CLAIMS

1. A ballast water treatment system including a water treatment apparatus which removes a substance to be removed from ballast water, and a ballast tank which stores the ballast water treated by the water treatment apparatus installed on a ship, the ballast water treatment system comprising:

a monitoring apparatus which monitors at least one of a concentration of aquatic organisms of the ballast water at an inlet part of the water treatment apparatus, a concentration of aquatic organisms of the ballast water at an outlet part of the water treatment apparatus, and a concentration of aquatic organisms of the ballast water in the ballast tank; and

a control apparatus which controls an operational condition of the water treatment apparatus, and circulation of the ballast water in the ballast tank to the water treatment apparatus and retreatment of the circulated ballast water in the water treatment apparatus, based on a monitoring result of the monitoring apparatus.

2. The ballast water treatment system according to claim 1, wherein

the monitoring apparatus monitors the concentration of aquatic organisms at the inlet part of the water treatment apparatus and the concentration of aquatic organisms at the outlet part of the water treatment apparatus, and

the control apparatus compares the monitored concentration of aquatic organisms at the inlet part of the water treatment apparatus with the monitored concentration of aquatic organisms at the outlet part of the water treatment apparatus, and controls the operational condition of the water treatment apparatus based on the comparison result.

3. The ballast water treatment system according to claim 1 or 2, further comprising

a circulation line which circulates the ballast water in the ballast tank or the ballast water to be discharged out of the ballast tank to the water treatment apparatus, wherein

the monitoring apparatus monitors the concentration of aquatic organisms of the water in the ballast tank,

the control apparatus compares the monitored concentration of aquatic organisms of the water in the ballast tank with a permissible value, and

~~when the monitored concentration of aquatic organisms of the ballast water in the ballast~~ tank is lower than the permissible value , the control apparatus controls to circulate the ballast water in the ballast tank to the water treatment apparatus through the circulation line to be retreated in the water treatment apparatus.

4. The ballast water treatment system according to claim 3, wherein

the monitoring apparatus monitors the concentration of aquatic organisms at the outlet part of the water treatment apparatus and the concentration of aquatic organisms of the water in the ballast tank, and

when the monitored concentration of aquatic organisms of the ballast water in the ballast tank becomes substantially equal to the monitored concentration of aquatic organisms of the ballast water at the

outlet part of the water treatment apparatus as the result of the comparison, the control apparatus controls to stop circulation of the ballast water in the ballast tank to the water treatment apparatus and retreatment in the water treatment apparatus.

5. The ballast water treatment system according to any one of claims 1 or 2, further comprising

a circulation line which circulates the ballast water in the ballast tank or the ballast water to be discharged out of the ballast tank to the water treatment apparatus, wherein

the monitoring apparatus monitors the concentration of aquatic organisms of the water in the ballast tank, and

when the monitored concentration of aquatic organisms of the ballast water in the ballast tank satisfies

a permissible value at the time of discharging, the control apparatus controls to discharge the ballast water in the ballast tank without the circulation and the retreatment, and

when the monitored concentration of aquatic organisms of the ballast water in the ballast tank does not satisfy the permissible value at the time of discharging, the control apparatus controls to circulate the ballast water in the ballast tank to the water treatment apparatus through the circulation line to be retreated in the water treatment apparatus.

6. The ballast water treatment system according to any one of claims 1 to 5,

wherein the monitoring apparatus automatically takes a sample of the ballast water through a sampling pipe to monitor the concentration of aquatic organisms.

7. The ballast water treatment system according to any one of claims 1 to 6,

~~wherein the water treatment apparatus comprises a physical removal apparatus which~~

~~physically removes large aquatic organisms and suspended solids to prevent mud from~~ accumulating in the ballast tank.

8. The ballast water treatment system according to claim 7, wherein the water treatment apparatus further comprises a sterilizing apparatus which kills small aquatic organisms using disinfectant.

9. The ballast water treatment system according to any one of claims 1 to 6, wherein

the water treatment apparatus comprises:

a coagulation apparatus which coagulates the substance to be removed by injecting a coagulant into and agitating the ballast water; and

a separation/removal apparatus which separates and removes aggregates which occurs in the coagulation apparatus.

10. The ballast water treatment system according to claim 9, wherein

the control apparatus controls the coagulation apparatus based on the monitoring result of the monitoring apparatus to adjust an injection amount of the coagulant

11. The ballast water treatment system according to claim 9 or 10, wherein

the separation/removal apparatus is configured as a combination of a magnetic separation and a filter separation.

12. The ballast water treatment system according to any one of claims 1 to 11, wherein

the monitoring apparatus monitors the ballast water by measuring at least one of a turbidity and a chromaticity of the ballast water.

13. The ballast water treatment system according to any one of claims 1 to 12, wherein

the monitoring apparatus monitors the ballast water by performing an image analysis ~~of the ballast water.~~

~~14. The ballast water treatment system according to any one of claims 1 to 13,~~ wherein

the control apparatus controls a treatment volume that is treated by the water ~~treatment apparatus per unit time.~~

CLAIMS

1. A ship comprising:

a pump which intakes and discharges ballast water;

a water treatment apparatus which removes a substance to be removed from ballast water;

a ballast tank which stores the ballast water treated by the water treatment apparatus;

a valve which is arranged between the pump and the water treatment apparatus;

a monitoring apparatus which monitors the concentration of aquatic organisms in the ballast water at an inlet part and an outlet part of the water treatment apparatus; and

a control apparatus which monitors the concentration of aquatic organisms in the ballast water when the ballast water is taken;

controls the opening of the valve based on the result of the monitoring to adjust the treatment amount per unit time of the water treatment apparatus;

monitors the concentration of aquatic organisms in the ballast water when the ballast water is discharged;

controls to discharge the ballast water if the concentration of aquatic organisms based on the result of the monitoring satisfies a permissive value; and

controls to discharge the ballast water after the water treatment apparatus retreats the ballast water if the concentration of aquatic organisms based on the result of the monitoring does not satisfy the permissive value.

2. The ship according to claim 1, further comprising a circulation line of which one edge is connected to the ballast tank and the other edge is connected to the upstream side of the pump, wherein the ballast water is supplied to the water treatment apparatus through the circulation line.

3. The ship according to claim 1 or 2, further comprising a monitoring apparatus which monitors the concentration of aquatic organisms in the ballast water in the ballast tank, wherein the control apparatus monitors the concentration of aquatic organisms in the ballast water in the ballast tank, and controls to retreat the ballast water in the ballast tank by circulating into the water treatment apparatus or to retreat and discharge the ballast water in the ballast tank by feeding to the water treatment apparatus when the ballast water in the ballast tank is discharged, based on the result of the monitoring.

4. The ship according to any one of claims 1 to 3, wherein the water treatment apparatus comprises a physical removal apparatus or a sterilizing apparatus.

5. The ship according to claim 4, wherein the sterilizing apparatus is an apparatus using at least one of sodium hypochlorite, ozone, chlorine dioxide, peracetic acid, hydrogen peroxide, and ultra-violet light.

6. The ship according to any one of claims 1 to 3, further comprising:

a coagulation apparatus which coagulates the substance to be removed by injecting a coagulant into and agitating the ballast water; and

a separation/removal apparatus which separates and removes aggregates which occurs in the coagulation apparatus.

7. The ship according to claim 6, wherein the separation/removal apparatus is configured as a combination of a magnetic separation and a filter separation.

8. The ship according to any one of claims 1 to 7, wherein the monitoring apparatus monitors the ballast water by measuring a least one of a turbidity and a chromaticity of the ballast water.

9. The ship according to any one of claims 1 to 7, wherein the monitoring apparatus monitors the ballast water by performing an image analysis of the ballast water.

10. The ship according to any one of claims 1 to 9, the control apparatus controls an injection amount of disinfectant or coagulant based on the result of the monitoring of the concentration of the aquatic organism in the ballast water at an inlet part of the water treatment apparatus, in the ballast water at an outlet part of the water treatment apparatus, or in the ballast water in the ballast tank.