

CLAIMS

1. A front opening unified pod (FOUP) cleaning device for cleaning a FOUP including a FOUP body and a FOUP cover, the FOUP cleaning device comprising:

5 a loading and unloading part configured to load or unload the FOUP;

a standby part which is provided at one side of the loading and unloading part and on which the FOUP body and the FOUP cover are separated from or coupled to each other;

10 a cleaning chamber configured to clean the FOUP body and the FOUP cover using steam; and

a robot configured to transport the FOUP body and the FOUP cover between the standby part and the cleaning chamber,

wherein:

15 the FOUP body includes a snorkel nozzle formed of a foamed porous material configured to purge an inside of the FOUP body; and

the cleaning chamber includes a compressed dry air supply part configured to inject compressed dry air into the snorkel nozzle after the FOUP body is cleaned.

20 2. The FOUP cleaning device of claim 1, wherein the steam is mixed with compressed dry air.

3. The FOUP cleaning device of claim 1, wherein the cleaning chamber includes:

25 an external cleaning fluid spray part configured to spray a cleaning fluid onto an outer surface of the FOUP body and the FOUP cover; and

an internal cleaning fluid spray part configured to spray a cleaning fluid onto an inner surface of the FOUP body.

4. The FOUP cleaning device of claim 3, wherein:

5 the cleaning fluid sprayed by the external cleaning fluid spray part includes hot deionized water; and

the cleaning fluid sprayed by the internal cleaning fluid spray part includes the steam.

10 5. The FOUP cleaning device of claim 4, wherein the hot deionized water and the steam are mixed with compressed dry air.

6. The FOUP cleaning device of claim 3, wherein:

hot deionized water or the steam is selectively supplied through the external
15 cleaning fluid spray part and the internal cleaning fluid spray part; and
the hot deionized water and the steam are mixed with compressed dry air.

7. The FOUP cleaning device of claim 3, wherein a plurality of nozzles configured to spray a cleaning fluid and vertically separated are formed in the
20 external cleaning fluid spray part,

wherein the plurality of nozzles are formed to have different lengths and different spray angles to be positioned close to the outer surface of the FOUP body.

8. The FOUP cleaning device of claim 7, wherein:

25 the FOUP body is rotatably provided in the cleaning chamber; and

the plurality of nozzles are obliquely formed to spray the cleaning fluid in a direction opposite to a direction in which the FOUP body rotates.

9. The FOUP cleaning device of claim 1, wherein the cleaning chamber
5 includes an air supply part configured to spray compressed dry air to dry the FOUP body and the FOUP cover which are cleaned.

10. The FOUP cleaning device of claim 9, wherein the air supply part
include:
10 an external air supply part configured to spray the compressed dry air onto an outer surface of the FOUP body; and
an internal air supply part configured to spray the compressed dry air onto an inner surface of the FOUP body.

15 11. The FOUP cleaning device of claim 10, wherein a plurality of nozzles configured to spray the compressed dry air and vertically separated are formed in the external air supply part,

wherein the plurality of nozzles are formed to have different lengths and different spray angles to be positioned close to the outer surface of the FOUP body.

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12. The FOUP cleaning device of claim 11, wherein:
the FOUP body is rotatably provided in the cleaning chamber; and
the plurality of nozzles are obliquely formed to spray the compressed dry air in a direction opposite to a direction in which the FOUP body rotates.

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13. The FOUP cleaning device of claim 10, wherein the air supply part further includes an upper air supply part positioned between the FOUP body and the FOUP cover in the cleaning chamber and configured to spray the compressed dry air onto the FOUP body and the FOUP cover which are cleaned.

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14. The FOUP cleaning device of claim 1, wherein the compressed dry air supply part is provided to be movable forward or backward to be connected to or disconnected from one side end of the snorkel nozzle.

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15. The FOUP cleaning device of claim 14, wherein the cleaning chamber includes a stopper provided to be movable forward or backward and configured to support one side surface of the FOUP body such that the FOUP body is not pushed and moved to one side by the compressed dry air sprayed by the compressed dry air supply part.

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16. A front opening unified pod (FOUP) cleaning device for cleaning a FOUP including a FOUP body and a FOUP cover, the FOUP cleaning device comprising:

a loading and unloading part configured to load or unload the FOUP;

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a standby part which is provided at one side of the loading and unloading part and on which the FOUP body and the FOUP cover are separated from or coupled to each other;

a cleaning chamber configured to clean the FOUP body and the FOUP cover using steam; and

a robot configured to transport the FOUP body and the FOUP cover between the standby part and the cleaning chamber,

wherein the cleaning chamber includes:

a cleaning chamber body in which the FOUP body is accommodated and
5 cleaned; and

a cleaning chamber cover which is configured to open or close an upper portion of the cleaning chamber body and in which the FOUP cover is supportedly cleaned, and

the cleaning chamber body includes a seating part provided at a lower
10 portion of the cleaning chamber body to seat the FOUP body thereon and a lifting part vertically moved between the upper portion and the lower portion of the cleaning chamber body and configured to put the FOUP body onto the seating part or to receive the FOUP body from the seating part to vertically move the FOUP body;

the lifting part is connected to the cleaning chamber cover through a
15 supporting part; and

both the lifting part and the cleaning chamber cover are vertically moved by one lifting driving part.

17. The FOUP cleaning device of claim 1, wherein the cleaning chamber
20 includes ultraviolet lamps configured to emit ultraviolet rays which dry the FOUP body and the FOUP which are cleaned.

18. The FOUP cleaning device of claim 17, wherein the ultraviolet lamps include:

an external ultraviolet lamp configured to emit the ultraviolet rays onto an outer surface of the FOUP body; and

an internal ultraviolet lamp configured to emit the ultraviolet rays onto an inner surface of the FOUP body.

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19. A front opening unified pod (FOUP) cleaning device for cleaning a FOUP including a FOUP body and a FOUP cover, the FOUP cleaning device comprising:

a loading and unloading part configured to load or unload the FOUP;

10 a standby part which is provided at one side of the loading and unloading part and on which the FOUP body and the FOUP cover are separated from or coupled to each other;

a cleaning chamber configured to clean the FOUP body and the FOUP cover using steam; and

15 a robot configured to transport the FOUP body and the FOUP cover between the standby part and the cleaning chamber,

further comprising a vacuum chamber into which the FOUP body and the FOUP cover, which are cleaned in the cleaning chamber, are transported by the robot,

20 wherein the vacuum chamber is connected to a nitrogen gas supply line configured to supply nitrogen gas into the vacuum chamber and a vacuum line configured to suction a fluid in the vacuum chamber to discharge the fluid to an outside, and

the FOUP body includes a snorkel nozzle formed of a foamed porous material configured to purge an inside of the FOUP body; and

the vacuum chamber includes a nitrogen gas supply part configured to inject nitrogen gas into the snorkel nozzle.

20. The FOUP cleaning device of claim 19, wherein the nitrogen gas supply
5 part is provided to be movable forward or backward to be connected to or disconnected from one side end of the snorkel nozzle.

21. The FOUP cleaning device of claim 20, wherein the vacuum chamber
includes a stopper provided to be movable forward or backward and configured to
10 support one side surface of the FOUP body such that the FOUP body is not pushed and moved to one side by the nitrogen gas sprayed by the nitrogen gas supply part.

22. The FOUP cleaning device of claim 19, wherein:
the vacuum chamber includes a vacuum chamber body, in which the FOUP
15 body and the FOUP cover are accommodated in a state in which the FOUP body and the FOUP cover are separated; and

a vacuum chamber cover configured to vertically or laterally move to open or close an opening formed in one side surface of the vacuum chamber body.

20 23. The FOUP cleaning device of claim 19, further comprising a buffer in which the FOUP body, in which the snorkel nozzle is dried, and the FOUP cover, which is dried in the vacuum chamber, are temporarily stored before being transported to the standby part by the robot.

24. A front opening unified pod (FOUP) cleaning method for cleaning a FOUP including a FOUP body and a FOUP cover, the FOUP cleaning method comprising:

- loading the FOUP on a loading and unloading part;
- 5 transporting the loaded FOUP to a standby part;
- transporting the FOUP body and the FOUP cover transported to the standby part to a cleaning chamber using a robot; and
- cleaning the FOUP body and the FOUP cover by supplying steam into the cleaning chamber,
- 10 further comprising, when the cleaning of the FOUP body and the FOUP cover is performed, drying the FOUP body and the FOUP cover by spraying compressed dry air onto the FOUP body and the FOUP cover, and
- wherein the drying of the FOUP body and the FOUP cover includes drying a snorkel nozzle included in the FOUP body by injecting the compressed dry air into
- 15 the snorkel nozzle.

25. The FOUP cleaning method of claim 24, wherein, in the cleaning of the FOUP body and the FOUP cover, the steam is mixed with compressed dry air and supplied into the cleaning chamber.

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26. The FOUP cleaning method of claim 24, wherein, in the cleaning of the FOUP body and the FOUP cover:

hot deionized water is supplied to an outer surface of the FOUP body and the FOUP cover; and

25 the steam is supplied to an inner surface of the FOUP body.

27. The FOUP cleaning method of claim 26, wherein the hot deionized water and the steam are mixed with compressed dry air and supplied.

5 28. The FOUP cleaning method of claim 24, further comprising, when the drying of the FOUP body and the FOUP cover is performed:

 transporting the FOUP body and the FOUP cover into a vacuum chamber using the robot; and

 discharging foreign matter containing moisture remaining on the FOUP body
10 and the FOUP cover by supplying nitrogen gas and suctioning the foreign matter by vacuum.

29. The FOUP cleaning method of claim 28, further comprising drying the snorkel nozzle by injecting nitrogen gas into the snorkel nozzle.

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30. The FOUP cleaning method of claim 29, further comprising, when the drying of the snorkel nozzle is performed:

 temporarily storing the FOUP body and the FOUP cover on a buffer;

 sequentially transporting the FOUP body and the FOUP cover to the standby
20 part and the loading and unloading part; and
 unloading the FOUP.