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(54) **ELECTROMAGNETIC HEATING ASSEMBLY AND COOKING EQUIPMENT**

(57) The application provides an electromagnetic heating assembly and cooking equipment. The electromagnetic heating assembly comprises: an electromagnetic coil configured to generate an electromagnetic field; a circuit board connected to the electromagnetic coil; a heat dissipation component arranged at the circuit board and configured to cool the circuit board; and an electrical device arranged at a side, facing away from the electromagnetic coil, of the heat dissipation component; where the heat dissipation component is further configured to isolate the electrical device from the electromagnetic field. The heat dissipation component having magnetic isolation performance is arranged and used as a magnetic isolation component to block the electromagnetic field. Thus, the magnetic isolation component can cool the circuit board and protect the electrical device simultaneously, and no separate magnetic isolation structures

for the electrical device and the electromagnetic coil are required. Accordingly, the technical defects of a high cost, a heavy weight, and a large size of a product in the related art are overcome.

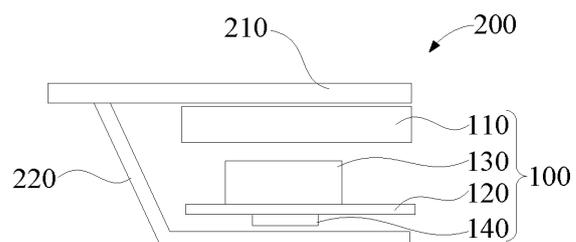


FIG. 1

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Description

[0001] The application claims the priority to Chinese Patent Application No. 202222333239.3, filed with the China National Intellectual Property Administration on September 2, 2022 and entitled "Electromagnetic heating assembly and cooking equipment", which is incorporated in its entirety herein by reference.

FIELD

[0002] The application relates to the technical field of cooking appliances, and in particular to an electromagnetic heating assembly and cooking equipment.

BACKGROUND

[0003] In the related art, to ensure that the operation of an electrical device is free of disturbance of an electromagnetic field, a magnetic isolation layer needs to be arranged between an electromagnetic coil and the electrical device. However, the additional magnetic isolation layer will increase a cost, and is not conducive to miniaturized and lightweight design of a product.

[0004] Thus, it is a pressing technical issue to overcome the above technical defects.

SUMMARY

[0005] The application aims to solve at least one of technical problems in the prior art.

[0006] Thus, in a first aspect, the application provides an electromagnetic heating assembly.

[0007] In a second aspect, the application provides cooking equipment.

[0008] In view of the above, in the first aspect, the application provides the electromagnetic heating assembly. The electromagnetic heating assembly comprises: an electromagnetic coil configured to generate an electromagnetic field; a circuit board connected to the electromagnetic coil; a heat dissipation component arranged at the circuit board and configured to cool the circuit board; and an electrical device arranged at a side, facing away from the electromagnetic coil, of the heat dissipation component; where the heat dissipation component is further configured to isolate the electrical device from the electromagnetic field.

[0009] The application provides the electromagnetic heating assembly. The electromagnetic heating assembly comprises the electromagnetic coil, the circuit board, and the electrical device. The electromagnetic coil can generate the electromagnetic field after energized. The electromagnetic heating assembly heats a target container through the electromagnetic field generated. A temperature of the target container is increased under the action of the electromagnetic field, and a food material is cooked into finished food through a high-temperature container. The circuit board is connected to the

electromagnetic coil. By arranging the circuit board, the electromagnetic coil may be electrically connected to each electrical device. The electrical device is arranged on the circuit board.

5 [0010] The electrical device comprises a controller, a power supply structure, a temperature measurement structure, etc. The controller may control an operation state of the electromagnetic coil through the circuit board. The power supply structure may supply power to the
10 electromagnetic coil and other power consuming structures through the circuit board. The temperature measurement structure may monitor operation temperatures of the circuit board, other power consuming structures, and the electromagnetic coil, and transmit the operation
15 temperatures to the controller through the circuit board, to complete targeted control. The electromagnetic field generated by the electromagnetic coil will disturb normal operation of the electrical device. Especially when the electromagnetic field intensity required for heating is
20 high, if directly exposed to an electromagnetic field coverage region, the electrical device probably malfunctions or even becomes damaged.

[0011] In the related art, in order to ensure that the electrical device in an induction cooker can operate
25 normally, a separate magnetic isolation structure is generally arranged between the electromagnetic coil and the electrical device, to isolate the electrical device from the electromagnetic field through the magnetic isolation structure. However, a magnetic isolation material has a
30 high cost and great density. With the magnetic isolation structure additionally arranged in the induction cooker, a cost and a weight of a product are obviously increased. Moreover, the magnetic isolation material increases a thickness of the induction cooker inevitably, which is not
35 conducive to arrangement and storage of the induction cooker. Thus, technical problems of a high cost, a large size, and a heavy weight of the product exist in the related art.

[0012] In view of the above, the electromagnetic heating assembly defined in the application further comprises
40 the heat dissipation component. The heat dissipation component is arranged on the circuit board. The heat dissipation component has excellent heat exchange performance, and can exchange heat with air rapidly, to dissipate heat from the circuit board to the air. Thus,
45 the circuit board is cooled accordingly. The heat dissipation component is made of the magnetic isolation material and arranged between the electrical device and the electromagnetic coil. In other words, the electrical device
50 is arranged at a side, facing away from the electromagnetic coil, of the heat dissipation component. Thus, the heat dissipation component having magnetic isolation performance isolates the electrical device from the electromagnetic field.

55 [0013] It can be seen that in the application, the heat dissipation component having magnetic isolation performance is arranged and used as a magnetic isolation component to block the electromagnetic field. Thus,

the magnetic isolation component can cool the circuit board and protect the electrical device simultaneously, and no separate magnetic isolation structures for the electrical device and the electromagnetic coil are required. Accordingly, the technical defects of a high cost, a heavy weight, and a large size of a product in the related art are overcome. Thus, the technical effects of reducing structural complexity of the electromagnetic heating assembly, reducing a production cost of the electromagnetic heating assembly, and facilitating miniaturized and lightweight design of the electromagnetic heating assembly are achieved.

[0014] Specifically, an aluminum alloy heat dissipation sheet or a silicon steel sheet may be selected as the heat dissipation component. Other materials having magnetic isolation performance and excellent heat exchange performance simultaneously or may be selected to manufacture the heat dissipation component. A specific material of the heat dissipation component is not rigidly limited in the technical solution, as long as the material can satisfy heat dissipation and magnetic isolation demand simultaneously.

[0015] Further, the above electromagnetic heating assembly provided by the application can further have the additional technical features as follows:

[0016] In some technical solutions, the heat dissipation component shields the electrical device between the electromagnetic coil and the electrical device.

[0017] In the technical solution, the heat dissipation component can shield the electrical device between the electrical device and the electromagnetic coil. In other words, a projection of the electrical device on a plane of the electromagnetic coil is positioned in a projection of the heat dissipation component on the plane of the electromagnetic coil, where a projection direction is perpendicular to the plane of the electromagnetic coil.

[0018] By defining the above shielding relation, the electrical device can be effectively shielded from the electromagnetic field, and the influence of the electromagnetic field generated by the electromagnetic coil during operation on the electrical device can be reduced as much as possible. Thus, the technical effect of improving operation stability and reliability of the electromagnetic heating assembly is achieved.

[0019] In some technical solutions, the heat dissipation component is positioned between the electromagnetic coil and the circuit board.

[0020] In the technical solution, the electromagnetic coil is spaced from the circuit board, and the heat dissipation component is arranged in a gap between the electromagnetic coil and the circuit board. With the structural layout, a heat dissipation channel is formed between the electromagnetic coil and the circuit board. Air flowing through the heat dissipation channel can carry heat away from the heat dissipation component and the electromagnetic coil, and the electromagnetic coil and the heat dissipation component are kept at a low temperature. Thus, operation stability of the electromagnetic coil is

improved, and cooling performance of the heat dissipation component is ensured. On this basis, the heat dissipation component is arranged between the electromagnetic coil and the circuit board, facilitating arrangement of the electrical device. Thus, the electrical device arranged on the circuit board can be shielded by the heat dissipation component.

[0021] In some technical solutions, the electrical device comprises: a main control chip connected to the circuit board.

[0022] In the technical solution, the electrical device comprises the main control chip. The main control chip is connected to the electromagnetic coil, etc. through the circuit board. The main control chip can control the electromagnetic heating assembly to execute corresponding operation modes through a computer program stored in the main control chip. By arranging the main control chip, the electromagnetic heating assembly can be automatically and intelligently controlled. By arranging the main control chip at a side, facing away from the electromagnetic coil, of the heat dissipation component, operation of the main control chip will be free of disturbance of the electromagnetic field, and the electromagnetic heating assembly can accurately execute the predetermined operation modes.

[0023] In some technical solutions, the main control chip is positioned at a side, facing away from the heat dissipation component, of the circuit board.

[0024] In the technical solution, the main control chip is arranged at the side, facing away from the heat dissipation assembly, of the circuit board. In other words, the circuit board is positioned between the heat dissipation component and the main control chip. Specifically, the heat dissipation component is arranged above the circuit board, and the main control chip is arranged below the circuit board. The circuit board is transversely arranged between the main control chip and the heat dissipation component. The influence of the electromagnetic field on the main control chip can be further reduced. Moreover, the main control chip can avoid a heat dissipation sheet, and damage to the main control chip caused by collision with the heat dissipation sheet loosened or even dislocated under the action of the air can be avoided. Thus, the technical effects of optimizing the structural layout of the electromagnetic heating assembly, improving the reliability of the electromagnetic heating assembly, and reducing a failure rate of the electromagnetic heating assembly are achieved.

[0025] In some technical solutions, the heat dissipation component comprises: a heat conduction portion in contact with the circuit board; and fins arranged at the heat conduction portion.

[0026] In the technical solution, the heat dissipation component is structurally described. Specifically, the heat dissipation component comprises the heat conduction portion and the fins. The heat conduction portion is arranged on the circuit board, and the heat conduction portion makes contact with the circuit board for heat

transfer. The fins are arranged on the heat conduction portion, to expand a heat exchange area between the heat dissipation component and air. The plurality of fins are spaced on the heat conduction portion. The heat exchange area between the heat dissipation component and the air is further expanded by increasing a number of the fins. Thus, the heat dissipation component can be kept at a low temperature, and a cooling effect of the heat dissipation component on the circuit board can be ensured.

[0027] In some technical solutions, the fins are transversely arranged between the electromagnetic coil and the electrical device, and the plurality of fins are arranged at an interval in a direction from the electromagnetic coil to the electrical device.

[0028] In the technical solution, the fins are transversely arranged between the electromagnetic coil and the electrical device, and the plurality of fins are spaced in the direction from the electromagnetic coil to the electrical device. By defining the above arrangement mode, a plurality of magnetic isolation layers may be formed between the electromagnetic coil and the electrical device. Thus, a magnetic isolation effect is enhanced through a plurality of layers of fins, and the possibility that the electrical device is disturbed by the electromagnetic field is further reduced.

[0029] Moreover, an air channel is delimited by the plurality of fins spaced, and the air can carry heat away from the fins on two sides when flowing through the air channel. Thus, heat exchange efficiency between the heat dissipation component and the air can be improved, the cooling effect of the heat dissipation component on the circuit board can be enhanced, and the circuit board can operate for a long time within a safe temperature range.

[0030] Further, in the structure protected in the technical solution, the fins are made of a magnetic isolation material, and the heat conduction portion may be made of a non-magnetic isolation material or a magnetic isolation material. When made of an identical material, the fins and the heat conduction portion can be manufactured through an integral formation process such as casting. The integral formation process can reduce the machining difficulty of the heat dissipation component, and thus is conducive to reduction of the production cost. Moreover, there is no structural section between the heat conduction portion and the fins that are integrally formed. Thus, structural strength of the heat dissipation component can be improved, and the possibility that the fins are dislocated or even fall off can be reduced.

[0031] In some technical solutions, the electromagnetic heating assembly further comprises: an insulated gate bipolar transistor arranged at the heat conduction portion and connected to the circuit board.

[0032] In the technical solution, the electromagnetic heating assembly is further provided with the insulated gate bipolar transistor (IGBT), where the insulated gate bipolar transistor is arranged at the heat conduction

portion and connected to the circuit board through pins.

[0033] By arranging the insulated gate bipolar transistor at the heat conduction portion, the insulated gate bipolar transistor can be cooled by the heat conduction portion, and the insulated gate bipolar transistor can operate for a long time within a safe temperature range. Thus, the technical effects of reducing a failure rate of the insulated gate bipolar transistor and improving the safety and reliability of the electromagnetic heating assembly are achieved.

[0034] In some technical solutions, a surface, facing the circuit board, of the heat conduction portion is provided with an avoidance groove, where the insulated gate bipolar transistor is arranged in the avoidance groove.

[0035] In the technical solution, on the basis of the foregoing technical solution, a position for arranging the insulated gate bipolar transistor is defined. Specifically, the heat conduction portion is provided with the avoidance groove, the avoidance groove faces the circuit board, and the insulated gate bipolar transistor is arranged in the avoidance groove and connected to an inner wall of the avoidance groove.

[0036] By providing the avoidance groove and arranging the insulated gate bipolar transistor in the avoidance groove, the insulated gate bipolar transistor can be prevented from lifting the heat conduction portion on the basis of ensuring that the heat conduction portion can cool the insulated gate bipolar transistor. Thus, the technical effects of improving structural compactness of the electromagnetic heating assembly and facilitating the miniaturized and lightweight design of the electromagnetic heating assembly are achieved.

[0037] In a second aspect, the application provides cooking equipment. The cooking equipment comprises: a base; and the electromagnetic heating assembly in any technical solution described above, where the electromagnetic heating assembly is arranged in the base.

[0038] The cooking equipment provided with the electromagnetic heating assembly in any technical solution described above is provided in the technical solution. Thus, the cooking equipment has the advantages of the electromagnetic heating assembly in any technical solution described above, and can achieve the technical effects achievable by the electromagnetic heating assembly in any technical solution described above. To avoid repetition, the technical effects will not be described in detail herein.

[0039] On this basis, the cooking equipment is further provided with a base, where the base is a main frame structure of the cooking equipment and configured to locate and support other operation structures such as the electromagnetic heating assembly.

[0040] In some technical solutions, the cooking equipment further comprises: a panel connected to the base and positioned at a top of the base, where the electromagnetic coil is positioned between the panel and the heat dissipation component.

[0041] In the technical solution, the base is box-

shaped, the electromagnetic heating assembly is arranged in the base, an opening is formed at the top of the base, and the electromagnetic heating assembly may be mounted into the base via the opening. On this basis, the cooking equipment further comprises the panel, where the panel is arranged above the base and configured to cover the opening of the base, to close internal space of the base.

[0042] By arranging the panel, the structure inside the base can be protected, and waste such as food debris can be prevented from entering and damaging the operation structure inside the base. Moreover, the panel can support the target container to be heated, and the target container can cook food above the panel.

[0043] The panel comprises a heating region, where the heating region is opposite the electromagnetic coil. The target container can be heated through the electromagnetic field after placed at a position above the heating region.

[0044] In some technical solutions, the heat dissipation component is detachably connected to the base.

[0045] In the technical solution, the heat dissipation component is connected to the base through a detachable structure. Specifically, the base may be connected to the heat dissipation component through screws, bolts, or snaps and slots. The specific connection structure is not rigidly limited in the technical solution, as long as detachable connection demand is satisfied. One end of the heat conduction portion is connected to the base through the detachable connection structure, and the other end of the heat conduction portion is connected to the circuit board through pins on the insulated gate bipolar transistor.

[0046] By arranging the detachable heat dissipation component, when corroded or deformed, the heat dissipation component can be disassembled and assembled by a user, to be maintained rapidly. Moreover, when the circuit board and the electrical device fail, the heat dissipation component can be disassembled to eliminate shielding, offering convenience for the user to maintain the circuit board and the electrical device. Thus, the technical effects of reducing maintenance difficulties of the cooking equipment and improving user experience are achieved.

[0047] In some technical solutions, the cooking equipment further comprises: a support portion arranged between the circuit board and the base and configured to support the circuit board.

[0048] In the technical solution, the cooking equipment further comprises the support portion, where the support portion is arranged between the circuit board and the base, a bottom end of the support portion abuts against the base, and a top end thereof abuts against a lower surface of the circuit board. Thus, the circuit board is supported by the support portion, and collapse of a circuit is avoided, and disconnection of the circuit board from the pins on the insulated gate bipolar transistor caused by dislocation of the circuit board is avoided. Thus, the technical effects of improving structural stability of the

cooking equipment and reducing a failure rate of the cooking equipment are achieved.

[0049] In some technical solutions, the cooking equipment further comprises: a heat dissipation fan arranged at the base and configured to generate heat dissipation air within the base.

[0050] In the technical solution, the base is provided with an air inlet and an air outlet, a fan is further arranged in the base, and the fan is arranged opposite one of the air inlet and the air outlet. After the fan is activated, the air outside the base is drawn into the base via the air inlet, and the air inside the base is discharged through the air outlet, and the heat dissipation air is formed in the base. A heat dissipation mechanism is arranged on a flow path of the heat dissipation air, and the heat dissipation air carries heat away from the fins when circulating, and the fins are kept in a low-temperature state. By providing the fan, the air inlet, and the air outlet, the heat inside the base can be rapidly transferred to an external environment. Thus, cooling capacities of the heat dissipation mechanism and a cooling pipeline are improved, and a high-temperature failure of the cooking equipment is avoided.

[0051] Further, positions of the air inlet and the air outlet are described. Specifically, the air inlet is provided at the bottom of the base, and the fan is arranged above and opposite the air inlet. The air outlet is provided at a peripheral side of the base, to surround a mounting cavity. After the fan is activated, when entering the base through the bottom of the base, external air is diffused around, and finally discharged back to the external environment through the air outlet.

[0052] With the arrangement mode, the air can cover entire internal space of the base after diffused inside the base, and the heat dissipation air can carry heat away from the heat dissipation component. Thus, the technical effects of improving a heat dissipation effect on the cooking equipment and reducing the failure rate of the cooking equipment are achieved.

[0053] In some technical solutions, the cooking equipment comprises: an integrated stove, an induction cooker, or a multi-burner stove.

[0054] A product type of the cooking equipment is limited in the technical solution. Specifically, the cooking equipment may be the integrated stove that heats the target container above the electromagnetic heating region through the electromagnetic heating assembly, and extracts cooking fumes generated through a cooking fume extraction assembly.

[0055] Similarly, the induction cooker heats the target container positioned above through the built-in electromagnetic heating assembly. By introducing the electromagnetic heating assembly defined in the application, a thickness and a weight of the induction cooker can be reduced, and practicality of the induction cooker can be improved.

[0056] The multi-burner stove is mostly applied to the catering industry. A plurality of electromagnetic heating

assemblies are arranged in the multi-burner stove, and each electromagnetic heating assembly corresponds to one heating region, and a large batch of target containers are heated in a plurality of heating regions.

[0057] Additional aspects and advantages of the application will become apparent from the following description, or will be learned by practice of the application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0058] The above and/or additional aspects and advantages of the application will become apparent and comprehensible in the description of examples made with reference to the following accompanying drawings.

FIG. 1 is a first schematic structural diagram of cooking equipment according to an example of the application;

FIG. 2 is a second schematic structural diagram of cooking equipment according to an example of the application; and

FIG. 3 is a third schematic structural diagram of cooking equipment according to an example of the application.

[0059] The correspondence relations between reference numerals and component names in Figs. 1-3 are as follows:

100 electromagnetic heating assembly, 110 electromagnetic coil, 120 circuit board, 130 heat dissipation component, 132 heat conduction portion, 1322 avoidance groove, 134 fin, 140 electrical device, 142 main control chip, 150 insulated gate bipolar transistor, 200 cooking equipment, 210 panel, 220 base, and 230 support portion.

DETAILED DESCRIPTION

[0060] In order to have clearer understanding of the above objectives, features, and advantages of the application, the application is further described in detail below with reference to the accompanying drawings and particular embodiments. It should be noted that the examples of the application and the features in the examples can be mutually combined without conflicts.

[0061] In the following description, numerous specific details are set forth to provide thorough understanding of the application. However, the application can further be implemented in other ways than those described herein. Thus, the scope of protection of the application is not limited by specific examples disclosed below.

[0062] An electromagnetic heating assembly and cooking equipment according to some examples of the application are described below with reference to Figs. 1-3.

[0063] As shown in Figs. 1-2, an electromagnetic heat-

ing assembly 100 is provided according to an example of the application. The electromagnetic heating assembly 100 comprises: an electromagnetic coil 110 configured to generate an electromagnetic field; a circuit board 120 connected to the electromagnetic coil 110; a heat dissipation component 130 arranged at the circuit board 120 and configured to cool the circuit board 120; and an electrical device 140 arranged at a side, facing away from the electromagnetic coil 110, of the heat dissipation component 130; where the heat dissipation component 130 is further configured to isolate the electrical device 140 from the electromagnetic field.

[0064] The application provides the electromagnetic heating assembly 100. The electromagnetic heating assembly 100 comprises the electromagnetic coil 110, the circuit board 120, and the electrical device 140. The electromagnetic coil 110 can generate the electromagnetic field after energized. The electromagnetic heating assembly 100 heats a target container through the electromagnetic field generated. A temperature of the target container is increased under the action of the electromagnetic field, and a food material is cooked into finished food through a high-temperature container. The circuit board 120 is connected to the electromagnetic coil 110. By arranging the circuit board 120, the electromagnetic coil 110 may be electrically connected to each electrical device 140. The electrical device 140 is arranged on the circuit board 120.

[0065] The electrical device 140 comprises a controller, a power supply structure, a temperature measurement structure, etc. The controller may control an operation state of the electromagnetic coil 110 through the circuit board 120. The power supply structure may supply power to the electromagnetic coil 110 and other power consuming structures through the circuit board 120. The temperature measurement structure may monitor operation temperatures of the circuit board 120, other power consuming structures, and the electromagnetic coil 110, and transmit the operation temperatures to the controller through the circuit board 120, to complete targeted control. The electromagnetic field generated by the electromagnetic coil 110 will disturb normal operation of the electrical device 140. Especially when the electromagnetic field intensity required for heating is high, if directly exposed to an electromagnetic field coverage region, the electrical device 140 probably malfunctions or even becomes damaged.

[0066] In the related art, in order to ensure that the electrical device in an induction cooker can operate normally, a separate magnetic isolation structure is generally arranged between the electromagnetic coil and the electrical device, to isolate the electrical device from the electromagnetic field through the magnetic isolation structure. However, a magnetic isolation material has a high cost and great density. With the magnetic isolation structure additionally arranged in the induction cooker, a cost and a weight of a product are obviously increased. Moreover, the magnetic isolation material increases a

thickness of the induction cooker inevitably, which is not conducive to arrangement and storage of the induction cooker. Thus, technical problems of a high cost, a large size, and a heavy weight of the product exist in the related art.

[0067] In view of the above, the electromagnetic heating assembly 100 defined in the application further comprises the heat dissipation component 130. The heat dissipation component 130 is arranged on the circuit board 120. The heat dissipation component 130 has excellent heat exchange performance, and can exchange heat with air rapidly, to dissipate heat from the circuit board 120 to the air. Thus, the circuit board 120 is cooled accordingly. The heat dissipation component 130 is made of the magnetic isolation material and arranged between the electrical device 140 and the electromagnetic coil 110. In other words, the electrical device 140 is arranged at a side, facing away from the electromagnetic coil 110, of the heat dissipation component 130. Thus, the heat dissipation component 130 having magnetic isolation performance isolates the electrical device 140 from the electromagnetic field.

[0068] It can be seen that in the application, the heat dissipation component 130 having the magnetic isolation performance is arranged and used as a magnetic isolation component to block the electromagnetic field. Thus, the magnetic isolation component can cool the circuit board 120 and protect the electrical device 140 simultaneously, and no separate magnetic isolation structures for the electrical device 140 and the electromagnetic coil 110 are required. Accordingly, the technical defects of a high cost, a heavy weight, and a large size of a product in the related art are overcome. Thus, the technical effects of reducing structural complexity of the electromagnetic heating assembly 100, reducing a production cost of the electromagnetic heating assembly 100, and facilitating miniaturized and lightweight design of the electromagnetic heating assembly 100 are achieved.

[0069] Specifically, an aluminum alloy heat dissipation sheet or a silicon steel sheet may be selected as the heat dissipation component 130. Other materials having magnetic isolation performance and excellent heat exchange performance simultaneously or may be selected to manufacture the heat dissipation component 130. A specific material of the heat dissipation component 130 is not rigidly limited in the example, as long as the material can satisfy heat dissipation and magnetic isolation demand simultaneously.

[0070] As shown in Figs. 1 and 2, in some examples, the heat dissipation component 130 shields the electrical device 140 between electromagnetic coil 110 and the electrical device 140.

[0071] In the example, the heat dissipation component 130 can shield the electrical device 140 between the electrical device 140 and the electromagnetic coil 110. In other words, a projection of the electrical device 140 on a plane of the electromagnetic coil 110 is positioned in a projection of the heat dissipation component 130 on the

plane of the electromagnetic coil 110, where a projection direction is perpendicular to the plane of the electromagnetic coil 110.

[0072] By defining the above shielding relation, the electrical device 140 can be effectively shielded from the electromagnetic field, and the influence of the electromagnetic field generated by the electromagnetic coil 110 during operation on the electrical device 140 can be reduced as much as possible. Thus, the technical effect of improving operation stability and reliability of the electromagnetic heating assembly 100 is achieved.

[0073] In some examples, the heat dissipation component 130 is positioned between the electromagnetic coil 110 and the circuit board 120.

[0074] In the example, the electromagnetic coil 110 is spaced from the circuit board 120, and the heat dissipation component 130 is arranged in a gap between the electromagnetic coil 110 and the circuit board 120. With the structural layout, a heat dissipation channel is formed between the electromagnetic coil 110 and the circuit board 120. Air flowing through the heat dissipation channel can carry heat away from the heat dissipation component 130 and the electromagnetic coil 110, and the electromagnetic coil 110 and the heat dissipation component 130 are kept at a low temperature. Thus, operation stability of the electromagnetic coil 110 is improved, and cooling performance of the heat dissipation component 130 is ensured. On this basis, the heat dissipation component 130 is arranged between the electromagnetic coil 110 and the circuit board 120, facilitating arrangement of the electrical device 140. Thus, the electrical device 140 arranged on the circuit board 120 can be shielded by the heat dissipation component 130.

[0075] In some examples, the electrical device 140 comprises: a main control chip 142 connected to the circuit board 120.

[0076] In the example, the electrical device 140 comprises the main control chip 142. The main control chip 142 is connected to the electromagnetic coil 110, etc. through the circuit board 120. The main control chip 142 can control the electromagnetic heating assembly 100 to execute corresponding operation modes through a computer program stored in the main control chip. By arranging the main control chip 142, the electromagnetic heating assembly 100 can be automatically and intelligently controlled. By arranging the main control chip 142 at a side, facing away from the electromagnetic coil 110, of the heat dissipation component 130, operation of the main control chip 142 will be free of disturbance of the electromagnetic field, and the electromagnetic heating assembly 100 can accurately execute the predetermined operation modes.

[0077] In some examples, the main control chip 142 is positioned at a side, facing away from the heat dissipation component 130, of the circuit board 120.

[0078] In the example, the main control chip 142 is arranged at the side, facing away from the heat dissipation assembly, of the circuit board 120. In other words, the

circuit board 120 is positioned between the heat dissipation component 130 and the main control chip 142. Specifically, the heat dissipation component 130 is arranged above the circuit board 120, and the main control chip 142 is arranged below the circuit board 120. The circuit board 120 is transversely arranged between the main control chip 142 and the heat dissipation component 130. The influence of the electromagnetic field on the main control chip 142 can be further reduced. Moreover, the main control chip 142 can avoid a heat dissipation sheet, and damage to the main control chip 142 caused by collision with the heat dissipation sheet loosened or even dislocated under the action of the air can be avoided. Thus, the technical effects of optimizing the structural layout of the electromagnetic heating assembly 100, improving the reliability of the electromagnetic heating assembly 100, and reducing a failure rate of the electromagnetic heating assembly 100 are achieved.

[0079] As shown in Figs. 1 and 2, in some examples, the heat dissipation component 130 comprises: a heat conduction portion 132 in contact with the circuit board 120; and fins 134 arranged at the heat conduction portion 132.

[0080] In the example, the heat dissipation component 130 is structurally described. Specifically, the heat dissipation component 130 comprises the heat conduction portion 132 and the fins 134. The heat conduction portion 132 is arranged on the circuit board 120, and the heat conduction portion 132 makes contact with the circuit board 120 for heat transfer. The fins 134 are arranged on the heat conduction portion 132, to expand a heat exchange area between the heat dissipation component 130 and air. The plurality of fins 134 are spaced on the heat conduction portion 132. The heat exchange area between the heat dissipation component 130 and the air is further expanded by increasing a number of the fins 134. Thus, the heat dissipation component 130 can be kept at a low temperature, and a cooling effect of the heat dissipation component 130 on the circuit board 120 can be ensured.

[0081] In some examples, the fins 134 are transversely arranged between the electromagnetic coil 110 and the electrical device 140, and the plurality of fins 134 are spaced in a direction from the electromagnetic coil 110 to the electrical device 140.

[0082] In the example, the fins 134 are transversely arranged between the electromagnetic coil 110 and the electrical device 140, and the plurality of fins 134 are spaced in the direction from the electromagnetic coil 110 to the electrical device 140. By defining the above arrangement mode, a plurality of magnetic isolation layers may be formed between the electromagnetic coil 110 and the electrical device 140. Thus, a magnetic isolation effect is enhanced through a plurality of layers of fins 134, and the possibility that the electrical device 140 is disturbed by the electromagnetic field is further reduced.

[0083] Moreover, an air channel is delimited by the plurality of fins 134 spaced, and the air can carry heat

away from the fins 134 on two sides when flowing through the air channel. Thus, heat exchange efficiency between the heat dissipation component 130 and the air can be improved, the cooling effect of the heat dissipation component 130 on the circuit board 120 can be enhanced, and the circuit board 120 can operate for a long time within a safe temperature range.

[0084] Further, in the structure protected in the example, the fins 134 are made of a magnetic isolation material, and the heat conduction portion 132 may be made of a non-magnetic isolation material or a magnetic isolation material. When made of an identical material, the fins 134 and the heat conduction portion 132 can be manufactured through an integral formation process such as casting. The integral formation process can reduce the machining difficulty of the heat dissipation component 130, and thus is conducive to reduction of the production cost. Moreover, there is no structural section between the heat conduction portion 132 and the fins 134 that are integrally formed. Thus, structural strength of the heat dissipation component 130 can be improved, and the possibility that the fins 134 are dislocated or even fall off can be reduced.

[0085] In some examples, the electromagnetic heating assembly 100 further comprises: an insulated gate bipolar transistor 150 arranged at the heat conduction portion 132 and connected to the circuit board 120.

[0086] In the example, the electromagnetic heating assembly 100 is further provided with the insulated gate bipolar transistor 150, where the insulated gate bipolar transistor 150 is arranged at the heat conduction portion 132 and connected to the circuit board 120 through pins.

[0087] By arranging the insulated gate bipolar transistor 150 at the heat conduction portion 132, the insulated gate bipolar transistor 150 can be cooled by the heat conduction portion 132, and the insulated gate bipolar transistor 150 can operate for a long time within a safe temperature range. Thus, the technical effects of reducing a failure rate of the insulated gate bipolar transistor 150 and improving the safety and reliability of the electromagnetic heating assembly 100 are achieved.

[0088] In some examples, a surface, facing the circuit board 120, of the heat conduction portion 132 is provided with an avoidance groove 1322, where the insulated gate bipolar transistor 150 is arranged in the avoidance groove 1322.

[0089] In the example, on the basis of the foregoing example, a position for arranging the insulated gate bipolar transistor 150 is defined. Specifically, the heat conduction portion 132 is provided with the avoidance groove 1322, the avoidance groove 1322 faces the circuit board 120, and the insulated gate bipolar transistor 150 is arranged in the avoidance groove 1322 and connected to an inner wall of the avoidance groove 1322.

[0090] By providing the avoidance groove 1322 and arranging the insulated gate bipolar transistor 150 in the avoidance groove 1322, the insulated gate bipolar transistor 150 can be prevented from lifting the heat conduc-

tion portion on the basis of ensuring that the heat conduction portion 132 can cool the insulated gate bipolar transistor 150. Thus, the technical effects of improving structural compactness of the electromagnetic heating assembly 100 and facilitating the miniaturized and light-weight design of the electromagnetic heating assembly 100 are achieved.

[0091] As shown in Figs. 2 and 3, cooking equipment 200 is provided in an example of the application. The cooking equipment 200 comprises: a base; and the electromagnetic heating assembly 100 in any example described above, where the electromagnetic heating assembly is arranged in the base.

[0092] The cooking equipment 200 provided with the electromagnetic heating assembly 100 in any example described above is provided in the example. Thus, the cooking equipment 200 has the advantages of the electromagnetic heating assembly 100 in any example described above, and can achieve the technical effects achievable by the electromagnetic heating assembly 100 in any example described above. To avoid repetition, the technical effects will not be described in detail herein.

[0093] On this basis, the cooking equipment 200 is further provided with a base 220, where the base 220 is a main frame structure of the cooking equipment 200 and configured to locate and support other operation structures such as the electromagnetic heating assembly 100.

[0094] In some examples, the cooking equipment 200 further comprises: a panel 210 connected to the base 220 and positioned at a top of the base 220, where the electromagnetic coil 110 is positioned between the panel 210 and the heat dissipation component 130.

[0095] In the example, the base 220 is box-shaped, the electromagnetic heating assembly 100 is arranged in the base 220, an opening is formed at the top of the base 220, and the electromagnetic heating assembly 100 may be mounted into the base 220 via the opening. On this basis, the cooking equipment 200 further comprises the panel 210, where the panel 210 is arranged above the base 220 and configured to cover the opening of the base 220, to close internal space of the base 220.

[0096] By arranging the panel 210, the structure inside the base 220 can be protected, and waste such as food debris can be prevented from entering and damaging the operation structure inside the base 220. Moreover, the panel 210 can support the target container to be heated, and the target container can cook food above the panel 210.

[0097] The panel 210 comprises a heating region, where the heating region is opposite the electromagnetic coil 110. The target container can be heated through the electromagnetic field after placed at a position above the heating region.

[0098] In some examples, the heat dissipation component 130 is detachably connected to the base 220.

[0099] In the example, the heat dissipation component 130 is connected to the base 220 through a detachable

structure. Specifically, the base 220 may be connected to the heat dissipation component 130 through screws, bolts, or snaps and slots. The specific connection structure is not rigidly limited in the example, as long as detachable connection demand is satisfied. One end of the heat conduction portion 132 is connected to the base 220 through the detachable connection structure, and the other end of the heat conduction portion 132 is connected to the circuit board 120 through pins on the insulated gate bipolar transistor 150.

[0100] By arranging the detachable heat dissipation component 130, when corroded or deformed, the heat dissipation component 130 can be disassembled and assembled by a user, to be maintained rapidly. Moreover, when the circuit board 120 and the electrical device 140 fail, the heat dissipation component 130 can be disassembled to eliminate shielding, offering convenience for the user to maintain the circuit board 120 and the electrical device 140. Thus, the technical effects of reducing maintenance difficulties of the cooking equipment 200 and improving user experience are achieved.

[0101] In some examples, the cooking equipment 200 further comprises: a support portion 230 arranged between the circuit board 120 and the base 220 and configured to support the circuit board 120.

[0102] In the example, the cooking equipment 200 further comprises the support portion 230, where the support portion 230 is arranged between the circuit board 120 and the base 220, a bottom end of the support portion 230 abuts against the base 220, and a top end thereof abuts against a lower surface of the circuit board 120. Thus, the circuit board 120 is supported by the support portion 230, and collapse of a circuit is avoided, and disconnection of the circuit board 120 from the pins on the insulated gate bipolar transistor 150 caused by dislocation of the circuit board 120 is avoided. Thus, the technical effects of improving structural stability of the cooking equipment 200 and reducing a failure rate of the cooking equipment 200 are achieved.

[0103] In some examples, the cooking equipment 200 further comprises: a heat dissipation fan arranged at the base 220 and configured to generate heat dissipation air within the base 220.

[0104] In the example, the base 220 is provided with an air inlet and an air outlet, a fan is further arranged in the base 220, and the fan is arranged opposite one of the air inlet and the air outlet. After the fan is activated, the air outside the base 220 is drawn into the base 220 via the air inlet, and the air inside the base 220 is discharged through the air outlet, and the heat dissipation air is formed in the base 220. A heat dissipation mechanism is arranged on a flow path of the heat dissipation air, and the heat dissipation air carries heat away from the fins 134 when circulating, and the fins 134 are kept in a low-temperature state. By providing the fan, the air inlet, and the air outlet, the heat inside the base 220 can be rapidly transferred to an external environment. Thus, cooling capacities of the heat dissipation mechanism and a cool-

ing pipeline are improved, and a high-temperature failure of the cooking equipment 200 is avoided.

[0105] Further, positions of the air inlet and the air outlet are described. Specifically, the air inlet is provided at the bottom of the base 220, and the fan is arranged above and opposite the air inlet. The air outlet is provided at a peripheral side of the base 220, to surround a mounting cavity. After the fan is activated, when entering the base 220 through the bottom of the base 220, external air is diffused around, and finally discharged back to the external environment through the air outlet.

[0106] With the arrangement mode, the air can cover entire internal space of the base 220 after diffused inside the base 220, and the heat dissipation air can carry heat away from the heat dissipation component 130. Thus, the technical effects of improving a heat dissipation effect on the cooking equipment 200 and reducing the failure rate of the cooking equipment 200 are achieved.

[0107] In some examples, the cooking equipment 200 comprises an integrated stove, an induction cooker, or a multi-burner stove.

[0108] A product type of the cooking equipment 200 is limited in the example. Specifically, the cooking equipment 200 may be the integrated stove that heats the target container above the electromagnetic heating region through the electromagnetic heating assembly 100, and extracts cooking fumes generated through a cooking fume extraction assembly.

[0109] Similarly, the induction cooker heats the target container positioned above through the built-in electromagnetic heating assembly 100. By introducing the electromagnetic heating assembly 100 defined in the application, a thickness and a weight of the induction cooker can be reduced, and practicality of the induction cooker can be improved.

[0110] The multi-burner stove is mostly applied to the catering industry. A plurality of electromagnetic heating assemblies 100 are arranged in the multi-burner stove, and each electromagnetic heating assembly 100 corresponds to one heating region, and a large batch of target containers are heated in a plurality of heating regions.

[0111] It should be noted that in the claims, description, and drawings of the description of the application, the term "a plurality of" indicates two or more. The orientation or position relations indicated by the terms "upper", "lower", etc. are based on the orientation or position relations shown in the accompanying drawings, unless expressly defined otherwise, merely for further facilitating the description of the application and simplifying a description process, rather than indicating or implying that the device or element referred to must have a particular orientation or be constructed and operated in a particular orientation, and thus cannot be interpreted as limiting the application. The terms "connection", "mount", "fix", etc. should be understood in a broad sense. For example, a "connection" can be a fixed connection, a detachable connection, an integrated connection, a direct connection, or an indirect connection via an intermediate medium between a

plurality of objects. Those of ordinary skill in the art can understand the specific meanings of the above terms in the application according to specific circumstances of the above terms.

[0112] In the claims, description, and drawings of the description of the application, the descriptions with reference to the terms "an example", "some examples", "a specific example", etc. indicate that a specific feature, structure, material, or characteristic described in connection with the example or instance is encompassed in at least one example or instance of the application. In the claims, description, drawings of the description of the application, the illustrative expressions of the above terms do not necessarily indicate a same example or instance. Moreover, the specific feature, structure, material, or characteristic described can be combined in any suitable way in any one or more examples or instances.

[0113] What are described above are some examples of the application, but are not intended to limit the application. Those skilled in the art can make various changes and variations to the application. Any modifications, equivalent replacements, improvements, etc. made within the spirit and principles of the application should fall within the scope of protection of the application.

Claims

1. An electromagnetic heating assembly, comprising:
 - an electromagnetic coil configured to generate an electromagnetic field;
 - a circuit board connected to the electromagnetic coil;
 - a heat dissipation component arranged at the circuit board and configured to cool the circuit board; and
 - an electrical device arranged at a side, facing away from the electromagnetic coil, of the heat dissipation component; wherein the heat dissipation component is further configured to isolate the electrical device from the electromagnetic field.
2. The electromagnetic heating assembly according to claim 1, wherein the heat dissipation component shields the electrical device between the electromagnetic coil and the electrical device.
3. The electromagnetic heating assembly according to claim 1, wherein the heat dissipation component is positioned between the electromagnetic coil and the circuit board.
4. The electromagnetic heating assembly according to claim 3, wherein the electrical device comprises: a main control chip connected to the circuit board.

5. The electromagnetic heating assembly according to claim 4, wherein the main control chip is positioned at a side, facing away from the heat dissipation component, of the circuit board. 5
6. The electromagnetic heating assembly according to any one of claims 1 to 5, wherein the heat dissipation component comprises: 10
a heat conduction portion in contact with the circuit board; and
fins arranged on the heat conduction portion.
7. The electromagnetic heating assembly according to claim 6, wherein the fins are transversely arranged between the electromagnetic coil and the electrical device, and the plurality of fins are arranged at an interval in a direction from the electromagnetic coil to the electrical device. 15
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8. The electromagnetic heating assembly according to claim 6, further comprising: 25
an insulated gate bipolar transistor arranged at the heat conduction portion and connected to the circuit board.
9. The electromagnetic heating assembly according to claim 8, wherein a surface, facing the circuit board, of the heat conduction portion is provided with an avoidance groove, and the insulated gate bipolar transistor is arranged in the avoidance groove. 30
10. A cooking equipment, comprising: 35
a base; and
an electromagnetic heating assembly according to any one of claims 1 to 9, arranged in the base. 40
11. The cooking equipment according to claim 10, further comprising: 45
a panel connected to the base and positioned at a top of the base, wherein an electromagnetic coil is positioned between the panel and a heat dissipation component.
12. The cooking equipment according to claim 10, wherein the heat dissipation component is detachably connected to the base. 50
13. The cooking equipment according to claim 12, further comprising: 55
a support portion arranged between a circuit board and the base and configured to support the circuit board.
14. The cooking equipment according to claim 10, further comprising: a heat dissipation fan arranged at the base and configured to generate heat dissipation air in the base.
15. The cooking equipment according to any one of claims 10 to 14, comprising an integrated stove, an induction cooker, or a multi-burner stove.

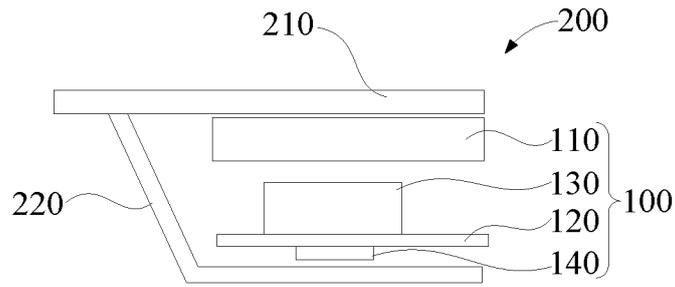


FIG. 1

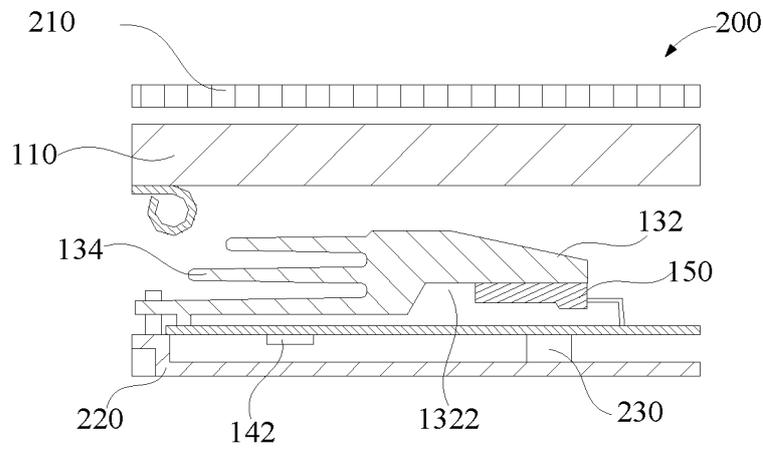


FIG. 2

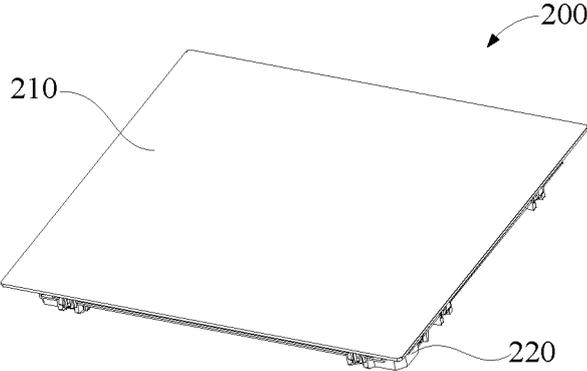


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2023/115739

A. CLASSIFICATION OF SUBJECT MATTER

F24C7/06(2006.01)i; F24C7/08(2006.01)i; F24C15/10(2006.01)i; H05B6/36(2006.01)i; H05B6/42(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F24C, H05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNTXT, DWPI, VEN, CNKI: 电磁, 线圈, 电路板, 散热, 隔, 磁, 烹饪, 灶, 炉, electromagnetic, coil, circuit, board, heat, dissipation, magnetic, isolation, cooking, equipment, stove

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 218001586 U (FOSHAN SHUNDE MIDEA ELECTRICAL HEATING APPLIANCES MANUFACTURING CO., LTD.) 09 December 2022 (2022-12-09) claims 1-15, description, paragraphs [0004]-[0117], and figures 1-3	1-15
X	CN 216087060 U (FOSHAN SHUNDE MIDEA ELECTRICAL HEATING APPLIANCES MANUFACTURING CO., LTD.) 18 March 2022 (2022-03-18) description, paragraphs [0003]-[0067], and figures 1-9	1-15
X	CN 213746898 U (ZHEJIANG SHAOXING SUPOR DOMESTIC ELECTRICAL APPLIANCE CO., LTD.) 20 July 2021 (2021-07-20) description, paragraphs [0005]-[0094], and figures 1-5	1-15
A	CN 215446564 U (GUANGDONG TAIGU ELECTRIC APPLIANCE TECHNOLOGY CO., LTD.) 07 January 2022 (2022-01-07) entire document	1-15
A	KR 20180066642 A (LG ELECTRONICS INC.) 19 June 2018 (2018-06-19) entire document	1-15

 Further documents are listed in the continuation of Box C.
 See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 November 2023

Date of mailing of the international search report

28 November 2023

Name and mailing address of the ISA/CN

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202222333239 [0001]