CLAIMS

1. An inside air control system provided for a container (11) housing breathing plants (15), the system comprising:

adsorption columns (34, 35), each of which houses an adsorbent that adsorbs a nitrogen component in air;

a first pump mechanism (31a) which supplies outside air to the adsorption columns (34, 35) to pressurize the adsorption columns (34, 35), thereby allowing each of the adsorption columns (34, 35) to perform an adsorption operation of adsorbing the nitrogen component in the air onto the adsorbent; and

a second pump mechanism (31b) which sucks the air from the adsorption columns (34, 35) to depressurize the adsorption columns (34, 35), thereby allowing each of the adsorption columns (34, 35) to perform a desorption operation of desorbing the nitrogen component adsorbed onto the adsorbent in the air, wherein

the inside air control system allows the adsorption columns (34, 35) to alternately perform the adsorption operation and the desorption operation so that nitrogen-enriched air having a higher nitrogen concentration and a lower oxygen concentration than the air is produced and supplied into the container (11),

the inside air control system performs a partial supply operation of discharging to the outside of the container (11) the nitrogen-enriched air produced for a predetermined time since the desorption operation was started, and then supplying into the container (11) the nitrogen-enriched air produced until the end of the desorption operation since the predetermined time passed, and

time for discharging the nitrogen-enriched air to the outside of the container (11) in the partial supply operation increases with decrease in the oxygen concentration of the air in

the container (11).

2. The inside air control system of claim 1, wherein

the inside air control system performs a whole supply operation of supplying the whole nitrogen-enriched air produced during a period from the start to end of the desorption operation into the container (11) until an oxygen concentration of the air in the container (11) reaches a predetermined concentration or lower, and

the inside air control system performs the partial supply operation when the oxygen concentration of the air in the container (11) has reached the predetermined concentration or lower.

3. The inside air control system of claim 1 or 2, further comprising:

a supply passage (44) which is connected to an outlet of the second pump mechanism (31b) and guides the nitrogen-enriched air discharged from the second pump mechanism (31b) into the container (11);

an oxygen discharge passage (45) which is connected to the adsorption columns (34, 35) and discharges, out of the inside air control system, oxygen-enriched air having a lower nitrogen concentration and a higher oxygen concentration than the air produced through the adsorption operation in the adsorption columns (34, 35);

an exhaust connection passage (71) connecting the supply passage (44) and the oxygen discharge passage (45) together;

an exhaust on-off valve (72) provided at the exhaust connection passage (71) to open and close the exhaust connection passage (71);

a supply on-off valve (73) which is provided at the supply passage (44) to be located further toward the inside of the container (11) than a junction where the exhaust connection

passage (71) is connected, and opens and closes the supply passage (44); and

a controller (55) which controls switching between a gas discharge operation in which the exhaust on-off valve (72) is instructed to open and the supply on-off valve (73) is instructed to close so that the nitrogen-enriched air produced is discharged to the outside of the container (11), and a gas supply operation in which the exhaust on-off valve (72) is instructed to close and the supply on-off valve (73) is instructed to open so that the nitrogen-enriched air produced is supplied into the container (11).

4. The inside air control system of claim 3, further comprising:

a measurement passage (81) which guides the nitrogen-enriched air flowing through the supply passage (44) toward an oxygen sensor (51) provided in the container (11); and

a measurement on-off valve (82) provided at the measurement passage (81) to open and close the measurement passage (81), wherein

the controller (55) instructs the exhaust on-off valve (72) and the supply on-off valve (73) to close, and the measurement on-off valve (82) to open, thereby performing a supply air measurement operation of allowing the oxygen sensor (51) to measure an oxygen concentration of the nitrogen-enriched air.

5. A container refrigeration apparatus attached to a container (11) housing breathing plants (15), the apparatus comprising:

a refrigerant circuit (20) which performs a refrigeration cycle to cool air in the container (11); and

an inside air control system (60) including a gas supply device (30) which produces nitrogen-enriched air having a higher nitrogen concentration and a lower oxygen concentration than the air and supplies the nitrogen-enriched air into the container (11), and

an exhaust portion (46) through which the air in the container (11) is exhausted to the outside of the container (11), the inside air control system (60) controlling a composition of the air in the container (11), wherein

the container refrigeration apparatus controls a temperature and composition of the air in the container (11) to a desired temperature and composition, and

the inside air control system (60) is comprised of the inside air control system (60) of any one of claims 1 to 4.