

HYDROGEN PEROXIDE VAPOR VAPORIZER DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of and priority to Korean Patent
5 Application No. 10-2024-0077816, filed on June 14, 2024, the entire disclosure(s)
of which is hereby incorporated herein by reference in its entirety.

TECHNICAL FIELD

The present disclosure relates to a hydrogen peroxide vapor vaporizer
10 device, and more particularly, to a hydrogen peroxide vapor vaporizer device
which may remove impurities in a hydrogen peroxide solution and supply the
solution to a vaporizer in a clean state to ensure a safety of a hydrogen peroxide
vapor gas state.

BACKGROUND

Hydrogen peroxide is used as a disinfectant, pesticide, bleach, and the
like, and is used in many applications in a stabilized form. Hydrogen peroxide
vapor converted into vapor by heating the hydrogen peroxide can be used for
sterilization and insecticidal purposes, or can be used as a raw material for a
20 chemical reaction.

Hydrogen peroxide vapor (HPV) sterilization is delivered in the form of
vapor to various devices to allow for device sterilization along with space
sterilization, and can remove up to the level of apo of microorganisms that cannot
be removed with general disinfectants due to their excellent sterilization power,
25 and is widely used because the residue after sterilization decomposes into water

and oxygen, which is safe and eco-friendly.

A hydrogen peroxide vapor vaporizer vaporizes the hydrogen peroxide in the air and converts the vaporized hydrogen peroxide into a vapor gas state. In this case, the hydrogen peroxide vapor vaporizer is directly connected to a hydrogen peroxide supplier through a hydrogen peroxide supply hose line so that an impurity-mixed hydrogen peroxide solution may be supplied as it is and generated as the hydrogen peroxide vapor. When the impurity-contained hydrogen peroxide solution is vaporized as it is, efficient vapor generation can occur, which can reduce the efficiency of a sterilization process. In particular, the presence of impurities can clog or damage a hydrogen peroxide vaporizer related equipment, which can cause safety issues and shorten the lifespan of the equipment.

Of course, clean hydrogen peroxide from which impurities have been removed using a purification device can be purchased and used as a raw material each time, but in this case, a price of the hydrogen peroxide solution increases, and a cost burden can occur.

[Prior Art Document]

[Patent Document]

(Patent Document 1) Korean Patent Registration No. 10-1817947
(January 8, 2018)

(Patent Document 2) Korean Patent Registration No. 10-1867904 (June 8, 2018)

SUMMARY

In view of the above, an embodiment of the present disclosure provides

a hydrogen peroxide vapor vaporizer device which may remove impurities in a hydrogen peroxide solution and supply the solution to a vaporizer in a clean state to ensure a safety of a hydrogen peroxide vapor gas state.

An embodiment of the present disclosure provides a hydrogen peroxide vapor vaporizer device which may be equipped with a filter to purify the hydrogen peroxide solution immediately before vaporizer injection to improve a sterilization effect using clean hydrogen peroxide vapor.

An embodiment of the present disclosure provides a hydrogen peroxide vapor vaporizer device which may replace only a specific component that fails in the event of a failure of a vaporizer-related portion, thereby reducing costs in the event of the failure.

Among embodiments, a hydrogen peroxide vapor vaporizer device includes: a hydrogen peroxide supply unit which supplies a certain amount of hydrogen peroxide solution; a vaporizer which vaporizes the hydrogen peroxide solution and changes the vaporized hydrogen peroxide solution to a vapor gas state; and an impurity removal unit which removes impurities contained in the hydrogen peroxide solution before the hydrogen peroxide solution supplied from the hydrogen peroxide supply unit is provided to the vaporizer.

The impurity removal unit may include a filter which supplies a clean hydrogen peroxide solution from which impurities have been removed by filtering the hydrogen peroxide solution to the vaporizer.

The filter may be a HEPA filter.

Among embodiments, the hydrogen peroxide vapor vaporizer device may further include a pump which transfers a constant amount of hydrogen peroxide solution to the vaporizer through a hydrogen peroxide supply hose line according

to a hydrogen peroxide vapor sterilization treatment condition and passes the hydrogen peroxide solution through the filter in a transfer process.

Among embodiments, the hydrogen peroxide vapor vaporizer device may further include: a housing; a lid which is detachably clamped to each of an upper
5 portion and a lower portion of the housing to seal the housing; a suction port which is connected to a lower lid of the housing to suck air into the housing; a discharge port connected to an upper lid of the housing and through which a gas flow converted into the hydrogen peroxide vapor gas state is discharged; and a heater which is provided at an initial entrance of the discharge port and reheats hydrogen
10 peroxide vapor produced in an internal an inner space of the housing before being discharged to prevent the hydrogen peroxide vapor from changing from a vapor gas state to a liquid.

The vaporizer may be disposed in parallel to a movement direction of the air sucked into the housing, and may be surrounded by the housing, so that a
15 thermal insulation and a heat dissipation effect are exhibited, thereby reducing a power burden during vaporization of the hydrogen peroxide solution.

ADVANTAGEOUS EFFECTS

The disclosed technology may have the following effects. However,
20 since it is not meant that a specific embodiment should include all of the following effects or merely include the following effects, the scope of the disclosed technology is not to be construed as being limited thereby.

According to an embodiment of the present disclosure, a hydrogen peroxide vapor vaporizer device may remove impurities in a hydrogen peroxide
25 solution and supply the solution to a vaporizer in a clean state to ensure a safety

of a hydrogen peroxide vapor gas state.

According to an embodiment of the present disclosure, a hydrogen peroxide vapor vaporizer device may be equipped with a filter to purify the hydrogen peroxide solution immediately before vaporizer injection to improve a sterilization effect using clean hydrogen peroxide vapor.

According to an embodiment of the present disclosure, a hydrogen peroxide vapor vaporizer device may replace only a specific component that fails in the event of a failure of a vaporizer-related portion, thereby reducing costs in the event of the failure.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagram illustrating an embodiment of a hydrogen peroxide vapor sterilization system to which the present disclosure is applied.

Fig. 2 is a diagram illustrating a hydrogen peroxide vaporizer device according to an embodiment of the present disclosure.

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Fig. 3 is a diagram illustrating an embodiment of a housing structure of Fig. 2.

Fig. 4 is a flowchart illustrating a hydrogen peroxide vapor vaporization treatment process of the hydrogen peroxide vaporizer device of Fig. 2.

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DETAILED DESCRIPTION

A description of the disclosed technology is merely an embodiment for a structural or functional description and the scope of the disclosed technology should not be construed as being limited by an embodiment described in a text.

That is, since the embodiment can be variously changed and have various forms,

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the scope of the disclosed technology should be understood to include equivalents capable of realizing the technical spirit.

Meanwhile, meanings of terms described in the present application should be understood as follows.

5 The terms “first,” “second,” and the like are used to differentiate a certain component from other components, but the scope of the present disclosure should not be construed to be limited by the terms. For example, a first component may be referred to as second component, and similarly, the second component may be referred to as first component.

10 It should be understood that the term “and/or” includes all combinations which may be presented from one or more related items. For example, the “first item, second item, and/or third item” means not only the first item, the second item, or the third item but also all combinations of items which may be presented from two or more among the first item, the second item, and the third item.

15 It should be understood that, when it is described that a component is “connected to” another component, the component may be directly connected to another component or a third component may be present therebetween. On the other hand, it should be understood that no component is present. Meanwhile, other expressions describing the relationship of the components, that is,
20 expressions such as “between” and “directly between” or “adjacent to” and “directly adjacent to” should be similarly interpreted.

 It is to be understood that the singular expression encompass a plurality of expressions unless the context clearly dictates otherwise and it should be understood that term “include” or “have” indicates that a feature, a number, a step,
25 an operation, a component, a part or the combination thereof described in the

specification is present, but does not exclude a possibility of presence or addition of one or more other features, numbers, steps, operations, components, parts or combinations thereof, in advance.

In each step, reference numerals (e.g., a, b, c, etc.) are used for
5 convenience of description, the reference numerals are not used to describe the order of the steps and unless otherwise stated, it may occur differently from the order specified. That is, the respective steps may be performed similarly to the specified order, performed substantially simultaneously, and performed in an opposite order.

10 Unless defined otherwise, all terms used herein have the same meaning as commonly understood by those skilled in the art to which the disclosed technology belongs. Terms which are defined in a generally used dictionary should be interpreted to have the same meaning as the meaning in the context of the related art, and are not interpreted as an ideal meaning or excessively formal
15 meanings unless clearly defined in the present application.

Fig. 1 is a diagram illustrating an embodiment of a hydrogen peroxide vapor sterilization system to which the present disclosure is applied.

Referring to Fig. 1, the hydrogen peroxide vapor sterilization system 100 may include a sterilization chamber 110, a suction pipe 120, an injection pipe 130,
20 a circulation fan 140, a distributor 150, a vapor detoxification device 160, and a hydrogen peroxide vapor vaporizer device 170.

The sterilization chamber 110 may be loaded with a sterilization object. The sterilization chamber 110 allows hydrogen peroxide vapor, which is a sterilization gas, to be introduced inwardly to disinfect the loaded sterilization
25 object. In an embodiment, the sterilization chamber 110 may correspond to a

space in which a vapor sterilization process is performed. Here, the sterilization chamber 110 may be implemented as a closed chamber to protect the sterilization object by preventing the hydrogen peroxide vapor from flowing out or external substances or contamination from an external environment. The sterilization
5 chamber 110 may be implemented to correspond to various sizes and shapes of sterilization objects.

The suction pipe 120 may be coupled to one side of the sterilization chamber 110 to suck air containing the sterilization gas in which sterilization has been performed into the sterilization chamber 110.

10 The injection pipe 130 may be coupled to the other side of the sterilization chamber 110 to inject air containing the sterilization gas into the sterilization chamber 110.

The circulation fan 140 may be connected to one side of the suction pipe 120 to suck air into the sterilization chamber 110. The circulation fan 140 moves
15 air sucked into the suction pipe 120 to a rear end of the suction pipe 120.

The distributor 150 may be installed on a rear end of the circulation fan 140 to branch the circulation of the air supplied from the suction pipe 120 in multiple directions. The distributor 150 is connected to the suction pipe 120 on the rear end side of the circulation fan 140 to branch the circulation of the air
20 supplied from the suction pipe 120 to the vapor detoxification device 160 and the hydrogen peroxide vapor vaporizer device 170. This distributor 150 consists of a three-way valve 3Way v/v to allow air to be supplied to the hydrogen peroxide vapor vaporizer device 170 side or to the vapor detoxification device 160 side as required by valve opening.

25 The vapor detoxification device 160 may be connected to the distributor

150 on one side to decompose the hydrogen peroxide contained in the air supplied to the suction pipe 120 and resupply the hydrogen peroxide into the sterilization chamber 110. The vapor detoxification device 160 is configured to include a catalyst unit 161, a dehumidifying unit 163, and a filter 165.

5 The catalyst unit 161 may decompose the sucked hydrogen peroxide vapor. The catalyst unit 161 decomposes the hydrogen peroxide vapor supplied from the suction pipe 120 using a decomposition catalyst. In an embodiment, a carbon catalyst may be used as the decomposition catalyst, and the decomposition catalyst is not necessarily limited thereto, and a metal such as platinum, silver, or
10 palladium may be used as a catalyst.

 The dehumidifying unit 163 may use a dehumidifying agent to remove water vapor resulting from the decomposition of the hydrogen peroxide vapor so that the activity of the hydrogen peroxide decomposition catalyst is maintained. The dehumidifying unit 163 absorbs the water vapor, which is a by-product of the
15 hydrogen peroxide vapor decomposition by the catalyst unit 161, so that the activity of a hydrogen peroxide decomposition catalyst contained in the catalyst unit 161 is sufficiently maintained. In an embodiment, silica gel may be used as the dehumidifying agent. The silica gel is a silicate particle having a strong network tissue produced by a reaction of sulfuric acid and sodium silicate, and is
20 an amorphous particle having a chemical formula of $\text{SiO}_2 \cdot n\text{H}_2\text{O}$, in which small pores are connected to each other to form a strong network tissue, and a solvent such as water enters and is hardened therebetween. The silica gel has a very large surface area and is very excellent in ability to absorb water, alcohol, and the like, and is widely used as the dehumidifying agent.

25 The filter 165 may filter by-product gas resulting from the decomposition

of the hydrogen peroxide vapor. The filter 165 passes through the dehumidifying unit 163 to remove impurities contained in the by-product gas of hydrogen peroxide vapor decomposition excluding the water vapor, and a HEPA filter may be generally applied.

5 When the vapor detoxification process of the vapor detoxification device 160 is described in detail, the air in the sterilization chamber 110 that has been subjected to a sterilizing operation is sucked into the circulation fan 140 to be moved to the rear end along the suction pipe 120. The air thus moved along the suction pipe 120 is led from the distributor 150 to the vapor detoxification device
10 160 side and decomposed using the hydrogen peroxide decomposition catalyst contained in the catalyst unit 161. In this case, the dehumidifying unit 163 absorbs the water vapor, which is the by-product of the hydrogen peroxide vapor decomposition, so that the activity of the hydrogen peroxide decomposition catalyst contained in the catalyst unit 161 is sufficiently maintained. In addition,
15 the by-product gas of the hydrogen peroxide vapor decomposition excluding the water vapor passes through the filter 165 while impurities are removed, and finally is resupplied into the sterilization chamber 110 through the injection pipe 130. The air thus resupplied is circulated several times along the vapor detoxification device 160 so that hydrogen peroxide contained in the air is
20 decomposed.

The hydrogen peroxide vapor vaporizer device 170 may be connected to the distributor 150 on one side to supply the hydrogen peroxide vapor produced by supplying and vaporizing the hydrogen peroxide to the air supplied to the suction pipe 120 into the sterilization chamber 110. The hydrogen peroxide
25 vapor vaporizer device 170 may be formed in a housing structure which houses a

vaporizer that mixes air branched to the other side in the distributor 150 with the hydrogen peroxide solution to vaporize in the air to produce the hydrogen peroxide vapor in an internal space. The hydrogen peroxide vapor vaporizer device 170 is configured to include a hydrogen peroxide supply unit 171, a
5 vaporizer 173, an impurity removal unit 175, and a heater 177.

The hydrogen peroxide supply unit 171 stores the hydrogen peroxide solution therein and supplies a certain amount of hydrogen peroxide solution to the vaporizer 173. The hydrogen peroxide supply unit 171 may include an injection pump for quantitative supply of the hydrogen peroxide solution.

10 The vaporizer 171 mixes the air branched to the other side in the distributor 150 and the hydrogen peroxide solution supplied from the hydrogen peroxide supply unit 171 to vaporize in the air to generate the hydrogen peroxide vapor. In an embodiment, the vaporizer 173 may be formed of a housing structure that is accommodated and installed in the internal space of the housing.

15 The impurity removal unit 175 may be disposed between the hydrogen peroxide supply unit 171 and the vaporizer 173, and may remove impurities contained in the supplied hydrogen peroxide solution and provide the removed impurities to the vaporizer 173. In an embodiment, the impurity removal unit 175 may be implemented to include a filter on a hydrogen peroxide supply hose
20 line connecting the hydrogen peroxide supply unit 171 and the vaporizer 173 to each other. The impurity removing unit 175 may filter the hydrogen peroxide solution through the filter so that a clean hydrogen peroxide solution from which impurities have been removed is supplied to the vaporizer 173. Here, the HEPA filter may be used as the filter, and the filter is not necessarily limited thereto, and
25 a filter of an appropriate type of filter may be used to remove impurities in the

hydrogen peroxide solution.

The heater 177 reheats the hydrogen peroxide vapor produced via the vaporizer 173 and then supplies the reheated hydrogen peroxide vapor to the injection pipe 130. The heater 177 heats the vaporized hydrogen peroxide vapor
5 once more by a rapid temperature change before being supplied into the sterilization chamber 110 to prevent condensation. In an embodiment, the heater 177, together with the vaporizer 173, may be accommodated and installed in the internal space of the housing or may be installed outside the housing.

Fig. 2 is a diagram illustrating a hydrogen peroxide vaporizer device
10 according to an embodiment of the present disclosure.

Referring to Fig. 2, the hydrogen peroxide vapor vaporizer device 170 may include a housing 210, a vaporizer 230, a heater 250, a pump 270, and a filter 290.

The housing 210 may correspond to an appearance of the hydrogen
15 peroxide vaporizer device 170. The housing 210 may have the internal space in which the vaporizer 230 and the heater 250 may be detachably coupled to generate the hydrogen peroxide vapor. In an embodiment, the housing 210 may be formed in a cylindrical shape or a columnar shape in which both upper and lower sides are open, and may be formed in various shapes without being necessarily
20 limited thereto.

An upper lid 220a and a lower lid 220b may be detachably fastened to both of opened upper and lower sides of the housing 210, or the lower lid 220b may be integrally formed and only the upper lid 220a may be detachably fastened. Here, the upper lid 220a and the lower lid 220b may correspond to lids covering
25 the openings of the housing 210 and may be detachably fastened to upper and

lower portions of the housing 210, respectively, to seal the housing 210.

The upper lid 220a may be detached from the housing 210 to open the internal space of the housing 210 for inspection, repair, replacement, or the like when equipment such as the vaporizer 230, the heater 250, or the like installed in the internal space of the housing 210 fails. In an embodiment, the upper lid 220a and the lower lid 220b may be fastened to the housing 210 through a fastener of a clamp structure. A suction port 280 that sucks air supplied from the suction pipe 120 into the housing 210 is connected to the lower lid 220b of the housing 210, and a discharge port 260 through which a gas flow converted into a hydrogen peroxide vapor gas state is discharged is connected to the upper lid 220a.

The vaporizer 230 may perform a hot plate function that converts a hydrogen peroxide liquid to a vapor gas state at a constant temperature point. The vaporizer 230 may receive a certain amount of hydrogen peroxide solution into the housing 210, primarily heat the hydrogen peroxide solution to a temperature close to the vaporization point of the hydrogen peroxide, and spray the primarily heated hydrogen peroxide solution onto a vaporization hot plate and instantaneously vaporize the hydrogen peroxide solution and convert the hydrogen peroxide solution to a vapor form. Here, the vaporizer 230 instantaneously evaporates the hydrogen peroxide liquid to a temperature of about 120 to 140°C. In this case, the vaporizer 230 is surrounded by the housing 210 to exhibit a thermal insulation and heat dissipation effect, and has a structure in which a minimum temperature is lowered during liquid vaporization, and power burden may be reduced with a low use voltage.

The vaporizer 230 may receive a certain amount of hydrogen peroxide solution from the hydrogen peroxide supply unit 171 through the hydrogen

peroxide supply hose line 240. In an embodiment, the hydrogen peroxide supply hose line 240 may be directly installed from the upper lid 220a of the housing 210 through the inside of the housing 210 and close to the vaporizer 230 side, or may be connected to a hydrogen peroxide supply pipe when the hydrogen peroxide supply pipe is installed inside the housing 210. The pump 270 is provided in the hydrogen peroxide supply hose line 240 to transfer the hydrogen peroxide solution to the vaporizer 230.

The pump 270 is an injection pump that pumps or injects the hydrogen peroxide solution into the vaporizer 230, and may accurately transfer the hydrogen peroxide solution to the vaporizer 230. In an embodiment, the pump 270 may automatically control a transfer speed or a capacity of the hydrogen peroxide solution depending on a condition of hydrogen peroxide vapor sterilization treatment.

In addition, the filter 290 is provided in the hydrogen peroxide supply hose line 240, so that the hydrogen peroxide solution may be supplied in a clean state in which impurities are removed by filtering the hydrogen peroxide solution before the hydrogen peroxide solution is supplied to the vaporizer 230. Here, the filter 290 may correspond to the impurity removal unit 175 of Fig. 1.

The filter 290 may supply the hydrogen peroxide solution to the vaporizer 230 in the clean state. The filter 290 may produce vapor in the clean state by removing impurities contained in the hydrogen peroxide solution before the solution is changed to a vapor gas state and prevent equipment clogging and damage caused by the impurities. Here, the filter 290 may remove the impurities in the hydrogen peroxide solution by using the HEPA filter. In this case, the pump 270 may allow the hydrogen peroxide solution to pass through the filter 290

by sucking the hydrogen peroxide solution into the filter 290 and releasing the purified solution back through the filter 290.

The heater 250 maintains a constant temperature of gas in which the hydrogen peroxide liquid passing through the vaporizer 230 is changed into the vapor gas state, and ejects the gas into the atmosphere (sterilization chamber) in the vapor gas state. The heater 250 is provided at an initial entrance of the discharge port 260 and has a phase change prevention structure in which the hydrogen peroxide vapor gas immediately before being discharged is reheated and maintained at a constant temperature to change from the vapor gas state to a liquid. In an embodiment, the heater 250 is installed inside the housing 210, but may be connected to an outlet side of the discharge port 260 which is an outside the housing 210.

The discharge port 260 is connected to the upper lid 220a and discharges a gas flow changed to the hydrogen peroxide vapor gas state by the vaporizer 230 mounted inside the housing 210.

The suction port 280 is connected to the lower lid 220b to suck air in the atmosphere (sterilization chamber) into the housing 210.

Fig. 3 is a diagram illustrating an embodiment of a housing structure of Fig. 2.

Referring to Fig. 3, the housing 210 may be fabricated in a cylindrical form of a metallic material as illustrated in Fig. 3A. In the housing 210, as illustrated in Fig. 3B, the upper lid 220a may be implemented in a separation form. The heater 250 may be integrally mounted on a bottom surface (a surface facing the inside of the housing in a state of being fastened to the housing) of the upper lid 220a. As a result, hydrogen peroxide in a vapor state may be reheated and

discharged to the discharge port 260 in the upper lid 220a. In addition, the heater 250 is also detached jointly when the upper lid 220a is detached, so that the heater 250 may be easily repaired when the heater 250 fails.

In addition, the housing 210 has a double circular structure, so that fire
5 safety may be ensured, heat retention and heat dissipation effects may be exhibited, and a stable liquid vaporization structure may be provided at a low use voltage. In addition, in the housing 210, the vaporizer 230 is detachably coupled to the internal space, and in the event of a failure of the vaporizer 230, the housing 210 may be easily separated from the housing 210 as illustrated in Figs. 3C to 3E,
10 thereby reducing maintenance cost.

Fig. 4 is a flowchart illustrating a hydrogen peroxide vapor vaporization treatment process of the hydrogen peroxide vaporizer device of Fig. 2.

In Fig. 4, the hydrogen peroxide vapor vaporizer device 170 may supply a certain amount of hydrogen peroxide solution to the vaporizer 230 through the
15 hydrogen peroxide supply unit 171 (step S410). The hydrogen peroxide supply unit 171 may store the hydrogen peroxide solution and transfer a quantity of hydrogen peroxide solutions to the vaporizer by an operation of the pump 270.

In addition, the hydrogen peroxide vapor vaporizer device 170 may remove the impurities contained in the hydrogen peroxide solution through the
20 filter 290 in the process of transferring the hydrogen peroxide solutions (step S430). The filter 290 may remove impurities through filtering before the hydrogen peroxide solution is injected into the vaporizer 230 to make it clean so that a clean hydrogen peroxide vapor is produced.

In addition, the hydrogen peroxide vapor vaporizer device 170 may
25 change the hydrogen peroxide solution to the vapor gas state through the vaporizer

230 (step S450). The hydrogen peroxide vapor vaporizer device 170 may suck air led through the suction port 280 into the housing 210, and receive the clean hydrogen peroxide solution from which the impurities are removed through the filter 290 to the vaporizer 230 mounted inside the housing 210 to perform a vaporization process. The vaporizer 230 mounted inside the housing 210 allows the hydrogen peroxide vapor to be produced through vaporization of the sucked air. The air sucked into the housing 210 is mixed with the hydrogen peroxide solution in the clean state from which the impurities have been removed, and is produced as vapor in the air while the hydrogen peroxide solutions are vaporized through a hot heated hot plate of the vaporizer 230. Here, instantaneous vaporization is a phenomenon in which all components in the liquid state may be present as the vapor, and in the hydrogen peroxide solution, a vapor mixture of hydrogen peroxide and water may be produced. In addition, the hydrogen peroxide vapor through this instantaneous vaporization may be present at a higher concentration than natural hydrogen peroxide vapor.

The hydrogen peroxide vapor vaporizer device 170 may reheat the vapor gas through the heater 250 and then eject the vapor gas (step S470). The air in which the hydrogen peroxide vapor is produced by the vaporizer 230 inside the housing 210 may be reheated while passing through the heater 250 immediately before being discharged to the discharge port 260 formed on an upper side of the housing 210. This is to prevent the hydrogen peroxide vapor from condensing due to a temperature change during movement. The reheated air may be discharged through the discharge port 260 connected to the upper lid 220a of the housing 210. The discharged air may be injected into the sterilization chamber 110 along the injection pipe 130 to perform a sterilizing operation on a

sterilization object.

In the hydrogen peroxide vapor vaporizer device according to an embodiment, a vaporizer structure that produces the hydrogen peroxide vapor gas is formed into a sealed housing structure, so that a fire risk due to high heat of the vaporizer may be prevented and a stable liquid vaporization structure may be provided, and a failure part may be easily repaired without overall replacement in the event of the failure.

In addition, by filtering the hydrogen peroxide solution before spraying the hydrogen peroxide solution with the vaporizer to remove impurities, the hydrogen peroxide solutions in the clean state may be used for vaporization to improve sterilization efficiency and prevent equipment clogging and damage due to impurities.

Although described above with reference to the preferred embodiments of the present application, it will be understood that those skilled in the art can make various modifications and changes to the present application without departing from the spirit and scope of the present application described in the following claims.

[Explanation of Reference Numerals and Symbols]

	100: Hydrogen peroxide vapor sterilization system
20	110: Sterilization chamber
	120: Suction pipe
	130: Injection pipe
	140: Circulation fan
	150: Distributor
25	160: Vapor detoxification device

	161: Catalyst unit
	163: Dehumidifying unit
	165: Filter
	170: Hydrogen peroxide vapor vaporizer device
5	171: Hydrogen peroxide supply unit
	173: Vaporizer
	175: Impurity removal unit
	177: Heater
	210: Housing
10	220a: Upper lid
	220b: Lower lid
	230: Vaporizer
	240: Hydrogen peroxide supply hose line
	250: Heater
15	260: Discharge port
	270: Pump
	280: Suction port
	290: Filter

CLAIMS:

1. A hydrogen peroxide vapor vaporizer device comprising:
a hydrogen peroxide supply unit which supplies a certain amount of hydrogen
5 peroxide solution;
a vaporizer which vaporizes the hydrogen peroxide solution and changes the
vaporized hydrogen peroxide solution to a vapor gas state; and
an impurity removal unit which removes impurities contained in the hydrogen
peroxide solution before the hydrogen peroxide solution supplied from the
10 hydrogen peroxide supply unit is provided to the vaporizer.
2. The hydrogen peroxide vapor vaporizer device of claim 1, wherein the
impurity removal unit includes a filter which supplies a clean hydrogen peroxide
solution from which impurities have been removed by filtering the hydrogen
15 peroxide solution to the vaporizer.
3. The hydrogen peroxide vapor vaporizer device of claim 2, wherein the
filter is a HEPA filter.
- 20 4. The hydrogen peroxide vapor vaporizer device of claim 2, further
comprising:
a pump which transfers a constant amount of hydrogen peroxide solution to the
vaporizer through a hydrogen peroxide supply hose line according to a hydrogen
peroxide vapor sterilization treatment condition and passes the hydrogen peroxide
25 solution through the filter in a transfer process.

5. The hydrogen peroxide vapor vaporizer device of claim 1, further comprising:

a housing,

a lid which is detachably clamped to each of an upper portion and a lower portion

5 of the housing to seal the housing;

a suction port which is connected to a lower lid of the housing to suck air into the housing;

a discharge port which is connected to an upper lid of the housing and through which a gas flow converted into the hydrogen peroxide vapor gas state is

10 discharged; and

a heater which is provided at an initial entrance of the discharge port and reheats hydrogen peroxide vapor produced in an internal an inner space of the housing before being discharged to prevent the hydrogen peroxide vapor from changing from a vapor gas state to a liquid.

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6. The hydrogen peroxide vapor vaporizer device of claim 5, wherein the vaporizer is disposed in parallel to a movement direction of the air sucked into the housing, and is surrounded by the housing, so that a thermal insulation and a heat dissipation effect are exhibited, thereby reducing a power burden during

20 vaporization of the hydrogen peroxide solution.