Claims

[Claim 1] A modular tank for culturing and transporting aquatic animals, the modular tank comprising:

an inner sidewall and an outer sidewall, wherein a closed space is formed between the inner sidewall and the outer sidewall to hold the aquatic animals, and the inner sidewall with at least one opening thereon forms a channel to allow an automated aquaculture system to be in fluid communication with the closed space;

a top coupling structure; and a bottom coupling structure, wherein the top coupling structure and the bottom coupling structure are configured to removably couple the modular tank to another modular tank so that the modular tank and the another modular tank are arranged in such a manner that the channel of the modular tank is substantially aligned to a second channel of the another modular tank.

[Claim 2] The modular tank according to claim 1, wherein the outer sidewall of the modular tank is in a cylinder shape.

[Claim 3] The modular tank according to claim 1 or claim 2, further comprising a side coupling structure, wherein the side coupling structure is configured to removably couple the modular tank to a frame.

[Claim 4] The modular tank according to any preceding claim, wherein the modular tank includes a non-flat bottom surface to form a lower area on the bottom of the modular tank.

[Claim 5] A system for culturing and transporting aquatic animals, the system comprising:

a plurality of modular tanks, each modular tank having an inner sidewall and an outer sidewall, wherein a closed space is formed between the inner sidewall and the outer sidewall to hold the aquatic animals, and the inner sidewall with at least one opening thereon forms a channel to allow an automated aquaculture system to be in fluid communication with the closed space, and

wherein the plurality of modular tanks are arranged in such a manner that the channels of the plurality of modular tanks are substantially aligned with each other to allow the automated aquaculture system to be installed therein.

[Claim 6] The system according to claim 5, wherein the plurality of modular tanks are arranged in a horizontal direction when the system is used for transporting aquatic animals.

[Claim 7] The system according to claim 5, wherein the plurality of modular tanks are arranged in a vertical direction when the system is used for culturing aquatic animals.

[Claim 8] The system according to any one of claim 5 to claim 7, wherein the outer sidewall of each modular tank is in a cylinder shape.

[Claim 9] The system according to any one of claim 5 to claim 8, wherein each of the plurality of modular tanks includes a top coupling structure, a bottom coupling structure, and/or a side coupling structure, wherein the top coupling structure and the bottom coupling structure are configured to removably attached the modular tank to another modular tank; wherein the side coupling structure is configured to removably couple the modular tank to a frame.

[Claim 10] The system according to any one of claim 5 to claim 9, wherein the automated aquaculture system further includes a first automatic monitoring system, wherein the automatic monitoring system includes at least one camera which is configured to detect water quality and/or status of the aquatic animals in the closed space of each modular tank, the status of the aquatic animals includes size, quantity and health index of the aquatic animals, wherein the at least one camera is installed on the inner sidewall and/or in the channel of each modular tank.

[Claim 11] The system according to any one of claim 5 to claim 10, wherein automated aquaculture system further includes an automated feeding system, wherein the automated feeding system includes a first pipeline which is installed in the channel of each modular tank and fluidly communicable with the closed space of each modular tank through a first opening 105a on the inner sidewall of each modular tank, wherein the automated feeding system is configured to automatically transfer food to any one of the plurality of tanks through the first pipeline according to a predetermined feeding schedule, and/or status of the

aquatic animals in each modular tank, wherein the status of the aquatic animals includes size, quantity and health index of the aquatic animals.

[Claim 12] The system according to any one of claim 5 to claim 11, wherein the automated aquaculture system further includes a water treatment system, wherein the water treatment system includes a second pipeline and a third pipeline which are fluidly communicable with the closed space of each modular tank through a second opening and a third opening on the inner sidewall of each modular thank respectively,

wherein the water treatment system is configured to bring water in any of the plurality of modular tanks to a water treatment apparatus through the second pipeline so that a water treatment process is conducted to improve water quality of the water from the modular tank; and transfer the water after treatment back to the modular tank through the third pipeline, wherein the water treatment system is configured to be activated to improve water quality in any one of the plurality of the tanks according to a predetermined time schedule, or water quality in each tank.

[Claim 13] The system according to claim 12, further comprising a second automated monitoring system which includes two sets of sensors, one set of the sensors is installed in the second pipeline, and the other set of the sensors is installed in the third pipeline.

[Claim 14] The system according to any one of claim 5 to claim 13, wherein the automated aquaculture system further includes an automated extracting system,

wherein the extracting system includes a fourth pipeline which is fluidly communicable with the closed space of each modular tank through a fourth opening on the inner sidewall of each modular tank, wherein the extracting system is configured to extract the aquatic animals in any one of the plurality of modular tanks automatically by activating a fish net installed in the modular tank to force the aquatic animals therein to leave from the modular tank through the fourth opening, according to a predetermined time schedule or status of the aquatic animals in the closed space of each modular tank.

[Claim 15] The system according to any one of claim 7 to claim 14, wherein the automated aquaculture system further includes a water circulation system, wherein the water circulation system includes a fifth pipeline which is fluidly communicable with the closed space of each modular tank through a fifth opening and a sixth opening on the inner sidewall of each modular tank respectively,

wherein the water circulation system is configured to discharge water in any one of the plurality of modular tanks, and bring clean water from an external water source to any of the modular tanks through the fifth pipeline, to ensure water quality in each modular tank satisfies a predetermined criteria, wherein the water circulation system is activated according to a predetermined time schedule, and/or water quality in each modular tank.

[Claim 16] The system according to claim 15, further comprising a third automated monitoring system which includes two sets of sensors, one set of the sensors is

installed in the fifth pipeline, and the other set of the sensors is installed in the sixth pipeline.

[Claim 17] The system according to claim 15 or claim 16, wherein the water circulation system is configured to discharge water in any one of the plurality of modular tanks back to sea, and bring seawater at a predetermined depth to any of the modular tanks through the fifth pipeline by using a pump.

[Claim 18] The system according to claim 15 or claim 16, wherein the plurality of modular tanks are disposed in an underground shaft.

[Claim 19] The system according to claim 18, wherein the fifth pipeline of the water circulation system includes a seawater intake portion having an inlet which is disposed at a predetermined depth below a sea level, and a seawater discharging portion having an outlet which is disposed on or close to a sea surface,

wherein the seawater intake portion forms a substantial inverted U-shape siphonic structure to allow seawater at the predetermined depth to enter into the seawater intake portion, wherein the seawater intake portion is fluidly communicable with the closed space of each tank through a first opening on the inner sidewall of each modular tank;

wherein the seawater discharging portion and a part of the seawater intake portion forms a substantial U-shape siphonic structure to bring the seawater close to the sea surface, wherein the seawater discharging portion is fluidly

communicable with the closed space of each tank through a second opening on the inner sidewall of each modular tank.

[Claim 20] A method for culturing and transporting aquatic animals, comprising:

providing a plurality of modular tanks, wherein each modular tank having an inner sidewall and an outer sidewall, wherein a closed space is formed between the inner sidewall and the outer sidewall to hold the aquatic animals, and the inner sidewall with at least one opening thereon of each modular tank forms a channel to allow an automated aquaculture system to be in fluid communication with the closed space,

arranging the plurality of modular tanks in such a manner that the channels of the plurality of modular tanks are substantially aligned with each other to allow the automated aquaculture system to be installed therein, and

installing the automated aquaculture system in the channel of each modular tank.

[Claim 21] The method according to claim 20, wherein the step of arranging the plurality of modular tanks comprises arranging the plurality of modular tanks in a vertical direction when the modular tanks are used for culturing aquatic animals; or arranging the plurality of modular tanks in a horizontal direction when the modular tanks are used for transporting aquatic animals.