it is desirable that the discharged gas-dissolved water is withdrawn and reused. From this viewpoint, there has been hitherto proposed an apparatus for withdrawing and reusing dissolved gas contained in gas-dissolved water discharged from a cleaning apparatus (for example, see Japanese Patent Laid-Open No. 2007-275744).

[0005]

However, it has not been so much considered for conventional apparatuses that the use amount of gas-dissolved water varies at a use point. For example, in the conventional apparatuses, even when the use amount of the gas-dissolved water at a use point decreases, the supply amount of gas-dissolved water to be supplied from a gas-dissolved water producing apparatus is not changed. Surplus gas-dissolved water has been hitherto discarded from a drain for waste water.

[0006]

Embodiments of the present invention seek to provide a gas-dissolved liquid producing apparatus capable of reusing circulated gas-dissolved liquid and preventing surplus gas-dissolved water from being wasted.

SUMMARY OF THE INVENTION

[0007]

A gas-dissolved liquid producing apparatus according an aspect of to the present invention comprises: a gas supply unit

dissolved liquid, and prevent a raw material (first liquid) of the gas-dissolved liquid from being wasted.

[0009]

The gas-dissolved liquid producing apparatus according to embodiments of the present invention may further comprise a gas-dissolved liquid reservoir that stores the circulated gas-dissolved liquid, and a liquid level measuring unit that measures a height of a liquid level of the gas-dissolved liquid stored in the gas-dissolved liquid reservoir, and the controller may control whether to actuate the second liquid supply unit based on the height of the liquid level of the gas-dissolved liquid measured by the liquid level measuring unit.

[0010]

According to the foregoing configuration, the second liquid supply unit can be appropriately actuated according to the height of the liquid level of the gas-dissolved liquid measured by the liquid level measuring unit. For example, when the height of the liquid level of the gas-dissolved liquid measured by the liquid level measuring unit is equal to or higher than a predetermined reference height, the second liquid has been sufficiently supplied to the second liquid supply unit, and thus there would be no problem even when the second liquid supply unit is actuated. On the other hand, when the height of the liquid level of the gas-dissolved liquid measured by the liquid level measuring unit has not reached the

predetermined reference height, the second liquid has not yet been sufficiently supplied to the second liquid supply unit, and this condition is not suitable for actuation of the second liquid supply unit.

[0011]

In the gas-dissolved liquid producing apparatus according to embodiments of the present invention, the second liquid generator may subject the circulated gas-dissolved liquid to a thermal decomposition treatment or a photolysis treatment to generate the second liquid from the gas-dissolved liquid.

[0012]

According to the foregoing configuration, the second liquid can be easily generated from the gas-dissolved liquid by subjecting the circulated gas-dissolved liquid to the thermal decomposition treatment or the photolysis treatment.

[0013]

In the gas-dissolved liquid producing apparatus according to embodiments of the present invention, the second liquid generator may subject the circulated gas-dissolved liquid to a degasification treatment to generate the second liquid from the gas-dissolved liquid.

[0014]

According to the foregoing configuration, the second liquid can be easily generated from the gas-dissolved

liquid by subjecting the circulated gas-dissolved liquid to the degasification treatment.

[0015]

In the gas-dissolved liquid producing apparatus according to embodiments of the present invention, the gas-dissolved liquid that has been generated in the gas-dissolved liquid generator and supplied to an outside of the gas-dissolved liquid producing apparatus may be circulated outside the gas-dissolved liquid producing apparatus and then supplied to the second liquid generator.

[0016]

According to the foregoing configuration, the gas-dissolved liquid generated in the gas-dissolved liquid generator is supplied to the outside of the gas-dissolved liquid producing apparatus, circulated outside the gas-dissolved liquid producing apparatus, and then supplied to the second liquid generator. This makes it possible to generate the second liquid serving as a raw material of the gas-dissolved liquid from the gas-dissolved liquid circulated outside the gas-dissolved producing apparatus, and reuse the second liquid for generation of the gas-dissolved liquid.

[0017]

In the gas-dissolved liquid producing apparatus according to embodiments of the present invention, the gas-dissolved liquid that has been generated in the gas-dissolved liquid generator and has not been supplied to an outside

of the gas-dissolved liquid producing apparatus is circulated inside the gas-dissolved liquid producing apparatus and supplied to the second liquid generator.

[0018]

According to the foregoing configuration, the gas-dissolved liquid generated in the gas-dissolved liquid generator is not supplied to the outside of the gas-dissolved liquid producing apparatus, but circulated inside the gas-dissolved liquid producing apparatus and supplied to the second liquid generator. As a result, the second liquid serving as a raw material of the gas-dissolved liquid can be generated from the gas-dissolved liquid circulated inside the gas-dissolved liquid producing apparatus, and reused for generation of the gas-dissolved liquid.

[0019]

A gas-dissolved liquid producing method according to another aspect of the present invention is implemented in a gas-dissolved liquid producing apparatus, the gas-dissolved liquid producing apparatus including a gas supply unit that supplies gas serving as a raw material of gas-dissolved liquid, a first liquid supply unit that supplies first liquid serving as a raw material of the gas-dissolved liquid, a gas-dissolved liquid generator that dissolves the gas supplied from the gas supply unit in the first liquid supplied from the first liquid supply unit to generate the gas-dissolved liquid, a second liquid

a raw material of the gas-dissolved liquid from the circulated gas-dissolved liquid. The second liquid generated in the second liquid generator is supplied from the second liquid supply unit to the gas-dissolved liquid generator and reused for generation of the gas-dissolved liquid. In this case, the flow rate of the circulated gas-dissolved liquid is measured by the flow rate measuring unit, and the supply amount (flow rate) of the first liquid to be supplied to the gas-dissolved liquid generator is controlled according to the measured flow rate of the gas-dissolved liquid. That is, the supply amount of the first liquid to be supplied to the gas-dissolved liquid generator is controlled in consideration of the flow rate of the circulated gas-dissolved liquid. Accordingly, for example, when the use amount of the gas-dissolved liquid at the use point decreases, the supply amount of the first liquid to be supplied to the gas-dissolved liquid generator can be reduced. This makes it possible to prevent excessive production of the gas-dissolved liquid, eliminate the need to discard the surplus gas-dissolved liquid, and eliminate the raw material (first liquid) of the gas-dissolved liquid from being wasted.

[0021]

According to embodiments of the present invention, it is possible to reuse the circulated gas-dissolved liquid, and