What is claimed is:

[Claim 1]

A membrane module apparatus to be subjected to steam sterilization, comprising:

a hollow fiber membrane module filled with a liquid;

an aseptic connection member for aseptically connecting the membrane module apparatus to another duct;

a connecting tube for connecting a liquid port of the hollow fiber membrane module and the aseptic connection member to each other; and

a closure member capable of pinching and closing the connecting tube, wherein

the aseptic connection member is an aseptic connection connector that provides aseptic connection by removing a membrane interposed between connecting surfaces,

the connecting tube has heat resistance to the steam sterilization, and

the closure member is attached for closing the connecting tube at a position located on the hollow fiber membrane module side with respect to the aseptic connection connector.

[Claim 2]

The membrane module apparatus according to claim 1, wherein the closure member has a structure of applying pressure to the connecting tube by a screw mechanism to close the connecting tube.

[Claim 3]

The membrane module apparatus according to claim 1 or 2, further comprising an opening/closing part that opens and closes an internal space, the internal space being located on the aseptic connection member side with respect to the closure member, in the connecting tube relative to an atmosphere.

[Claim 4]

The membrane module apparatus according to any one of claims 1 to 3, further comprising a fixing apparatus for fixing at least one of the connecting tube and the aseptic connection member.

[Claim 5]

The membrane module apparatus according to claim 4, wherein the fixing apparatus includes a fixing plate and a fixture for fixing at least one of the connecting tube and the aseptic connection member onto the fixing plate.

[Claim 6]

The membrane module apparatus according to any one of claims 1 to 5, wherein the connecting tube is made of a silicon resin or a fluorine resin.

[Claim 7]

The membrane module apparatus according to any one of claims 1 to 6, wherein the hollow fiber membrane module has a plurality of liquid ports, and at least one of the liquid ports is connected to an expansion member that expands due to an increase in an internal pressure of the hollow fiber membrane module during the steam sterilization.

[Claim 8]

A packaging body containing a membrane module apparatus, the packaging body hermetically packaging the membrane module apparatus according to any one of claims 1 to 7.

[Claim 9]

The packaging body containing a membrane module apparatus according to claim 8, wherein the packaging body provides packaging with an air permeable member.

[Claim 10]

A packaging body that hermetically packages a membrane module apparatus to be subjected to steam sterilization,

wherein the membrane module apparatus comprises:

a hollow fiber membrane module filled with a liquid;

a connecting tube having heat resistance to the steam sterilization, the connecting tube being connected to a liquid port of the hollow fiber membrane module;

a closure member capable of pinching and closing the connecting tube; and

an aseptic connection member for aseptically connecting the membrane module apparatus to another duct,

wherein the aseptic connection member is an aseptic connection connector that provides aseptic connection by removing a membrane interposed between connecting surfaces,

wherein the connecting tube and the aseptic connection member are separated from each other and connectable to each other, and

wherein the closure member is attached for closing the connecting tube at a position located on the hollow fiber membrane module side with respect to the aseptic connection connector.

[Claim 11]

The packaging body containing a membrane module apparatus according to claim 10, wherein the connecting tube and the aseptic connection member are connectable to each other using a half-splittable connector.

[Claim 12]

A liquid treatment system constructed by aseptically connecting the aseptic connection member of the membrane module apparatus according to any one of claims 1 to 11 and another duct to each other.

[Claim 13]

A method of sterilizing by steam a hollow fiber membrane module filled with a liquid, the method comprising:

connecting a heat resistant connecting tube to all or part of liquid ports of the hollow fiber membrane module; closing the connecting tube with a closure member; connecting an aseptic connection connector to the connecting tube, the aseptic connection connector providing aseptic connection by removing a membrane interposed between connecting surfaces; and sterilizing by steam the hollow fiber membrane module with the closure member being attached at a position located on the hollow fiber membrane side with respect to the aseptic connection connector.

[Claim 14]

A method of sterilizing by steam a hollow fiber membrane module filled with a liquid, the method comprising:

connecting a connecting tube having a heat resistance to steam sterilization to all or part of liquid ports of the hollow fiber membrane module; closing the connecting tube with a closure member; and sterilizing by steam the hollow fiber membrane module with the connecting tube and an aseptic connection connector being separated from each

other, the aseptic connection connector providing aseptic connection by removing a membrane interposed between connecting surfaces.

[Claim 15]

The method of sterilizing by steam a hollow fiber membrane module according to claim 13 or 14, wherein the steam sterilization is performed with the hollow fiber membrane module, the connecting tube and the aseptic connection connector being hermetically packaged in an air permeable member.

[Claim 16]

The method of sterilizing by steam a hollow fiber membrane module according any one of claims 13 to 15, wherein the steam sterilization is performed with an internal space, located on the aseptic connection connector side with respect to the closure member, in the connecting tube being opened to a steam atmosphere.

[Claim 17]

The method of sterilizing by steam a hollow fiber membrane module according any one of claims 13 to 16, wherein the steam sterilization is performed with at least one of the connecting tube and the aseptic connection connector being fixed by a fixing apparatus.

[Claim 18]

A method of constructing a liquid treatment system by aseptically connecting a hollow fiber membrane module filled with a liquid to another duct, the method comprising:

a step of connecting a connecting tube having heat resistance to steam sterilization to all or part of liquid ports of the hollow fiber membrane module, connecting an aseptic connection connector to the connecting tube, the aseptic connection connector providing aseptic connection by removing a membrane

interposed between connecting surfaces, and closing the connecting tube with a closure member at a position in the connecting tube, which is located on the hollow fiber membrane module side with respect to the aseptic connection connector;

a step of hermetically packaging, with an air permeable member, the hollow fiber membrane module, the connecting tube connected to the hollow fiber membrane module and the aseptic connection connector connected to the connecting tube;

a step of sterilizing the hollow fiber membrane module by steam after the step of hermetic packaging; and

a step of aseptically connecting the aseptic connection connector to the another duct.

[Claim 19]

A method of constructing a liquid treatment system by aseptically connecting a hollow fiber membrane module filled with a liquid to another duct, the method comprising:

a step of connecting a connecting tube having heat resistance to steam sterilization to all or part of liquid ports of the hollow fiber membrane module and closing the connecting tube with a closure member;

a step of hermetically packaging, with an air permeable member, the hollow fiber membrane module, the connecting tube connected to the hollow fiber membrane module and an aseptic connection connector that provides aseptic connection by removing a membrane interposed between connecting surfaces;

a step of sterilizing the hollow fiber membrane module by steam after the step of hermetic packaging, with the connecting tube and the aseptic connection connector being separated from each other;

a step of connecting the aseptic connection connector to the connecting tube after the steam sterilization step; and

a step of aseptically connecting the aseptic connection connector to the another duct.