CLAIMS

1. A container refrigeration apparatus comprising:

a refrigeration cycle unit (30) having a refrigerant circuit (40); and

a control unit (80) configured to control an action of the refrigeration cycle unit (30) to adjust a temperature of inside air in a container (11) to a desired temperature,

the control unit (80) including:

an impact determination section (83) configured to determine whether or not a strong impact acted on the container (11), and

an abnormality diagnosis section (84) configured to perform an abnormality diagnosis to diagnose whether or not at least one of the container (11) or the container refrigeration apparatus (10) has an abnormality when the impact determination section (83) determines that a strong impact acted on the container (11), and

the container refrigeration apparatus further comprising:

a detector (73, 75) configured to detect a physical quantity for determining whether or not a strong impact acted on the container (11) by the impact determination section (83), and transmit the physical quantity to the control unit (80);

a first power source (91) connected to components of the refrigeration cycle unit (30) and configured to supply electric power to the components; and

a third power source (93) separate from the first power source (91) and configured to supply electric power to the controller (80) and the detector (73, 75).

2. The container refrigeration apparatus of claim 1, further comprising

a refrigerant leakage detection unit (74) provided in the container (11) and configured to detect a leakage of a refrigerant from the refrigerant circuit (40), wherein

in the abnormality diagnosis, the abnormality diagnosis section (84) determines whether or not the refrigerant has leaked from the refrigerant circuit (40) based on a value detected using the refrigerant leakage detection unit (74), and if the abnormality diagnosis section (84) determines that the refrigerant has leaked from the refrigerant circuit (40), the abnormality diagnosis section (84) diagnoses that the container refrigeration apparatus (10) has an abnormality.

3. A container refrigeration apparatus comprising:

a refrigeration cycle unit (30) having a refrigerant circuit (40); and

a control unit (80) configured to control an action of the refrigeration cycle unit (30) to adjust a temperature of inside air in a container (11) to a desired temperature,

the control unit (80) including:

an impact determination section (83) configured to determine whether or not a strong impact acted on the container (11), and

an abnormality diagnosis section (84) configured to perform an abnormality diagnosis to diagnose whether or not at least one of the container (11) or the container refrigeration apparatus (10) has an abnormality when the impact determination section (83) determines that a strong impact acted on the container (11), and

the container refrigeration apparatus further comprising:

a first power source (91) connected to components of the refrigeration cycle unit (30) and configured to supply electric power to the components;

a second power source (92) separate from the first power source (91), and

a refrigerant leakage detection unit (74) provided in the container (11), the refrigerant leakage detection unit (74) connected to the first power source (91) and the second power source (92) and configured to detect a leakage of a refrigerant from the refrigerant circuit

(40), wherein

in the abnormality diagnosis, the abnormality diagnosis section (84) determines whether or not the refrigerant has leaked from the refrigerant circuit (40) based on a value detected using the refrigerant leakage detection unit (74), and if the abnormality diagnosis section (84) determines that the refrigerant has leaked from the refrigerant circuit (40), the abnormality diagnosis section (84) diagnoses that the container refrigeration apparatus (10) has an abnormality,

if the impact determination section (83) diagnoses that a strong impact acted on the container (11) with the first power source (91) being in a power-ON state in which electric power can be supplied, the control unit (80) makes the first power source (91) supply electric power to the refrigerant leakage detection unit (74) to make the refrigerant leakage detection unit (74) detect a leakage of the refrigerant from the refrigerant circuit (40), and

if the impact determination section (83) diagnoses that a strong impact acted on the container (11) with the first power source (91) being in the power-OFF state in which electric power cannot be supplied, the control unit (80) makes the second power source (92) supply electric power to the refrigerant leakage detection unit (74) to make the refrigerant leakage detection unit (74) detect a leakage of the refrigerant from the refrigerant circuit (40).

4. The container refrigeration apparatus of claim 2, further comprising

a second power source (92) separate from the first power source (91), wherein

the refrigerant leakage detection unit (74) is connected to the first and second power sources (91) and (92),

if the impact determination section (83) diagnoses that a strong impact acted on the container (11) with the first power source (91) being in a power-ON state in which electric power can be supplied, the control unit (80) makes the first power source (91) supply electric

power to the refrigerant leakage detection unit (74) to make the refrigerant leakage detection unit (74) detect a leakage of the refrigerant from the refrigerant circuit (40), and

if the impact determination section (83) diagnoses that a strong impact acted on the container (11) with the first power source (91) being in the power-OFF state in which electric power cannot be supplied, the control unit (80) makes the second power source (92) supply electric power to the refrigerant leakage detection unit (74) to make the refrigerant leakage detection unit (74) detect a leakage of the refrigerant from the refrigerant circuit (40).

5. The container refrigeration apparatus of claims 3 or 4, wherein

the refrigeration cycle unit (30) includes an internal fan (36) provided inside the container (11) and configured to circulate the inside air, and a ventilating device (29) that allows inside and outside of the container (11) to communicate with each other to perform ventilation of the inside of the container (11), and

the control unit (80) includes a processing section (85) configured to

cause the internal fan (36) to operate and activate the ventilating device (29) to perform a refrigerant discharge action to discharge a refrigerant that has leaked from the refrigerant circuit (40) together with the inside air when the abnormality diagnosis section (84) diagnoses that the container refrigeration apparatus (10) has an abnormality with the first power source (91) being in the power-ON state, and

perform the refrigerant discharge action after the first power source (91) is switched to the power-ON state from the power-OFF state when the abnormality diagnosis section (84) diagnoses that the container refrigeration apparatus (10) has an abnormality with the first power source (91) being in the power-OFF state.

6. A container refrigeration apparatus comprising:

a refrigeration cycle unit (30) having a refrigerant circuit (40); and

a control unit (80) configured to control an action of the refrigeration cycle unit (30) to adjust a temperature of inside air in a container (11) to a desired temperature,

the control unit (80) including:

an impact determination section (83) configured to determine whether or not a strong impact acted on the container (11), and

an abnormality diagnosis section (84) configured to perform an abnormality diagnosis to diagnose whether or not at least one of the container (11) or the container refrigeration apparatus (10) has an abnormality when the impact determination section (83) determines that a strong impact acted on the container (11), and

the container refrigeration apparatus further comprising:

a GPS receiver (73) configured to detect positional information of the container (11), wherein

the impact determination section (83) calculates an impact value acted on the container (11) based on a change in positional information of the container (11) detected with the GPS receiver (73), and if the calculated impact value is equal to or greater than a predetermined value, the impact determination section (83) determines that a strong impact acted on the container (11).

7. The container refrigeration apparatus of any one of claims 1 to 5, further comprising

a GPS receiver (73) configured to detect positional information of the container (11), wherein

the impact determination section (83) calculates an impact value acted on the container (11) based on a change in positional information of the container (11) detected with

the GPS receiver (73), and if the calculated impact value is equal to or greater than a predetermined value, the impact determination section (83) determines that a strong impact acted on the container (11).

8. The container refrigeration apparatus of any one of claims 1 to 5, further comprising

an impact sensor (75) configured to detect an acceleration, wherein

if a value of the acceleration detected using the impact sensor (75) is equal to or greater than a predetermined value, the impact determination section (83) determines that a strong impact acted on the container (11).

9. The container refrigeration apparatus of any one of claims 1 to 8, wherein

the abnormality diagnosis section (84) performs the abnormality diagnosis after a predetermined time has elapsed since the impact determination section (83) determined that a strong impact acted on the container (11).