CLAIMS

[Claim 1]

A high-frequency heating apparatus comprising:

a heating chamber that accommodates a heating target;

a high-frequency oscillator that generates a high-frequency wave for heating the heating target;

a waveguide that guides the high-frequency wave generated by the high-frequency oscillator;

an antenna shaft that causes the high-frequency wave in the waveguide to propagate;

a plate-shaped antenna that is coupled to the antenna shaft, is arranged substantially parallel to a bottom of the heating chamber, and is configured to diffuse the high-frequency wave into the heating chamber; and

rotary drive means that rotates the antenna through the antenna shaft;

wherein the antenna includes

a first antenna in which at least one opening as a first radiation part is formed in a conductor section coupled to the antenna shaft,

first and second conductive paths branching from the first antenna, and

a second antenna that has a plate section as a second radiation part which is connected to the first conductive path and the second conductive path.

[Claim 2]

The high-frequency heating apparatus of claims 1, wherein:

at least two of the first antennas are coupled to the antenna shaft, and

the first conductive path is connected to either one of the first antennas, and the second conductive path is connected to the other one of the first antennas.

[Claim 3]

The high-frequency heating apparatus of claim 1 or 2, wherein a rotation locus defined by the first radiation part upon rotating the antenna shaft is different from a rotation locus defined by the second radiation part.

[Claim 4]

The high-frequency heating apparatus of any one of claims 1 through 3, wherein either one of or both the first radiation part and the second radiation part include plural of the first radiation parts and plural of the second radiation parts, respectively.

[Claim 5]

The high-frequency heating apparatus of any one of claims 1, 3 or 4, wherein:

a pair of the first antennas that are symmetric with respect to a joint portion connected to the antenna shaft are provided; and

the first conductive path is connected to one of the first antennas, and the second conductive path is connected to the other one of the first antennas.

[Claim 6]

The high-frequency heating apparatus of any one of claims 1 through 5, wherein a distance from a joint portion connected to the antenna shaft to a connection point between the plate section and the first conduction path is different from a distance from the joint portion connected to the antenna shaft to a connection point between the plate section and the second conduction path.

[Claim 7]

The high-frequency heating apparatus of any one of claims 1 through 6, wherein the first conductive path and the second conductive path are connected at positions that are geometrically shifted by 90 degrees with respect to a center of the plate section.

[Claim 8]

The high-frequency heating apparatus of any one of claims 1 through 7, wherein a phase of a high-frequency wave that is incident on the second radiation part from the first conductive path and a phase of a high-frequency wave that is incident on the second radiation part from the second conductive path are shifted by approximately 90 degrees.

[Claim 1]

A high-frequency heating apparatus comprising:

a heating chamber that accommodates a heating target;

a high-frequency oscillator that generates a high-frequency wave for heating the heating target;

a waveguide that guides the high-frequency wave generated by the high-frequency oscillator;

an antenna shaft that causes the high-frequency wave in the waveguide to propagate;

a plate-shaped antenna that is coupled to the antenna shaft, is arranged substantially parallel to a bottom of the heating chamber, and is configured to diffuse the high-frequency wave into the heating chamber; and

rotary drive means that rotates the antenna through the antenna shaft;

wherein the antenna includes

a first antenna in which an opening as a first radiation part is formed in a conductor section coupled to the antenna shaft,

first and second conductive paths branching from the first antenna, and

a second antenna being a plate antenna that has a plate section as a second radiation part which is connected to the first conductive path and the second conductive path, receives power via the antenna shaft, the conductor section of the first antenna, and the first and second conductive paths, and radiates a circularly-polarized wave.

[Claim 2]

The high-frequency heating apparatus of claims 1, wherein:

at least two of the first antennas are coupled to the antenna shaft, and

the first conductive path is connected to either one of the first antennas, and the second conductive path is connected to the other one of the first antennas.

[Claim 3]

A high-frequency heating apparatus comprising:

a heating chamber that accommodates a heating target;

a high-frequency oscillator that generates a high-frequency wave for heating the heating target;

a waveguide that guides the high-frequency wave generated by the high-frequency oscillator;

an antenna shaft that causes the high-frequency wave in the waveguide to propagate;

a plate-shaped antenna that is coupled to the antenna shaft, is arranged substantially parallel to a bottom of the heating chamber, and is configured to diffuse the high-frequency wave into the heating chamber; and

rotary drive means that rotates the antenna through the antenna shaft;

wherein the antenna includes

a first antenna in which an opening as a first radiation part is formed in a conductor section coupled to the antenna shaft,

first and second conductive paths branching from the first antenna, and

a second antenna that has a plate section as a second radiation part which is connected to the first conductive path and the second conductive path, wherein

a pair of the first antennas that are symmetric with respect to a joint portion connected to the antenna shaft are provided, and

the first conductive path is connected to one of the first antennas, and the second conductive path is connected to the other one of the first antennas.

[Claim 4]

The high-frequency heating apparatus of any one of claims 1 through 3, wherein a rotation locus defined by the first radiation part upon rotating the antenna shaft is different from a rotation locus defined by the second radiation part.

[Claim 5]

The high-frequency heating apparatus of any one of claims 1 through 4, wherein either one of or both the first radiation part and the second radiation part include plural of the first radiation parts and plural of the second radiation parts, respectively.

[Claim 6]

The high-frequency heating apparatus of any one of claims 1 through 5, wherein a distance from a joint portion connected to the antenna shaft to a connection point between the plate section and the first conduction path is different from a distance from the joint portion connected to the antenna shaft to a connection point between the plate section and the second conduction path.

[Claim 7]

The high-frequency heating apparatus of any one of claims 1 through 6, wherein the first conductive path and the second conductive path are connected at positions that are geometrically shifted by 90 degrees with respect to a center of the plate section.

[Claim 8]

The high-frequency heating apparatus of any one of claims 1 through 7, wherein a phase of a high-frequency wave that is incident on the second radiation part from the first conductive path and a phase of a high-frequency wave that is incident on the second radiation part from the second conductive path are shifted by approximately 90 degrees.