of time to sterilize and dry the interior of the chamber 1 (sterilizing-drying step). This sterilizing-drying step is carried out automatically subsequent to the main sterilizing step. The sterilizing operation is terminated upon completion of the sterilizing-drying step, and the foregoing packaging operation then follows.

The sterilizing operation described above includes the presterilizing step, during which the web W is moved, so that the aqueous solution of hydrogen peroxide is applied or fixed also to the portions of contact between the web W and the rollers 6, 8 to 16 within the chamber 1 which are rotated by the movement, hence reliable sterilization.

The tube forming step is followed by the cooling step to cool the interior of the chamber 1 prior to the main sterilizing step. The solution of hydrogen peroxide can therefore be applied or fixed to the surfaces of various portions in the interior of the chamber 1. The antiseptic can be introduced in the form of a gas into the chamber 1. In this case, the cooling step need not precede the main sterilizing step.

Although the heater 17 of the tube forming device 2 uses hot air for heating the web W according to the embodiment described, other means such as high-frequency heating means may be used for heating.

The antiseptic need not always be the aqueous solution of hydrogen peroxide but can be, for example, peracetic acid.

Claims

1. A method of sterilizing a chamber in a packaging machine wherein a web for making package containers is moved in the interior of the chamber by being guided by rollers, formed into a tubular shape, heated and sealed at opposite edges of the web longitudinally thereof to obtain a tubular web, and thereafter sealed transversely thereof outside the chamber to form the tubular web into containers, the chamber sterilizing method being characterized in that the method includes the step of presterilization by introducing an antiseptic into the chamber while moving the web to provide the antiseptic between the web and the rollers, and the step of main sterilization by introducing the antiseptic

tic into the chamber again with the tubular web closed at a bottom portion as brought out the chamber.

2. A chamber sterilizing method as defined in claim 1 5
which is characterized in that the antiseptic is in the
form of a mist.
3. A chamber sterilizing method as defined in claim 1
or 2 which is characterized in that the step of cool- 10
ing the interior of the chamber is performed prior to
the main sterilization step.
4. A chamber sterilizing method as defined in claim 1
which is characterized in that the antiseptic is in the 15
form of a gas.
5. A chamber sterilizing method as defined in any one
of claims 1, 2, 3 and 4 which is characterized in that 20
the antiseptic is an aqueous solution of hydrogen
peroxide.

25

30

35

40

45

50

55

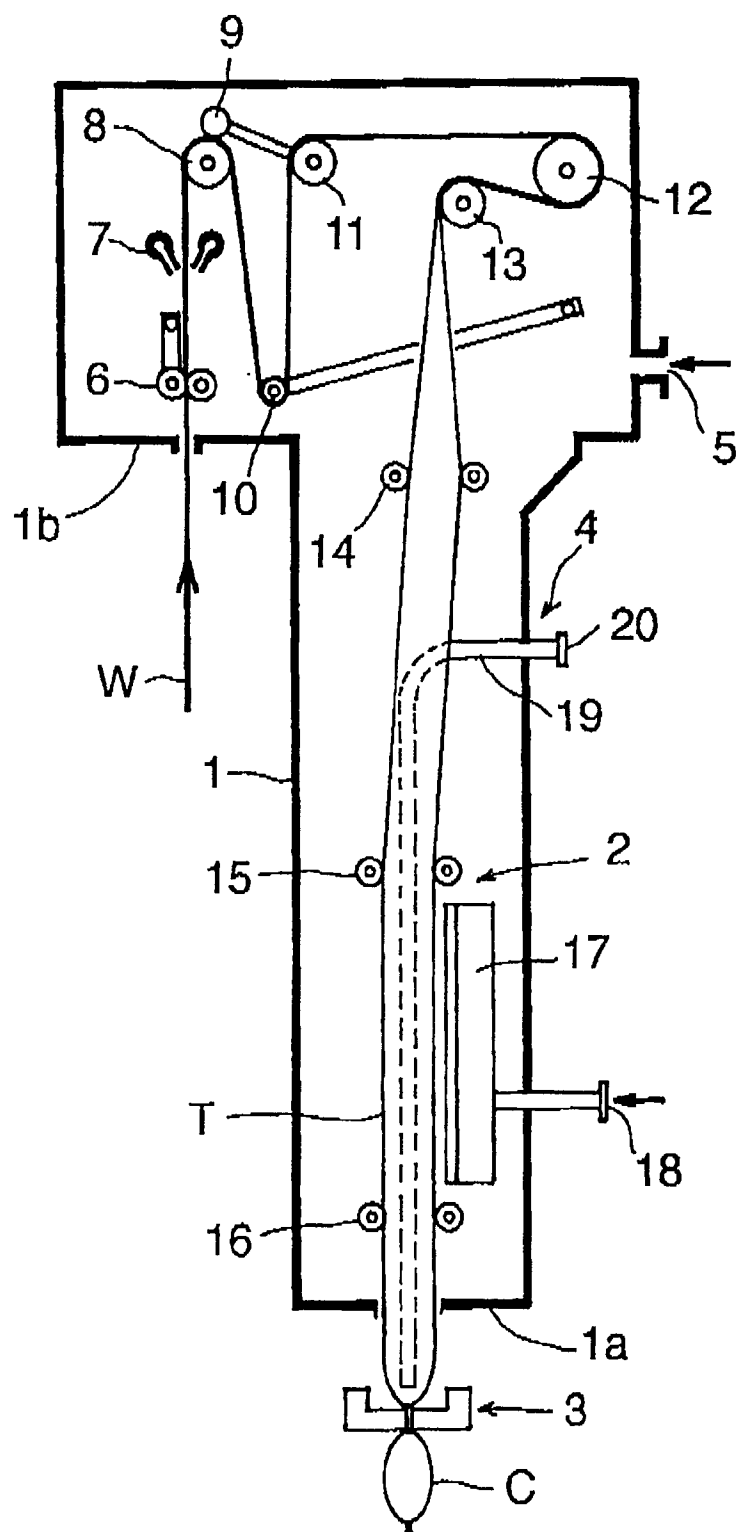


FIG. 1



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 20 1913

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	FR 2 145 527 A (ALPURA KORECO) 23 February 1973 * page 3, line 21-24 * * page 5, line 13-19; figure 1 * -----	1,2,4	B65B55/10
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 18 September 1997	Examiner Grentzius, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)