CLAIMS

[Claim 1] A cryopreservation device comprising:

a cryopreservation vessel that internally accommodates a case configured to store preservation targets side by side and has an opening communicating with an outside provided in an upper surface thereof;

a first arm that raises and lowers the case in a vertical direction via the opening in a state where the case is held and maintains the case at an arbitrary height;

a first stage that is provided above the cryopreservation vessel so as to be adjacent to the opening as seen in plan view and allows the preservation targets to be placed thereon; and

a second arm that moves the preservation targets to be located at a height adjacent to the first stage from the case side to the first stage.

[Claim 2] The cryopreservation device according to Claim 1,

wherein the cryopreservation device further comprises a control unit that controls at least the first arm and the second arm.

[Claim 3] The cryopreservation device according to Claim 1 or 2,

wherein the cryopreservation device further comprises a third arm that moves the preservation targets placed on the first stage to the case.

[Claim 4] The cryopreservation device according to Claim 3,

wherein the cryopreservation device further comprises a rotary table at a lower part within the cryopreservation vessel,

wherein the case is allowed to be placed on the circumference of an arbitrary circle centered on a rotary shaft of the rotary table, and

wherein the opening is located on the circumference of the circle as seen in plan view.

[Claim 5] The cryopreservation device according to Claim 4,

wherein two or more of the openings are provided on an upper surface of the cryopreservation vessel so as to be adjacent to a direction orthogonal to a direction from the case side toward the first stage side,

wherein the rotary table allows the case to be placed on the circumference of each of two or more arbitrary concentric circles centered on the rotary shaft of the rotary table, and

wherein the openings are located on the circumference of each of the concentric circles as seen in plan view.

[Claim 6] The cryopreservation device according to Claim 5,

wherein the first arm, the second arm, the third arm, and the first stage are movable in the direction orthogonal to the direction from the case side toward the first stage side.

[Claim 7] The cryopreservation device according to any one of Claims 1 to 6,

wherein the cryopreservation device further comprises a second stage provided opposite to the first stage across the opening at a position adjacent to the opening, as seen in plan view, above the cryopreservation vessel.

[Claim 8] The cryopreservation device according to Claim 7,

wherein the first stage and the second stage are movable in a pair in the direction orthogonal to the direction from the case side toward the first stage side.

[Claim 9] The cryopreservation device according to Claim 7 or 8,

wherein the first stage and the second stage adjacent to the opening as seen in plan view support the case when the case is raised or lowered in the vertical direction via the opening.

[Claim 10] The cryopreservation device according to any one of Claims 1 to 9,

wherein the cryopreservation device further comprises an identification device that identifies the preservation targets placed on the first stage.

[Claim 11] The cryopreservation device according to any one of Claims 1 to 10,

wherein the preservation targets are accommodated in vials, and

wherein the vials are stored in a box side by side in two dimensions in the vertical direction.

[Claim 12] The cryopreservation device according to Claim 7,

wherein the cryopreservation device further comprises a third arm configured to move the preservation targets placed on the first stage to the case,

wherein a tip part of the third arm is provided with a plurality of pressing arms,

wherein the second arm is provided with one pressing arm, the one pressing arm is movable in a direction orthogonal to a direction from the case toward the second stage, and

wherein the first stage is further provided with a holder having a space into which the plurality of pressing arms are inserted.

[Claim 13] The cryopreservation device according to Claim 12,

wherein the holder is provided with a partition plate configured to partition the space into which the plurality of pressing arms are inserted.

[Claim 14] The cryopreservation device according to Claim 12,

wherein the cryopreservation device further comprises a guide that restricts a positional deviation when the case is raised and lowered in the vertical direction, and

wherein the guide has a first guide located up along a lifting and lowering direction of the case, and a second guide located below the first guide.

[Claim 15] The cryopreservation device according to Claim 14,

wherein the cryopreservation device further comprises a second stage provided opposite to the first stage across the opening at a position adjacent to the opening, as seen in plan view, the cryopreservation vessel,

wherein the first guide is attached to the first arm, and

wherein the second guide is attached to the second stage.

[Claim 16] The cryopreservation device according to Claim 13,

wherein a tip part of the partition plate is provided with a taper.