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(54) COOKER AND COOKING VESSEL POSITION SENSING SYSTEM

(57) There is provided a cooker (5) having a heating element (10) mounted on a mechanical arrangement (90, 95, 115, 120) for moving the heating element (10). The cooker (5) has a supporting structure (15) for supporting a cooking vessel (20) above the heating element (10). The cooker (5) is provided with a proximity sensing arrangement (25, 30, 35, 40) for sensing the position of a cooking vessel (20) placed onto the supporting structure (15). The mechanical arrangement (90, 95, 115, 120) is arranged to move the heating element (10) to a position corresponding to the position of a cooking vessel (20) placed onto the supporting structure (15) as sensed by the proximity sensing arrangement (25, 30, 35, 40). A cooking vessel proximity sensing system (25, 30, 35, 40, 110) is also provided, having a plurality of movable proximity sensing elements (25, 30, 35, 40) and a controller (110).

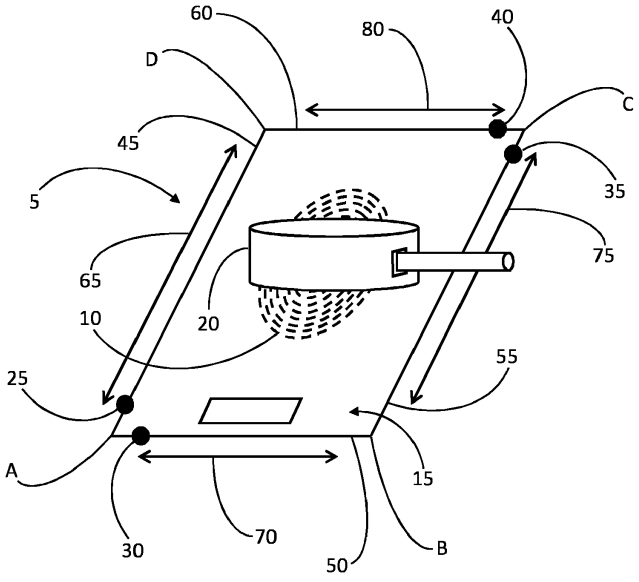

Figure 1

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Description

Technical Field

[0001] The present disclosure relates to a cooker and to a cooking vessel position sensing system.

Background

[0002] When cooking using an induction cooker or a cooker having direct heating elements, it is beneficial for a cooking vessel to be positioned accurately over an induction heating coil or direct heating element to ensure an intended heating effect. However, if a cooking vessel is not, or cannot, be accurately positioned then it is known, in the field of induction cookers in particular, to provide movable induction cooking coils.

Summary

[0003] According to a first aspect disclosed herein, there is provided a cooker, comprising:

a heating element mounted on a mechanical arrangement for moving the heating element;
a supporting structure for supporting a cooking vessel above the heating element; and
a proximity sensing arrangement for sensing the position of a cooking vessel placed onto the supporting structure,
the mechanical arrangement being arranged to move the heating element to a position corresponding to the position of a cooking vessel placed onto the supporting structure as sensed by the proximity sensing arrangement.

[0004] The use of a proximity sensing arrangement enables the position of a cooking vessel upon the supporting structure to be determined by sensors positioned separately from the heating element. This is beneficial in particular where the cooker uses direct heating elements as the sensors are unlikely to be damaged by direct heating.

[0005] In an example, the proximity sensing arrangement comprises a plurality of movable proximity sensing elements each arranged to output signals indicative of a sensed distance from the sensing element to a cooking vessel.

[0006] By providing movable sensing elements, fewer sensing elements are required to obtain a sufficient number of measurements, as compared with fixed sensor arrangements, to determine the position of a cooking vessel.

[0007] In an example, each of the plurality of movable proximity sensing elements is supported by and movable along a rod, track or other form of conveyance. This enables each sensing element to follow a predetermined path when making measurements of cooking vessel distance.

[0008] In an example, the plurality of movable proximity sensing elements are arranged to output signals indicative of the position of the cooking vessel upon the supporting structure from each of a plurality of positions.

[0009] In an example, the plurality of movable proximity sensing elements comprise at least one inductive proximity sensor. Inductive proximity sensors may each be used to measure a distance to a metal cooking vessel from a number of different positions close to the cooking vessel.

[0010] In an example, the plurality of movable proximity sensing elements include at least one pair of sensing elements comprising a signal source and a corresponding signal sensor. This provides a different method for determining the distance of a cooking vessel from a number of known sensor positions around the supporting structure of the cooker.

[0011] In an example, the signal source and the signal sensor of the at least one pair of sensing elements are arranged to move simultaneously. In this way, the changing positions of the signal source and the corresponding signal sensor provide for a number of different angles from which distance from the sensing elements to the cooking vessel may be determined.

[0012] In an example, the signal source of the at least one pair of sensing elements is arranged to emit an optical or radio frequency signal and the corresponding sensor of the at least one pair of sensing elements is arranged to detect the emitted signal following reflection from the cooking vessel.

[0013] In an example, the mechanical arrangement comprises an arrangement of rods, tracks, levers or other forms of conveyance, linked to one or more actuators, to support and to move the heating element to a position corresponding with a position sensed by the proximity sensing arrangement.

[0014] In an example, the mechanical arrangement comprises one or more position sensors arranged to output signals to the controller indicative of a position of the heating element.

[0015] According to a second aspect disclosed herein, there is provided a cooking vessel position sensing system, comprising a plurality of movable proximity sensing elements, wherein the plurality of movable proximity sensing elements is arranged to output signals indicative of a sensed distance from each said sensing element to a cooking vessel, and a controller configured to determine from the output signals a position of the cooking vessel.

[0016] In an example of the position sensing system, each of the plurality of movable proximity sensing elements is supported by and movable along a rod, track or other form of conveyance.

[0017] In an example of the position sensing system, the plurality of movable proximity sensing elements comprise at least one inductive proximity sensor.

[0018] In an example of the position sensing system, the plurality of movable proximity sensing elements in-

clude at least one pair of sensing elements comprising a signal source and a corresponding signal sensor and wherein the signal source and the signal sensor of the at least one pair of sensing elements are arranged to move simultaneously.

[0019] In an example of the position sensing system, the signal source of the at least one pair of sensing elements is arranged to emit an optical or radio frequency signal and the corresponding sensor of the at least one pair of sensing elements is arranged to detect the emitted signal following reflection from a cooking vessel.

Brief Description of the Drawings

[0020] To assist understanding of the present disclosure and to show how embodiments may be put into effect, reference is made by way of example to the accompanying drawings in which:

Figure 1 shows schematically in a perspective view an example of a cooking surface of a cooker, according to an example disclosed herein;

Figure 2 shows schematically in a perspective view an example of a mechanical arrangement for supporting and moving an induction cooking coil or other type of cooker heating element to a determined position, according to an example disclosed herein; and

Figure 3 shows an example block diagram showing components of an example cooking vessel position sensing system according to an example disclosed herein.

Detailed Description

[0021] An example will firstly be described, with reference to Figure 1 and to Figure 2, of an induction cooker able to sense the position of a cooking vessel when placed upon a cooking surface of the cooker and to move an induction cooking coil into alignment with the cooking vessel automatically. However, the principles disclosed herein may also be applied in other types of cooker, in particular those with direct heating elements based for example upon electric heating elements or gas heating elements.

[0022] Referring firstly to Figure 1, there is shown schematically an example of an induction cooker 5 in a perspective view, comprising one induction cooking coil 10 mounted on a mechanical arrangement (not shown in Figure 1) below a cooking surface 15 of the induction cooker 5. The mechanical arrangement, as will be described in further detail below, includes one or more controllable actuators to move the induction cooking coil 10 to a determined position within a planar region beneath the cooking surface 15.

[0023] The induction cooker 5 is provided with a cooking vessel sensing system for sensing, upon activation of the cooker 5, the position of a cooking vessel 20 placed upon the cooking surface 15. The sensing system comprises, for example, four proximity sensing elements 25, 30, 35, 40 linked to a controller (not shown in Figure 1). The controller may be a dedicated sensing system controller or a controller of the induction cooker 5. Each proximity sensing element 25, 30, 35, 40 is mounted upon a respective rail (not shown in Figure 1) which may comprise for example a rod or a track or other form of supporting conveyance for the sensor, each rail extending along a respective edge 45, 50, 55, 60 of the cooking surface 15. Each proximity sensing element 25, 30, 35, 40 is able to slide or otherwise travel back and forth along its respective rail between respective corners A and D, A and B, B and C, C and D of the cooking surface 15.

[0024] Actuators may be provided (not shown in Figure 1) to move each proximity sensing element 25-40 along its respective rail. Alternatively, one or more of the sensing elements 25-40 may comprise its own motor drive arrangement to self-propel at a predetermined rate along the respective rail. Each sensing element 25-40 may be moved independently at the same or at a different rate. Alternatively, the sensing elements 25-40 may be moved in particular combinations. For example, the sensing elements 25, 30 may be moved simultaneously as a first pair of elements and the sensing elements 35, 40 may be moved simultaneously as a second pair of elements. Each of the sensing elements 25-40 may for example be moved at a predetermined rate such that each sensing element 25-40 completes a return journey along its respective rail in the same time period.

[0025] The proximity sensing elements 25-40 may for example comprise inductive proximity sensing elements. The proximity sensing elements 25-40 may each operate independently to sense the presence and distance of a metal cooking vessel 20 as the sensor 25-40 moves along its respective rail. The controller may select signals output by each sensor 25-40 when the sensor is at each of a number of predetermined positions along its respective rail and thereby determine from the distance measurements at each sensor position the position of an edge of a cooking vessel 20 on the cooking surface 15.

[0026] The proximity sensors 25-40 may alternatively comprise optical or radio frequency sensors operating in pairs. For example, the sensing elements 25, 30 may operate as a first pair, comprising a signal source 25 and a corresponding sensor 30, while the sensing elements 35, 40 may operate as a second pair, comprising a signal source 35 and a corresponding sensor 40. Each of the pair of sensing elements may be moved simultaneously so that, for example, each measurement of distance is made when the emitter 25, 35 has moved along the same proportion of its rail as the corresponding sensor 30, 40.

[0027] The signal sources 25, 35 may emit an optical or radio-frequency signal, for example at the same or a different frequency, directed over a range of angles across the cooking surface 15. For example, the emitters 25, 35 may emit a sequence of optical or radio frequency

broad-beam pulses, each covering a range of angles sufficient to extend to a cooking vessel 20 placed anywhere on the cooking surface 15. Alternatively, the emitters 25, 35 may emit a sequence of narrow-beam signals, each directed at a different angle over the cooking surface 15. When a signal is reflected from a cooking vessel 20 and detected by the corresponding sensor 30, 40, the controller may be configured to determine, for example, the time interval from emission to detection of a pulse, or the angle of emission of a pulse and the angle from which the reflected pulse is detected. Such measurements may be made at each of a number of predetermined positions of the respective pair of sensing elements 25, 30 or 35, 40 along their respective rails. From these measurements, the controller may calculate the distance of an edge of the cooking vessel 20 on the cooking surface 15 from each of multiple different sensing element positions and hence calculate an estimate of the centre position of the cooking vessel 20 on the cooking surface 15.

[0028] Other proximity sensing techniques and sensing element types, as would be apparent to a person of ordinary skill in the relevant art, may be used to provide a proximity sensing system for determining the position of a cooking vessel 20 when placed upon the cooking surface 15.

[0029] Having determined the centre position of a cooking vessel 20 on the cooking surface 15, and optionally subject to an indication from a user to activate the induction cooking coil 10, the controller is configured to activate one or more actuators of the mechanical arrangement supporting the induction cooking coil 10 to move the coil 10 to a position aligned with the determined centre position of the cooking vessel 20. There are a number of possible arrangements for the mechanical arrangement, as would be apparent to a person of ordinary skill in the relevant art, to enable the induction cooking coil 10 to be aligned to a determined position on the cooking surface 15. One example mechanical arrangement will now be described with reference to Figure 2.

[0030] Referring additionally to Figure 2, a perspective view is provided of an example mechanical arrangement for supporting the induction cooking coil 10 and for moving it to a determined position. The mechanical arrangement comprises a rail 90, comprising for example a rod, a track, a lever or other form of conveyance on which the induction cooker coil 10 is mounted such that it may slide or otherwise travel back and forth along the rail 90 in the direction 100 under the control of a respective actuator. When mounted within the induction cooker 5, the rail 90 is aligned substantially parallel with the sides 50, 60 of the induction cooking surface 15 such that the coil 10 may be moved back and forth in a respective direction 80.

[0031] Mounted substantially at right angles to the rail 90 are a pair of rails 95, each comprising for example a rod, a track, a lever or other form of conveyance which when mounted in the induction cooker 5 are aligned substantially parallel with the sides 45, 55 of the cooking surface 15. The rails 95 support respective ends of the rail 90 such that the rail 90 may move back and forth along the rails 95 in the direction 65, 105, maintaining its alignment with the sides 50, 60 of the cooking surface 15. In this way, the combination of movement in the direction 65, 105 of the rail 90 and the movement in the direction 80, 100 along the rail 90 of the induction cooking coil 10 provides two axes 65, 80 of movement, enabling alignment of the coil 10 with any determined position of the cooking vessel 20.

[0032] Movement of the rail 90 along the rails 95 and movement of the induction cooking coil 10 along the rail 90 may, for example, be achieved using respective actuators, for example based upon electric motors linked to the rail 90 and to the coil 10 by an arrangement of levers or by an arrangement of cords and pulleys. Alternatively, the coil 10 may be mounted on a self-driven component which may be controlled by the cooker or sensing system controller to self-propel itself along the rail 90 to a determined position. Positions sensors may be provided to sense the position of the coil 10 on the rail 90 and the position of the rail 90 on the supporting rails 95 and to provide indications of the sensed positions to the controller controlling the positioning of the coil 10. The position sensors may for example be rotary or linear position sensors based upon optical or electromagnetic sensing principles, incorporated within the actuators or linear position sensors associated with the rails 90, 95.

[0033] An example arrangement for controlling the positioning of the induction cooking coil 10 based upon signals output by the proximity sensing elements 25-40 will now be described with reference to Figure 3.

[0034] Referring additionally to Figure 3, there is shown in an example block diagram the four proximity sensing elements 25, 30, 35, 40 linked to a controller 110, which may be a dedicated controller for the proximity sensing system or a controller of the induction cooker 5. The controller 110 may be configured, for example after receiving an indication from a user of the cooker 5 to activate the induction cooking coil 10: to energise the proximity sensing elements 25-40 and to trigger or to control their movement along their respective rails; to receive signals output by the sensing elements 25-40; and to determine thereby a centre position of a cooking vessel 20 placed upon the cooking surface 15. The controller 110 is configured to operate according to the particular type of proximity sensors provided, as would be apparent to a person of ordinary skill in the relevant art.

[0035] Having determined the centre position of a cooking vessel 20 on the cooking surface 15, the controller 110 activates the actuator 115 for moving the induction cooking coil along the rail 90 and the actuator 120 for moving the rail 90 along the rails 95, as appropriate, to move the coil 10 to a position beneath the cooking surface 15 substantially aligned with the determined centre position of the cooking vessel 20. The controller 110 may receive signals from position sensors associated with the actuators 115, 120 or with the respective rails 90, 95 to determine when the coil 10 has reached the

required position. If a different mechanical arrangement is provided to that described above with reference to Figure 2, the controller 110 is configured to control the mechanical arrangement provided to move the coil 10 to the required position.

[0036] The controller 110 and the connected components 25, 30, 35, 40, 115, 120 as shown in Figure 3 are represented as a block diagram for the purposes of explaining the functionality of the controller 110 and the connected components only. The configuration and implementation of the controller 110 and of the connected components 25, 30, 35, 40, 115, 120 may comprise any one of a number of variants as would be apparent to a person of ordinary skill in the relevant art according to the principles described herein.

[0037] The example described above with reference to Figures 1, 2 and 3 comprises only a single heating element, in this example an induction cooking coil 10 of an induction cooker 5. However, as will be apparent to a person of ordinary skill in the relevant art, the proximity sensing system 25, 30, 35, 40, 110 may be applied to cookers having more than one movable induction cooking coil 10 or more than one heating element of a different type, such as a direct-heating element of an electric or gas cooker. In such an example, the controller 110 may be configured to select one heating element from more than one available heating element and to move the selected heating element to the determined position of a cooking vessel 20.

[0038] The controller 110 may in practice be provided by a single chip or integrated circuit or plural chips or integrated circuits, optionally provided as a chipset, an application-specific integrated circuit (ASIC), field-programmable gate array (FPGA), digital signal processor (DSP), graphics processing units (GPUs), etc. The chip or chips may comprise circuitry (as well as possibly firmware) for embodying at least one or more of a data processor or processors, a digital signal processor or processors, baseband circuitry and radio frequency circuitry, which are configurable so as to operate in accordance with the exemplary embodiments. In this regard, the exemplary embodiments may be implemented at least in part by computer software stored in (non-transitory) memory and executable by the processor, or by hardware, or by a combination of tangibly stored software and hardware (and tangibly stored firmware).

[0039] Data storage associated with the controller 110 may be provided by a single device or by plural devices. Suitable devices include for example a hard disk and non-volatile semiconductor memory.

[0040] Although at least some aspects of the embodiments described herein with reference to the drawings comprise computer processes performed in processing systems or processors, the invention also extends to computer programs, particularly computer programs on or in a carrier, adapted for putting the invention into practice. The program may be in the form of non-transitory source code, object code, a code intermediate source and object code such as in partially compiled form, or in any other non-transitory form suitable for use in the implementation of processes according to the invention. The carrier may be any entity or device capable of carrying the program. For example, the carrier may comprise a storage medium, such as a solid-state drive (SSD) or other semiconductor-based RAM; a ROM, for example a CD ROM or a semiconductor ROM; a magnetic recording medium; optical memory devices in general; etc.

[0041] The examples described herein are to be understood as illustrative examples of embodiments of the invention. Further embodiments and examples are envisaged. Any feature described in relation to any one example or embodiment may be used alone or in combination with other features. In addition, any feature described in relation to any one example or embodiment may also be used in combination with one or more features of any other of the examples or embodiments, or any combination of any other of the examples or embodiments. Furthermore, equivalents and modifications not described herein may also be employed within the scope of the invention, which is defined in the claims.

Claims

1. A cooker (5), comprising:

   a heating element (10) mounted on a mechanical arrangement (90, 95, 115, 120) for moving the heating element;
   a supporting structure (15) for supporting a cooking vessel (20) above the heating element (10); and
   a proximity sensing arrangement (25, 30, 35, 40, 110) for sensing the position of a cooking vessel (20) placed onto the supporting structure (15),
   the mechanical arrangement (90, 95, 115, 120) being arranged to move the heating element (10) to a position corresponding to the position of a cooking vessel (20) placed onto the supporting structure (15) as sensed by the proximity sensing arrangement (25, 30, 35, 40).

2. The cooker (5) according to claim 1, wherein the proximity sensing arrangement (25, 30, 35, 40) comprises a plurality of movable proximity sensing elements (25, 30, 35, 40) each arranged to output signals indicative of a sensed distance from the sensing element (25, 30, 35, 40) to a cooking vessel (20).

3. The cooker (5) according to claim 2, wherein each of the plurality of movable proximity sensing elements (25, 30, 35, 40) is supported by and movable along a rod, track or other form of conveyance.

4. The cooker (5) according to claim 2 or claim 3, where-

in the plurality of movable proximity sensing elements (25, 30, 35, 40) are arranged to output signals indicative of the position of the cooking vessel (20) upon the supporting structure (15) from each of a plurality of positions.

5. The cooker (5) according to any one of claims 2 to 4, wherein the plurality of movable proximity sensing elements (25, 30, 35, 40) comprise at least one inductive proximity sensor.

6. The cooker (5) according to any one of claims 2 to 5, wherein the plurality of movable proximity sensing elements (25, 30, 35, 40) include at least one pair of sensing elements (25, 30; 35, 40) comprising a signal source (25, 35) and a corresponding signal sensor (30, 40).

7. The cooker (5) according to claim 6, wherein the signal source (25, 35) and the signal sensor (30, 40) of the at least one pair of sensing elements (25, 30; 35, 40) are arranged to move simultaneously.

8. The cooker (5) according to claim 6 or claim 7, wherein the signal source (25, 35) of the at least one pair of sensing elements (25, 30; 35, 40) is arranged to emit an optical or radio frequency signal and the corresponding sensor (30, 40) of the at least one pair of sensing elements (25, 30; 35, 40) is arranged to detect the emitted signal following reflection from the cooking vessel (20).

9. The cooker (5) according to any one of claims 1 to 8, wherein the mechanical arrangement (90, 95, 115, 120) comprises an arrangement of rods, tracks, levers or other forms of conveyance (90, 95), linked to one or more actuators (115, 120), to support and to move the heating element (10) to a position corresponding with a position sensed by the proximity sensing arrangement (25, 30, 35, 40).

10. The cooker (5) according to any one of claims 1 to 9, wherein the mechanical arrangement (90, 95, 115, 120) comprises one or more position sensors arranged to output signals indicative of a position of the heating element (10).

11. A cooking vessel position sensing system (25, 30, 35, 40, 110), comprising a plurality of movable proximity sensing elements (25, 30, 35, 40), wherein the plurality of movable proximity sensing elements (25, 30, 35, 40) is arranged to output signals indicative of a sensed distance from each said sensing element (25, 30, 35, 40) to a cooking vessel (20), and a controller (110) configured to determine from the output signals a position of the cooking vessel (20).

12. The cooking vessel position sensing system (25, 30, 35, 40, 110) according to claim 11, wherein each of the plurality of movable proximity sensing elements (25, 30, 35, 40) is supported by and movable along a rod, track or other form of conveyance.

13. The cooking vessel position sensing system (25, 30, 35, 40, 110) according to claim 11 or claim 12, wherein the plurality of movable proximity sensing elements (25, 30, 35, 40) comprise at least one inductive proximity sensor.

14. The cooking vessel position sensing system (25, 30, 35, 40, 110) according to any one of claims 11 to 13, wherein the plurality of movable proximity sensing elements (25, 30, 35, 40) include at least one pair of sensing elements (25, 30; 35, 40) comprising a signal source (25, 35) and a corresponding signal sensor (30, 40) and wherein the signal source (25, 35) and the signal sensor (30, 40) of the at least one pair of sensing elements (25, 30; 35, 40) are arranged to move simultaneously.

15. The cooking vessel position sensing system (25, 30, 35, 40, 110) according to claim 14, wherein the signal source (25, 35) of the at least one pair of sensing elements (25, 30; 35, 40) is arranged to emit an optical or radio frequency signal and the corresponding sensor (30, 40) of the at least one pair of sensing elements (25, 30; 35, 40) is arranged to detect the emitted signal following reflection from a cooking vessel (20).

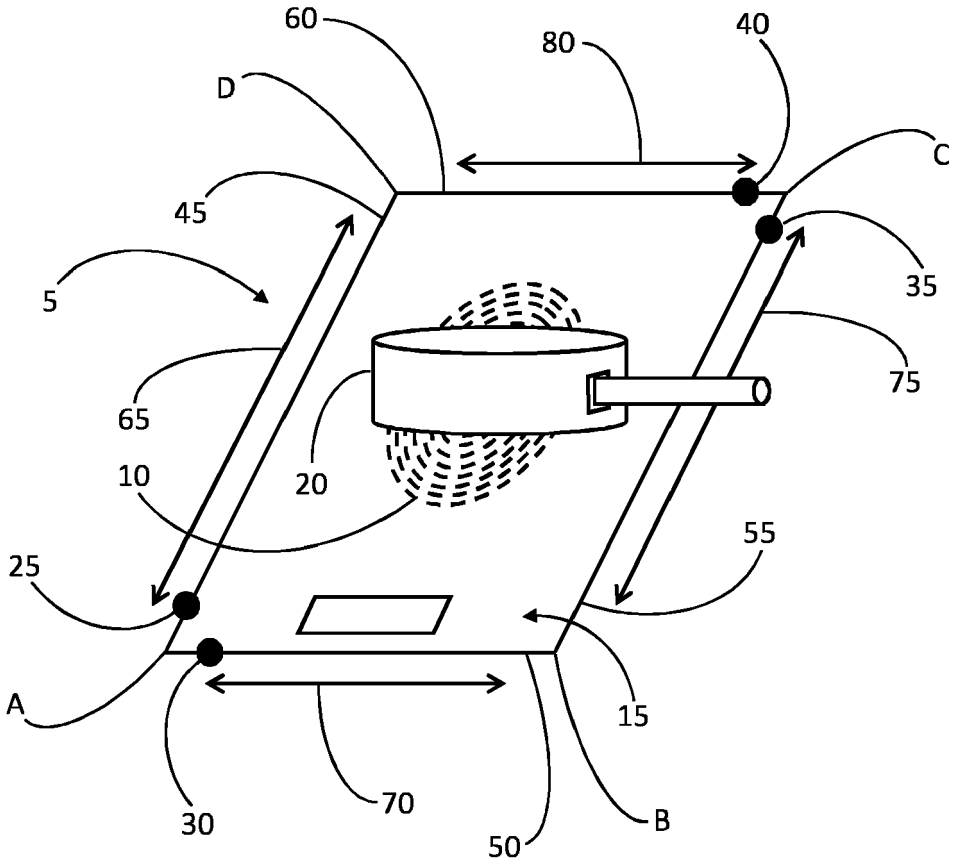


Figure 1

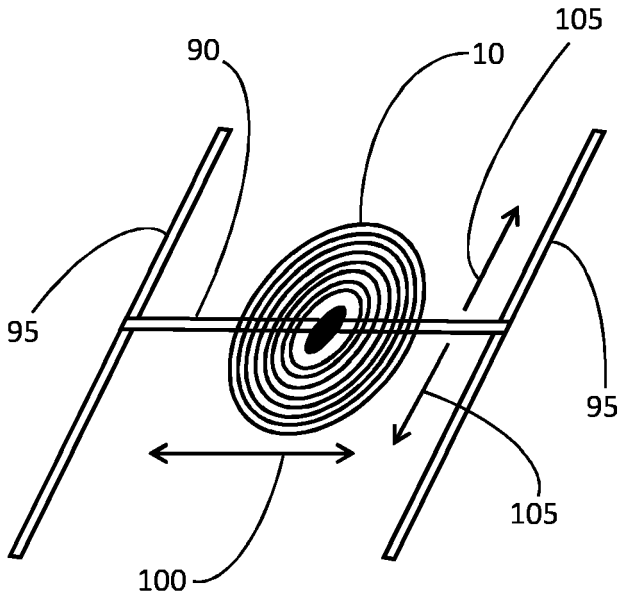
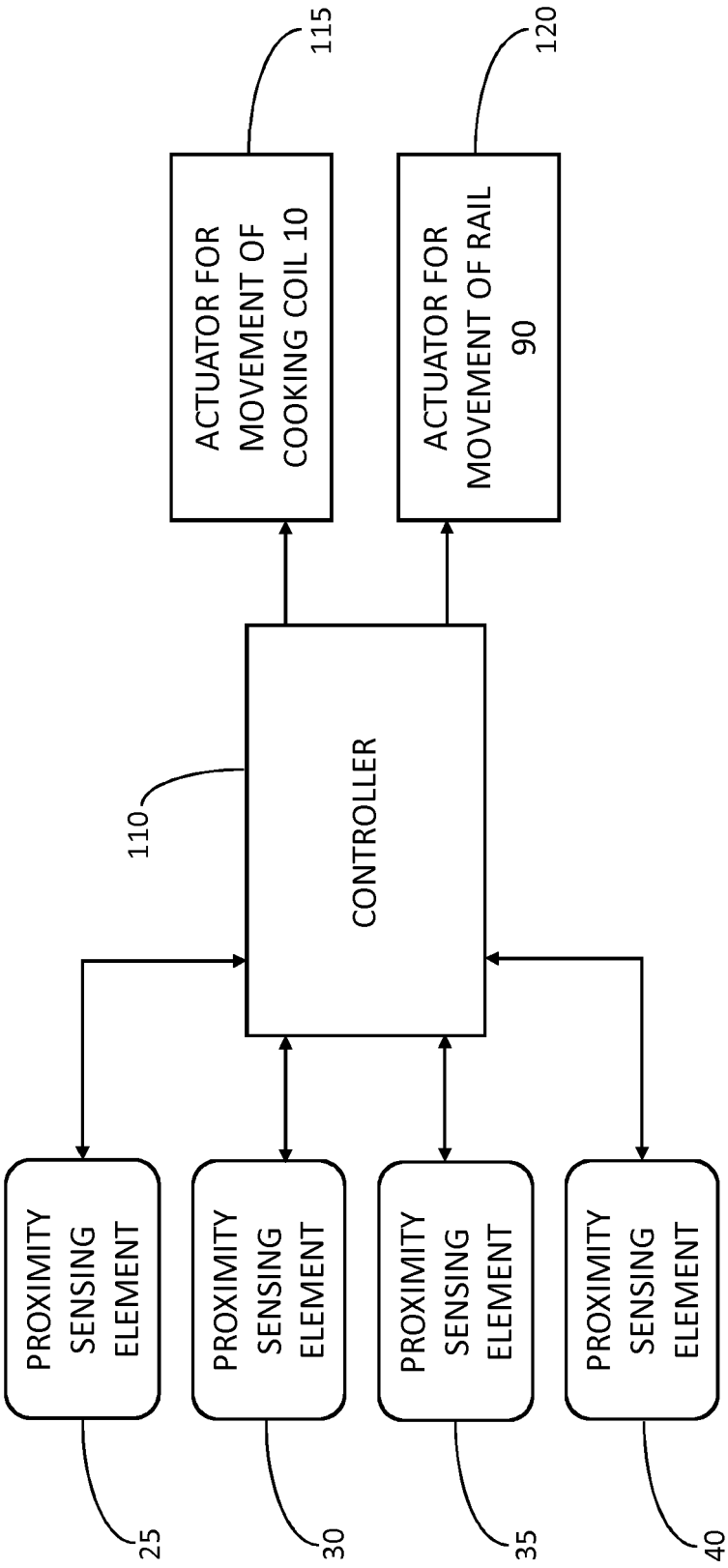


Figure 2


ACTUATOR FOR MOVEMENT OF COOKING COIL 10
115
ACTUATOR FOR MOVEMENT OF RAIL 90
120
CONTROLLER
110
PROXIMITY SENSING ELEMENT
25
PROXIMITY SENSING ELEMENT
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PROXIMITY SENSING ELEMENT
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PROXIMITY SENSING ELEMENT
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Figure 3

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EUROPEAN SEARCH REPORT

Application Number
EP 17 20 7270

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2009 011400 A (CLEANUP CORP) 22 January 2009 (2009-01-22) * paragraph [0033]; figures 1-2 * -----	1-15	INV. H05B6/06
X	WO 2008/101766 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; GARCIA JIMENEZ JOSE RAMON [ES]; AC) 28 August 2008 (2008-08-28) * figure 1 * -----	1 2-15	
A	EP 2 600 690 A2 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 5 June 2013 (2013-06-05) * figure 6 * -----	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 June 2018	Pierron, Christophe

CATEGORY OF CITED DOCUMENTS

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2009011400 A	22-01-2009	NONE	
WO 2008101766 A1	28-08-2008	DE 102008064731 A1	05-07-2012
		DE 112008000413 A5	10-12-2009
		ES 2319031 A1	01-05-2009
		WO 2008101766 A1	28-08-2008
EP 2600690 A2	05-06-2013	EP 2600690 A2	05-06-2013
		EP 2600691 A2	05-06-2013

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