

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
División de Nuevas Creaciones
E. S. D.

Ref: EXPEDIENTE N° 01-110498
Solicitud de patente a nombre de THE
QUAKER OATS COMPANY

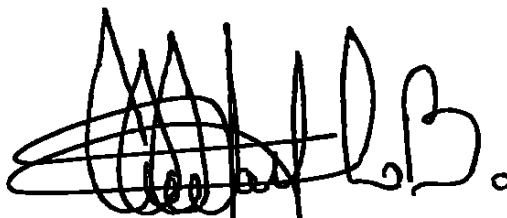
Me refiero al examen de forma recaído en el asunto de la referencia y adjunto presento los siguientes documentos:

1. El documento de cesión legalizado por Apostilla con su traducción simple.
2. La copia certificada de la solicitud estadounidense N° 09/753.437 de la cual se reclama prioridad con la traducción simple de los apartes principales.
3. Los dibujos formales.

A pesar de que en el poder presentado se menciona el lugar de constitución de la solicitante, indico que este es el Estado de New Jersey .

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

Atentamente,



JERONIMO CASTILLO BONILLA
T.P. 104167 C.S. Judicatura
C.C. 79.462.057 Bogotá

**ESTADO DE ILLINOIS
SECRETARIA DE ESTADO
SPRINGFIELD, ILLINOIS**

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Certificado**
- 5. Springfield, Illinois**
- 6. Febrero 14,2002**
- 7. por el secretario de Estado, Estado de Illinois**
- 8. N° 5552**
- 9. Sello/Estampilla
Sello**
- 10. Firma
JESSE WHITE
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ESTADO DE ILLINOIS**

ESTADO DE ILLINOIS
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13. N° 5553
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Sello
10. Firma
JESSE WHITE
SECRETARIO DE ESTADO
ESTADO DE ILLINOIS

A

Poder con Cesión**El abajo firmado****Subodh K. Raniwala de 25796 N. Arrowhead Drive, Mundelien, Illinois, Estados Unidos de América****por el presente nombra a JERONIMO CASTILLO BONILLA y/o XIMENA BONILLA PEREIRA y/o ALVARO CASTILLO GRAU, domiciliados en la Calle 93A # 14-17 de Bogotá, Colombia, como apoderados, conjuntamente, alternativamente o indistintamente, con poder especial y suficiente para solicitar y obtener de las oficinas competentes y autoridades de Colombia Patente de Invención, Modelo de Utilidad o Diseño Industrial para****SISTEMA Y METODO PARA ESTERILIZAR BOTELLAS****para ser expedida a nombre de****THE QUAKER OATS COMPANY, una corporación de New Jersey, localizada en 321 North Clark Street, Chicago, Illinois, Estados Unidos de América****a quien se ha hecho la cesión de todos los derechos y títulos sobre dicha patente para el territorio de Colombia sin ninguna restricción.****La cesionaria también firma el presente en señal de aceptación de dicha cesión y por el presente autoriza a dichos apoderados para tomar todos los pasos necesarios ante dichas oficina y autoridades para el propósito arriba indicado; para hacer peticiones, declaraciones y reivindicaciones y para usar todos los medios que dichos apoderados estimen necesarios para la salvaguarda de los intereses de la constituyente. Este poder incluye las facultades de recibir, desistir, renunciar, comprometer, transar, sustituirlo en todo o en parte, revocar sustituciones, recibir notificaciones y nombrar apoderados judiciales o extrajudiciales. Los apoderados arriba mencionados pueden ejercer este poder alternativa o indistintamente.****Firmas****SUBODH K. RANIWALA fdo Mary L. Lamczyk****Notario para Subodh K. Raniwala****por THE QUAKER OATS COMPANY****Michael T. Welch, Vice Presidente****Fdo. Sandra D. Long****Notario para Michael T. Welch**



APOSTILLE

(Convention de La Haye du 5 Octobre 1961)

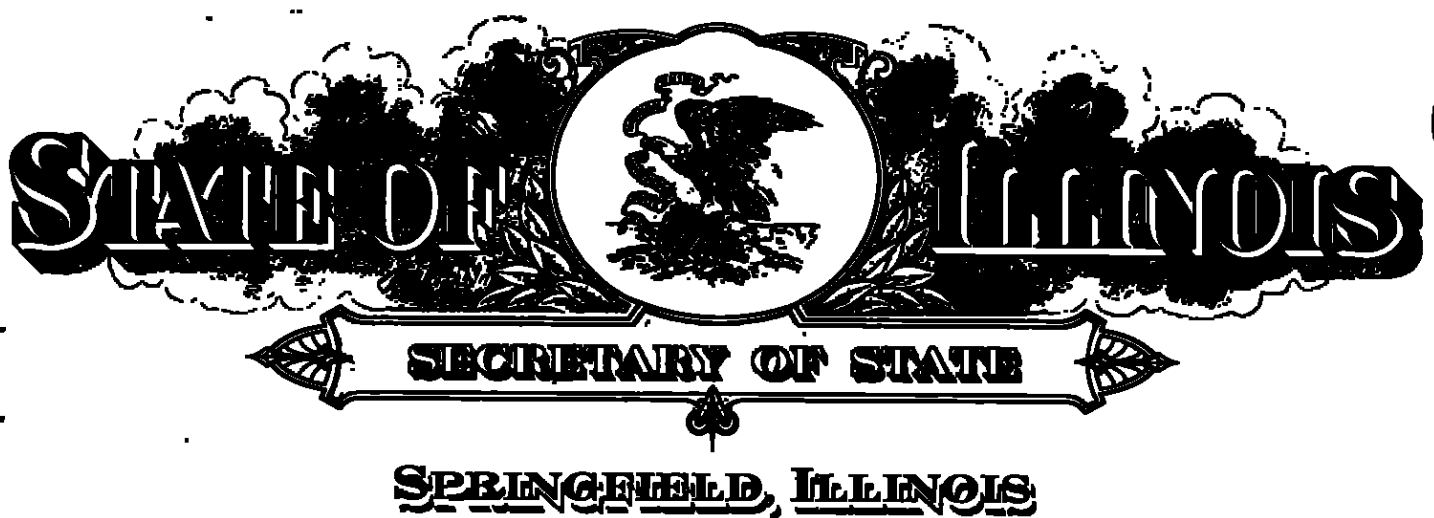
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Certified

5. Springfield, Illinois
6. FEBRUARY 14, 2002
7. by the Secretary of State, State of Illinois
8. No. 5552
9. Seal/Stamp:
10. Signature:

Jesse White

JESSE WHITE
SECRETARY OF STATE
STATE OF ILLINOIS



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7. by the Secretary of State, State of Illinois
8. No. 5553
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10. Signature:

Jesse White

JESSE WHITE
SECRETARY OF STATE
STATE OF ILLINOIS

Power with Assignment
Our Docket No.: 1715 Colombia

Insert here
Full name
And address

The undersigned
- Subodh K. Raniwala, 25796 N. Arrowhead Drive, Mundelien, Illinois
United States of America

hereby appoints Jerónimo Castillo Bonilla and/or Ximena Bonilla Pereira and/or Alvaro Castillo Grau domiciled at Calle 93A N° 14-17 of Bogotá, Colombia, conjointly, alternatively or indistinctly as attorneys with special and sufficient powers to apply and obtain from the competent offices and authorities of Colombia Patent of Invention, Utility Model or Industrial Design for
BOTTLE STERILIZING SYSTEM AND METHOD

Name and
Address of
Assignee

to be issued in the name of
THE QUAKER OATS COMPANY, a New Jersey corporation, located at
321 North Clark Street, Chicago, Illinois, United States of America

to whom assignment has been made of all right and title of said ~~patent~~
for the territory of Colombia without any restriction.

The assignee also signs these presents in token of acceptance of the said assignment and hereby authorizes the said attorneys to take all necessary steps before the said offices and authorities for the purpose above stated; to make petitions, declarations and claims and to use all means which said attorneys shall deem proper for the safeguard of the interests of the constituent. This power includes the faculties to receive, desist, renounce, compromise, transact, substitute it in all or in part, to revoke substitutions, to receive notifications and to appoint extra-judicial or judicial attorneys. The attorneys mentioned above can exercise this power alternatively or indistinctly.

Signatures

SUBODH K. RANIWALA

SK Raniwala

Mary L. Lamaczyk
Notary for Subodh K. Raniwala
"OFFICIAL SEAL"
MARY L. LAMACZYK
Notary Public, State of Illinois
My Commission Expires 10/09/02
12/20/01

by **THE QUAKER OATS COMPANY**

Michael T. Welch
Michael T. Welch, Vice President

Sandra D. Long
Notary for Michael T. Welch

"OFFICIAL SEAL"
SANDRA D. LONG
Notary Public, State of Illinois
My Commission Expires 04/28/04

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4. Coloca el sello/estampilla de Oficina de Marcas y Patentes
Certificado
5. en Washington, D.C.
6. El quinceavo de Febrero 2002
7. por Oficial Asistente de Autenticación, Departamento de Estado de los Estados Unidos
8. N° 02008943-4
9. Sello/Estampilla
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Patrick O. Hatchett

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Diciembre 11,2001

LO SIGUIENTE ES PARA CERTIFICAR QUE LO QUE AQUÍ SE ANEXA ES UNA COPIA VERDADERA DE LOS ARCHIVOS DE LA OFICINA DE PATENTES Y MARCAS DE LOS ESTADOS UNIDOS, SOBRE AQUELLOS DOCUMENTOS ABAJO IDENTIFICADOS COMO UNA SOLICITUD DE PATENTE, Y QUE LOS MISMOS REUNEN LOS REQUISITOS PARA QUE SE LES OTORQUE UNA FECHA DE PRESENTACION BAJO EL 35 USC 111.

NUMERO DE SOLICITUD: 09/753,437
FECHA DE PRESENTACION: Enero 3,2001

Por la Autoridad del
COMISIONADO DE PATENTES Y MARCAS

Firmado
T. WALLACE
Oficial Certificador

AS ye

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5. at Washington, D.C.

6. the fifteenth of February, 2002

7. by *Assistant Authentication Officer, United States Department of State*

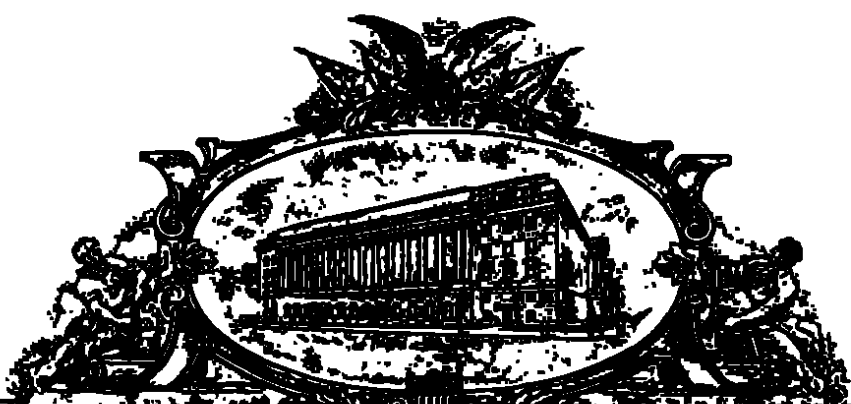
8. No. 02008943-4

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Patrick O. Hatchett



PA 500443

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December 11, 2001

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: 09/753,437 /
FILING DATE: January 03, 2001



**By Authority of the
 COMMISSIONER OF PATENTS AND TRADEMARKS**

T. Wallace
T. WALLACE
Certifying Officer

01/03/01

01-64-01

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PATENT APPLICATION TRANSMITTAL LETTER
(Large Entity)

Docket No.
40002-10217

TO THE ASSISTANT COMMISSIONER FOR PATENTS

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

Subodh K. Raniwala

For: **BOTTLE STERILIZING SYSTEM AND METHOD**



Enclosed are:

- ☒ Certificate of Mailing with Express Mail Mailing Label No. **EK762507729US**
- ☒ Four (4) Informal 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	40	- 20 =	20	x \$18.00	\$360.00
Indep. Claims	3	- 3 =	0	x \$80.00	\$0.00
Multiple Dependent Claims (check if applicable) ☐					\$0.00
BASIC FEE					\$710.00
TOTAL FILING FEE					\$1,070.00

- A check in the amount of **\$1,070.00** to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **90-0503** 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. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: January 3, 2001



James D. Ryndak, Reg. No. 28,754
Ryndak & Suri
30 N. LaSalle Street, Suite 2630
Chicago, Illinois 60602
(312) 214-7770

cc:

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CERTIFICATE OF MAILING BY "EXPRESS MAIL" (37 CFR 1.10)			Docket No. 40002-10217
Applicant(s): Subodh K. Ranjwala			
Serial No. To be assigned	Filing Date Concurrently herewith	Examiner	Group Art Unit
Invention: BOTTLE STERILIZING SYSTEM AND METHOD			
I hereby certify that the following correspondence: Patent application and associated documents <i>(Identify type of correspondence)</i> is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 in an envelope addressed to: The Assistant Commissioner for Patents, Washington, D.C. 20231 on <u>January 3, 2001</u> <i>(Date)</i> <u>Karen L. Hanton</u> <i>(Typed or Printed Name of Person Mailing Correspondence)</i> <u><i>Karen L. Hanton</i></u> <i>(Signature of Person Mailing Correspondence)</i> <u>EK762507729US</u> <i>("Express Mail" Mailing Label Number)</i>			



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Notes: Each paper must have its own certificate of mailing.

**APPLICATION FOR
UNITED STATES LETTERS PATENT**

SPECIFICATION

09753137.010301

TO ALL WHOM IT MAY CONCERN:

Be it known that I, Subodh K. Ranjwa
a citizen of the United States, residing at Mundelein
in the County of Lake and State of Illinois
have invented a new and useful BOTTLE STERILIZING SYSTEM AND METHOD
of which the following is a specification.

BOTTLE STERILIZING SYSTEM AND METHOD

FIELD OF THE INVENTION

The present invention relates to a system, method and apparatus for sterilizing bottles by introducing a sterilizing agent in the form of discrete atomized liquid droplets onto the bottle's surfaces.

BACKGROUND OF THE INVENTION

In the high-speed automated bottling of beverages, it is desirable to fill the bottles in such a manner as to achieve a product shelf life as long as possible. In a cold-fill bottling process where the use of chemical additives or pasteurization is impractical, a germ-free bottle is necessary to minimize the chance that bacteria, spores or other microorganisms may contaminate the beverage during the filling stage, thereby reducing the shelf life of the bottled product.

In order to achieve this high degree of sterility, cold-fill systems typically incorporate the beverage bottling stage in a closed system, otherwise known as a clean room. A clean room is often used to minimize potential contamination and to substantially maintain a desired sterile environment level once it has been obtained.

Although the use of a clean room reduces the possibility of contamination, fill bottles, in particular, should be free from contamination as well. It is known in the art to apply sterilizing agents such as pressurized steam or liquid chemical solutions to sterilize bottles immediately prior to the beverage fill stage. These known methods, however,

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have certain drawbacks for a number of reasons. First, pressurized steam is not ideal to sanitize plastic (PET) bottles due to temperature deformation. Secondly, chemical spray or chemical bath approaches both require relatively large volumes of sterilizing solution to achieve proper sterilization. This is economically undesirable. Furthermore, the use of chemical sterilizing solutions requires excessive energy use and substantial amounts of equipment to maintain the solution at the required temperature to achieve the proper degree of sterilization.

A need therefore exists to apply sterilizing agent in a more uniform and energy efficient manner to all surfaces of a bottle while simultaneously ensuring that the required degree of sterilization is obtained.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention, a system, method and apparatus for sterilizing bottles in a uniform and efficient manner is provided that is particularly useful in a cold-fill bottling process. The present invention can reduce the amount of sterilizing agent required and can eliminate the need for post-bottling pasteurization.

In accordance with one aspect of the present invention, a system introduces a sterilizing agent in the form of discrete atomized liquid droplets onto the surface of a bottle to be sterilized. Once contacting the bottle surfaces, these droplets form a thin liquid film thereon. The film is maintained on the surface for a sufficient time and in sufficient concentration so that the sterilizing agent reduces the microorganism concentration on the surfaces to the desired level of sterility. When introducing the sterilizing agent, any bottle orientation may be used. Preferably, the bottle is inverted before the sterilizing agent is introduced. The inverted bottle is more readily adaptable to

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a sterilizing agent removal process, such as rinsing with water. Thus, the present action is particularly suited to sterilizing the interior of a bottle or other container as well as the exterior of such bottle or container. Thereafter, the bottle can be filled with a beverage as desired.

5 As used herein, "atomized" means a droplet size in the range of about 1 millimicron to 1000 microns (1 millimeter) in diameter. As such, the droplets may or may not be visible to the naked eye. The sterilizing agent may be atomized by any suitable method known to those skilled in the art. This may include but not be limited to techniques such as applying ultrasonic energy to liquid and forming a suspension of atomized particles, or utilizing a fog generator, an aspirator or a hydraulic atomizer nozzle. Given this size range, the atomized droplets may be introduced in various physical states including but not limited to a fog, a nebula, a vapor, a mist or an aerosol suspension.

10 Preferably, an air atomizer nozzle is used. The spray angle can vary from 0°, a straight-line jet, to a full-cone spray of 360°. The desired concentration of sterilizing agent is achieved by adjusting the sterilizing agent/air ratio of the nozzle pressure.

15 Likewise, the flow rate and the droplet size can also be varied by adjusting the nozzle discharge aperture. By applying liquid sterilizing agent to bottles in the form of atomized liquid droplets, the normal volume usage of liquid sterilizing solution can be reduced by about 90% or 95% or more compared to traditional spray sterilizing methods in which a stream of liquid solution is sprayed into the bottles.

20 For purposes of the present invention, the term "surface(s)," refers to any bottle surface defined by the interior and exterior material layer of the bottle's shape. The bottle surface would thereby include any exposed convex or concave surfaces thereof.

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After application of the sterilizing agent to the desired surface(s) of the bottle, the sterilizing agent is allowed to remain on the surface(s) for sufficient time to effect the desired degree of sterilization. Residual sterilizing agent is then removed from the bottle. This can be performed by rinsing the bottle with water, either by spraying the bottle with rinse water or immersing the bottle in a water bath. When spray rinsing the bottle, it is preferable to have the bottle inverted so that gravity assists in draining the rinse water from the bottle interior. After rinsing, if inverted, the bottle is turned up for filling.

In accordance with another aspect of the invention, the sterilizing agent is a liquid that is evaporable or washable without leaving any substantial residue. One such sterilizing agent is Oxonia™. Oxonia™ is an aqueous mixture of hydrogen peroxide, peracetic acid and inert ingredients. When such a sterilizing agent is used, the bottle may or may not need to be rinsed with water. Also, the sterilizing agent can be adequately removed by applying compressed air to the bottle until all the surfaces are sufficiently dry, which may physically remove the sterilizing agent from the surface as well as hasten evaporation.

In accordance with a preferred embodiment of the present invention, the atomized droplets contact the bottle by impinging the bottle surface. After impingement, the droplet collapses and the liquid sterilizing agent adheres to the bottle surface, generally covering more surface area than immediately after impingement. As more droplets impinge upon the surface, the collapsed droplets disperse or spread and wet the surface by creating a thin film of sterilizing agent. Impingement by a sufficient number of droplets per unit area of bottle surface (i.e., droplet density) creates a continuous thin film on the bottle surface.

In a preferred embodiment of the present invention, the atomized droplets are introduced in sufficient density so as to condense upon the bottle's surface and form a

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continuous thin film of sterilizing solution thereon. Condensation may be enhanced by supersaturating the sterilizing solution. Condensation may also be promoted by creating a temperature differential between the sterilizing solution and the bottle surface in which the bottle is colder than the surrounding atmosphere. Preferably, this occurs in a closed chamber or room. If a temperature differential is utilized, it can be on the order of 10°F or more as desired. The closed chamber helps maintain the temperature of the sterilizing agent when it is introduced at an elevated temperature. Moreover, the atmospheric pressure in the closed chamber may also be increased to promote condensation of the atomized droplets upon the bottle surface. A closed chamber with increased pressure also provides for a more sterile environment by preventing the entry of contaminating particles. The temperature differential can also be created by lowering the bottle temperature immediately prior to the introduction of the sterilizing agent.

In accordance with another aspect of the invention, an automated sterilization system is provided that can perform the foregoing sterilization methods, thereby eliminating the need for manual application of the sterilizing agent. Such a system is reliable and uses a far lower volume of sterilizing solution than prior systems.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic fragmentary view of a portion of a sterilizing device in accordance with the present invention;

FIG. 2 is an enlarged fragmentary sectional view illustrating the initial injection of sterilizing agent into a bottle;

FIG. 3 is an enlarged fragmentary sectional view illustrating continued injection of sterilizing agent into a bottle;

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FIG. 4 is an enlarged fragmentary sectional view showing a film of sterilizing agent on the bottle interior;

FIG. 5 is an enlarged fragmentary sectional view illustrating injection of a fog of sterilizing agent into the exterior of a bottle;

FIG. 6 is an enlarged fragmentary sectional view illustrating a thin film of condensed sterilizing agent on the interior bottle surface;

FIG. 7 is an enlarged fragmentary sectional view illustrating rinsing of the bottle interior;

FIG. 8 is an enlarged fragmentary sectional view illustrating gravity discharge of the rinsing fluid; and

FIG. 9 is an enlarged fragmentary sectional view illustrating removing the sterilizing agent from the bottle interior with compressed air.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides a system, method and apparatus for sterilizing bottles by introducing a sterilizing agent in the form of discrete atomized particles onto bottle surfaces, which is particularly suited for use with a cold-fill bottling process.

Referring to the Figures generally and in particular to Figures 1 and 2 a bottle 10 is illustrated having an interior surface 10a and an exterior surface 10b. Bottle 10 also has a body portion 12, a neck portion 14 and a mouth 16. FIG. 1 depicts bottle 10 prior to the introduction of sterilizing agent. Bottle 10 is exposed to a plurality of atomizing nozzles 18 by a conveyor 22. The plurality of nozzles 18 may be above, below, lateral to or in any combination thereof to the bottle 10. Preferably, bottle 10 is inverted before introducing the sterilizing agent. Bottles 10', 10" and 10''' are similar to bottle 10.

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Atomizing nozzles 18 are each in fluid communication with suitable piping 24 which is connected to a storage source of sterilizing agent (not shown) and is a device for producing droplets in the desired size range. The sterilizing agent may be obtained from any suitable source and stored in any suitable manner, such as in a tank, vat or other storage device, for example. Nozzles 18 each have an aperture 20 and may be any suitable type of atomizing nozzle or other device or structure known in the art for producing droplets in the desired size range. Such types of atomizing nozzles include, but are not limited to, a fog generator, an aspirator or a hydraulic atomizer nozzle. Also, ultrasonic energy can be used to form a suspension of liquid atomized particles. Any suitable method or apparatus that can atomize and deliver liquid particles in the size range of 1 millimicron to 1000 microns can be utilized in accordance with the present invention.

Preferably, atomizing nozzles 18 are air atomizing nozzles. Standard air atomizers known in the art allow the user to define a wide array of parameters. For example, the spray angle can vary from 0°, a straight-line jet, to a full-cone spray of 360°. Moreover, the desired concentration of sterilizing agent can be achieved by adjusting the sterilizing agent/air ratio of the nozzle pressure. Likewise, the flow rate and the particle size can also be varied by adjusting the nozzle discharge aperture 20.

FIG. 2 depicts nozzle 18 atomizing and beginning the injection of the sterilizing agent 26 under pressure into bottle 10. Each of nozzles 18 can be operated to continuously or intermittently discharge a stream of atomized particles of sterilizing solution so that when bottles 10-10" traverse the conveyor and pass over nozzles 18, droplets of sterilizing agent are injected therein. Within the given size range, some particles of the atomized sterilizing agent 26 may be invisible to the naked eye while others may be visible. As such, the physical form of the atomized sterilizing agent 26

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can be, but is not limited to, a fog, a vapor, a mist or an aerosol suspension. FIG. 2 shows the introduction of atomized sterilizing agent 26 into the interior 28 of bottle 10. Nozzles 18 can be arranged or configured so that atomized sterilizing agent 26 can also be applied onto the interior bottle surfaces 10a, the exterior bottle surfaces 10b, or both the interior 10a and exterior 10b bottle surfaces.

Preferably, the sterilizing agent is a solution or liquid that 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, currently is believed to comprise an aqueous mixture of 27.5% hydrogen peroxide, 88.7% inert ingredients and 5.8% peracetic acid. The sterilizing agent may either be applied directly or mixed with water to assure the desired degree of sterility.

FIG. 3 depicts atomized sterilizing agent 26 being further introduced into bottle interior 28 in the form of discrete atomized particles 30. The atomized sterilizing agent particles 30 impact or otherwise contact the interior bottle surface 10a so that droplets 32 of sterilizing agent 26 form upon the interior bottle surface 10a, as shown in FIG. 3. As additional atomized particles 30 contact the interior bottle surface 10a, the droplets 32 form a continuous thin film 34 of sterilizing agent 26 upon the interior bottle surface 10a coating substantially all of the surface desired to be treated with sterilizing agent, as shown in FIG. 4. Typically, the amount of droplets to impinge upon the bottle surface will be in sufficient quantity to form a continuous thin film.

Preferably, atomized particles 30 contact the bottle's interior surface 10a by impinging thereupon. Upon impingement with interior bottle surface 10a, atomized particles 30 collapse and subsequently disperse or spread over interior bottle surface

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10a. In this manner, the interior bottle surface 10a is wetted by forming a continuous thin film 34 of sterilizing agent 26 thereon. Thin continuous film 34 of sterilizing agent 26 is then allowed to remain on the interior bottle surface 10a for sufficient duration to ensure the desired degree of sterility and/or reduction of microbial contamination.

5 In a preferred embodiment of the present invention, the atomized sterilizing agent is introduced so as to cause it to condense upon the interior and/or exterior of desired bottle surface 10. This can be accomplished in a number of ways. First, the sterilizing agent may be introduced to the bottle surface as a supersaturated fog so that upon contact with interior bottle surface 10a, the atomized sterilizing agent 26 readily condenses thereon. Alternatively, a temperature differential between the sterilizing agent solution and the bottle temperature is created, preferably in a closed chamber with the temperature of the bottle being lower than that of the fog or droplets to promote condensation on the bottle surface. The temperature of the sterilizing agent is elevated before the sterilizing agent is atomized. Preferably the temperature of the sterilizing agent is between 80° – 180° Fahrenheit immediately prior to atomization or as otherwise desired. The atmospheric temperature and pressure within the closed chamber can also be adjusted to further promote condensation of atomized sterilizing agent 26 upon the interior bottle surface 10a or other bottle surface.

FIG. 5 depicts the atomized sterilizing agent 26 condensing as a fog 36. As quantity and volume of the atomized sterilizing agent 26 is increased, the concentration of fog 36 within the bottle interior 28 increases, reaching the atmospheric saturation point within the bottle interior 28. Once this occurs, sterilizing agent droplets 32 consequently form upon the interior bottle surface 10a. As condensation continues, droplets 32 combine to form a thin film of sterilizing agent 34 upon the interior bottle surface 10a as depicted in FIG. 6.

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After sufficient contact time, typically on the order of about 3 seconds to about 30 seconds, for example, the film 34 of sterilizing agent is removed from the interior bottle surface 10a. The sterilizing agent may be removed in any suitable manner such as by rinsing the bottle 10 with water. FIG. 7 depicts the interior of bottle 28 being sprayed with a stream of water 38 under pressure. Preferably, the bottle is in the inverted position during rinsing thereby enabling gravity to assist the free discharge and flow of rinse water 38 through the bottle mouth 16 and off of interior bottle surfaces 10a as shown in FIG. 8.

FIG. 9 depicts one preferred embodiment wherein Oxonla™ or a similar sterilizing agent that does not leave a residue on surfaces is utilized. The sterilizing agent is removed by applying a blast of compressed air 40 onto the surfaces of bottle 10 treated with sterilizing agent for a sufficient duration and pressure to cause removal of the sterilizing agent from the bottle's interior surfaces 10a. Compressed air 40 is applied to interior bottle surface 10a to substantially evaporate any or physically remove remaining sterilizing agent. Evaporation of Oxonla™, or similar sterilizing agents, does not leave a residue.

In accordance with another aspect of the invention, the process of introducing atomized sterilizing agent 26, allowing the thin film 34 of sterilizing agent 26 to contact the interior bottle surface 10a, and removing the sterilizing agent film 34 from the interior bottle surface 10a can be automated by use of a microprocessor, computer (not shown) or the like. An automated system would not only eliminate the need for manual application of the sterilizing agent but would also produce repeatable and reliable results and can be operated on a continuous, in-line basis as part of a cold-fill bottling operation utilizing known equipment for such cold-fill bottling.

While the invention has been described with respect to certain preferred embodiments, 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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CLAIMS

1. A system for sterilizing bottles, said bottles having an interior and exterior surface, comprising:

a source of a liquid sterilizing agent;

means for introducing said sterilizing agent onto the surface of said bottle in the

form of discrete atomized liquid particles by contacting the bottle surface with said

particles to form at least a thin liquid film thereon, present in sufficient concentration

to substantially eliminate microbial contamination on the surface of said bottle after

being in contact with said liquid film for a sufficient period of time; and

means for substantially removing said sterilizing agent from said bottle surface after said bottle is sufficiently sterile.

2. The system of claim 1 wherein said contact occurs by said particles impinging and dissipating upon the bottle surface thereby substantially wetting said surface.

3. The system of claim 1 wherein said sterilizing agent is introduced so as to promote condensation of said particles onto the bottle surface.

4. The system of claim 3 wherein said sterilizing agent is introduced in a supersaturated solution to promote condensation of said particles onto the bottle surface.

5. The system of claim 1 wherein said sterilizing agent source is selected from a group consisting of an ultrasonic energy atomizer, a fog generator, hydraulic atomizer nozzle, or an air atomizer.

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6. The system of claim 1 wherein said liquid droplets are in a form selected from the group consisting of a fog, a vapor, a mist, and an aerosol suspension.
7. The system of claim 1 wherein all the bottle's surfaces are contacted with sterilizing agent.
8. The system of claim 1 wherein said sterilizing agent is introduced in a closed chamber.
9. The system of claim 8 wherein said closed chamber is adapted for increased temperature and pressure to promote condensation of sterilizing agent on the surfaces of said bottle.
10. The system of claim 8 wherein the temperature of the sterilizing agent is between 60°F and 180°F.
11. The system of claim 1 wherein said sterilizing agent comprises hydrogen peroxide and peracetic acid.
12. The system of claim 1 further comprising means for inverting the bottle before introducing said sterilizing agent.
13. The system of claim 1 wherein said sterilizing agent is removed from the bottle surface by rinsing said bottle with water.

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14. The system of claim 1 wherein said sterilizing agent is removed from the bottle surface with compressed air.

15. The system of claim 1 wherein said system is operated in a cold-fill liquid product filling operation.

16. A method for sterilizing bottles, said bottles having interior and exterior surfaces, comprising:

introducing a sterilizing agent in the form of discrete atomized liquid particles onto the interior bottle surface;

contacting the interior bottle surface with said particles whereby said particles form a thin liquid film on the bottle surface;

maintaining the sterilizing agent on the surface of said bottle for a fixed period of time sufficient to reduce to a desired level the amount of active microorganisms on said surface;

removing said sterilizing agent from substantially all the interior and exterior surfaces so that said surfaces are sufficiently sterile.

17. The method of claim 16 wherein said particles impinge and dissipate upon said bottle surface.

18. The method of claim 16 wherein said sterilizing agent is introduced so as to promote condensation of said particles onto the interior bottle surface.

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19. The method of claim 18 wherein said sterilizing agent is introduced in a supersaturated solution to promote condensation of said particles onto the interior bottle surface.

20. The method of claim 16 wherein sterilizing agent is introduced by an ultrasonic energy atomizer, a fog generator, a hydraulic atomizer nozzle, or an air atomizer.

21. The method of claim 16 wherein said liquid particles are introduced in a form selected from the group consisting of a fog, a vapor, a mist or an aerosol suspension.

22. The method of claim 16 wherein said sterilizing agent is introduced in a closed chamber.

23. The method of claim 16 wherein said closed chamber is adapted for elevated temperature and pressure to promote condensation of the sterilizing agent.

24. The method of claim 16 wherein the sterilizing agent comprises an aqueous solution containing about 27.5% hydrogen peroxide and about 5.8% peracetic acid.

25. The method of claim 16 wherein said sterilizing agent is removed from the bottle surface by rinsing with water.

26. The method of claim 16 wherein said sterilizing agent is removed from the bottle surface with compressed air.

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27. The method of claim 16 further comprising inverting the bottles before the introduction of said sterilizing agent.

28. The method of claim 17 wherein the method is operated in a cold-filling liquid product filling operation.

29. An apparatus for sterilizing bottles, said bottles having interior and exterior surfaces, comprising:

a source of a liquid sterilizing agent in the form of atomized liquid particles;
at least one nozzle for introducing said sterilizing agent onto the surface of the bottle in the form of discrete atomized liquid particles by contacting the bottle surface with said particles to form at least a thin liquid film thereon, present in sufficient concentration to substantially eliminate microbial contamination on the surfaces of said bottle in contact with said liquid film; and
a rinsing device for substantially removing said sterilizing agent from said bottle's surfaces after said bottle is sufficiently sterile.

30. The apparatus of claim 29 wherein said contact occurs by impinging and dispersing over said bottle surface.

31. The apparatus of claim 29 wherein said sterilizing agent is introduced so as to promote condensation of said particles onto the bottle surface.

32. The apparatus of claim 31 wherein said sterilizing agent is introduced in a supersaturated solution to promote condensation of said particles onto the bottle surface.

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33. The apparatus of claim 29 wherein said source of liquid sterilizing agent comprises a device selected from the group consisting of an ultrasonic energy atomizer, a fog generator, a hydraulic atomizer nozzle and an air atomizer.
34. The apparatus of claim 29 wherein said atomized sterilizing agent is selected from the group consisting of a fog, a vapor, a mist and an aerosol suspension.
35. The apparatus of claim 29 wherein substantially all the bottle surfaces are contacted with sterilizing agent.
36. The apparatus of claim 29 wherein said sterilizing agent is introduced in a closed chamber.
37. The apparatus of claim 36 wherein said closed chamber is adapted for increased temperature and pressure to promote condensation of sterilizing agent on the surfaces of said bottle.
38. The apparatus of claim 29 wherein the temperature of the sterilizing agent is between 60°F and 180°F.
39. The apparatus of claim 29 wherein said sterilizing agent comprises hydrogen peroxide and peracetic acid.

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40. The apparatus of claim 29 further comprising means for inverting the bottle before introducing said sterilizing agent.

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ABSTRACT

A system and method for sterilizing bottles is provided. The system has structure for producing and introducing a source of liquid sterilizing agents in the form of discrete particles onto the bottle surface to form a thin liquid film thereon. Structure is provided for removing the sterilizing agent from the bottle surface after the desired degree of sterilization is achieved.

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Docket No.
40002-10217**Declaration and Power of Attorney For Patent Application**
English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

BOTTLE STERILIZING SYSTEM AND METHOD

the specification of which

(check one)

☐ is attached hereto.☐ was filed on _____ as United States Application No. or PCT International

Application Number _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	☐
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	☐
_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	☐

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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 Mark K. Suri (Reg. No. 36,024)
 and the attorneys of RYNDAK & SURI
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 RYNDAK & SURI
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Direct Telephone Calls to: *(name and telephone number)*
 James D. Ryndak - (312) 214-7770

09/24/97 01:00

Full name of sole or first inventor Subodh K. Rastwala	
Sole or first inventor's signature <i>MR R</i>	Date 11/2/2001
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Citizenship U.S.A.	
Post Office Address 25796 N. Arrowhead Drive	
Mundelein, Illinois 60060	

Full name of second inventor, if any	
Second inventor's signature	Date
Residence	
Citizenship	
Post Office Address	

PATENT APPLICATION TRANSMITTAL LETTER
(Large Entity)

Docket No.
40002-10217

TO THE ASSISTANT COMMISSIONER FOR PATENTS

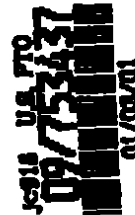
Transmitted herewith for filing under 35 U.S.C. 111 and 37 C.F.R. 1.53 is the patent application of:

Subodh K. Raziwala

For: **BOTTLE STERILIZING SYSTEM AND METHOD**

Enclosed are:

- ☒ Certificate of Mailing with Express Mail Mailing Label No. **EK762507729US**
☒ Four (4) Informal 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
Indep. Claims	40	- 20 =	20	x \$18.00	\$360.00
Multiple Dependent Claims (check if applicable) ☐	3	- 3 =	0	x \$80.00	\$0.00
BASIC FEE					\$710.00
TOTAL FILING FEE					\$1,070.00

- ☒ A check in the amount of **\$1,070.00** to cover the filing fee is enclosed.
☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **50-0503** 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. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: **January 3, 2001**



James D. Ryndak, Reg. No. 28,754
Ryndak & Suri
30 N. LaSalle Street, Suite 2630
Chicago, Illinois 60602
(312) 214-7770

cc:

FIG 1

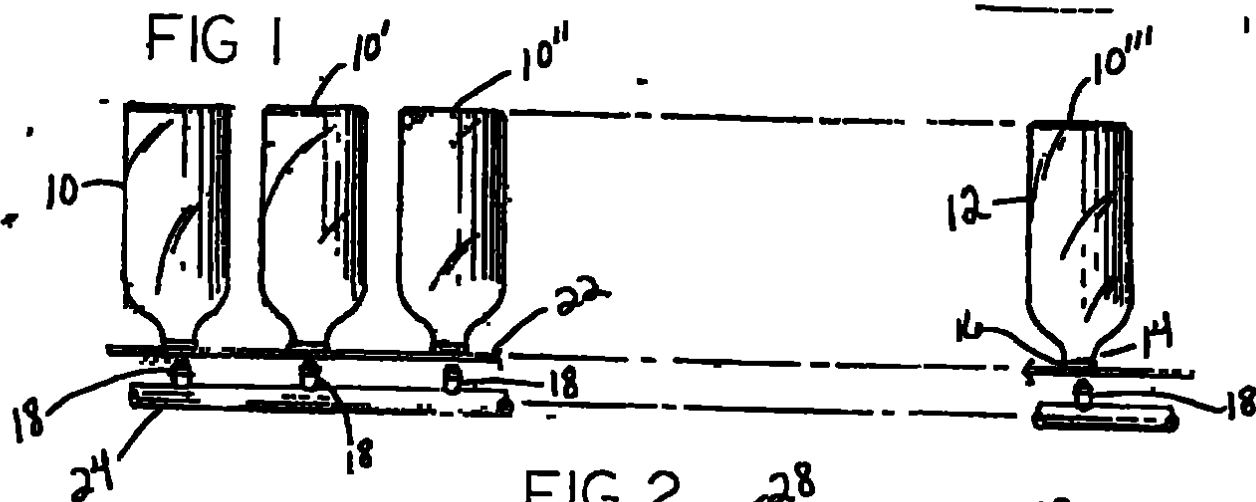


FIG 2

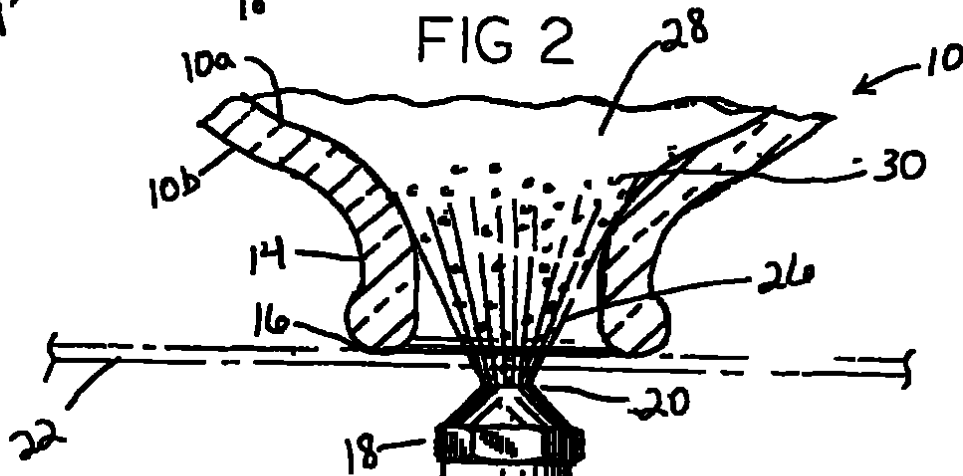
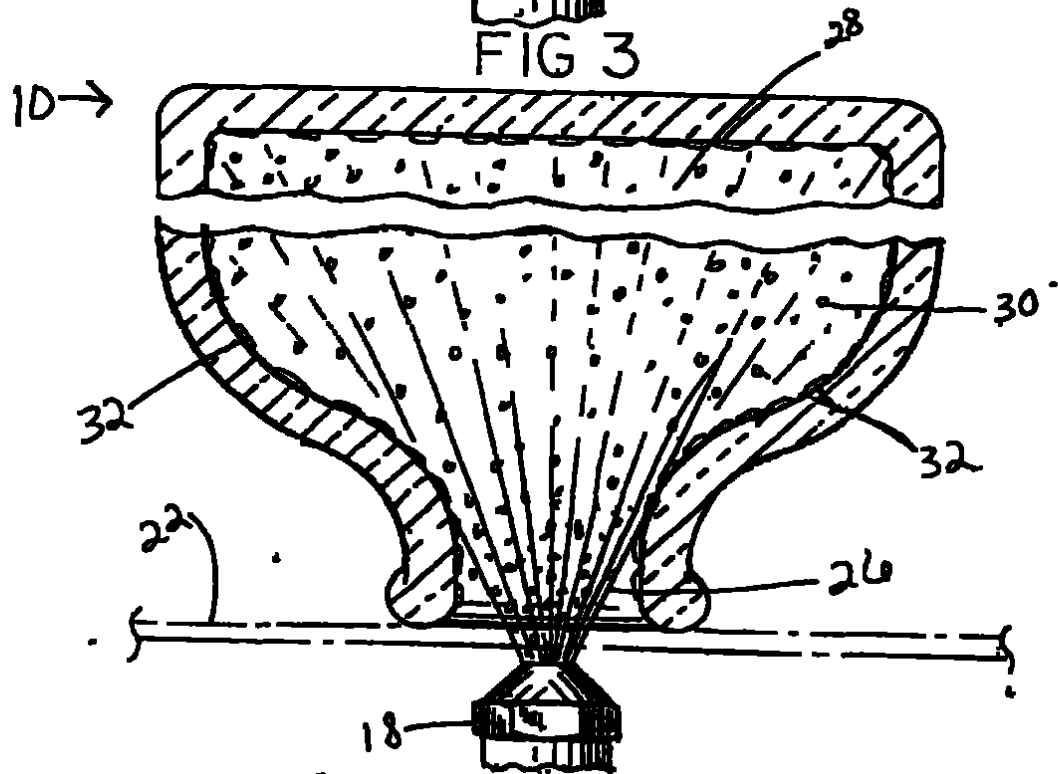


FIG 3



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FIG 4

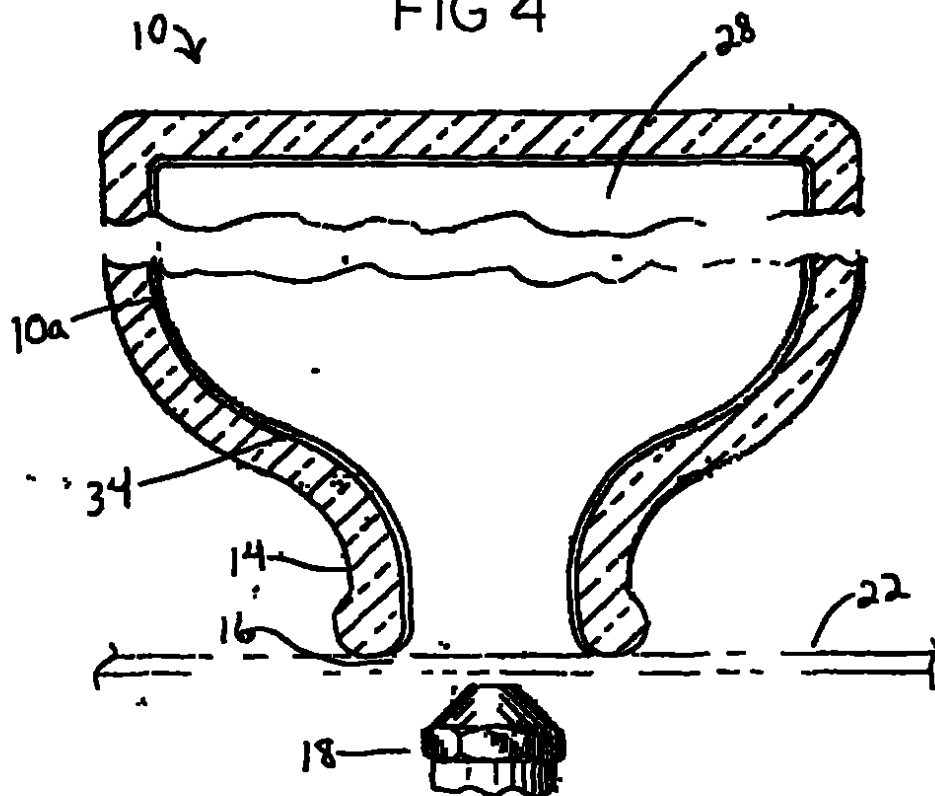


FIG. 5

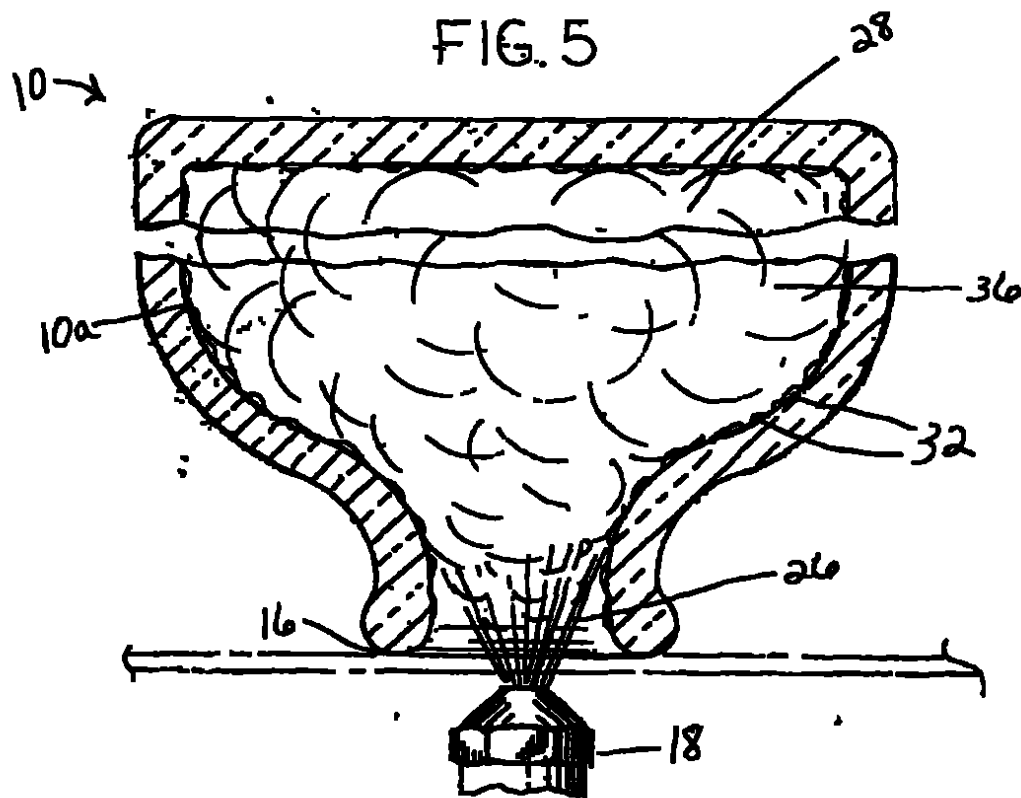


FIG 6

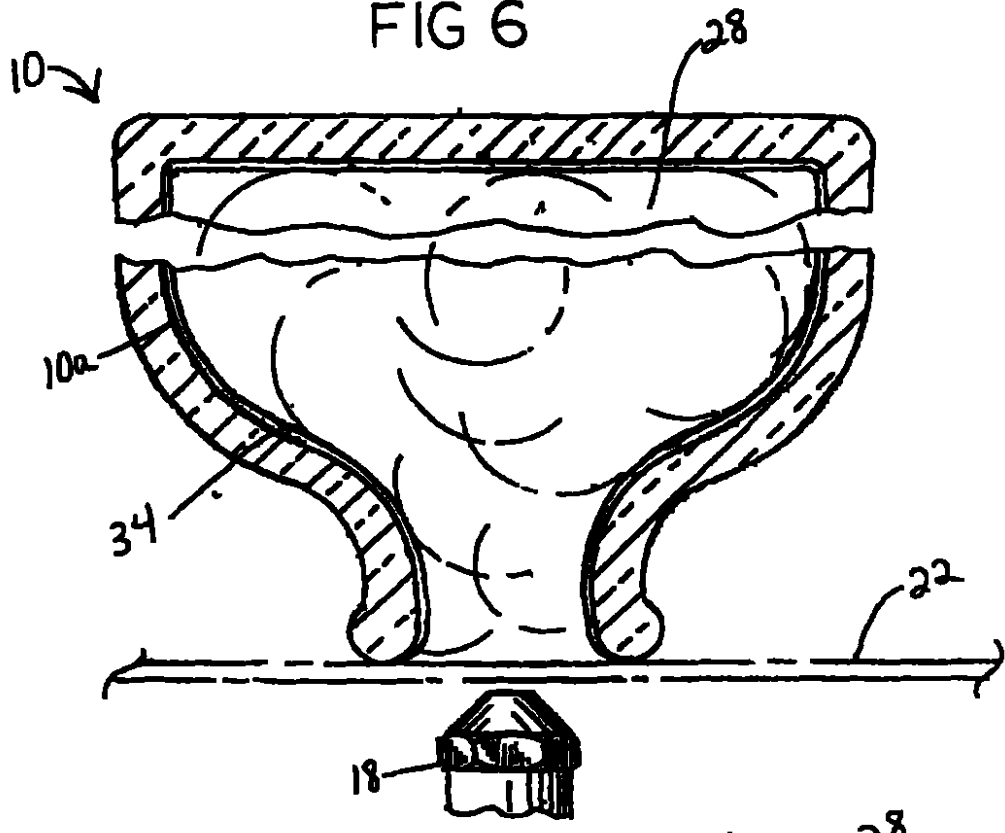
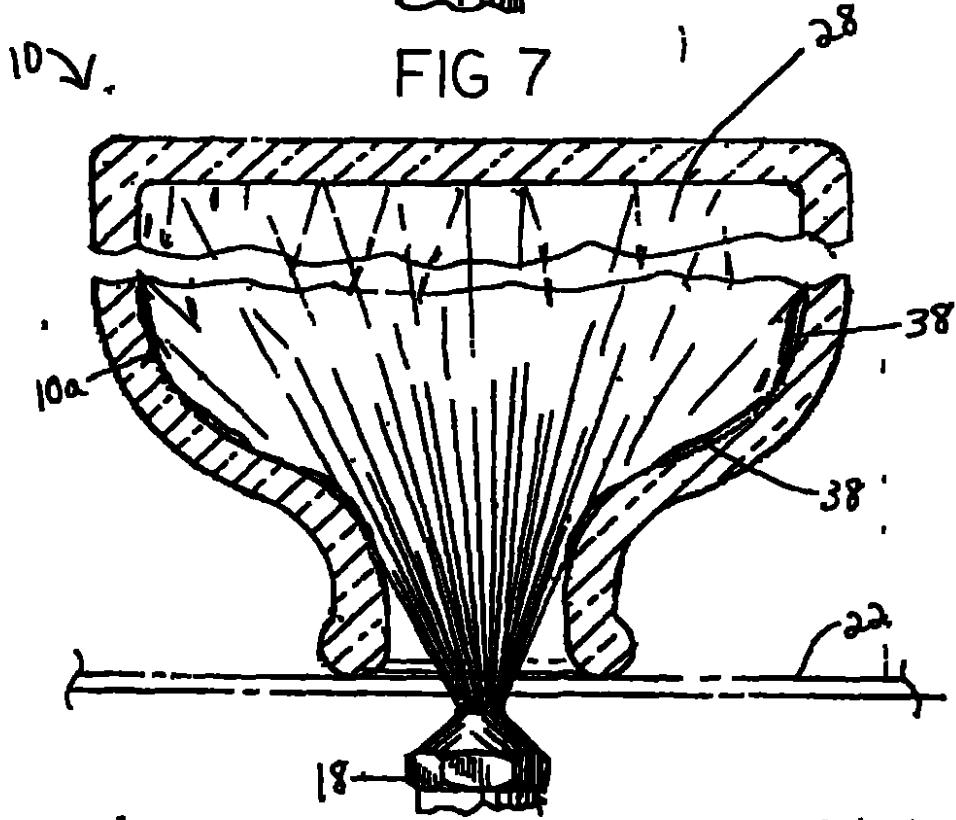


FIG 7



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FIG 8

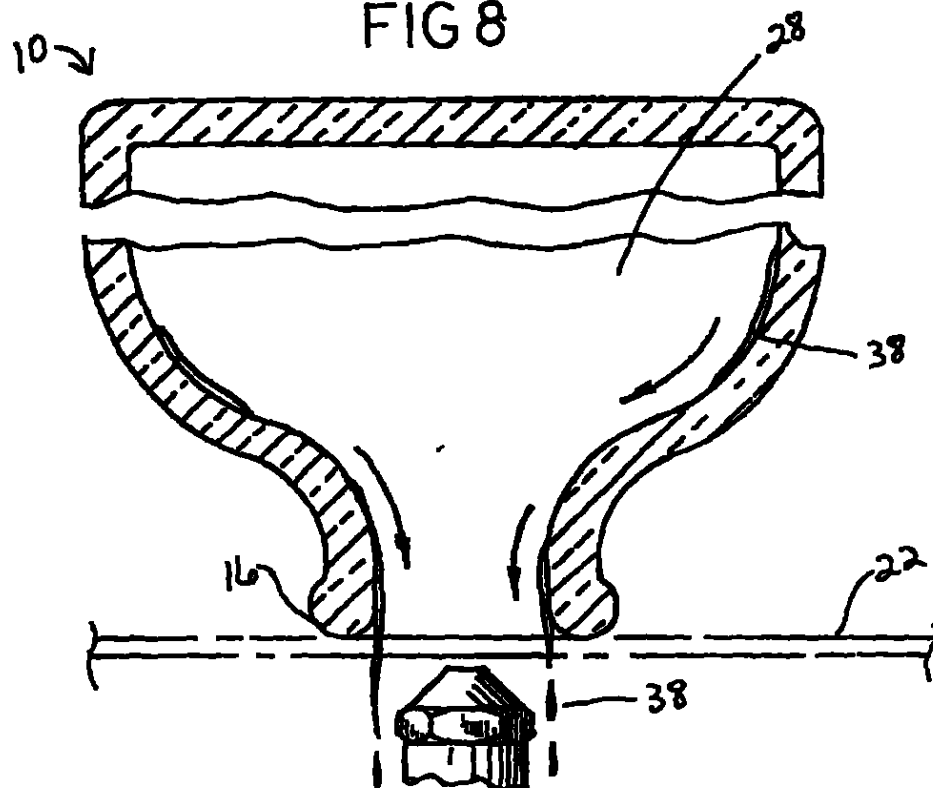
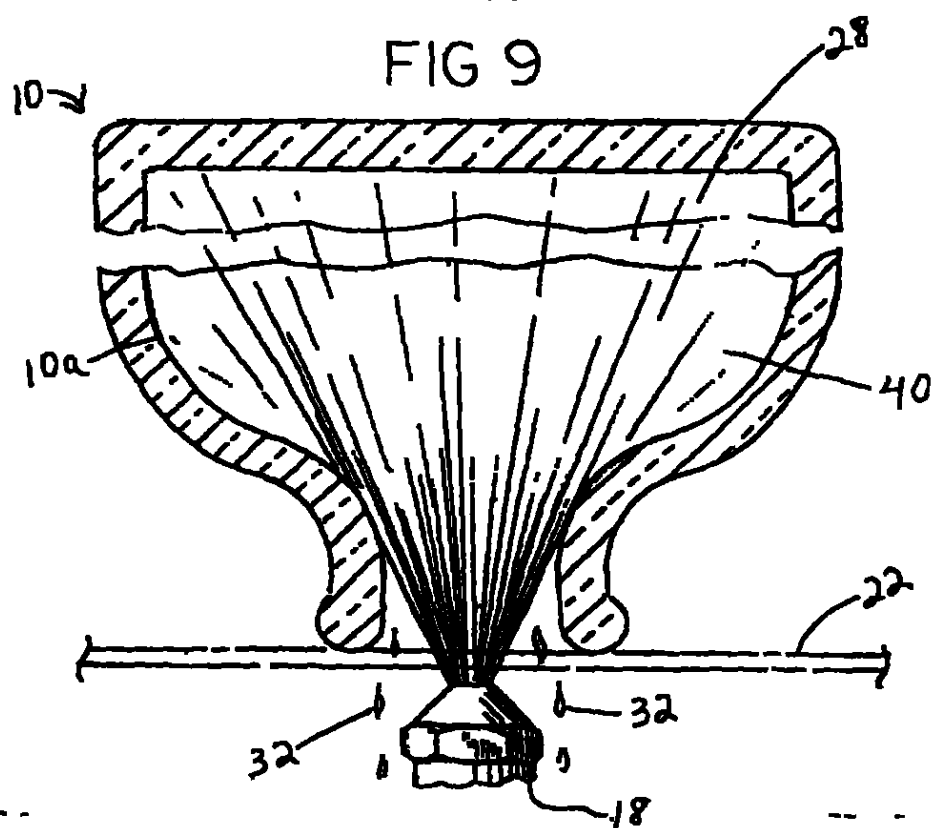


FIG 9



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2do EXAMEN DE FORMA PATENTE DE INVENCION

Radicación no 01-110498

Folio 78

Concepto Técnico no 1662 Clasificación Internacional de Patentes A 61 L 2/22, 101/22

Practicado el examen de acuerdo a lo establecido en el Art 38 de la Decisión 486 se determinó que esta solicitud de Patente de Invención

- | | |
|--|---|
| SI ☒] NO ☐] | Contiene un resumen de la invención (Art 26-e) |
| SI ☒] NO ☐] | Contiene el título o nombre de la invención (Art 27-d) |
| SI ☒] NO ☐] | Contiene la descripción de la invención (Art.26-b) |
| SI ☒] NO ☐] | NO ES APLICABLE ☐] Contiene los dibujos necesarios para comprender la invención (Art 26-d) |
| SI ☒] NO ☐] | Contiene una o más reivindicaciones (Art 26-c) |
| SI ☐] NO ☒] | NO ES APLICABLE ☐] Han sido desarrollados los productos y/o procedimientos a partir de recursos genéticos o de sus productos derivados de los que cualquiera de los Países Miembros es país de origen (Art 26- h) |
| SI ☐] NO ☒] | NO ES APLICABLE ☐] Los productos y/o procedimientos han sido obtenidos o desarrollados a partir de los conocimientos tradicionales de las comunidades indígenas, afroamericanas, o locales de los países miembros, de acuerdo a lo establecido en la Decisión 391 y sus modificaciones y reglamentaciones vigentes (Art.26-i) |
| SI ☐] NO ☒] | La invención se refiere a un producto relativo a un material biológico (Art 26-J) |
| SI ☒] NO ☐] | NO ES APLICABLE ☐] La prioridad coincide con la materia reivindicada |
| SI ☒] NO ☐] | CUMPLE LOS REQUISITOS TÉCNICOS |

OBSERVACIONES Y OTROS

EXAMINADOR TÉCNICO
202043

Bogotá D C, 2002-08-21

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2020
Bogotá D.C.

Doctor
JERÓNIMO CASTILLO BONILLA
Apoderado

REFERENCIA:	Radicación No.	01-110498
	Trámite	002
	Evento	001
	Actuación	416
	Oficio No.	1662
	Folios	001

Teniendo en cuenta que la solicitud de privilegio de patente que se tramita bajo el expediente indicado en la referencia, reúne los requisitos de forma establecidos en los artículos 26 y 27 de la Decisión 486 de la Comisión de la Comunidad Andina, y en las demás disposiciones vigentes sobre la materia, se envía el extracto de la solicitud a la Oficina de Comunicaciones para efecto de su publicación en la Gaceta de Propiedad Industrial, conforme lo establece el artículo 40 de la misma Decisión. De acuerdo con lo anterior éste se publicará a partir del 27 de diciembre de 2002.

Cúmplase

Dado en Bogotá D.C., a los 26 de Dec 2002


ALIX CARMENZA CÉSPEDES DE VERGEL
Jefe de la División de Nuevas Creaciones

Bogotá, DC, El extracto de esta solicitud fue publicado en el número de
la Gaceta de Propiedad Industrial, de fecha . El término hábil señalado por la
ley expiró el y SI ____ NO ____ se presentaron oposiciones por parte de terceros.