CLAIMS

[Claim 1]

A ballast water treatment system for a ship, the system comprising a rotary filtration apparatus including a filter that is cylindrically formed so as to surround an axis, that is rotatable around the axis, and that has a pleated shape that is folded in a cylinder radial direction; a cleaning nozzle that ejects untreated water toward an outer peripheral portion of the filter; a case that includes an outer cylindrical portion that is disposed so as to surround the filter, a nozzle opening of the cleaning nozzle being disposed inside the case; a filtered water channel through which filtered water that has passed through the filter flows from a cylindrical space inside the filter to outside of the case; a discharge channel through which discharged water that has not passed through the filter is discharged to outside of the case; and an electric motor for rotating the filter,

wherein a distance between the cleaning nozzle and a recess of the filter is 120 mm or less, and

wherein the ballast water treatment system is configured to perform a steady-state operation that satisfies the following conditions a to d:

a) a rotation speed of the filter during a filtering operation is in the range of 20 to 100 rpm,

b) a flow speed of cleaning water ejected from the cleaning nozzle is 250 m/min or more,

c) a flow rate of filtered water per unit area of the filter is 5.1 m/h or less, and

d) a flow rate of discharged water discharged from the discharge channel is 5% of the flow rate of filtered water or more.

[Claim 2]

The ballast water treatment system for a ship according to Claim 1, wherein the filter has an effective filtration area of 5 m^2 or more and is capable of removing 99% or more of microorganisms in sea water having a size of 30 μm or more.

[Claim 3]

The ballast water treatment system for a ship according to Claim 1 or 2, wherein in a case where the untreated water is sea water having a turbidity in the range of 1 to 1000 NTU, the ballast water treatment system is capable of continuing the steady-state operation for 12 hours or more.

[Claim 4]

A ballast water treatment method for a ship, the method using a rotary filtration apparatus including a filter that is cylindrically formed so as to surround an axis, that is rotatable around the axis, and that has a pleated shape that is folded in a cylinder radial direction; a cleaning nozzle that ejects untreated water toward an outer peripheral portion of the filter; a case that includes an outer cylindrical portion that is disposed so as to surround the filter, a nozzle opening of the cleaning nozzle being disposed inside the case; a filtered water channel through which filtered water that has passed through the filter flows from a cylindrical space inside the filter to outside of the case; a discharge channel through which discharged water that has not passed through the filter is discharged to outside of the case; and an electric motor for rotating the filter,

wherein a distance between the cleaning nozzle and a recess of the filter is 120 mm or less, and

wherein a steady-state operation that satisfies the following conditions a to d is performed:

a) a rotation speed of the filter during a filtering operation is in the range of 20 to 100 rpm,

b) a flow speed of cleaning water ejected from the cleaning nozzle is 250 m/min or more,

c) a flow rate of filtered water per unit area of the filter is 5.1 m/h or less, and

d) a flow rate of discharged water discharged from the discharge channel is 5% of the flow rate of filtered water or more.

CLAIMS

[Claim 1]

A ballast water treatment system for a ship, the system comprising a rotary filtration apparatus including a filter that is cylindrically formed so as to surround an axis, that is rotatable around the axis, and that has a pleated shape that is folded in a cylinder radial direction; a cleaning nozzle that ejects untreated water toward an outer peripheral portion of the filter; a case that includes an outer cylindrical portion that is disposed so as to surround the filter, a nozzle opening of the cleaning nozzle being disposed inside the case; a filtered water channel through which filtered water that has passed through the filter flows from a cylindrical space inside the filter to outside of the case; a discharge channel through which discharged water that has not passed through the filter is discharged to outside of the case; and an electric motor for rotating the filter,

wherein a distance between the cleaning nozzle and a recess of the filter is 120 mm or less, and

wherein the ballast water treatment system is configured to perform a steady-state operation that satisfies the following conditions a to d:

a) a rotation speed of the filter during a filtering operation is in the range of 20 to 100 rpm,

b) a flow speed of cleaning water ejected from the cleaning nozzle is 250 m/min or more,

c) a flow rate of filtered water per unit area of the filter is 5.1 m/h or less, and

d) a flow rate of discharged water discharged from the discharge channel is 5% of the flow rate of filtered water or more,

and wherein the filter has an effective filtration area of 5 m^2 or more and is made of a non-woven cloth and removes 99% or more of microorganisms in sea water having a size of 30 μm or more.

[Claim 2]

The ballast water treatment system for a ship according to Claim 1, wherein the ballast water treatment system provides for a steady-state operation for 12 hours or more in a case where the untreated water is sea water having a turbidity in the range of 1 to 1000 NTU.

[Claim 3]

A ballast water treatment method for a ship, the method using a rotary filtration apparatus including a filter that is cylindrically formed so as to surround an axis, that is rotatable around the axis, and that has a pleated shape that is folded in a cylinder radial direction; a cleaning nozzle that ejects untreated water toward an outer peripheral portion of the filter; a case that includes an outer cylindrical portion that is disposed so as to surround the filter, a nozzle opening of the cleaning nozzle being disposed inside the case; a filtered water channel through which filtered water that has passed through the filter flows from a cylindrical space inside the filter to outside of the case; a discharge channel through which discharged water that has not passed through the filter is discharged to outside of the case; and an electric motor for rotating the filter,

wherein a distance between the cleaning nozzle and a recess of the filter is 120 mm or less, and

wherein a steady-state operation that satisfies the following conditions a to d is performed:

a) a rotation speed of the filter during a filtering operation is in the range of 20 to 100 rpm,

b) a flow speed of cleaning water ejected from the cleaning nozzle is 250 m/min or more,

c) a flow rate of filtered water per unit area of the filter is 5.1 m/h or less, and

d) a flow rate of discharged water discharged from the discharge channel is 5% of the flow rate of filtered water or more,

and wherein the filter has an effective filtration area of 5 m^2 or more and is made of a non-woven cloth and removes 99% or more of microorganisms in sea water having a size of 30 μm or more.