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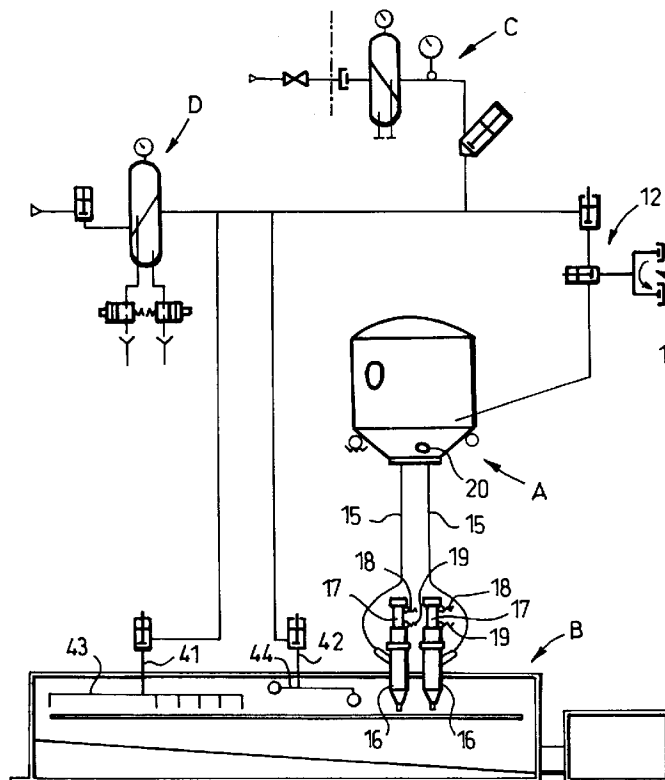
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• **Mykkänen, Ensio****FIN-37640 Valkeakoski (FI)**• **Kleemola, Pertti****FIN-37620 Valkeakoski (FI)**(74) Representative: **Ablewhite, Alan James****MARKS & CLERK,****57/60 Lincoln's Inn Fields****London WC2A 3LS (GB)****(54) A method and an apparatus for sterilizing packaging machine with steam**

(57) The invention relates to a method and an apparatus for sterilizing a packaging machine with steam. Pressurized steam is supplied to a product supply equipment (A) and a product packing space (B). In order to simplify the removal of condensate produced by ster-

ilization steam, condensate is removed from the tube system by means of cycling of pressurized sterilization steam. The cycling is performed at least at one valve (17) arranged at an outlet (16) of the tube system, whereby the cycling is monitored by means of at least one position sensor (18,19).

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Description

The invention relates to a method for sterilizing a packaging machine with steam in which method pressurized steam is supplied to the tube system of the packaging machine, to the product supply equipment and to the product packing space.

The packaging machine in this context refers to a machine with which containers of various shapes and types are filled for example with foodstuffs, such as juice, refreshments, dairy products or the like products. The parts of the packaging machine mentioned above have to be in an aseptic state and sterilized for preserving the product to be filled into containers.

In prior art solutions, condensate produced by steam sterilization of a packaging machine is often removed on the packing space side of the product. Mechanical condensate removers are arranged at the parts of the tube systems leading to the packing space and opening to the packing space, such as container sterilization lines, packaging machine wash lines and product supply lines. Besides the large space required by condensate removers, the aseptic packing space needs to be opened when condensate removers are installed, whereby the aseptic state of the packing space can be lost and it must be made aseptic again. These mechanical condensate removers that take up space and are fastened to the openings of feed nozzles cause extra problems especially at the product feed nozzles opening to the packing space. The feed nozzles are generally aligned essentially to the level of the filler opening of the container, which means that in practice, there is no space left between the transfer and support devices and the feed nozzles of the containers. Therefore said transfer and support devices have to be provided with mechanical lifting devices so that the containers can be lifted towards the product feed nozzles during production drive and on the other hand, so that the transfer and support devices can be transferred away from the feed nozzles when the condensate removers are installed. In addition to additional mechanical arrangements and structures, the prior art solutions cause extra process stages and an extended down time, which weakens the profitability and the production capacity of the production drive of the packing machine.

The object of the present invention is to achieve a method with which the above-mentioned drawbacks are avoided and which enables condensate to be removed effectively with uncomplicated and reliable means. This object is achieved with a method that is primarily characterized in that condensate produced by steam is removed from the tube system by means of cycling, the cycling is performed at least at one valve arranged at an outlet of the tube system and the cycling is monitored by means of at least one position sensor.

The basic idea of the invention is that condensate produced by sterilization steam can be flexibly removed during sterilization by utilizing essentially the compo-

nents already in the packaging machine and without requiring any specific equipment for this purpose, nor any special structures to the packaging machine and additional processes relating thereto. The pressurized steam and the condensate are thus removed by means of short-sequence cycling from at least one end of the packaging machine line through a valve often already arranged thereto. To ensure the correct operation of the valve, at least one position sensor is arranged at the valve to indicate the open or closed state of the valve. It is ascertained by means of two sensors used for indicating both open and closed state that cycling operates in the required manner. At least one valve of the product dosing nozzle opening to the packing space of the product supply equipment is preferably selected as the condensate removal valve that is preferably operated pneumatically. One considerable further advantage of the apparatus of the invention is that the temperature of the packing space is raised by means of cycling to a level advantageous for a sterile and aseptic state, which conventionally has required heating as a separate procedure.

The invention further relates to an apparatus for sterilizing a packaging machine with steam which apparatus comprises a supply equipment for pressurized sterilization steam and elements for removing condensate produced by sterilization steam. The apparatus of the invention is primarily characterized in that the elements for removing condensate comprise at least one valve arranged in the area of the ends of the supply lines for sterilization steam situated on the packing space side and leading to the packing space of the packaging machine, and that the valve is provided with at least one position sensor for indicating the open or closed state of the valve.

In the following, one preferred embodiment of the invention will be explained in more detail by means of an example with reference to the attached drawing that shows a simplified schematic view of the packaging machine.

The following components are shown in the drawing: a product supply equipment A, a product packing space B, a supply equipment C for sterilization steam and a supply equipment D for sterile air and a tube system connected thereto.

Before production drive is started, the packaging machine is sterilized by supplying pressurized steam to the packaging machine and to its tube system from the supply equipment C for sterilization steam. After this, sterile air is blown to the packaging machine from the supply equipment D for sterile air in order to attain an aseptic overpressure. A product storage 11 and its connections 12 are aseptically clean at the starting point.

The supply of sterilization steam produces condensate which has to be removed from the packaging machine before the actual production drive is started. Pressurized, the pressure for example about 3 kPa, sterilization steam produces a certain overpressure in the

coverage area of the sterilization steam of the packaging machine, whereby the condensate generally accumulates to the end of each tube system or equipment, that is, in the example shown in the drawing, to the ends of the lines situated on the packing space side of the packaging machine.

The condensate should be removed from each line, whereby the most significant outlet is the product supply equipment A. Pressurized sterilization steam is transferred via a tube system 13 to a supply equipment chamber 14 and further via lines 15 to product dosing nozzles 16 which are preferably provided with pneumatically operated dosing valves 17. Each valve is provided with a first position sensor 18 which indicates the open state of the valve and with a second position sensor 19 which indicates the closed state of the valve. The cycling of pressurized steam is performed at said valves, for example by cycling the opening of outlet valves by using fast closures in which case valves are kept open for example between about 40 to 60 ms, preferably 50 ms. A temperature sensor 20 can be preferably connected to the lower part of the chamber 14 of the supply equipment A, whereby it is ascertained by detecting the temperature and/or temperature changes that the condensate has been removed in the correct manner.

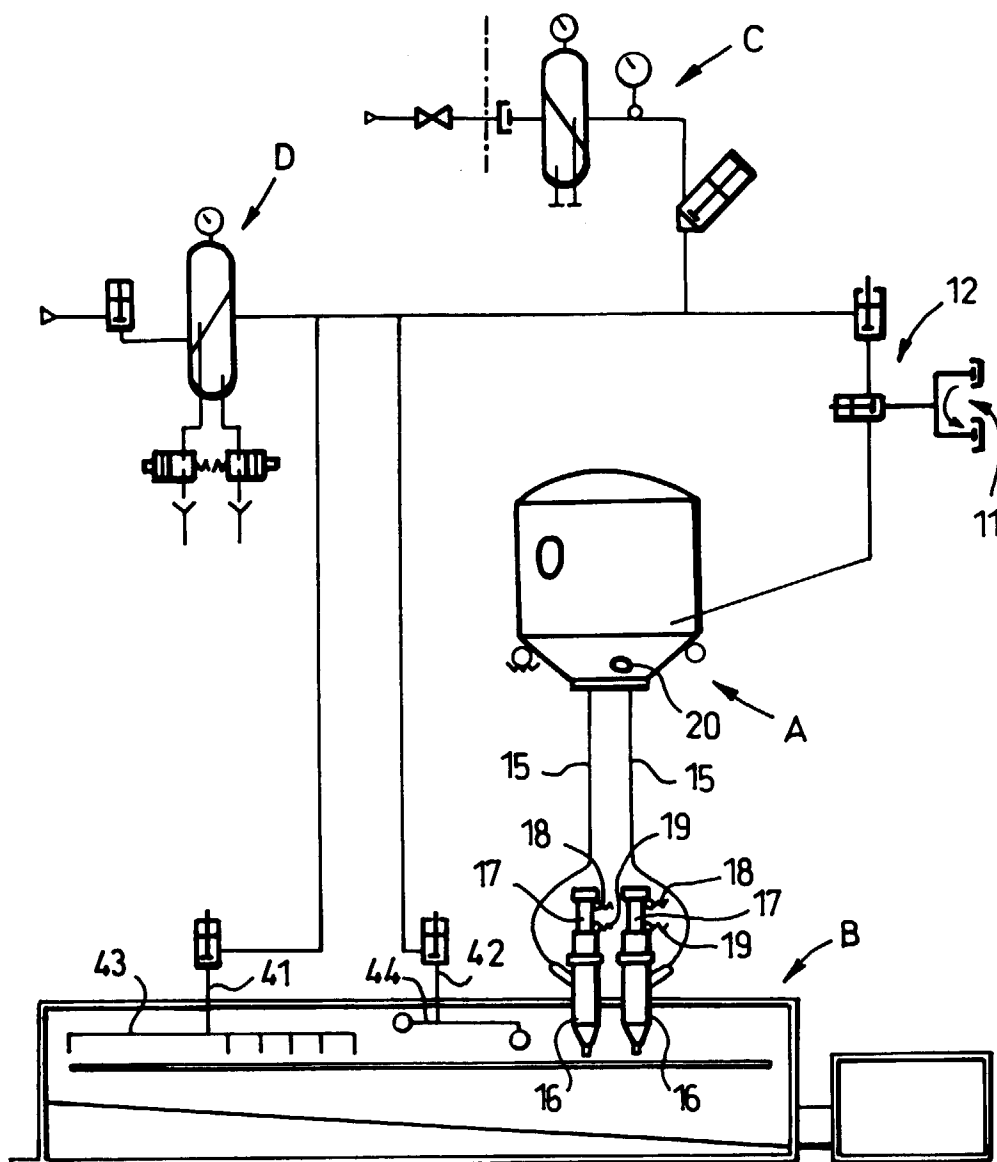
The cycling of pressurized sterilization steam directed to the packing space B also causes the temperature of the packing space to rise to a preferable level in order to induce the aseptic state following the sterilization of the packaging machine and of the packing space, in particular.

The cycling of sterilization steam can also be performed, for example, at valves 41 and 42 situated on the packing space B side which valves lead to wash and sterilization means 43, 44 of the packing space and containers.

The drawing and the specification relating thereto are only meant to illustrate the basic idea of the invention. The method and apparatus of the invention may vary in their details within the scope of the appended claims.

Claims

1. A method for sterilizing a packaging machine with steam, in which method pressurized steam is supplied to a product supply equipment (A) and a product packing space (B), **characterized** in that condensate produced by steam is removed from the tube system by means of cycling, the cycling is performed at least at one valve (17, 41, 42) arranged at an outlet of the tube system and the cycling is monitored by means of at least one position sensor (18, 19).
2. A method according to claim 1, **characterized** in that the cycling is monitored by means of first and second position sensors (18, 19) arranged at each valve (16), whereby the first position sensor indicates the open state of the valve and the second position sensor indicates the closed state of the valve.
3. A method according to claim 1 or 2, **characterized** in that the cycling is performed at the valve (17) of the product dosing nozzle (16) opening to the packing space (B) of the product supply equipment (A).
4. A method according to any of claims 1 to 3, **characterized** in that the opening time of the valve (17) during cycling is for example between about 40 to 60 ms, preferably about 50 ms.
5. A method according to claim 3, **characterized** in that the removal of condensate is monitored by means of a temperature sensor (20) arranged at the product supply equipment (A).
6. An apparatus for sterilizing a packaging machine with steam, which apparatus comprises a supply equipment (C) for sterilization steam and elements (17, 18, 19, 41, 42) for removing condensate produced by sterilization steam, **characterized** in that the elements for removing condensate comprise at least one valve (17, 41, 42) arranged in the area of the ends of the supply lines for sterilization steam situated on the packing space side and leading to the packing space (B) of the packaging machine, and that the valve is provided with at least one position sensor (18, 19) for indicating the open or closed state of the valve.
7. An apparatus according to claim 6, **characterized** in that each valve (17) is provided with a first position sensor (18) which indicates the open state of the valve and with a second position sensor (19) which indicates the closed state of the valve.
8. An apparatus according to claim 6 or 7, **characterized** in that the valve (17) of the product dosing nozzle (16) opening to the packing space (B) of the product supply equipment (A) is arranged as a condensate removal valve.
9. An apparatus according to claim 8, **characterized** in that a temperature sensor (20) is arranged at the product supply equipment (A) for monitoring the removal of condensate.





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EUROPEAN SEARCH REPORT

Application Number
EP 95 30 9131

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)
X	EP-A-0 440 042 (CAPSULIT) * column 2, line 37 - column 6, line 55; figures *	1,3,5,6, 8,9	B65B55/02
X A	US-A-4 547 339 (H. MCCLURE) * column 3, line 3 - column 5, line 59; figures *	1,6 3,9	
A	EP-A-0 418 079 (AUTOMATIC LIQUID PACKAGING)		
A	DE-A-20 27 792 (TETRA PAK)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B B67C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 1 April 1996	Examiner Jagusiak, A
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			

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