

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

División de Nuevas Creaciones

E. S. D.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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Ref: EXPEDIENTE N° 01-001355

**Solicitud de Patente a nombre de
THE QUAKER OATS COMPANY**

En el asunto de la referencia me permito adjuntar los siguientes documentos:

- 1- La copia certificada de la solicitud estadounidense No 09/481.106 del 11 de enero del 2000, con la traducción simple de sus aportes principales y reivindicaciones.**
- 2- La tarjeta de archivo temático con el arte final**
- 3- La tarjeta de archivo de propietarios**
- 4- El extracto requerido para la publicación**
- 5- Dos copias del arte final en 12 x 12 cms**
- 6- Dibujo formal.**

Como el expediente queda así completo , pido se ordene su trámite.

Atentamente,


MARCELA CASTILLO TORRES
T.P 80331 C.S. Judicatura
C.C.39.784109 Usaquén

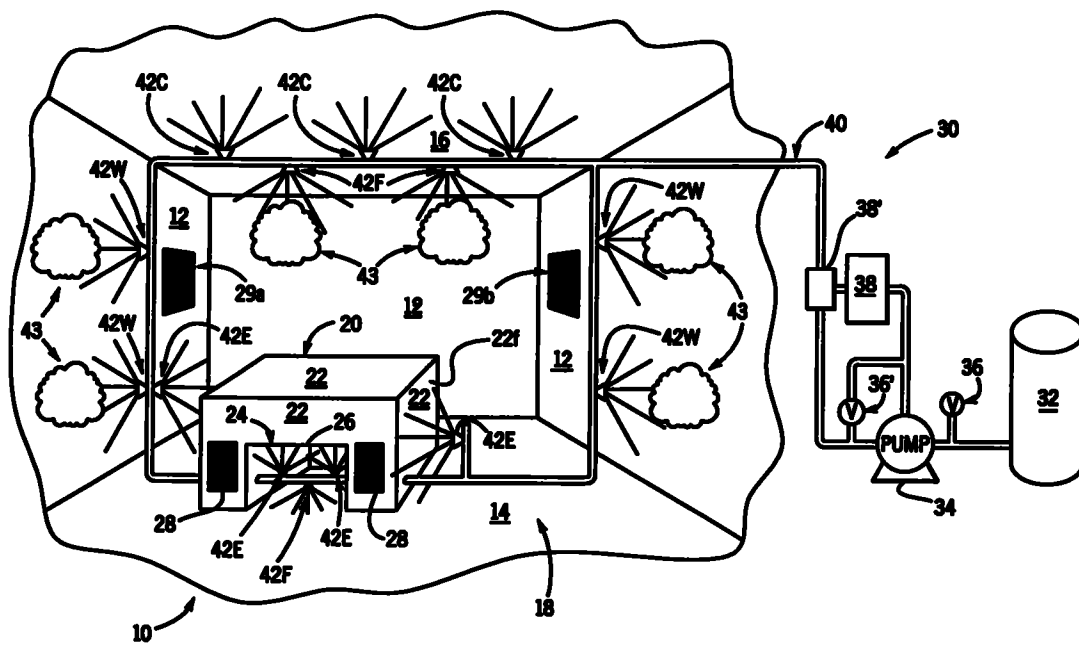


FIG 1

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FORMATO DE DIGITALIZACION
RELACION DE ANEXOS



Reyni
Technologías S.A.
Avenida 10 de Agosto - Caracas - Venezuela

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Expediente No		No de Folio
Item	No de Unidades	
1	CD	✓
2	DVD	
3	REVISTA	
4	LIBRO	
5	PERIODICO	
6	DISQUETES	
7	SOBRE DE MANILA	I
8	SOBRE BLANCO TAMAÑO CARTA	
9	SOBRE BLANCO TAMAÑO OFICIO	
10	OTROS:	

Observaciones: *De Fncal*

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Diciembre 19, 2000

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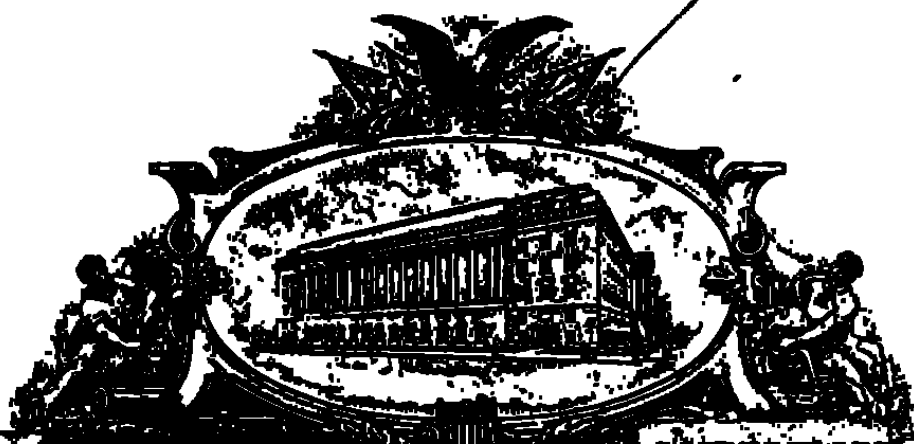
NUMERO DE SOLICITUD: 09/481,106
FECHA DE PRESENTACIÓN: Enero 11, 2000.

Por la Autoridad del
COMISIONADO PARA PATENTES Y MARCAS

Firmado
L. EDELEN
Oficial Certificador

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PA 342343



THE UNITED STATES OF AMERICA

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UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

December 19, 2000

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: 09/481,106

FILING DATE: January 11, 2000



By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

L. Edelen

L. EDELEN
Certifying Officer

01-12.00

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A 9

PATENT APPLICATION TRANSMITTAL LETTER
(Large Entity)

Docket No.
40002-10018

TO THE ASSISTANT COMMISSIONER FOR PATENTS

Submitted herewith for filing under 35 U.S.C. 111 and 37 C.F.R. 1.53 is the patent application of:
General Railways

For: **STERILIZATION SYSTEM AND METHOD FOR FOOD PACKAGING**

Enclosed are:

- ☒ Certificate of Mailing with Express Mail Mailing Label No.
- ☒ One (1) sheets of drawings.
- ☐ A certified copy of a application.
- ☐ Declaration ☐ Signed. ☐ Unsigned.
- ☐ Power of Attorney
- ☐ Information Disclosure Statement
- ☐ Preliminary Amendment
- ☐ Other.

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	38	- 20 =	18	x \$18.00	\$288.00
Indep. Claims	3	- 3 =	0	x \$78.00	\$0.00
Multiple Dependent Claims (check if applicable) ☐					\$0.00
BASIC FEE					\$890.00
TOTAL FILING FEE					\$978.00

- ☒ A check in the amount of \$978.00 to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. 90-8583 as described below. A duplicate copy of this sheet is enclosed.
 - ☐ Charge the amount of as filing fee.
 - ☒ Credit any overpayment.
 - ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
 - ☐ Charge the issue fee set in 37 C.F.R. 1.16 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: January 11, 2000


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cc:

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to

**APPLICATION FOR
UNITED STATES LETTERS PATENT**

SPECIFICATION

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TO ALL WHOM IT MAY CONCERN:

Be It known that I/we, Subodh Ran/wala
a citizen of the United States, residing at Mundelein
in the County of Lake and State of Illinois
and _____
a citizen of the United States, residing at _____
in the County of _____ and State of _____
and _____
a citizen of the United States, residing at _____
in the County of _____ and State of _____
and _____
a citizen of the United States, residing at _____
in the County of _____ and State of _____
have invented a new and useful STERILIZATION SYSTEM AND METHOD FOR FOOD PACKAGING

of which the following is a specification.

Patent

Attorney Docket
No. 40002-10018**STERILIZATION SYSTEM AND
METHOD FOR FOOD PACKAGING****FIELD OF THE INVENTION**

The present invention relates to a system and method for sterilizing a food packaging area, such as a food packaging clean room, by introducing a sterilizing agent into the atmosphere and contacting surfaces in the area with the sterilizing agent.

BACKGROUND OF THE INVENTION

Typically, food and beverage products are packaged by high speed automated filling and packaging machines in a variety of different containers, such as bottles, cartons, boxes, cans, etc. It is advantageous and necessary in some cases, depending upon various factors, including for example, the type of food being packaged and the type of package, for the atmosphere surrounding the food packaging machines as well as various surfaces in the area to be sterilized prior to the processing the food or beverage. For example, in processes for manufacturing ultimately shelf-stable products not subjected to undue heat, cold fill processes may require certain sterility.

The level of sterility can be measured in terms of classes which represent the number of particles per cubic meter. For example, cold filling certain

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preservative-free non-carbonated liquid beverages at temperatures of 120°F or less into a bottle or other container may require such processing to occur in an area of Class 100 which signifies a maximum of 100 particles greater than 0.5 microns in size per cubic foot of air. Without such sterility, the end product may have a shorter shelf life or fail to meet certain Food and Drug Administration requirements.

Additionally, sterilization of the atmosphere and surfaces in the area prior to the processing and packaging of foods and beverages, typically along with certain manufacturing practices, may eliminate the need to sterilize such foods and beverages post packaging. A closed environment, such as a clean room, is often used to minimize potential contamination and to substantially maintain a desired sterile environment level once it has been obtained.

Sterilizing the food processing or packaging machines and the surrounding area causes destruction of microorganisms, including bacteria and certain types of spores. This, in turn, minimizes the risk of contamination of the food product and the spoilage rate of the food product, among other things. A need exists for an effective method of sterilizing a large area including food processing or food packaging machinery.

As used herein, "sterilization" does not necessarily mean complete elimination of microorganisms, and as known to those skilled in the art, there are levels of sterilization (such as numbers of microorganisms in the atmosphere per cubic volume).

It is known to manually apply liquid sterilizing agents and solutions on exposed surfaces, such as on

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food packaging equipment and to the floor surrounding the food packaging equipment. For example, this has been achieved by application through a hose or mop directly on the desired equipment or surface. However, such a method is time and labor intensive and cannot ensure that either the surrounding atmosphere or nonexposed surfaces of the equipment have been sterilized.

A need exists for a less labor intensive method for sterilizing a food packaging area that is reliable and easily repeatable. A need exists for a method for sterilizing a food packaging area that is less time consuming. A need also exists for a precise method of obtaining a desired level of sterility in the atmosphere and all surfaces of food packaging equipment and the room containing that equipment. Merely applying a liquid sterilizing agent to equipment does not provide uniform exposure to all areas of the food packaging equipment and the surrounding atmosphere of the room, such as in a clean room, for example. A need exists to sterilize the nonexposed surfaces and the atmosphere in the room, and to minimize the waste of the sterilizing agent during the sterilization process.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention, a method of sterilizing a food packaging area or room is provided that is especially suited for automation. This method comprises introducing a sterilizing agent into the atmosphere of the food packaging area or room to create an aerosol suspension containing the sterilizing agent and distributing the

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atmospheric aerosol suspension for a sufficient time and in a sufficient concentration to reduce the microorganism concentration in the atmosphere to desired levels and on the surfaces in the area that are to be sterilized. Typically, the desired level of sterility is to achieve sterilization in the area. The sterilizing agent is preferably contained in an aerosol suspension and condenses on various surfaces. By "aerosol", applicant means a suspension of liquid particles in the atmosphere, which particles may be in the colloidal size range (typically the colloidal size range is about 1 millimicron to about 1 micron), such as a gas, fog, mist, or fine spray or droplet.

For purposes of the present invention, "surface(s)" refers to the surface(s) of the walls, floor, ceiling, food processing equipment and any other thing present in the area or room that is exposed to the atmosphere of the area or room (i.e., air in the room contacts the surface of the walls and floor), the surface of which is to be sterilized. For purposes of the present invention, "exposed surface(s)" refer to any surface(s) that are readily accessible to direct spraying. For purposes of the present invention, "nonexposed surface(s)" refers to any surface(s) which are not readily accessible to direct spraying. For example, a box with spaced apart slats would contain exposed surfaces on the outside of the box and nonexposed surfaces which are inside the slats on the box yet still open to the atmosphere. It should be noted that the box in this example may contain parts which are neither exposed surfaces nor nonexposed surfaces if interior portions are completely isolated

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from the atmosphere. A vented enclosure for equipment may have exterior surfaces that are "exposed" and interior surfaces that are unexposed but open to the atmosphere and hence a "nonexposed surface" in accordance with the invention. Similarly, a surface such as the interior of an incandescent bulb or cathode ray tube is neither an "exposed surface" nor a "nonexposed surface" and for purposes of the invention is a "closed surface" (i.e., a surface that is not exposed to the atmosphere). The present invention is not applicable to such closed surfaces.

In accordance with the present invention, the sterilizing agent may be introduced directly into the atmosphere as an aerosol suspension, preferably in the form of small droplets or a fog that condense on a surface (and are readily evaporable) to react with and/or kill microorganisms. While not wishing to be bound by theory, it is believed that sterilizing agent reacts with microorganisms when the sterilizing agent condenses on a surface, and may also react by contacting the microorganisms in the atmosphere without condensing. Preferably, the aerosol suspension condenses on all or substantially all (or as otherwise desired or needed) of the exposed surfaces to be sterilized in the food packaging area or room. The sterilizing agent is distributed throughout the area to ensure that the atmosphere and substantially all of the exposed and nonexposed surfaces are sterilized to a desired level. No circulation is accomplished in the atmosphere in the area or room to maintain high concentration of the sterilizing agent. After the sterilizing agent is present for at least a sufficient

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period of time to accomplish the desired degree of sterilization, the sterilizing agent may be removed from the area, leaving a resulting atmosphere and surfaces that have a sufficient sterility for a given purpose. Generally, removal of the sterilizing agent to some threshold level is necessary prior to unprotected personnel entering the area. This method can provide for more precise control over the sterility of the room than the prior art.

In accordance with another aspect of the invention, the sterilizing agent is a liquid sterilizing agent that is evaporable without leaving any residue or any substantial residue. One such sterilizing agent is known as OxoniaTM, which is an aqueous mixture of hydrogen peroxide, peracetic acid and inert ingredients. The sterilizing agent can be diluted as desired with an appropriate carrier liquid, such as water.

In accordance with another aspect of the invention, atmospheric conditions in the area or room to be sterilized are controlled such that the sterilizing agent, after introduction into the area or room, condenses on surfaces, including on exposed and unexposed surfaces, in the area or room to be treated.

In accordance with another aspect of the present invention, an automated sterilization system is provided that can practice the foregoing sterilization methods and eliminates the need for manual application of the sterilizing agent. Such a system can be more economical, reliable and repeatable than a manual system.

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In accordance with another aspect of the present invention, the method of sterilization may be operated in a cold filling liquid product filling operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation view of a system for sterilizing a closed food packaging area in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a method and system of reducing the level of microorganism concentration in a food or beverage processing or packaging area, including sterilizing the atmosphere and substantially all exposed and nonexposed surfaces in the area. The environment may be a closed system, such as a clean room, an enclosed room or series of clean rooms or enclosed rooms, or a partially open system. One example of a partially open system is a continuous (non-batch) method of filling containers where containers are transported into and out of sterile areas. When a series of clean rooms is used, each room may be used for a different processing or packaging purpose, such as one room for filling a product into a container and one room for capping the container. Each clean room within a series may require or necessitate a different level of cleanness. For example, the series of clean rooms may have the following required levels of sterility, Class 1000, 100, 100 for operator walkway, rinsing, and filling of beverage containers, respectively.

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One embodiment of the present invention is illustrated in FIG. 1. FIG. 1 illustrates in fragmentary view a food packaging room 10. Food packaging room 10 consists of walls 12, a floor 14, a ceiling 16 and an atmosphere 18 which in this case is air. Food packaging room 10 contains food packaging equipment 20 which is shown in schematic form. Food packaging equipment 20 includes exposed surfaces 22 which, for example, are located on the top and sides of food packaging equipment 20 as well as on a raised underside portion 24 of food packaging equipment 20. Food packaging equipment 20 also includes nonexposed surfaces 26 located behind vents 28 of food packaging equipment 20. An HVAC system 29 represented by inlet and outlet vents 29a and 29b, respectively, for providing heating, cooling, ventilating and air filtration is part of room 10. HVAC system 29 can form part of the sterilizing system for room 10 as hereinafter described, for either purging the sterilizing agent from atmosphere 18 and/or for introducing the sterilizing agent into atmosphere 18. HVAC system 29 also includes a HEPA filter (not shown) and permits outside HEPA filtered air to be introduced into room 10 while exhausting air leaving atmosphere 18 to the outside atmosphere.

FIG. 1 illustrates a sterilizing system 30, which in the illustrated embodiment consists of a tank 32, a pump 34, valves 36 and 36', a control system 38 and pressure and flow sensor 38', piping 40 and fixed spray nozzles 42C, E, F and W.

Tank 32 contains a sufficient quantity of sterilizing solution to effect sterilization of food

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packaging room 10 and may incorporate a heater (not shown) for heating the sterilizing agent contained therein to a desired temperature, such as about 75 to about 180°F.

Pump 34 pumps the sterilizing solution from tank 32 through piping 40 and nozzles 42 located in food packaging room 10. A pneumatic head on nozzles 42 atomizes the sterilizing solution into an aerosol suspension, a vapor or fog 43. In the alternative, aerosol suspension 43 can be generated by a stand alone fogging machine or any other method of aerosol suspension generation known to those skilled in the art. Control system 38 and pressure and flow sensor 38' control pressure and flow rate of sterilizing solution pump through nozzles 42.

Nozzles 42 are arrayed and mounted in fixed locations to provide maximum coverage on walls 12, floor 14, ceiling 16 and food packaging equipment 20, including on nonexposed surfaces 26 at raised underside portion 24 of food packaging equipment 20. More specifically, nozzles 42C are dedicated to applying the aerosol suspension to the entire exposed surface of ceiling 16, nozzles 42W are dedicated to applying the aerosol suspension to the entire exposed surface of walls 12, nozzles 42F are dedicated to the entire exposed surface of floor 14, as well as line of sight exposed surfaces 22F of food packaging equipment 20. Nozzles 42E are dedicated to applying aerosol suspension 43 to various exposed surfaces 22 of food packaging equipment 20 as indicated in FIG. 1. Any suitable type of nozzle can be used to achieve the desired introduction of the sterilizing agent into the

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area or room, and preferably an atomizing type nozzle is used.

Nozzles 42 also introduce the sterilizing agent into atmosphere 18 of food packaging area 10. Nozzles 42 can provide a liquid droplet so that the sterilizing agent readily evaporates into atmosphere 18 to form an aerosol suspension 43. The aerosol suspension 43 may condense when it comes into contact with exposed or nonexposed surfaces because of the temperature differential between such surfaces and the aerosol suspension. The humidity, concentration of sterilizing agent and temperature of atmosphere 18 can be adjusted so that condensation of sterilizing agent on surfaces 22 and 26 is maximized.

Alternatively, spray nozzles or other structure to inject sterilizing agent into the atmosphere and/or on surfaces to be sterilized could be movable or contained on a movable device that traverses the room, (e.g., across the floor or suspended from the ceiling and/or walls) such as on a motorized wheeled vehicle or robot, for example.

In accordance with the system and method of the invention, the sterilizing agent may be introduced to atmosphere 18 in the form of an aerosol suspension, gas, fog or mist. Such introduction could be accomplished through HVAC system 29 or through a separate system, for example.

After introduction, the sterilizing agent is allowed to remain in atmosphere 18 for at least a sufficient time to provide the desired level of sterilization. During this time, the sterilizing agent reacts with and/or kills microorganisms by contact with

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exposed and nonexposed surfaces 22 and 26 within the area or room 10. Later, the sterilizing agent may be substantially removed or purged from atmosphere 18, preferably replaced with filtered air (such as with a HEPA 99.97% filter), or other air that is free or substantially free of microorganisms to the desired degree.

The sterilizing agent preferably is a compound or element which is effective for removing, reducing or otherwise rendering harmless microorganisms and is capable of evaporating without leaving a residue or a substantial residue on surfaces. Examples include Vortex[™] (of Ecolab Inc. of St. Paul, Minnesota) and peroxyacetic acid compositions. A preferred sterilizing agent is Oxonia[™]. Oxonia[™], a trademark of Ecolab Inc. of St. Paul, Minnesota, comprises an aqueous mixture of 27.5% hydrogen peroxide, 66.7% inert ingredients and 5.8% peracetic acid and is preferably present to its saturation level in the area.

The sterilizing agent may be provided and stored in any suitable manner, such as in bulk (such as in a tank, vat or other storage device) or mixed in line with a water source, for example, which is isolated in some manner from the atmosphere to be treated. The sterilizing agent may also be stored at ambient or elevated temperature. Some sterilizing agents perform better at an elevated temperature. In addition, injecting the sterilizing agent at elevated temperature into the atmosphere of the area or room facilitates its evaporation into the atmosphere, thereby increasing the sterilizing agent concentration and facilitating condensation of the sterilizing agent on exposed and

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unexposed surfaces when desired. In addition, condensation of the sterilizing agent on the exposed and unexposed surfaces can be facilitated by raising the atmospheric temperature in the area or room to be treated above the temperature of the surfaces in the area or room, providing a concentration of sterilizing agent and water in the atmosphere such that condensation from the atmosphere forms at least a thin liquid film on the surfaces (preferably both exposed and unexposed) of the area or room, such as on the walls 12, floor 14, ceiling 16 and equipment surfaces 20 and 26, thereby providing a sterilizing effect on those surfaces, without requiring either direct spray or other atmospheric contact. Depending upon the sterilizing agent used, the agent may be diluted as desired. For example, in the preferred embodiment, between 2-3% Oxonia[™] is diluted to a 2-3% aqueous Oxonia[™] solution at between about 75°F and 130°F.

In accordance with the method of the invention, when sterilization of the food packaging area is to be initiated, the sterilizing agent is introduced into the area. The sterilizing agent may be introduced into the area by injecting an aerosol suspension, gas, a fog or a mist or by spraying droplets into the atmosphere of the area or room as well as directly on the surfaces of the area or room, or by combination thereof, or any other like method.

In the preferred embodiment, the nozzles are configured such that the aerosol suspension directly condenses and wets the maximum amount of the exposed surfaces in the area. The nozzles may spray in any direction. For example, depending on the orientation

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of equipment or other items in the area, nozzles may be mounted below the equipment and spray in an upwardly direction. The nozzles should have a desired spraying angle to effectively apply the antimicrobial composition. The nozzle location and spray angles depend upon, for example, the configuration of the equipment and room or area to be sprayed. Generally, the nozzles should be located and positioned to obtain maximum distribution of the sterilizing agent directly on the exposed surfaces and in the atmosphere. The nozzles may be fixed or rotatable.

The sterilizing agent may be introduced into the area as an aerosol suspension, gas, mist, vapor or in a liquid droplet form. For example, a microprocessor can be used in operating system 30 of FIG. 1 to automatically initiate and operate a sterilization cycle. Preferably, direct spraying of the exposed surfaces in the room with the sterilizing agent should be maximized, which can occur by condensation of the sterilizing agent both on exposed and nonexposed surfaces in the area. The contact can occur in the gas phase, or, if conditions are suitable, in a liquid phase as a result of condensation of the sterilizing agent on surfaces. The desired concentration of sterilizing agent in the atmosphere depends upon the type of sterilizing agent used and the size of the room to be sterilized, among other things. In a sterilization process, the concentration of the sterilizing agent must be sufficient so that where the agent contacts a surface, it sterilizes that surface. For Oxonia™, the preferred atmospheric composition of Oxonia™ is at the saturation level of the room. The

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necessary concentration of the sterilizing agent and frequency of the sterilization can be obtained by reviewing historical data for the area.

Generally, the sterilizing agent will be introduced into the clean room or area for a predetermined amount of time, such as for 30 minutes or until a desired concentration of sterilizing agent is provided in the atmosphere. The tubes or lines containing the sterilizing agent may be purged thereafter to remove any residual agent from the nozzles. Then, the sterilizing agent is distributed throughout the area to achieve contact with microorganisms for a sufficient amount of time to achieve a desired level of sterility.

After this contact time, the remaining sterilizing agent may be removed from the atmosphere. The sterilizing agent may be removed by any suitable means such as by heating the room to evaporate the sterilizing agent and thereafter purging the atmosphere in the room or area to the external atmosphere, for example. Preferably, to purge the atmosphere, clean, microorganism-free (to a desired level) air is introduced into the room or area to replace the atmosphere containing the sterilizing agent. For example, when Oxonia™ is used, the room may be heated to evaporate all Oxonia™ on exposed and nonexposed surfaces and then the atmosphere may be evacuated until the hydrogen peroxide concentration in the area is less than 0.5 ppm. Evaporating the Oxonia™ does not leave a residue. This entire process may be periodically repeated as often as desired to maintain or obtain a certain sterility based on historical data or by

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directly monitoring sterilizing agent concentration and/or microorganism concentration in the atmosphere.

While the invention has been described with respect to certain preferred embodiments and, as will be appreciated by those skilled in the art, it is to be understood that the invention is capable of numerous changes, modifications and rearrangements and such changes, modifications and rearrangements are intended to be covered by the following claims.

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26I CLAIM

1. A system for sterilizing a food packaging area comprising:

a source of a sterilizing agent;

means for introducing the sterilizing agent into the atmosphere of a food packaging area to create an aerosol suspension containing the sterilizing agent and to contact substantially all of the exposed surfaces to be sterilized in the food packaging area, the means for introducing the sterilizing agent being capable of supplying the sterilizing agent in the area in sufficient concentration to reduce the microbial concentration in the atmosphere and on surfaces contacted by the sterilizing agent contained in the atmosphere; and

means for contacting at least substantially all exposed and nonexposed surfaces in the area that are to be sterilized by contact with the sterilizing agent contained in the atmosphere.

2. The system of claim 1 where the aerosol suspension condenses to form at least a thin liquid film on at least one exposed surface to be sterilized in the area.

3. The system of claim 1 wherein the means for introducing includes structure for spraying the sterilizing agent into the food packaging area.

4. The system of claim 1 wherein the source of a sterilizing agent is a fog generator.

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5. The system of claim 3 wherein the structure for spraying includes a plurality of nozzles located in the packaging area for introducing the sterilizing agent into the atmosphere.

6. The system of claim 1 wherein the means for introducing the sterilizing agent includes structure for providing the sterilizing agent is selected from the group consisting of an aerosol suspension, a gas, a mist and a fog.

7. The system of claim 6 further comprising means for causing the sterilizing agent to condense into a thin liquid film on surfaces in the area.

8. The system of claim 1 wherein the food packaging area is an enclosed room.

9. The system of claim 1 wherein the sterilizing agent comprises hydrogen peroxide, inert ingredients and peracetic acid.

10. The system of claim 1 wherein the sterilizing agent is evaporable.

11. The system of claim 1 wherein all of the exposed and nonexposed surfaces are contacted with the sterilizing agent.

12. The system of claim 8 wherein the sterilizing agent is between 75°F and 130°F.

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13. The system of claim 1 further comprising means for substantially removing the agent from the atmosphere after the area is sufficiently sterile.

14. The system of claim 1 wherein the means for providing the sterilizing agent into the atmosphere is automated.

15. The system of claim 1 wherein the food packaging area is enclosed.

16. A method for sterilizing a food packaging area having surfaces to be sterilized and a food packaging machine comprising:

introducing a sterilizing agent as an aerosol suspension into the atmosphere in the area surrounding the food packaging area;

contacting substantially all of the surfaces that are to be sterilized in the area;

maintaining the sterilizing agent within the atmosphere for a fixed period of time sufficient to reduce to a desired level the amount of active microorganisms in the atmosphere and on the surfaces; and

substantially removing the sterilizing agent from the atmosphere so that the resulting atmosphere and area is sufficiently sterile.

17. The method of claim 16 wherein said introducing the sterilizing agent comprises spraying the sterilizing agent into the atmosphere.

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18. The method of claim 16 wherein said introducing the sterilizing agent forms an aerosol suspension that condenses on at least a thin liquid film on exposed surfaces in the area.

19. The method of claim 16 wherein said sterilizing agent is introduced in liquid form on at least a portion of the surfaces in the area by condensing the sterilizing agent from the atmosphere.

20. The method of claim 19 wherein the temperature of the atmosphere is adjusted to promote said condensing.

21. The method of claim 19 wherein the humidity and concentration of sterilizing agent is increased to promote said condensing.

22. The method of claim 19 wherein the condensing occurs on exposed and nonexposed surfaces.

23. The method of claim 19 further comprising spraying the sterilizing agent in liquid form on at least a portion of the surfaces to be sterilized in the area.

24. The method of claim 18 wherein the sterilizing agent is introduced in gaseous form into the atmosphere.

25. The method of claim 18 wherein the sterilizing agent is introduced as a mist form into the

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atmosphere, at least a portion of the sterilizing agent contained in the droplets evaporates into the atmosphere.

26. The method of claim 18 wherein the sterilizing agent is introduced as an aerosol suspension into the atmosphere, at least a portion of the sterilizing agent contained in the droplets evaporates into the atmosphere.

27. The method of claim 16 wherein all of the exposed and nonexposed surfaces in the area are contacted with a liquid film containing the sterilizing agent.

28. The method of claim 27 wherein the exposed surfaces are sprayed with a fog containing the sterilizing agent.

29. The method of claim 16 wherein the sterilizing agent comprises hydrogen peroxide, inert ingredients and peracid acid.

30. The method of claim 16 wherein the sterilizing agent comprising about 27.5% hydrogen peroxide, about 66.7% inert ingredients and 5.8% peracetic acid.

31. The method of claim 29 wherein the sterilizing agent is at least partially removed from the surfaces in the area by evaporation and the sterilizing agent is removed from the area by purging.

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32. The method of claim 16 wherein the food packaging area is enclosed.

33. The method of claim 16 wherein the method is operated in a cold filling liquid product filling operation.

34. A system for sterilizing a food packaging room comprising:

a source of an evaporable sterilizing agent;

a sterilizing agent delivery system connected to the source of sterilizing agent for introducing the evaporable sterilizing agent into the food packaging atmosphere to create a fog containing the sterilizing agent to contact with substantially all of the exposed surfaces to be sterilized in the food packaging area, wherein the delivery system can supply the sterilizing agent in sufficient quantity and concentration to reduce the microbial concentration in the atmosphere and on surfaces contacted by the atmosphere containing the sterilizing agent; and

means for distributing the sterilizing agent to contact substantially all exposed and nonexposed surfaces in the area.

35. The system of claim 34 wherein the sterilizing agent delivery system includes a plurality of fixed nozzles mounted in the room and arrayed to spray at least an aerosol suspension that condenses to form a thin liquid film on an exposed surface to be sterilized.

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36. The system of claim 34 wherein the room has packaging equipment contained therein and at least one of the nozzles is capable of spraying the equipment with said sterilizing agent.

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ABSTRACT

A system and method for sterilizing to a desired level a food packaging area or room including the associated atmosphere that can be automated is provided. The method includes introducing the sterilizing agent as an aerosol suspension into the atmosphere of the food packaging area and exposed surfaces in the area, and then distributing the sterilizing agent to contact the surfaces therein that are to be sterilized with the sterilizing agent. The method may also include condensing the aerosol suspension to form a thin liquid film containing the sterilizing agent on exposed and nonexposed surfaces in the area or room to thereby effect sterilization of those surfaces.

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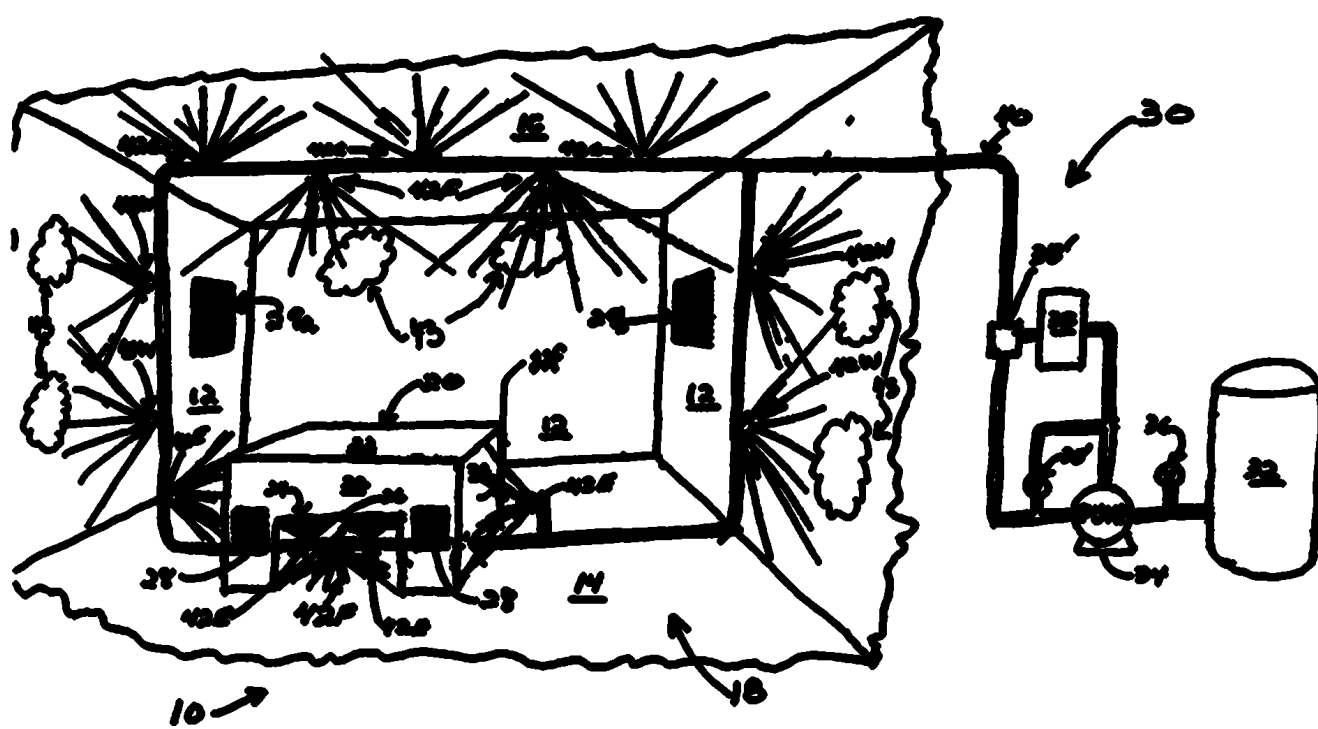


FIG. 1

REIVINDICACIONES

1. Un sistema para esterilizar un área de empaque de alimentos, el cual comprende:

una fuente de un agente esterilizador;

los medios para introducir el agente esterilizador en la atmósfera de un área de empaque de alimentos, para crear una suspensión en aerosol que contenga el agente esterilizador y que haga contacto con sustancialmente todas las superficies expuestas que van a ser esterilizadas en el área de empaque de alimentos, siendo dichos medios para introducir el agente esterilizador capaces de proporcionar el agente esterilizador en el área en una concentración suficiente para reducir la concentración microbiana en la atmósfera y en las superficies que hayan entrado en contacto con el agente esterilizador contenido en la atmósfera; y

los medios para hacer contacto con por lo menos sustancialmente todas las superficies expuestas y no expuestas en el área que se va a esterilizar mediante contacto con el agente esterilizador contenido en la atmósfera.

2. El sistema descrito en la reivindicación 1, en el cual la suspensión en aerosol se condensa para formar por lo menos una delgada película líquida sobre por lo menos una de las superficies expuestas que se van a esterilizar en el área.

3. El sistema descrito en la reivindicación 1, en el cual los medios de introducción incluyen una estructura para pulverizar el agente esterilizador en el área de empaque de alimentos.

4. El sistema descrito en la reivindicación 1, en el cual la fuente de un agente esterilizador es un generador de niebla.

5. El sistema descrito en la reivindicación 3, en el cual la estructura de pulverización incluye una pluralidad de boquillas situadas en el área de empaque para introducir el agente esterilizador en la atmósfera.

6. El sistema descrito en la reivindicación 1, en el cual los medios para introducir el agente esterilizador incluyen una estructura para proporcionar el agente esterilizador seleccionado entre el grupo compuesto por una suspensión en aerosol, un gas, una bruma y una niebla.

7. El sistema descrito en la reivindicación 6, el cual comprende, además, los medios para hacer que el agente esterilizador se condense en una delgada película líquida sobre las superficies en el área.

8. El sistema descrito en la reivindicación 1, en el cual el área de empaque de alimentos es un recinto cerrado.

9. El sistema descrito en la reivindicación 1, en el cual el agente esterilizador contiene peróxido de hidrógeno, ingredientes inertes y ácido peracético.

10. El sistema descrito en la reivindicación 1, en el cual el agente esterilizador es evaporable.

11. El sistema descrito en la reivindicación 1, en el cual todas las superficies expuestas y no expuestas entran en contacto con el agente esterilizador.

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12. El sistema descrito en la reivindicación 8, en el cual el agente esterilizador está a una temperatura comprendida entre 24°C y 55°C.

13. El sistema descrito en la reivindicación 1, el cual comprende, además, los medios para retirar sustancialmente el agente de la atmósfera una vez que el área está suficientemente estéril.

14. El sistema descrito en la reivindicación 1, en el cual los medios para introducir el agente esterilizador en la atmósfera son automáticos.

15. El sistema descrito en la reivindicación 1, en el cual el área de empaque de alimentos es cerrada.

16. Un método para esterilizar un área de empaque de alimentos que tiene superficies que deben ser esterilizadas y una máquina para el empaque de alimentos, el cual comprende:

la introducción de un agente esterilizador en forma de suspensión en aerosol dentro de la atmósfera del área que rodea el área de empaque de alimentos;

la puesta en contacto de sustancialmente todas las superficies que van a ser esterilizadas en el área;

el mantenimiento del agente esterilizador dentro de la atmósfera durante un período de tiempo fijo suficiente para reducir a un nivel deseado la cantidad de microorganismos activos en la atmósfera y en las superficies; y

el retiro sustancial del agente esterilizador de la atmósfera de tal manera que la atmósfera y el área resultantes estén suficientemente estériles.

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17. El método descrito en la reivindicación 16, en el cual dicha introducción del agente esterilizador comprende la pulverización del agente esterilizador en la atmósfera.

18. El método descrito en la reivindicación 16, en el cual dicha introducción del agente esterilizador forma una suspensión en aerosol que se condensa en por lo menos una delgada película líquida sobre las superficies expuestas en el área.

19. El método descrito en la reivindicación 16, en el cual dicho agente esterilizador se introduce en forma líquida en por lo menos una porción de las superficies en el área mediante la condensación del agente esterilizador desde la atmósfera.

20. El método descrito en la reivindicación 19, en el cual la temperatura de la atmósfera se ajusta para favorecer dicha condensación.

21. El método descrito en la reivindicación 19, en el cual la humedad y la concentración del agente esterilizador se aumentan para favorecer dicha condensación.

22. El método descrito en la reivindicación 19, en el cual la condensación ocurre sobre las superficies expuestas y no expuestas.

23. El método descrito en la reivindicación 19, el cual comprende, además, la pulverización del agente esterilizador en forma líquida sobre por lo menos una porción de las superficies que se van a esterilizar en el área.

24. El método descrito en la reivindicación 18, en el cual el agente esterilizador se introduce en forma gaseosa en la atmósfera.

25. El método descrito en la reivindicación 18, en el cual el agente esterilizador se introduce en forma de niebla en la atmósfera, y por lo menos una porción del agente esterilizador contenido en las pequeñas gotas se evapora en la atmósfera.

26. El método descrito en la reivindicación 18, en el cual el agente esterilizador se introduce como una suspensión en aerosol en la atmósfera, y por lo menos una porción del agente esterilizador contenido en las pequeñas gotas se evapora en la atmósfera.

27. El método descrito en la reivindicación 16, en el cual todas las superficies expuestas y no expuestas en el área entran en contacto con una película líquida que contiene el agente esterilizador.

28. El método descrito en la reivindicación 27, en el cual las superficies expuestas se rocían con una niebla que contiene el agente esterilizador.

29. El método descrito en la reivindicación 16, en el cual el agente esterilizador contiene peróxido de hidrógeno, ingredientes inertes y ácido peracético.

30. El método descrito en la reivindicación 16, en el cual el agente esterilizador contiene aproximadamente 27,5% de peróxido de hidrógeno, 66,7% de ingredientes inertes y 5,8% de ácido peracético.

31. El método descrito en la reivindicación 29, en el cual el agente esterilizador se retira por lo menos parcialmente de las superficies en el área mediante evaporación, y el agente esterilizador se retira del área mediante purga.

32. El método descrito en la reivindicación 16, en el cual el área de empaque de alimentos es cerrada.

33. El método descrito en la reivindicación 16, en el cual el método se aplica en una operación de llenado de producto líquido mediante llenado en frío.

34. Un sistema para esterilizar un área de empaque de alimentos, el cual comprende:

una fuente de un agente esterilizador evaporable;

un sistema de entrega del agente esterilizador conectado a la fuente de agente esterilizador para la introducción del agente esterilizador evaporable en la atmósfera de empaque de alimentos, para crear una niebla que contenga el agente esterilizador y que haga contacto con sustancialmente todas las superficies expuestas que van a ser esterilizadas en el área de empaque de alimentos, pudiendo dicho sistema de entrega proporcionar el agente esterilizador en una cantidad y concentración suficientes para reducir la concentración microbiana en la atmósfera y en las superficies que hayan entrado en contacto con la atmósfera que contiene el agente esterilizador; y

los medios para distribuir el agente esterilizador de manera que haga contacto con sustancialmente todas las superficies expuestas y no expuestas en el área.

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35. El sistema descrito en la reivindicación 34, en el cual el sistema de entrega del agente esterilizador incluye una pluralidad de boquillas fijas montadas en el recinto y distribuidas para que pulvericen por lo menos una suspensión en aerosol que se condensa para formar una delgada película líquida sobre una superficie expuesta que va a ser esterilizada.

36. El sistema descrito en la reivindicación 34, en el cual el recinto contiene equipos para empaque y por lo menos una de las boquillas es capaz de pulverizar dicho agente esterilizador sobre los equipos.