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(71) Applicant (for all designated States except US): **JOHN-SONDIVERSEY, INC.** [US/US]; 8310 16th Street - M/S 509, Sturtevant, Wisconsin 53177 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **GROENEWEGEN, Cornelis H.** [CA/US]; 5878 Yankee Road, Middletown, Ohio 45044 (US). **ROACH, Kenneth J.** [US/US]; 5536 Whitcomb Drive, Hamilton, Ohio 45011 (US).

(74) Agent: **RYMARZ, Renee, J.**; JohnsonDiversey, Inc., 8310 16th Street - M/S 509, Sturtevant, Wisconsin 53177 (US).

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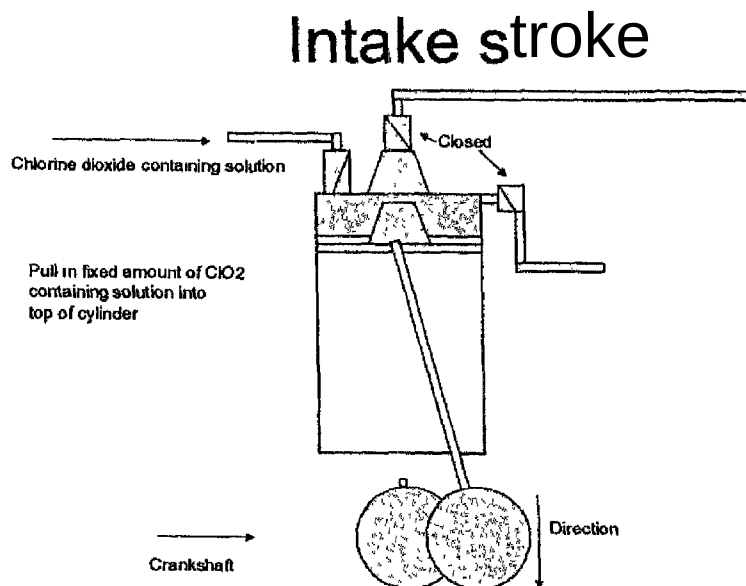
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(54) Title: METHOD AND APPARATUS FOR DISINFECTION WITH CHLORINE DIOXIDE



(57) Abstract: One aspect of the present invention relates to separating a gas, such as chlorine dioxide, from a solution. In another aspect of the invention, the separated gas is then used for the sterilization or sanitation of items, such as food, food storage containers, other food contact surfaces, medical devices, and the like. In yet another aspect of the invention, that gas is then decomposed or otherwise neutralized after contacting the item. In yet another aspect of the invention, the separated gas is dissolved or otherwise introduced into a pure solution, such as water, to form highly pure solution containing the gas.

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AMENDED CLAIMS

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What is claimed is:

1. A method for treating a food container, the method comprising:
providing a food container,
providing a sample of the chlorine dioxide containing solution into a chamber;
applying a vacuum to the sample;
sealing the chamber;
actuating a piston within the chamber to generate a vacuum within the chamber and
extract chlorine dioxide gas from the chlorine dioxide containing solution;
injecting chlorine dioxide gas into the food container to treat the food container;
allowing the chlorine dioxide gas to contact the container for a sufficient time to treat
the container; and
deactivating the chlorine dioxide gas within the containers via an illuminated
ultraviolet light positioned adjacent the container.
2. An apparatus for treating a food container, the apparatus comprising:
a reservoir containing a chlorine dioxide solution;
a selectively sealable chamber adapted to receive a sample of the chlorine dioxide
solution;
a piston selectively moveable within the chamber, wherein movement of the piston in
a first direction generates a vacuum within the chamber to separate chlorine dioxide gas from
the solution and movement of the piston in the opposite direction forces the chlorine dioxide
gas from the chamber;
a conduit coupled to the source of chlorine dioxide gas and positioned to inject the
chlorine dioxide gas into the container, and
an ultraviolet light positioned adjacent to the container and adapted to be selectively
illuminated to deactivate the chlorine dioxide gas in the container.

3. A method for disinfecting an item, the method comprising:
 - providing a solution containing a water soluble gas having disinfecting properties;
 - extracting the water soluble gas from the solution with a vacuum by providing a sample of the solution into a chamber, sealing the chamber, and actuating a piston within the chamber to generate a vacuum within the chamber;
 - removing the water soluble gas from the vacuum by actuating the piston within the chamber to expel the gas via an outlet in the chamber;
 - injecting the water soluble gas from the vacuum toward the item; and
 - disinfecting the item with the water soluble gas.
 4. The method of claim 3, wherein the water soluble gas is chlorine dioxide.
 5. The method of claim 4, wherein the item is a food container.
 6. The method of claim 5 further comprising eliminating the chlorine dioxide gas from the container.
 7. The method of claim 6 wherein the step of eliminating the chlorine dioxide gas from the container comprises exposing the chlorine dioxide gas to an ultraviolet light to deactivate the chlorine dioxide gas.
- S. An apparatus for disinfecting an item, the apparatus comprising:
- a reservoir containing a solution containing a water soluble gas having disinfecting properties;
 - a vacuum coupled to the reservoir to remove the water soluble gas from the solution;
 - and
 - a conduit coupled to the vacuum and positioned to inject the water soluble gas into contact with the item to disinfect the item,
- wherein the vacuum comprises a selectively sealable chamber adapted to receive a sample of the solution, and a piston selectively moveable within the chamber, wherein movement of the piston in a first direction generates a vacuum within the chamber to separate water soluble gas from the solution and movement of the piston in the opposite direction forces the water soluble gas from the chamber.

9. The apparatus of claim 8, further comprising a device positioned adjacent the item to eliminate the water soluble gas once the item has been effectively treated by the water soluble gas.
10. The apparatus of claim 9, wherein the water soluble gas is chlorine dioxide and the device that eliminates the chlorine dioxide gas comprises an ultraviolet light adapted to be selectively illuminated to deactivate the chlorine dioxide gas in the container.
11. The apparatus of claim 8, wherein the water soluble gas is chlorine dioxide.
12. The apparatus of claim 11, wherein the item is a food container.
13. A method for disinfecting an item, the method comprising:
 - providing a solution containing a water soluble gas having disinfecting properties;
 - extracting the water soluble gas from the solution with a vacuum by providing a sample of the solution into a chamber, sealing the chamber, and actuating a piston within the chamber to generate a vacuum within the chamber;
 - removing the water soluble gas from the vacuum by actuating the piston within the chamber to expel the gas via an outlet in the chamber;
 - dissolving the extracted water soluble gas into purified water to create a highly pure solution;
 - contacting the item with the highly pure solution; and
 - disinfecting the item with the highly pure solution.
14. The method of claim 13, wherein the water soluble gas is chlorine dioxide.
15. The method of claim 14, wherein the item is a food container.