Desired in this regard is development of a vacuum insulation panel capable of maintaining its heat insulating properties for a long time. Developed as a vacuum insulation panel having long-term heat insulation properties is a vacuum insulation panel that is evacuated inside and has a stainless steel-based end portion welded in a state where a core member such as glass wool is wrapped with a thin metal plate such as a stainless steel plate.

Patent Document 1 discloses a device for manufacturing such vacuum insulation panels. In the device, a heat insulating material is arranged in the space that is formed by an inner plate body and an outer plate body provided with an evacuation port, a laminated body is prepared in which the peripheral edge portions of the outer and inner plate bodies are welded, a sealing member is placed on the wax that is arranged around the evacuation port, the laminated body is arranged in a chamber, vacuum suctioning is performed from the evacuation port by a vacuum suction unit, the wax is melted by heating of the laminated body, and the evacuation port is sealed by the sealing member.

Patent Document 1: Japanese Patent No. 4365736

DISCLOSURE

In the manufacturing device disclosed in Patent Document 1, evacuation and brazing are performed in the chamber. Accordingly, the chamber is required into which the entire

laminated body of the outer and inner plate bodies and the heat insulating material is put. In addition, a heating unit in the chamber is required since brazing is performed in the chamber. As a result, the size of the vacuum insulation panel manufacturing device increases to entail costs.

Embodiments of the present disclosure provide a miniaturizable vacuum insulation panel manufacturing device.

In an aspect, there is provided a vacuum insulation panel manufacturing device in which a vacuum insulation panel is manufactured by wrapping an insulating core member with a packaging member in which an evacuation port is provided, applying a vacuum to evacuate inside of the packaging member from the evacuation port, and sealing the evacuation port with a sealing member, the vacuum insulation panel manufacturing device comprising:

a chamber with an opened bottom;

a chamber evacuation hole provided in the chamber;

a quartz glass window unit provided in the top of the chamber;

a holding unit which can hold an outer periphery of the sealing member, the holding unit including a hole for allowing laser light to pass through;

a lifting mechanism which raises/lowers the holding unit;

a frame member which holds and raises/lowers the chamber; and

a laser welding unit provided outside of the chamber.

In the vacuum insulation panel manufacturing device according to an embodiment, a vacuum insulation panel is manufactured by wrapping an insulating core member with a packaging member in which an evacuation port is provided, applying a vacuum to evacuate inside of the packaging member from the evacuation port, and sealing the evacuation port with a sealing member. The vacuum insulation panel manufacturing device includes a chamber with an opened bottom, a chamber evacuation hole provided in the chamber, a quartz glass window unit provided in the top of the chamber, a holding unit which can hold the sealing member, a lifting mechanism which raises/lowers the holding unit, a frame member which holds and raises/lowers the chamber, and a laser welding unit provided outside of the chamber.

The holding unit may include a magnet and be capable of holding the sealing member as a magnetic body by using a magnetic force on an evacuation port side surface of the holding unit.

The holding unit may be capable of pressing the sealing

member to a region covering the evacuation port of the packaging member.

A seal member may be attached to an outer periphery of the opening of the chamber.

A laser emitting unit of the laser welding unit may be rotatable around an axis.

According to the present disclosure, a miniaturizable vacuum insulation panel manufacturing device can be provided.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross-sectional view of a vacuum insulation panel 1.

Fig. 2 is an exploded view of the vacuum insulation panel 1.

Fig. 3 is a block diagram of a vacuum insulation panel manufacturing device 2 manufacturing the vacuum insulation panel 1.

Fig. 4 is a diagram illustrating a seam welding device 100.

Fig. 5 is a schematic perspective view of the seam welding device 100.

Fig. 6 is a diagram illustrating a vacuum device 3 of the vacuum insulation panel manufacturing device 2.

Figs. 7 are diagrams illustrating a method for manufacturing the vacuum insulation panel 1 by using the vacuum insulation panel manufacturing device 2.

What is claimed is:

1. A vacuum insulation panel manufacturing device in which a vacuum insulation panel is manufactured by wrapping an insulating core member with a packaging member in which an evacuation port is provided, applying a vacuum to evacuate inside of the packaging member from the evacuation port, and sealing the evacuation port with a sealing member, the vacuum insulation panel manufacturing device comprising:

a chamber with an opened bottom;

a chamber evacuation hole provided in the chamber;

a quartz glass window unit provided in the top of the chamber;

a holding unit which can hold an outer periphery of the sealing member, the holding unit including a hole for allowing laser light to pass through;

a lifting mechanism which raises/lowers the holding unit;

a frame member which holds and raises/lowers the chamber; and

a laser welding unit provided outside of the chamber.

2. The vacuum insulation panel manufacturing device according to claim 1, wherein the holding unit includes a magnet and can hold the sealing member as a magnetic body by using a magnetic force on an evacuation port side surface of the holding unit.

3. The vacuum insulation panel manufacturing device according to claim 1 or 2,

wherein the holding unit, in a state of holding an outer periphery of the sealing member, lowers the sealing member, blocks the evacuation port by way of the sealing member and presses the sealing member toward the evacuation port side, and

wherein the laser welding unit laser welds the sealing member and the packaging member, in a state in which a stacked portion between the sealing member and the packaging member is restrained without any gap.

4. The vacuum insulation panel manufacturing device according to any one of claims 1 to 3, wherein a seal member is attached to an outer periphery of the opening of the chamber.

5. The vacuum insulation panel manufacturing device according to any one of claims 1 to 4, wherein a laser emitting unit of the laser welding unit is rotatable around an axis.

6. A method for manufacturing the vacuum insulation panel according to any one of claims 1 to 5,

wherein the holding unit is supported by way of a support rod attached in three places along an outer periphery, and

wherein an upper end of the support rod is fixed to the lifting mechanism, passing through an outer periphery of a portion where a window is provided to an upper middle portion of the chamber, in which quartz glass is attached to the window.