CLAIMS

[1] An automatic culturing apparatus comprising:

a chemical supply unit for individually accommodating plural chemicals necessary for culture;

an incubator unit for accommodating a cell culture container;

a withdrawing unit for withdrawing cultured cells cultured in the culture container;

a supply/discharge unit for supplying the cells to the culture container, supplying the chemicals from the chemical supply unit to the culture container, and discharging cultured cells from the culture container to the withdrawing unit; and

a control unit for controlling a chemical supply operation to the culture container, a cell culturing operation in the culture container and a discharge operation of cultured cells from the culture container and has means for making the supply/discharge unit execute, at least once, a cell culturing step containing a chemical supply step of the supply/discharge unit and a cultured cell discharging step on the cultured cells left in the culture container when the cultured cells are withdrawn.

[2] The automatic culturing apparatus according to claim 1, wherein the supply/discharge unit comprises a supply tube pipe for selectively supplying one chemical from plural

chemical bags provided to the chemical supply unit to the culture container, a valve provided to the tube pipe and a supply pump.

[3] The automatic culturing apparatus according to claim 2, wherein the chemicals accommodated in the plural chemical bags contain culture medium and cleaning liquid.

[4] The automatic culturing apparatus according to claim 3, wherein the chemicals accommodated in the plural chemical bags further contain parting agent.

[5] The automatic culturing apparatus according to claim 1, wherein the supply/discharge unit comprises plural withdrawing bags for withdrawing cultured cells, a waste liquid container for accommodating used chemicals, a discharging tube pipe for selectively discharging used chemicals and cultured cells from the culture container to the withdrawing bags or the waste liquid container, a valve provided to the tube pipe and a discharge pump.

[6] The automatic culturing apparatus according to claim 1, wherein the culture container is provided with plural nozzles connected to the supply/discharge unit.

[7] The automatic culturing apparatus according to claim 6, wherein a predetermined gap is provided between the bottom surface of the culture container and the tip of the nozzle connected to the discharging tube pipe of the supply/discharge unit, the tip being located in the culture

container, and some of cultured cells are left in the culture container by the gap when the cultured cells are withdrawn.

[8] The automatic culturing apparatus according to claim 5, wherein the withdrawing bag is formed of a material having thermo compression property and has a tube portion to be connected to the discharging tube pipe.

[9] The automatic culturing apparatus according to claim 5, wherein the discharging tube pipe of the discharging unit is constructed so that a single tube connected to the culture container is connected to plural tubes connected to the plural withdrawing bags and the waste liquid container, the discharging pump is disposed in the single tube, the valve is disposed in each of the tubes connected to the plural withdrawing bags and the waste liquid container.

[10] The automatic culturing apparatus according to claim 5, wherein the discharging tube pipe of the discharging unit has tubes whose number is set to such a value that the culture container is individually connected to each of the waste liquid container and the plural withdrawing bags, and a discharge pump and a valve are disposed in each of the tubes.

[11] The automatic culturing apparatus according to claim 5, wherein the discharging tube pipe of the discharging unit comprises a waste liquid tube for connecting the culture container to the waste liquid container, a single tube connected to the culture container and plural tubes for

connecting the single tube to the plural withdrawing bags, and a discharging pump and a valve are disposed in each of the waste liquid tube and the single tube connected to the culture container.

[12] A cell culturing method comprising:

(1) a step of injecting cells extracted from a human body and a culture medium into a culture container;

(2) a step of culturing cells while performing air ventilation and exchange of the culture medium in the culture container in which the culture medium and the cells are put;

(3) a step of cleaning cultured cells which are cultured in the culture container and then withdrawing the cleaned cells from the culture container into a cell withdrawing vessel while some of the cleaned cells are left in the culture container;

(4) a step of injecting a culture medium to the cultured cells left in the culture container in the step (3); and

(5) a step of repetitively executing the step (2) and the step (3).

[13] The cell culturing method according to claim 12, wherein the step (4) and the step (5) are executed at least once.

[14] The cell culturing method according to claim 12, wherein the cell withdrawing step in the step (3) contains a step of parting cultured cells from the culture container

by injecting parting agent subsequently to a step of cleaning the cultured cells in the culture container.

[15] The cell culturing method according to claim 14, further comprising a step of injecting a new culture medium into the culture container to weaken the effect of the parting agent on the cultured cells subsequently to the injection of the parting agent in the step (3).

[16] The cell culturing method according to claim 12, wherein the cultured cells withdrawn in the step (5) is withdrawn into a container different from a container in which cells are withdrawn in the step (3).

[17] The cell culturing method according to claim 14, wherein the cultured cells withdrawn in the step (5) is withdrawn into a container different from a container in which cells are withdrawn in the step (3).

[18] The cell culturing method according to claim 15, wherein the cultured cells withdrawn in the step (5) are withdrawn into a container different from a container in which cells are withdrawn in the step (3).

CLAIMS

[1] An automatic culturing apparatus comprising:

a chemical supply unit for individually accommodating plural chemicals necessary for culture;

an incubator unit for accommodating a cell culture container to which the cultured cells can be adhered;

a withdrawing unit for withdrawing human cultured cells cultured in the culture container;

a supply/discharge unit for supplying the human cells to the culture container, supplying the chemicals from the chemical supply unit to the culture container, and discharging human cultured cells from the culture container to the withdrawing unit; and

a control unit for controlling a chemical supply operation to the culture container, a cell culturing operation in the culture container and a discharge operation of human cultured cells from the culture container and has means for making the supply/discharge unit execute, at least once, a cell culturing step containing a chemical supply step of the supply/discharge unit and a cultured cell discharging step on the human cultured cells left in the culture container when the human cultured cells are withdrawn.

wherein the culture container is provided with plural nozzles connected to the supply/discharge unit and wherein a predetermined gap is provided between the bottom surface of the culture container and the tip of the nozzle connected to the discharging tube pipe of the supply/discharge unit, the tip being located in the culture container, and some of the human cultured cells are left in the culture container by the gap when the human cultured cells are withdrawn

[2] The automatic culturing apparatus according to claim 1, wherein the supply/discharge unit comprises a supply tube pipe for selectively supplying one chemical from plural chemical bags provided to the chemical supply unit to the culture container, a valve provided to the tube pipe and a supply pump.

[3] The automatic culturing apparatus according to claim 2, wherein the chemicals accommodated in the plural chemical bags contain culture medium and cleaning liquid.

[4] The automatic culturing apparatus according to claim 3, wherein the chemicals accommodated in the plural chemical bags further contain parting agent.

[5] The automatic culturing apparatus according to claim 1, wherein the supply/discharge unit comprises plural withdrawing bags for withdrawing human cultured cells, a waste liquid container for accommodating used chemicals, a discharging tube pipe for selectively discharging used chemicals and human cultured cells from the culture container to the withdrawing bags or the waste liquid container, a valve provided to the tube pipe and a discharge pump.

[6] The automatic culturing apparatus according to claim 5, wherein the withdrawing bag is formed of a material having thermo compression property and has a tube portion to be connected to the discharging tube pipe.

[7] The automatic culturing apparatus according to claim 5, wherein the discharging tube pipe of the discharging unit is constructed so that a single tube connected to the culture container is connected to plural tubes connected to the plural withdrawing bags and the waste liquid container, the discharging pump is disposed in the single tube, the valve is disposed in each of the tubes connected to the plural withdrawing bags and the waste liquid container.

[8] The automatic culturing apparatus according to claim 5, wherein the discharging tube pipe of the discharging unit has tubes whose number is set to such a value that the culture container is individually connected to each of the waste liquid container and the plural withdrawing bags, and a discharge pump and a valve are disposed in each of the tubes.

[9] The automatic culturing apparatus according to claim 5, wherein the discharging tube pipe of the discharging unit comprises a waste liquid tube for connecting the culture container to the waste liquid container, a single tube connected to the culture container and plural tubes for connecting the single tube to the plural withdrawing bags, and a discharging pump and a valve are disposed in each of the waste liquid tube and the single tube connected to the culture container.

[10] A human cell culturing method comprising:

(1) a step of injecting human cells extracted from a human body and a culture medium into a culture container;

(2) a step of culturing human cells while performing air ventilation and exchange of the culture medium in the culture container in which the culture medium and the human cells are put;

(3) a step of cleaning human cultured cells which are cultured in the culture container and then withdrawing the cleaned human cells from the culture container into a cell withdrawing vessel while some of the cleaned human cells are left in the culture container;

(4) a step of injecting a culture medium to the human cultured cells left in the culture container in the step (3); and

(5) a step of repetitively executing the step (2) and the step (3).

[11] The human cell culturing method according to claim 10, wherein the step (4) and the step (5) are executed at least once.

[12] The human cell culturing method according to claim 10, wherein the cell withdrawing step in the step (3) contains a step of parting human cultured cells from the culture container by injecting parting agent subsequently to a step of cleaning the human cultured cells in the culture container.

[13] The human cell culturing method according to claim 12, further comprising a step of injecting a new culture medium into the culture container to weaken the effect of the parting agent on the human cultured cells subsequently to the injection of the parting agent in the step (3).

[14] The human cell culturing method according to claim 10, wherein the human cultured cells withdrawn in the step (5) is withdrawn into a container different from a container in which human cells are withdrawn in the step (3).

[15] The human cell culturing method according to claim 12, wherein the human cultured cells withdrawn in the step (5) is withdrawn into a container different from a container in which human cells are withdrawn in the step (3).

[16] The human cell culturing method according to claim 13, wherein the human cultured cells withdrawn in the step (5) are withdrawn into a container different from a container in which human cells are withdrawn in the step (3).