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(54) **A COOKING DEVICE FOR DETECTING THE AMOUNT OF LOAD**

(57) The present invention relates to a cooking device (1) comprising a tray (2) which is suitable for placing the ingredients to be cooked therein, a cooking chamber (3) wherein the tray (2) is placed, a casing (5) which surrounds the cooking chamber (3), which has two side walls

(4) and which is in the form of a box with the front side being open, and at least one support (6) which is provided on the side wall (4) and which enables the tray (2) to be placed into the cooking chamber (3).

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Description

[0001] The present invention relates to a cooking device for detecting the amount of load.

[0002] In cooking devices, the detection of the weight of the foodstuff, which is placed into the cooking chamber and which is desired to be cooked, is critical in terms of enabling the user to see the weight of the foodstuff to be cooked, preventing any excessive load, adjusting the cooking time with respect to the weight of the foodstuff to be cooked or operating the programs suitable for the weight and thus increasing the cooking efficiency of the cooking device. Moreover, determining the cooking method suitable for the weight by detecting the weight of the foodstuff to be cooked is also important in the energy efficiency of the cooking device. In the state of the art, weight sensors positioned under the tray are used to detect the weight of the foodstuffs to be cooked. In these embodiments, the weight sensors can be damaged due to high temperatures in the cooking device.

[0003] In the state of the art Patent Application No. US5463207, a cooking device is disclosed, wherein the weight of the tray placed therein is detected.

[0004] The aim of the present invention is the realization of a cooking device wherein the weight of the tray and the foodstuff placed into the tray to be cooked can be easily determined.

[0005] The cooking device realized in order to attain the aim of the present invention, explicated in the first and the respective claims thereof, comprises a tray which is suitable for placing the ingredients to be cooked therein, a cooking chamber wherein the tray is placed, a casing which surrounds the cooking chamber, which has two side walls and which is in the form of a box with the front side being open, and at least one support which is provided on the side wall and which enables the tray to be placed into the cooking chamber.

[0006] The cooking device of the present invention further comprises an elastic member which changes length by being squeezed by the weight of the tray upon placing the tray on the support and which is at least partially produced from a magnetic material so as to generate a magnetic field by interacting with the magnetic, at least one magnet which is placed onto the support so as to generate a magnetic field with the elastic member, and a magnetic sensor which is disposed on the side wall and which detects the changes in the magnetic field intensity generated between the elastic member and the magnet. The length of the elastic member decreases due to the weight of the tray placed on the support. When the force acting on the elastic member is removed, the length of the elastic member returns to the initial state. As the length of the elastic member decreases, the magnetic field intensity generated between the same and the magnet changes. The changing magnetic field intensity is detected by the magnetic sensor disposed on the side wall. Depending on the changing magnetic field intensity, the decrease in the length of the elastic member is determined. In a

preferred version of the present invention, the length of the elastic member decreases in proportion to the weight of the tray or there is a certain correlation between the weight of the tray and the decrease in the length of the elastic member. Thus, the weight of the tray can be easily calculated.

[0007] In an embodiment of the present invention, the cooking device comprises a control unit which regulates the operation. The control unit adjusts the cooking time and the suitable cooking method according to the data received from the magnetic sensor.

[0008] In another version of the present invention, a plurality of magnets are disposed on the support. Thus, the intensity of the magnetic field generated between the magnets and the elastic member is increased.

[0009] In another version of the present invention, a magnet and an elastic member are provided on each of the supports on both side walls, and a magnetic sensor is provided on each of the two side walls. In case of the presence of unbalanced load on the tray, more weight may act on one side. In this case, a measurement performed at one side may cause erroneous results. By performing measurement at both sides after the tray is placed onto the support from both sides, the weight can be calculated more correctly.

[0010] In another version of the present invention, a cut-out is formed on the part of the side wall remaining between the magnet and the magnetic sensor. Thus, the detection of the magnetic field generated between the elastic member and the magnet by the magnetic sensor is facilitated.

[0011] In another version of the present invention, the cooking device comprises a magnet which is placed onto the support so as to be positioned on the elastic member. Thus, the intensity of the magnetic field to be generated between the magnet and the elastic member is increased, and the detection of said magnetic field by the magnetic sensor is facilitated.

[0012] By means of the present invention, a cooking device is realized, wherein the weight of the tray on which the foodstuff to be cooked is placed is detected by means of the elastic member which is squeezed with the weight of the tray placed on the support so as to decrease in length, the magnet which is placed on the support so as to generate a magnetic field between the magnet and the elastic member, and a magnetic sensor which detects the magnetic field generated.

[0013] The cooking device realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the schematic view of the cooking device related to an embodiment of the present invention.

Figure 2 - is the schematic view of the cooking device related to an embodiment of the present invention.

[0014] The elements illustrated in the figures are numbered as follows:

1. Cooking device
2. Tray
3. Cooking chamber
4. Side wall
5. Casing
6. Support
7. Elastic member
8. Magnet
9. Magnetic sensor
10. Control unit

[0015] The cooking device (1) comprises a tray (2) which is suitable for placing the ingredients to be cooked therein, a cooking chamber (3) wherein the tray (2) is placed, a casing (5) which surrounds the cooking chamber (3), which has two side walls (4) and which is in the form of a box with the front side being open, and at least one support (6) which is provided on the side wall (4) and which enables the tray (2) to be placed into the cooking chamber (3). The tray (2) is placed on the support (6). The support (6) can be in the form of a wire shelf disposed on the side wall (4) or in the form of a recess or protrusion formed on the side wall (4), suitable for the placement of the tray (2) thereon.

[0016] The cooking device (1) of the present invention comprises an elastic member (7) which is disposed on the support (6) and which changes length by being squeezed by the weight of the tray (2) upon placing the tray (2) on the support (6), at least one magnet (8) which is placed onto the support (6) so as to generate a magnetic field with the elastic member (7), and a magnetic sensor (9) which is disposed on the side wall (4) and which detects the changes in the magnetic field intensity generated between the elastic member (7) and the magnet (8). The elastic member (7) comprises a material suitable for generating a magnetic field together with the magnet (8). The elastic member (7) can be a traditional spring or a spring steel. Moreover, the elastic member (7) can be produced from an elastic material such as silicone resistant to high temperatures. The weight of the elastic member (7) decreases when a weight is placed thereon. The length of the elastic member (7) returns to the initial state when the weight acting thereon is removed. In a preferred version of the present invention, the magnet (8) is a magnet (8) resistant to high temperatures, and is placed onto the support (6) so as to be positioned in the cooking chamber (3). In the preferred version of the present invention, the magnetic sensor (9) is disposed on the side wall (4) so as to be positioned outside the cooking chamber (3). The magnetic sensor (9) is disposed on the surface of the side wall (4) facing the outside so as to detect the magnetic field generated between the magnet (8) and the elastic member (7) and to be aligned with the magnet (8) which is disposed on the part of the side wall (4) facing the inner volume of the cooking chamber (3). The length of the elastic member (7) changes depending on the weight of the tray (2). As the length of the elastic member (7) changes, the intensity

of the magnetic field generated between the elastic member (7) and the magnet (8) also changes. Said change in the intensity of the magnetic field is detected by the magnetic sensor (9). The magnetic sensor (9) can determine the change in the length of the elastic member (7) depending on the change in the intensity of the magnetic field. Since the change in the length of the elastic member (7) is proportional to the weight of the tray (2), the weight of the ingredients in the tray (2) to be cooked can be determined.

[0017] In an embodiment of the present invention, the cooking device (1) comprises a control unit (10) which processes the data received from the magnetic sensor (9) so as to perform the cooking program suitable for the weight of the tray (2). The control unit (10) regulates the operation of the cooking device (1). After the weight of the tray (2) placed into the cooking chamber (3) is determined by means of the data received from the magnetic sensor (9), the cooking program suitable for the determined weight is performed by the control unit (10). The control unit (10) determines the cooking time and the cooking method according to the weight of the foodstuff to be cooked. Thus, the efficiency of the cooking process is improved, providing savings in energy.

[0018] In another embodiment of the present invention, the cooking device (1) comprises a plurality of magnets (8) which are disposed on the support (6). By increasing the number of magnets (8), the intensity of the magnetic field generated between the magnets (8) and the elastic member (7) is also increased. Thus, the change in the length of the elastic member (7) causes the change in the intensity of the magnetic field to increase. The magnetic field is enabled to expand to the outside of the cooking chamber (3). Consequently, the detection of the change in the intensity of the magnetic field by the magnetic sensor (9) is facilitated.

[0019] In another embodiment of the present invention, the cooking device (1) comprises two elastic members (7) each disposed on the support (6) on each of the two side walls (4), at least two magnets (8) with at least one being disposed on each of the supports (6), and two magnetic sensors (9) each disposed on each of the two side walls (4). One support (6) is provided on each of the two side walls (4). The tray (2) is placed onto the supports (6) in the cooking chamber (3). The weight of the tray (2) on the elastic member (7) is measured at the side of the two side walls (4). Thus, in case the user cannot place the foodstuff on the tray in a balanced manner, the risk of calculating the weight erroneously is eliminated. Consequently, the weight on the tray (2) is enabled to be calculated more correctly.

[0020] In another embodiment of the present invention, the cooking device (1) comprises a cut-out which is formed on the part of the side wall (4) aligned with the magnet (8). In the preferred version of the present invention, the magnet (8) is disposed on the support (6) provided on the part of the side wall (4) facing the inner volume of the cooking chamber (3), and a magnetic sen-

sor (9) is disposed on the outer surface of the side wall (4). The intensity of the magnetic field generated between the magnet (8) and the elastic member (7) disposed on the support (6) decreases while passing through the side wall (4), and may get difficult to be detected by the magnetic sensor (9). In order to prevent the magnetic field from weakening while passing through the side wall (4), a cut-out is formed on the part of the side wall (4) remaining between the magnet (8) and the magnetic sensor (9). Thus, the magnetic field generated in the cooking chamber (3) weakens less while passing through the side wall (4) and can be detected by the magnetic sensor (9) more easily. In another preferred version of the present invention, a material such as Teflon, silicone, etc. which is resistant to high temperatures and has a high magnetic permeability is filled into the formed cut-out.

[0021] In another embodiment of the present invention, the cooking device (1) comprises the magnet (8) which is placed onto the support (6) so as to be positioned on the elastic member (7).

[0022] By means of the present invention, a cooking device (1) is realized, wherein the weight of the tray (2) is efficiently detected by means of an elastic member (7) which changes in length depending on the weight of the tray (2) placed onto the support (6), a magnet (8), and a magnetic sensor (9) which is disposed on the side wall (4) so as to detect the changes in the magnetic field generated between the elastic member (7) and the magnet (8).

ceived from the magnetic sensor (9) so as to perform the cooking program suitable for the weight of the tray (2).

- 5 3. A cooking device (1) as in any one of the above claims, **characterized by** a plurality of magnets (8) which are disposed on the support (6).
- 10 4. A cooking device (1) as in any one of the above claims, **characterized by** two elastic members (7) each disposed on the support (6) on each of the two side walls (4), at least two magnets (8) with at least one being disposed on each of the supports (6), and two magnetic sensors (9) each disposed on each of the two side walls (4).
- 15 5. A cooking device (1) as in any one of the above claims, **characterized by** a cut-out which is formed on the part of the side wall (4) aligned with the magnet (8).
- 20 6. A cooking device (1) as in any one of the above claims, **characterized by** the magnet (8) which is placed onto the support (6) so as to be positioned on the elastic member (7).
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Claims

1. A cooking device (1) comprising a tray (2) which is suitable for placing the ingredients to be cooked therein, a cooking chamber (3) wherein the tray (2) is placed, a casing (5) which surrounds the cooking chamber (3), which has two side walls (4) and which is in the form of a box with the front side being open, and at least one support (6) which is provided on the side wall (4) and which enables the tray (2) to be placed into the cooking chamber (3), **characterized by**
 - an elastic member (7) which is disposed on the support (6) and which changes length by being squeezed by the weight of the tray (2) upon placing the tray (2) on the support (6),
 - at least one magnet (8) which is placed onto the support (6) so as to generate a magnetic field with the elastic member (7), and
 - a magnetic sensor (9) which is disposed on the side wall (4) and which detects the changes in the magnetic field intensity generated between the elastic member (7) and the magnet (8).
2. A cooking device (1) as in Claim 1, **characterized by** a control unit (10) which processes the data re-

Figure 1

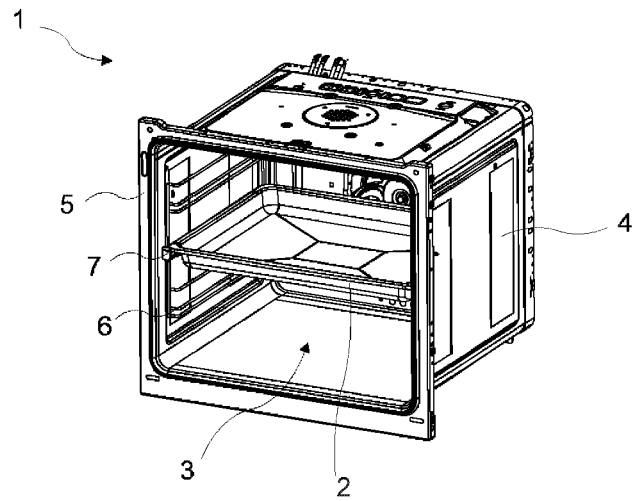
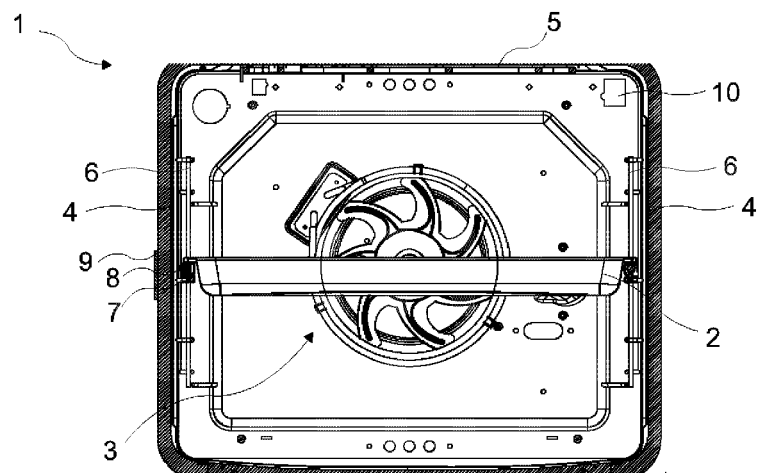


Figure 2





EUROPEAN SEARCH REPORT

Application Number
EP 21 15 1828

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 May 2021	Examiner Meyers, Jerry
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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