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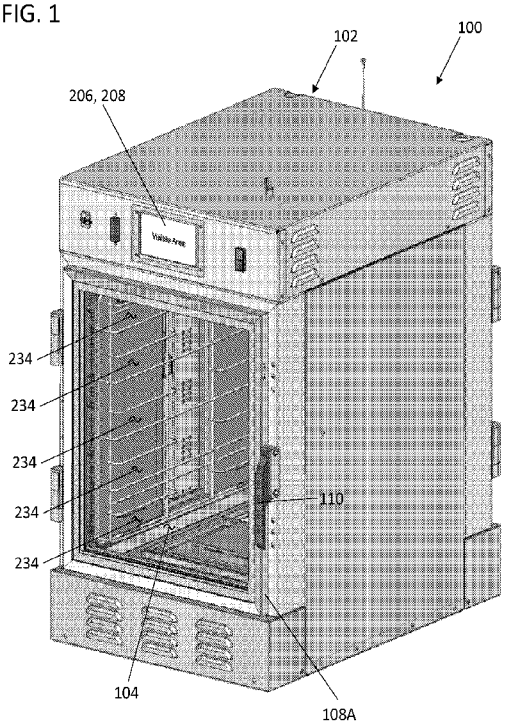
(54) Title: FOOD HOLDING CABINET

FIG. 1



(57) Abstract: Food preparation apparatus and associated components and methods. The food holding cabinet may be configured to hold various types of food according to different recipes. The food holding cabinet includes at least one conditioning element (e.g., heater) to condition a food holding cavity of the apparatus. The food preparation apparatus may include a humidity sensor configured to be easily removed for maintenance or replacement.

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[Continued on next page]

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

FOOD HOLDING CABINET

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority to U.S. Provisional Patent App. No. 63/507,330, filed June 9, 2023, the entirety of which is hereby incorporated by reference.

FIELD

[0002] The present disclosure generally relates to food preparation apparatus, and more particularly to a food holding cabinet.

BACKGROUND

[0003] Food holding cabinets (e.g., food holding ovens) are used in the fast food service industry, for example, to hold pre-cooked food (e.g., fried chicken) at a desired temperature for a period of holding time during which the quality of the food remains suitable for serving. If the food is not consumed within this time, it is generally discarded.

SUMMARY

[0004] In one aspect, food holding cabinet comprises a housing having a cavity sized and shaped to hold trays of food. The housing having a door arranged to provide access to the cavity. The housing has tray supports arranged to support the trays of food in the cavity. The tray supports define a plurality of holding locations in the cavity. A heating system is configured to heat the cavity. A humid air exhaust system is configured to exhaust air from the cavity. A control system is configured to control the heating system and the humid air exhaust system. The control system is programmable to execute food holding recipes for different types of food simultaneously held in the cavity. The control system includes a user interface having a display. The display is configured to show a plurality of holding location displays. Each holding location display corresponds to one of the holding locations. The holding location displays are arranged in an array matching the arrangement of the corresponding holding locations in the cavity.

[0005] In another aspect, a food preparation apparatus comprises a housing defining a food conditioning cavity. A humidity sensor has a sensor head in fluid communication with the food conditioning cavity. A shield overlying the sensor head shields the sensor head from being

contacted from inside the food conditioning cavity. The shield is configured to permit air from the food conditioning cavity to flow around the shield to the sensor head.

[0006] Other objects and features of the present disclosure will be in part apparent and in part pointed out herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a perspective of a food holding cabinet of the present disclosure;

[0008] FIG. 2 is a rear perspective of the food holding cabinet of FIG. 1;

[0009] FIG. 3 is a section of the food holding cabinet taken widthwise of the cabinet;

[0010] FIG. 4 is another section of the food holding cabinet taken widthwise of the cabinet;

[0011] FIG. 5 is an enlarged fragmentary perspective of an inside side portion of the cabinet showing a portion of a food support rack and portions of removable duct walls;

[0012] FIG. 6 is a section of the cabinet indicating flow of heated air from ductwork into the food holding cavity;

[0013] FIG. 7 is a fragmentary section of the cabinet taken widthwise of the cabinet;

[0014] FIG. 8 is a section of the cabinet taken widthwise of the cabinet;

[0015] FIG. 9 is a section of the cabinet taken widthwise of the cabinet showing flow of air through the humid air exhaust flow path;

[0016] FIG. 10 is a section of the cabinet taken lengthwise of the cabinet;

[0017] FIG. 11A is a fragmentary left perspective of the cabinet showing an access opening in the side of the housing;

[0018] FIG. 11B is a fragmentary exploded left perspective of the cabinet showing humidity sensor and temperature sensors removed from the housing;

[0019] FIG. 12 is a photograph of an access cover covering the access opening;

[0020] FIG. 13 is a photograph of the access opening after the access cover has been removed and an electrical connector disconnected from the humidity sensor;

[0021] FIG. 14 is a section of the left housing portion of the cabinet showing details of mounting of the humidity sensor and temperature sensor;

[0022] FIG. 15 is a schematic of a cabinet control system; and

[0023] FIGS. 16-42 show various view of a graphical user interface of the cabinet.

[0024] Corresponding reference characters indicate corresponding parts throughout the drawings.

DETAILED DESCRIPTION

[0025] Referring to FIGS. 1 and 2, an embodiment of a food holding cabinet (e.g., food preparation apparatus) of the present disclosure is generally indicated at 100. The food holding cabinet 100 comprises a housing 102 having a holding cavity or chamber 104 for holding pre-cooked food at desired temperature and humidity conditions prior to serving the food. The cavity 102 is configured to hold one or more containers (e.g., food pans or trays) of food on supports spaced at different elevations in the cavity. It will be appreciated that aspects of the present disclosure could be implemented in other types of food preparation apparatus (e.g., ovens).

[0026] The housing 102 comprises a top wall, a bottom wall, opposite side walls, a front wall, and a back wall. The walls include suitable thermal insulation. An upper internal horizontal panel is spaced below the top wall to create an upper compartment inside the housing. Similarly, a lower internal horizontal panel is spaced above the bottom wall of the housing to create a lower compartment inside the housing for housing various components of the cabinet, as will be described.

[0027] Access to the food holding cavity 104 is provided by front and rear doors 108A, 108B at the front and rear of the housing for loading/unloading of food. The cavity 104 is defined by interior walls inside the housing including left and right side walls, a front wall formed by the front door, a rear wall formed by the rear door, and upper and lower walls formed by the upper and lower internal horizontal panels. The doors 108A, 108B are hinged to permit opening/closing. A handle 110 with a suitable door-latching mechanism is provided on each door. The front and rear doors provide a "pass through" arrangement that allows food to be loaded and/or unloaded from both the front and the rear of the cabinet.

[0028] The cabinet has a cavity conditioning system for controlling the temperature, relative humidity (RH), and air flow conditions in the cavity 104. By way of example, conditions in the cavity may be set for holding fried foods, such as bone-in and/or boneless fried chicken. The cavity conditioning system includes a heating system and a humid air exhaust system.

[0029] The heating system for controlling the temperature of the cavity comprises ductwork (broadly, plenums) defining air flow paths, a blower 120 (broadly, air-circulation device) for circulating (e.g., recirculating) air through the ductwork and cavity, a heater (e.g., at least one electrical resistance heating element 122) for heating the air. A temperature sensor 126 can be provided for measuring the temperature of the air (e.g., the circulated air). The temperature sensor may be mounted in the cavity or in the ductwork. A humidity sensor 128 may also be provided.

[0030] As shown in FIG. 3, the ductwork comprises a lower duct 130 extending horizontally below the cavity, front and rear left side ducts 132 on the left of the cavity, and front and rear right side ducts 132 on the right of the cavity. The lower duct 130 extends substantially the entire width of the cavity and most of the depth (front-to-back dimension) of the cavity. Each side duct 132 communicates at its lower end with the lower duct along substantially the entire depth (front-to-back dimension) of the respective side duct. In one embodiment, the left and right side ducts 132 are mirror images of one another (e.g., have substantially the same construction).

[0031] Referring to FIGS. 5 and 6, each front side duct 132 has a series of front facing outlet openings 134 spaced from the rear (inner) surface of the front door when the front door is closed. Similarly, each rear side duct 132 has a series of rear facing outlet openings 134 spaced from the front (inner) surface of the rear door when the rear door is closed. Each series of front and rear openings is arranged in a vertical array extending from adjacent the top of the cavity 104 to adjacent the bottom of the cavity. The openings are arranged and sized for directing flow of circulating air into the cavity primarily along a perimeter of the cavity rather than toward a center of the cavity to reduce direct air flow over pre-cooked food product in a center area of the cavity. Desirably, the ductwork directs circulating air into the cavity primarily toward the four corners of the cavity. A few small apertures (not shown) may be provided in the side ducts to allow small amounts of ducted air to "bleed" out among the pan support locations for better temperature and humidity distribution and/or reduction of stratification in the cavity. However, the flow of air over the food product is desirably "indirect," i.e., most of the air flowing over the product has been previously deflected by a surface at a perimeter of the oven cavity. Indirect air flow assists in preventing excessive surface drying of the food. Other configurations can be used without departing from the scope of the present disclosure.

[0032] Referring to FIG. 6, air exiting the outlet openings impacts against inner surfaces of deflectors 136 positioned inside the cavity. The front deflectors overlap the left and right side portions of the front door and the rear deflectors overlap the left and right side portions of the rear door. In the illustrated embodiment, the deflectors include generally flat plates which extend inward widthwise of the cavity and extend substantially the entire height of the cavity to overlap respective arrays of outlet openings. The openings 134 are oriented for directing air flow toward the deflectors. The air flows directly against the inner surfaces (facing the cavity) of the deflectors, where it is directed generally around the perimeter of the cavity. Some of the air may thereafter contact the inside surfaces of the doors, but desirably only after initial contact with the deflectors. The deflectors deflect the air for uniform distribution into the cavity where it flows gently over the pre-cooked food product. An example air flow pattern is indicated by broken arrows A in FIG. 6.

[0033] The configuration of the deflectors 136 also prevents substantial loss of conditioned air directly from the openings when the doors are open. The deflectors desirably prevent air from the openings from flowing directly out of the cavity to ambient. Other types of deflectors may be used without departing from the scope of the present disclosure. For example, the deflectors may include curved surfaces (e.g., for turning the air flow from the openings to a direction along the inside surface of the door or rear interior wall). Moreover, the deflectors may be configured for deflecting air upward and/or downward in the cavity. Other configurations can be used without departing from the scope of the present disclosure.

[0034] In one embodiment the air exiting the outlet openings 134 has an average speed of about 310 feet per minute. Desirably, the speed of the air flowing over the food is relatively low, e.g., at an average maximum speed of no more than about 6, 8, 10, 12, 14, or 16 ft/min. The outlet openings are arranged and sized for uniform flow of air into the cavity along substantially the entire vertical dimension of the cavity.

[0035] Referring to FIG. 7, air exits the cavity 104 through an air outlet 140 in the lower wall into the lower duct 130 at a location generally under the center of the cavity. In the illustrated embodiment, the air outlet 140 is defined by a tower extending upward from the lower wall. The air outlet comprises one or more air outlet sections. The fan or wheel of the blower 120 is disposed at the base of the tower. Other configurations can be used without departing from the scope of the present disclosure.

[0036] Still referring to FIG. 7, the blower 120 for the cavity 104 is mounted on a pan-shaped support secured to a lower internal panel of the lower duct. The blower includes a blower wheel rotatable by a motor. The motor may be a one-speed motor or a variable-speed motor having electrical lead wires for connection to a source of power. The blower is mounted such that the blower wheel is positioned in the lower duct below the air outlet of the cavity. The blower wheel rotates about a generally vertical axis and has blades spaced around the axis of the wheel. The size and flow capabilities of the blower will vary depending on the size of the cavity.

[0037] The heater comprises one or more electric resistance heating elements 122 in the lower duct 130 extending around the blower wheel for heating air flowing through the ductwork. The one or more heating elements have connections for receiving power from an electric power source.

[0038] Referring to FIGS. 8-10, the humid air exhaust system or de-humidification system is configured to remove water vapor from the circulating air of the cavity 104. A relative humidity (RH) sensor 128 is provided for sensing the relative humidity of the circulating air of the cavity. In one embodiment, the RH sensor is positioned in the upper portion of the cavity. However, it will be understood that the RH sensor can be mounted in other ways and other locations (e.g., in the ductwork).

[0039] As shown in FIGS. 8-10, the de-humidification system comprises a vent and a blower 150 for venting (exhausting) high-humidity air from the cavity to atmosphere surrounding the cabinet. The vent comprises right and left side vent ducts 152 and an upper vent connecting duct 154 connecting the side vent ducts in communication with the blower 150. The vent also includes an outlet downstream from the blower where the air is vented to atmosphere through a perforated plate 156 at the rear of the cabinet. The vent includes an outlet vent duct 158 for guiding the air from the blower to the outlet. When energized, the blower 150 creates a flow of air to exhaust air from the cavity through the left and right side vent ducts 152, the vent connecting duct 154, the outlet vent duct 158, and the outlet 156. The right and left vent ducts have inlets comprising arrays of perforations in the interior side walls. Other configurations can be used without departing from the scope of the present disclosure.

[0040] The left and right side vent ducts 152 are positioned between the front and rear respective left and right side air ducts 132 about midway along the length of the cavity. The left side vent duct has a bottom which is above and spaced from the bottom of the front and rear left

side air ducts and extends upward to the top of the cavity. It is understood the right side vent duct has substantially the same construction as described with respect to the left side vent duct.

[0041] In the illustrated embodiment, the cabinet omits a humidification system for humidifying (e.g., raising the humidity of) the circulating air in the cavity. Such a system is not needed if the cabinet is used to hold fried foods. However, a humidification system may be provided without departing from the scope of the present disclosure.

[0042] Referring to FIG. 10, the food container racks 156 (which define a plurality of food container supports 158 arranged in a column for holding food trays in a column/stack) are removable, and the cabinet includes removable panels 160 (e.g., removable side vent panels, removable side recirculation duct panels) to provide convenient access from the cavity to clean internal surfaces of the ductwork. The removable panels 160 and racks 156 may be removed from the housing by hand, the exposed internal surfaces can be cleaned, and then the removable panels and supports may be replaced or reinserted in the housing. The removable panels define portions of the left and right interior walls of the cavity. Each removable panel includes an inner surface which faces the cavity and defines a side boundary of the cavity and an opposite surface which faces away from the cavity and forms a boundary of the side ducts or side vent duct. The removable panels extend substantially the entire height of the cavity. Other configurations can be used without departing from the scope of the present disclosure.

[0043] Referring to FIGS. 11-14, the cabinet includes a sensor access door permitting access to the humidity sensor 128 and temperature sensor 126 for maintenance and/or replacement thereof. The temperature sensor 126 and humidity sensor 128 each include sensor heads 126A, 128A located to sense temperature and humidity, respectively, in the food holding cavity 104. In the illustrated embodiment, the access door comprises an access opening 160 covered by an access panel 162 permitting access to the sensors. The access panel 162 is removable by removal of two fasteners 164 (e.g., thumb screws). After removal of a web of insulation 168, the user has access to the humidity and temperature sensors 128, 126.

[0044] The temperature sensor 126 is mounted on a bracket 170 that is secured to an interior panel of the housing by two fasteners 174. The sensor head 126A of the temperature sensor protrudes through the interior panel to be located in the food holding cavity 104. An L-shaped blocker 176 including a first leg 176A and a second leg 176B is mounted in the food holding cavity to provide the second leg as an obstruction adjacent the temperature sensor head

126A to reduce likelihood that the sensor head will be inadvertently contacted or pushed inside the cavity.

[0045] The humidity sensor 128 is mounted on a panel 180 (e.g., piece of sheet metal) that is mounted to the interior wall of the housing via two fasteners 172 (e.g., two thumb nuts on associated threaded studs). A gasket 184 made of resiliently compressible material (e.g., silicone) is provided between and is sandwiched/compressed by the panel 180 and the interior wall to provide a peripheral seal around the humidity sensor 128. A rear of the humidity sensor 128 including an electrical connector 128B is visible through and accessible through an opening 180A in the panel to permit connection of an electrical connector 190 to connect the humidity sensor to the controller. To remove the humidity sensor, the connector 190 is disconnected, and the fasteners 172 are released to loosen the panel 180 from the interior wall. The panel and humidity sensor can be removed from the housing to permit replacement of the humidity sensor. A new humidity sensor is seated in the gasket 184 and reinstalled with the panel 180, and held in position by reinstallation of the fasteners 172. After connection of the electrical connectors 190, 128B, the access panel is reinstalled.

[0046] Referring to FIGS. 5 and 14, a shield 194 is provided for shielding the head 128B of the humidity sensor 128 from being inadvertently contacted or pushed from inside the food cavity 104. The shield 194 comprises a mount 194A secured to the inner wall of the housing. The shield includes a shroud 194B extending from the mount and extending over the head 128A of the humidity sensor. The shroud 194B overlies the face of the humidity sensor that faces the food cavity 104 but does not block the humidity sensor from being in fluid communication with the food cavity to sense humidity conditions therein. A gap is provided between a lip 194C of the shroud 194B and the internal wall of the housing to permit communication between the humidity sensor and the food cavity.

[0047] As shown schematically in FIG. 15, the cabinet includes an electronic cabinet control system 200. The control system includes a cabinet controller or holding unit controller 202 (e.g., microprocessor or central processing unit), a non-transitory tangible storage medium 204 (e.g., including forms of storage such as software and/or firmware), and a user interface including a user input 206 and a display 208. The control system includes interconnection electronics (e.g., including electrical, fiber optic lines, and/or wireless communication devices) that operatively connect the various components of the control system with each other and with

other components of the cabinet. For example, the controller 202 can receive signals and user input signals via the interconnection electronics. It will be appreciated that the interconnection electronics can include other components, such as A/D converters and/or filters through which signals such as the scale signal passes to the controller. A printed circuit board assembly in the cabinet housing can be configured to include the controller 202 and the storage medium 204. Other configurations can be used without departing from the scope of the present disclosure. The controller 202 is configured to read and execute instructions stored in the storage medium 204, and is responsive to the user input, for controlling operation of the cabinet. A user can enter and/or modify instructions stored on the storage medium via the user input. In the illustrated embodiment, the user interface comprises a touch screen, described in further detail below. Other types of user interfaces can be used without departing from the present disclosure. The user interface provides command signals via the interconnection electronics to the controller. The command signals can include changes to data stored in the tangible storage medium. The controller responds to the command signals and provides control signals corresponding thereto via the interconnection electronics to the heaters and/or blowers. It will be appreciated that in other embodiments the controller and/or the tangible storage medium can be part of another device such as a smart phone or tablet operatively connectable to the cabinet (e.g., wirelessly) without departing from the scope of the present disclosure.

[0048] In the illustrated embodiment, the user interface comprises a touch screen, including both the user input 206 and display 208. The display includes a liquid crystal display screen, and the user input can include a touch-sensitive panel on the display screen. The user input includes actuators at various areas of the touch screen where the touch screen is responsive to the touch of a user. The actuators may be identifiable to the user by text or graphic information on the display at respective areas of the touch sensitive panel. The user input may also include other actuators, including an on/off actuator not part of the touch screen.

[0049] Other types of user interfaces can be used without departing from the scope of the present invention. For example, the display and user input can be separate from one another. The display can include other types of screens or indicators. Moreover, the user input can comprise other types of actuators, such as keyboards, mice, buttons, switches, or even microphones for receiving information from the user.

[0050] The controller 202 may be programmed (e.g., the storage medium stores instructions) to maintain temperature and relative humidity ("RH") conditions in the cavity 104 at optimal values selected to maximize holding times for particular foods. Moreover, the cabinet may be programmed to initiate rapid temperature restoration and maintenance of temperature conditions in the cavity. The controller and associated components are housed in the upper compartment. The controller may be programmed to initiate rapid temperature restoration when the measured temperature of the circulating air of the first cavity rises above or falls below a target temperature, such as immediately following a door opening/closing event during which a door of the cabinet is opened, food is loaded into the cavity or unloaded from the first cavity, and the door is closed. Alternatively, the controller may be programmed to execute time-based methods to maintain and rapidly restore target temperature and RH conditions in the cavity. In this way, the temperature and RH in the cavity are maintained at optimal values selected to maximize holding times for particular foods, as will be discussed. Other configurations can be used without departing from the scope of the present disclosure.

[0051] The controller 202 may be programmed in various ways to carry out rapid restoration and maintenance of temperature and RH conditions in the cavity. Two example methods by which these operations may be regulated (and according to which the controller may be programmed) are described below. In one example, de-humidification and temperature are controlled according to closed-loop methods. Other methods and/or combinations of the described methods may be used without departing from the scope of the present disclosure.

[0052] Methods according to the example will now be described. Food product (e.g., trays holding fried chicken) is loaded into the cavity, and the temperature and humidity target settings for the cavity are selected using the user interface. The controller then operates according to the closed-loop methods to create, maintain, and, when necessary, rapidly regenerate temperature and RH conditions corresponding to the target settings.

[0053] If the measured temperature is below the target setting (e.g., 180 degrees F), the controller energizes ("enables") the heating elements 122 until the measured temperature is at or somewhat above (e.g., 1.0 degree F above) the target setting, at which time the heating elements are de-energized ("disabled"). The heating elements stay de-energized until the measured temperature falls below or somewhat below the target temperature, at which time the heating elements are again energized and the process repeats. In this manner, the temperature in the

oven cavity can be regulated within a tight range (e.g., ± 5.0 degrees F) close to the target setting. The blower 120 of the heating system can be energized and de-energized with the heating elements or separately from the heating elements. For example, the controller may continue to energize the blower of the heating system to continually circulate air even when the heating elements are de-energized.

[0054] For example, the amount of heat supplied by the heating elements can be proportional to the magnitude of the difference between the measured temperature and the target temperature (i.e., the target temperature setting). That is, if the magnitude is large, a large amount of heat will be supplied; if the magnitude is small, a smaller amount of heat will be supplied. This can be accomplished by varying the duty cycle of the heating elements, as will be understood by those skilled in the art. Alternatively, instead of using a proportional control, the heating elements may be energized continuously until the temperature sensor indicates the temperature is at or above the desired set point, at which point the controller de-energizes the heating elements.

[0055] Similarly, if the measured RH of the circulating air of the cavity is above the target RH setting, the blower 150 of the de-humidification system is operated to exhaust the high-humidity air in the cavity, which is replaced by drier make-up air from the environment surrounding the cabinet. The blower 150 of the de-humidification system remains on until the measured RH in the cavity falls to the target RH or a RH slightly below (e.g., 1%) the target RH, at which time the fan is de-energized ("disabled").

[0056] An operator may use the user interface to program the temperature and RH setting of the cabinet based on the type of food. Using the user interface, the temperature and humidity target settings for the cavity are selected, the particular type of food product loaded in the cavity is selected, and/or a quantity of the food product (e.g., full or partial load) is selected. For example, an operator may program the cabinet to hold fried chicken in the cavity by indicating accordingly on the user interface. For fried chicken, the controller may be programmed to maintain the cavity at target temperature and RH conditions of, for example, 180 degrees F and 20% RH. The controller may or may not execute a pre-holding sequence to bring the temperature and RH in the cavity to these values. The operator opens the door, inserts the fried chicken, and closes the door.

[0057] The methods described above are efficacious in maintaining pre-cooked food product at a quality not only suitable for human consumption but also appetizing to the pallet for extended holding times relative to conventional holding ovens. For example, "high mass" pre-cooked food product such as bone-in fried or breaded chicken can be maintained at such quality for holding periods of up to 80, 90, 100, 110, 120, 130, 140, or even 150 minutes.

[0058] The user interface (e.g., touch screen comprising a screen (display) 208 and touch sensitive panel (user input) 206) is adapted for permitting a user to program various food recipes (e.g., "food holding recipes") for different food types. The user interface provides the user the ability to program individual parameters or aspects of recipes independently of each other for controlling the temperature, RH, and hold time in the cavity based on the type of food being held. The parameters can define operational states (e.g., active or inactive) of the heating system and de-humidification system (broadly, food environment control devices). If different types of food will be held in the cabinet at the same time, recipes for each food type can be programmed.

[0059] The operator can use the Setting Screen (e.g., shown in FIG. 16) to program the various recipes. If it is desired to program a new recipe or modify an existing recipe, the user may press the “Recipe” actuator of the screen. This brings the user to a Recipe Edit Home Screen, shown in FIG. 17. The Recipe Edit Home Screen provides three options: (1) Cavity Settings, (2) Recipes, and (3) Tray Configuration. The user may select any of these by pressing the respective actuator. Pressing the Cavity Settings actuator causes the display to show the Cavity Settings Screen (e.g., FIG. 18). This screen lists several parameters on the user input which may be programmed in a given recipe. For example, the parameters include Cavity Set Point temperature, Water Gain, Vent Fan on RH% (the RH in the cavity at which the de-humidification system will activate), and Vent Fan Off RH% (the RH in the cavity at which the de-humidification system will deactivate). Each of the parameters includes a parameter value display (i.e., indicating the programmed value for the respective parameter) and an actuator permitting the user to change the displayed value. In the illustrated case, the actuators each include plus and minus buttons for increasing or decreasing the programmed value.

[0060] Pressing the Recipe actuator (FIG. 17) causes the display to show the Recipe Screen shown in FIG. 19. This screen lists the various recipes stored by the control system and allows the operator to add or remove recipes. For example, the listed recipes include “BIC SPICY” (e.g., fried bone in chicken spicy), “BIC MILD” (e.g., fried bone in chicken mild), and

"CHICKEN" (e.g., fried boneless chicken). To add a new recipe, the operator selects a blank actuator 210. To modify an existing recipe, the operator presses an actuator with a recipe name displayed. For example, pressing the "BIC MILD" actuator causes the display to show the BIC MILD Recipe Screen shown in FIG. 20. This screen lists one or more parameters on the user input which may be programmed in a given recipe. For example, the parameters may include a hold time (e.g., the amount of time the cooked food can be safely held while waiting to be served before having to be discarded). Each of the parameters includes a parameter value display (i.e., indicating the programmed value for the respective parameter) and an actuator permitting the user to change the displayed value. In the illustrated case, the actuators each include plus 212 and minus 214 buttons for increasing or decreasing the programmed value. In this case, the parameter value is in hours and minutes. The operator uses the plus/minus buttons to increase or decrease the holding time (shown as 12:00 in FIG. 20).

[0061] The operator may also press the "Aa Bb" actuator 216 (broadly, the Recipe Name Change actuator) to cause the display to show the Edit Recipe Name Screen shown in FIG. 21. This screen includes a keyboard allowing the operator to change the name of the recipe.

[0062] Referring back to the Recipe Edit Home Screen (FIG. 17), pressing the Tray Configuration actuator causes the display to show the Tray Configuration Screen shown in FIG. 22. This screen lists the various tray positions in the cavity and allows the operator to associate a recipe with each tray position. For example, the tray positions include Trays 1-5. The arrangement of the tray icons in a column corresponds to the arrangement of trays in five holding locations defined by the tray supports in the cavity 104.

[0063] To associate a tray position with a recipe, the operator presses the Tray Position (e.g., Tray 1) actuator, which causes the display to show the Tray Location Configuration screen (in this case for the Tray 1 position) shown in FIG. 23. This screen lists the recipes stored by the control system. To associate a recipe with the tray location, the operator selects the desired recipe from the list by pressing the corresponding Recipe actuator (e.g., the actuator with the name of the desired recipe displayed thereby). For example, if the desired recipe is "BIC SPICY", the operator presses the "BIC SPICY" actuator. The display then returns to the Tray Configuration Screen, except now the recipe name "BIC SPICY" is displayed in the tray 1 position as shown in FIG. 24. The operator can now repeat this process for the other tray positions.

[0064] After the recipes are programmed (e.g., parameters selected) as desired, they are saved to the memory (e.g., the tangible storage medium 204) of the control system. In one example, BIC SPICY recipe is programmed for Trays 1 and 2, BIC MILD recipe is programmed for Trays 3 and 4, and CHICKEN recipe is programmed for Tray 5. The recipes may differ, for example, by each having a different hold time.

[0065] It will be appreciated that the recipes described above are provided by way of example without limitation. Other recipes may be used without departing from the scope of the present disclosure. For example, the cabinet may be programmed for holding food such as grilled chicken, fried chicken, hamburger patties, etc. in a cooked state prior to serving.

[0066] As shown in FIGS. 1 and 3, the cabinet includes a plurality of locations 234 (different vertical positions within the cavity) in which food may be received and held in the cavity (e.g., in a tray). The holding locations are defined by the shelves of each support that can support a tray of food. The touch screen display of the user interface is configured to monitor food inventory (e.g., cooked food inventory) and provide associated information and instructions to employees or operators. The user interface (e.g., the touch screen display) may provide information to the employees and receive information from the employees regarding many aspects of food inventory. The touch screen display indicates to an operator the status of food being held in the cavity 104 (e.g., whether the food is suitable for being served, whether its hold time has expired, etc.).

[0067] Figure 25 shows a screen shot of an example view or screen (graphic interface) that may be displayed on the touch screen display. This screen may be referred to as an Operational screen. In this example, the cabinet is programmed to hold BIC MILD chicken in the top three holding locations 234 and to hold BIC SPICY chicken in the bottom two holding locations 234. The Operational screen may include status indicators and/or actuators, such as a Wi-Fi indicator 240 and/or a settings actuator 242 for entering the settings described above. The Operational screen also includes a food holding status indication section 250 showing the status of the holding locations of the cabinet where food may be held. Food may be stored in the cavity 104 of the cabinet (e.g., after it is cooked or otherwise prepared, such as by thawing, cutting, assembling, and/or portioning) in the holding locations 234 until it is served to a customer or discarded as waste. Indications of the status of the holding locations 234 (e.g., status of food held at the holding locations) may be shown on the touch screen display. The food holding

apparatus status section 250 indicates status of food holding locations such as "no food present," "food present," "food suitable for serving," "food to be served first," "food to be served second," and "food expired or to be discarded."

[0068] The food holding apparatus status section 250 includes an array of holding location displays 252 representing respective holding locations 234 of the cabinet and on which information associated with the respective holding locations is displayed. The holding location displays 252 are arranged in an array (e.g., a column) corresponding to an arrangement of the food holding locations of the cabinet, and the holding location displays are positioned in the array corresponding to the position of the respective holding locations in the arrangement. The status of the respective holding locations 234 may be shown by status indicators such as symbols, color, outlining, bolding, flashing, text, numbers, graphics or other visual indicators. Each holding location display includes a food type indicator 260, a hold time indicator 262, and a hold time graphic 264, such as a food type name or symbol, etc. (e.g., “BIC MILD,” “BIC SPICY,” etc.) representing a type of food to be held at the holding location. The type of food indicated at each holding location display can be changed via the recipe settings described above. In the illustrated embodiment, the holding locations that are inactive or are standing by to receive food are indicated by a generally blank holding location display and dim or gray appearance of the holding location display (see top “BIC MILD” in FIG. 25). The holding locations that are active (e.g., are holding food) are indicated at least by a displayed hold time indicator 262 (e.g., countdown timer) and an active hold time graphic 264 (e.g., an active progress bar). In the illustrated embodiment, the hold time graphic 264 comprises a progress bar that visually represents the ratio between the amount of hold time that has passed versus the amount of hold time remaining. As hold time passes, the progress bar 264 grows longer and transitions from yellow to orange to red. The holding locations in which food is held are indicated by a displayed hold time indicator 262 (e.g., countdown timer), and an active hold time graphic 264. A holding location 234 having food for which the hold time has not yet elapsed and which has been held the longest (or will expire the soonest) among locations holding the same type of food is indicated by the hold time indicator 262 having a green coloring. Holding locations 234 having the same food type that have been held for a shorter time are indicated by the hold time indicator 262 having a yellow coloring (or orange/amber coloring). It will be understood that these indicators convey to the employees to serve food from the holding location indicated by green

(corresponding to food longest held or soonest to expire) before serving food from the holding location indicated by yellow to facilitate a "first-in, first-out" serving convention. A holding location 234 having food for which the hold time has elapsed is indicated by the hold time indicator 262 having red coloring. The hold time indicator may display a “00:00” hold time or an “X”. The processor is responsive to instructions in the tangible storage medium and user input from the user interface for displaying, updating, and changing the indicators on the holding location displays 252. Other configurations can be used without departing from the scope of the present disclosure.

[0069] In one embodiment, shown in FIG. 26, the hold time graphic 264 includes a color gradient to further indicate to an operator the status of the holding location. For example, the hold time graphic 264 can have a gradient starting at one color and changing to one or more other colors as the hold time runs. In the illustrated embodiment, the hold time graphic is a linear progress bar. The linear progress bar includes a colored section 264A (broadly, an elapsed hold time graphic) representing the amount of hold time that has passed and a grey section 264B (broadly, a full hold time graphic) representing the total amount of hold time. The portion of the grey section that is uncovered by the colored section represents the amount of hold time remaining. The appearance between the colored section and the uncovered grey section visually indicates the ratio of the amount of hold time that has expired versus the amount of hold time remaining. The colored section 264A gradually grows (starts at the left and expands rightward) in the grey section 264B as the hold time continues to run down. The colored section completely fills the grey section when the hold time has expired to indicate the hold time has expired. In the illustrated embodiment, the colored section starts out as yellow, turns to orange, and then red as the hold time runs down.

[0070] Figures 27-30 provide an example of the Operational screen progressing from a full standby mode (FIG. 27), to all holding location displays active (FIG. 28) (e.g., all timers started) indicating each holding location contains food, to one holding location (e.g., the top holding location) containing expired food (FIG. 29), to the said one holding location (e.g., the top holding location) returning to a standby mode (FIG. 30).

[0071] In one embodiment, each holding location display 252 includes (e.g., defines) an actuator or button. To start the recipe (e.g., hold timer) for a given holding location display (and indicate that holding location contains food), the operator simply presses the holding location

display 252. Similarly, to cancel the hold time or otherwise reset a holding location display back to the standby mode, the operator can press the holding location display 252 again (e.g., press the holding location display while it is active).

[0072] Although the holding location displays 252 are illustrated as all being sections of the touch screen display, it will be appreciated that other configurations can be used without departing from the scope of the present disclosure. For example, the holding location displays could be unconnected or separate from each other (e.g., on respective separate touch screen displays). Such separate holding location displays could still be arranged in an array corresponding to the holding locations. For example, the holding location displays could be positioned on the cabinet in such an array (e.g., next to the respective holding locations).

[0073] Although the illustrated hold time indicators 262 are count down timers, it will be understood other hold time indicators may be used without departing from the scope of the present disclosure. For example, the hold time indicator may be a count up timer, a static time (e.g., static expiration time), color, symbol, graphic, text, bolding, highlighting, outlining, or other indicator without departing from the scope of the present disclosure. As used herein, the term "hold time" can mean an expiration time, a time remaining until expiration, a time food has been held, etc., without departing from the scope of the present disclosure.

[0074] Although the illustrated hold time graphic 264 is a progress bar, it will be understood other hold time graphics may be used without departing from the scope of the present disclosure. For example, the hold time graphic may be a series of changing symbols, a pie-type chart, or other suitable graphic without departing from the scope of the present disclosure.

[0075] It is understood that the organization and layout of the Operational screen (e.g., the holding location displays and elements thereof) and changing states of the holding location displays enables the touch screen display to have a relatively clean appearance and be relatively uncluttered, which enhances user understanding (e.g., the user is able to ascertain the status of the food in the cavity of the cabinet with a quick glace of the Operational screen) and facilitates efficient interaction. The arrangement of the holding location displays and their elements, as described herein, provide the holding location displays with a relatively clean appearance and facilitate quick user comprehension and interaction.

[0076] Other configurations of the Operational screen are within the scope of the present disclosure.

[0077] For example, in one embodiment, the hold time graphic 264 includes a solid color (e.g., black, red, yellow, orange, etc.) instead of a gradient, as shown in FIG. 31.

[0078] In one embodiment, the hold time graphic 264 includes a solid color (e.g., red, yellow, green) that matches and changes with the color of the hold time indicator as shown in FIG. 32.

[0079] In one embodiment, the hold time graphic includes a single color (e.g., black, red, yellow, orange, etc.) gradient instead of a multi-color gradient, as shown in FIG. 33.

[0080] In one embodiment, the hold time graphic 264 includes a solid color (e.g., red, yellow, green) gradient with the single color matching and changing with the color of the hold time indicator 262 as shown in FIG. 34.

[0081] In one embodiment, the cabinet may be programed to provide a user with a warning indication that the end of a recipe is upcoming. The warning indication may be an audio (e.g., an alarm such as a chirp or beep) and/or visual (e.g., flash of the lights inside the cavity) indication. For example, the storage medium or memory 204 may include instructions to provide a warning indication when there is 5, 4, 3, 2, and/or 1, etc. minutes remaining on a given recipe or that the hold time on a given recipe has expired and the corresponding food needs to be discarded.

[0082] In one embodiment, the touch screen display provides the user with an indication that the recipe has ended (e.g., the hold time has expired). In one embodiment, the holding location display includes an expired food indicator 280 (broadly, an end of recipe indicator) that informs the operator the food at the corresponding holding location is expired as shown below (broadly, that the recipe has ended). In this embodiment, the expired food indicator includes the food type name and a directive, such as "please transfer product" which tells the operator to remove any remaining food at the holding location from the cavity of the cabinet. Typically, the removed food will be discarded. In this embodiment, the expired food indicator generally occupies the space previously occupied by the food type indicator and the hold time graphic. In one embodiment, the expired food type indicator replaces the food type indicator and the hold time graphic when the hold time expires (e.g., at the same time the hold time indicator changes to indicate the hold time has expired). In other embodiments, the expired food type indicator may appear after a given time (e.g., 5, 4, 3, 2, or 1 minutes) after the hold time has expired to provide a delayed secondary notification to the operator that the food has expired. In one embodiment,

the food expired indicator may flash to bring visual attention to itself to catch the operator's attention and inform the operator that the food has expired. In one embodiment, the entire expired food type indicator or a portion thereof (including any combination of the expired symbol, food type name, directive, background of the expired food type indicator) may flash. The food expired indicator may be used in combination with the audio and/or visual indications described above. Examples are shown in FIGS. 35 and 36. Pressing the holding location display 252, such as at the "X" in the hold time indicator, can clear the holding location display, indicating to the control system that the food has been discarded, causing the holing location display to return to a standby state ready for a new food product.

[0083] The food expired indicator 280 may be considered as providing a second food expired notification in addition to the notification provided by the hold time indicator (e.g., when the hold time indicator indicates the hold time has expired).

[0084] In one embodiment, the expired food indicator 280 may also include an expired symbol (e.g., "!"), as shown in FIG. 37, in addition to or instead of the food type name and/or the directive, such as shown in FIGS. 37 and 38. The expired symbol, the food type name, and/or the directive can be colored (e.g., red) to match the color of the hold time indicator when the hold time indicator indicates the hold time has expired.

[0085] In the embodiments described above, the expired symbol, the food type name, and the directive are arranged in a row. Other arrangements are within the scope of the present disclosure, such as shown in FIGS. 39-41.

[0086] In one embodiment, instead of or in addition to the expired food indicator 280, the touch screen display displays a pop-up expired food indicator or window as shown in FIG. 42 to provide the user with an indication that the recipe has ended (e.g., the hold time has expired). Similar to the expired food indicator, the pop-up expired food indicator includes the expired symbol, the food type name, and/or the directive. In this embodiment, the pop-up expired food indicator generally overlies the holding location displays. Desirably, any portion of the touch screen display that does not display the pop-up expired food indicator has a grey/dim appearance. In one embodiment, the pop-up expired food type indicator is displayed when the hold time expires (e.g., at the same time the hold time indicator changes to indicate the hold time has expired). In other embodiment, the pop-up expired food type indicator may appear after a given time (e.g., 5, 4, 3, 2, or 1 minutes) after the hold time has expired to provide a delayed

secondary (or tertiary if the expired food type indicator is also used) notification to the operator that the food has expired. In one embodiment, the pop-up food expired indicator may flash to bring visual attention to itself to catch the operators attention and inform the operator that the food has expired. In one embodiment, the entire pop-up expired food type indicator or a portion thereof (including any combination of the expired symbol, food type name, directive, background of the expired food type indicator) may flash. The pop-up food expired indicator may be used in combination with the audio and/or visual indications described above. The food type indicator may include an actuator (e.g. "OK" button) that the user presses to dismiss the pop-up food expired indicator and return to the Operational screen displaying all the holding location displays. In one embodiment, when the user presses the actuator, the corresponding holding location display may change to the standby state (described above). In another embodiment, when the user presses the actuator, the holding location display may continue to show the hold time has expired (e.g., the hold time indicator remains red with an "X" and the hold time graphic also indicates the hold time has expired). In this case, the user has to reset the holding location display, by pressing the holding location display as described above. Other configurations can be used without departing form the scope of the present disclosure.

[0087] In view of the above, it will be appreciated that the tangible storage medium stores instructions executable by the controller to perform the actions described above.

[0088] For purposes of illustration, programs and other executable program components, such as the operating system, are illustrated herein as discrete blocks. It is recognized, however, that such programs and components reside at various times in different storage components of a computing device, and are executed by one or more data processors of the device.

[0089] Embodiments of the aspects of the invention may be described in the general context of data and/or processor-executable instructions, such as program modules, stored one or more tangible, non-transitory storage media and executed by one or more processors or other devices. Generally, program modules include, but are not limited to, routines, programs, objects, components, and data structures that perform particular tasks or implement particular abstract data types. Aspects of the invention may also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote storage media including memory storage devices.

[0090] In operation, processors, computers and/or servers may execute the processor-executable instructions (e.g., software, firmware, and/or hardware) such as those illustrated herein to implement aspects of the invention.

[0091] Embodiments of the aspects of the invention may be implemented with processor-executable instructions. The processor-executable instructions may be organized into one or more processor-executable components or modules on a tangible processor readable storage medium. Aspects of the invention may be implemented with any number and organization of such components or modules. For example, aspects of the invention are not limited to the specific processor-executable instructions or the specific components or modules illustrated in the figures and described herein. Other embodiments of the aspects of the invention may include different processor-executable instructions or components having more or less functionality than illustrated and described herein.

[0092] The order of execution or performance of the operations in embodiments of the aspects of the invention illustrated and described herein is not essential, unless otherwise specified. That is, the operations may be performed in any order, unless otherwise specified, and embodiments of the aspects of the invention may include additional or fewer operations than those disclosed herein. For example, it is contemplated that executing or performing a particular operation before, contemporaneously with, or after another operation is within the scope of aspects of the invention.

[0093] When introducing elements of aspects of the invention or the embodiments thereof, the articles "a," "an," "the," and "said" are intended to mean that there are one or more of the elements. The terms "comprising," "including," and "having" are intended to be inclusive and mean that there may be additional elements other than the listed elements.

[0094] In view of the above, it will be seen that several advantages of the aspects of the invention are achieved and other advantageous results attained.

[0095] Not all of the depicted components illustrated or described may be required. In addition, some implementations and embodiments may include additional components. Variations in the arrangement and type of the components may be made without departing from the spirit or scope of the claims as set forth herein. Additional, different or fewer components may be provided and components may be combined. Alternatively or in addition, a component may be implemented by several components.

[0096] The above description illustrates the aspects of the invention by way of example and not by way of limitation. This description enables one skilled in the art to make and use the aspects of the invention, and describes several embodiments, adaptations, variations, alternatives and uses of the aspects of the invention, including what is presently believed to be the best mode of carrying out the aspects of the invention. Additionally, it is to be understood that the aspects of the invention is not limited in its application to the details of construction and the arrangement of components set forth in the description or illustrated in the drawings. The aspects of the invention are capable of other embodiments and of being practiced or carried out in various ways. Also, it will be understood that the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting.

[0097] It will be apparent that modifications and variations are possible without departing from the scope of aspects of the invention as defined in the appended claims. It is contemplated that various changes could be made in the above constructions, products, and methods without departing from the scope of aspects of the invention. In the preceding specification, various embodiments have been described with reference to the accompanying drawings. It will, however, be evident that various modifications and changes may be made thereto, and additional embodiments may be implemented, without departing from the broader scope of the aspects of the invention as set forth in the claims that follow. The specification and drawings are accordingly to be regarded in an illustrative rather than restrictive sense.

[0098] Additional statements of invention are provided below.

[0099] A food holding cabinet comprising:

[00100] a housing having a cavity sized and shaped to hold trays of food, the housing having a door arranged to provide access to the cavity, the housing having tray supports arranged to support the trays of food in the cavity, the tray supports defining a plurality of holding locations in the cavity;

[00101] a heating system configured to heat the cavity;

[00102] a control system configured to control the heating system and the humid air exhaust system, the control system programmable to execute food holding recipes for different types of food simultaneously held in the cavity, the control system including a user interface having a display, the display configured to show a plurality of holding location displays, each holding location display corresponding to one of the holding locations, the holding

location displays arranged in an array matching the arrangement of the corresponding holding locations in the cavity.

[00103] A food preparation apparatus comprising:

[00104] a housing defining a food conditioning cavity and a food access opening for providing food in the food conditioning cavity;

[00105] a humidity sensor having a sensor head in fluid communication with the food conditioning cavity, the humidity sensor being accessible for removal from the housing via a humidity sensor access opening different from the food access opening.

WHAT IS CLAIMED IS:

1. A food holding cabinet comprising:

a housing having a cavity sized and shaped to hold trays of food, the housing having a door arranged to provide access to the cavity, the housing having tray supports arranged to support the trays of food in the cavity, the tray supports defining a plurality of holding locations in the cavity;

a heating system configured to heat the cavity;

a humid air exhaust system configured to exhaust air from the cavity;

a control system configured to control the heating system and the humid air exhaust system, the control system programmable to execute food holding recipes for different types of food simultaneously held in the cavity, the control system including a user interface having a display, the display configured to show a plurality of holding location displays, each holding location display corresponding to one of the holding locations, the holding location displays arranged in an array matching the arrangement of the corresponding holding locations in the cavity.

2. The food holding cabinet of claim 1, wherein each holding location display includes a food type indicator representing a type of food held at the corresponding holding location and a hold time indicator representing a hold time of food held at the corresponding holding location.

3. The food holding cabinet of claim 2, wherein each holding location display includes a timer indicating a hold time associated with the respective holding location.

4. The food holding cabinet of claim 1, wherein the food holding recipes include at least a first recipe and a second recipe, the first recipe including a food hold time of a first duration, and the second recipe including a food hold time of a second duration less than the first duration.

5. The food holding cabinet of claim 1, wherein the food holding locations are arranged in a column and the food holding location displays are arranged in a column.

6. The food holding cabinet of claim 1, wherein the door is a front door and the housing further comprises a rear door arranged to provide access to the cavity.

7. The food holding cabinet of claim 1, wherein control system is programmable to change the food holding recipe for each of the holding locations.

8. The food holding cabinet of claim 1, wherein the holding location display is programmable to change the name of the food type held at the associated holding location.

9. A food preparation apparatus comprising:

a housing defining a food conditioning cavity;

a humidity sensor having a sensor head in fluid communication with the food conditioning cavity; and

a shield overlying the sensor head to shield the sensor head from being contacted from inside the food conditioning cavity, the shield being configured to permit air from the food conditioning cavity to flow around the shield to the sensor head.

10. The food preparation apparatus set forth in claim 9, further comprising a food access opening and a sensor access opening, the food access opening being arranged to permit food to be located in the food conditioning cavity, the sensor access opening being different from the food access opening and being configured to permit access to the humidity sensor from outside the food conditioning cavity for removal of the humidity sensor from the housing.

11. The food preparation apparatus set forth in claim 10, further comprising a gasket forming a seal around the humidity sensor.

12. The food preparation apparatus set forth in claim 10, wherein the humidity sensor is mounted on a panel releasably mounted in the housing to permit removal of the sensor on the panel from the housing.

13. The food preparation apparatus set forth in claim 12, wherein the panel is secured to the housing by tool-less fasteners.

14. The food preparation apparatus set forth in claim 12, further comprising a processor, and wherein the panel includes an opening through which the humidity sensor is electrically connected to the processor.

15. The food preparation apparatus set forth in claim 10, further comprising a temperature sensor arranged to sense temperature of air in the food conditioning cavity, the temperature sensor being removable from the access opening.

FIG. 1

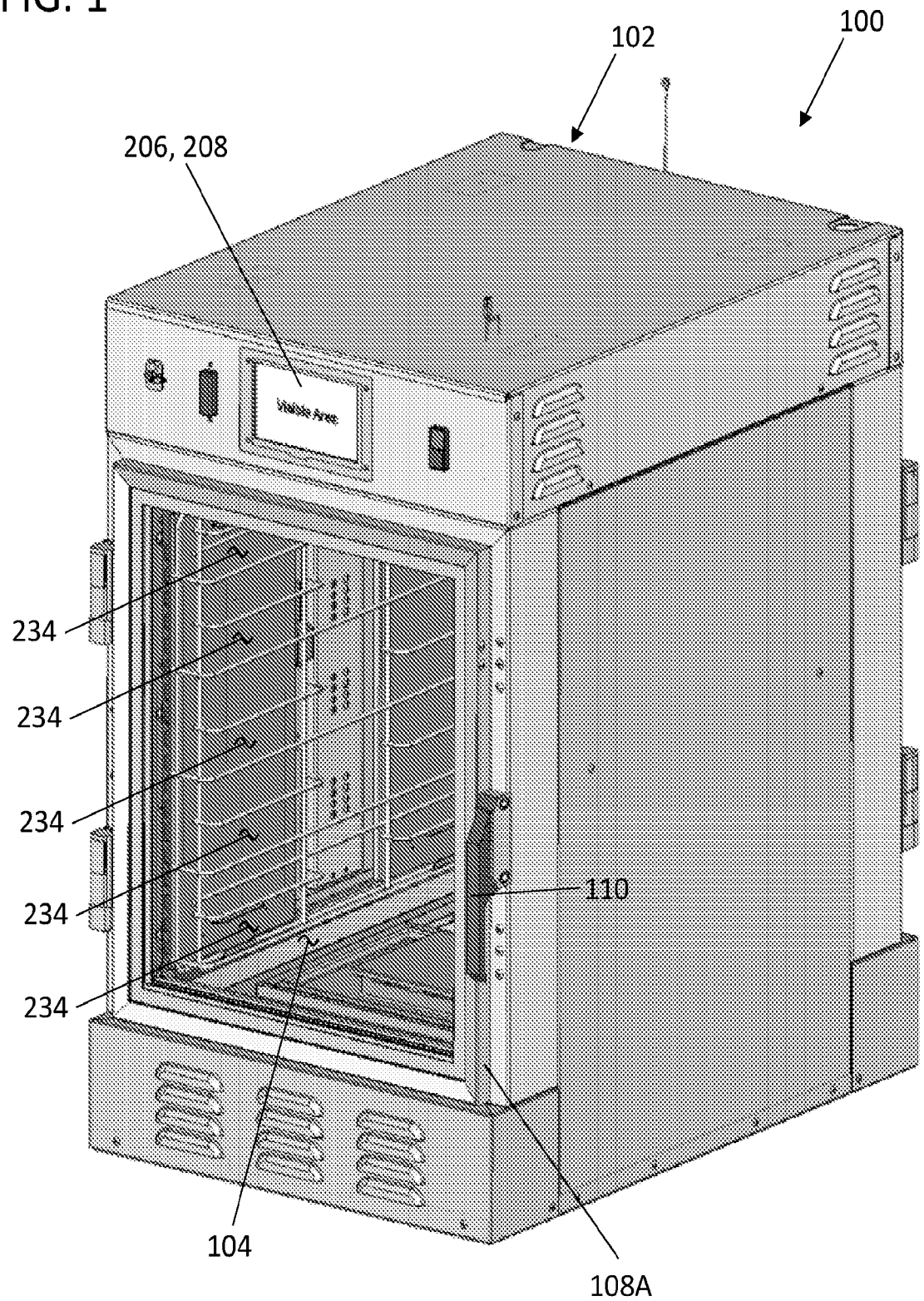


FIG. 2

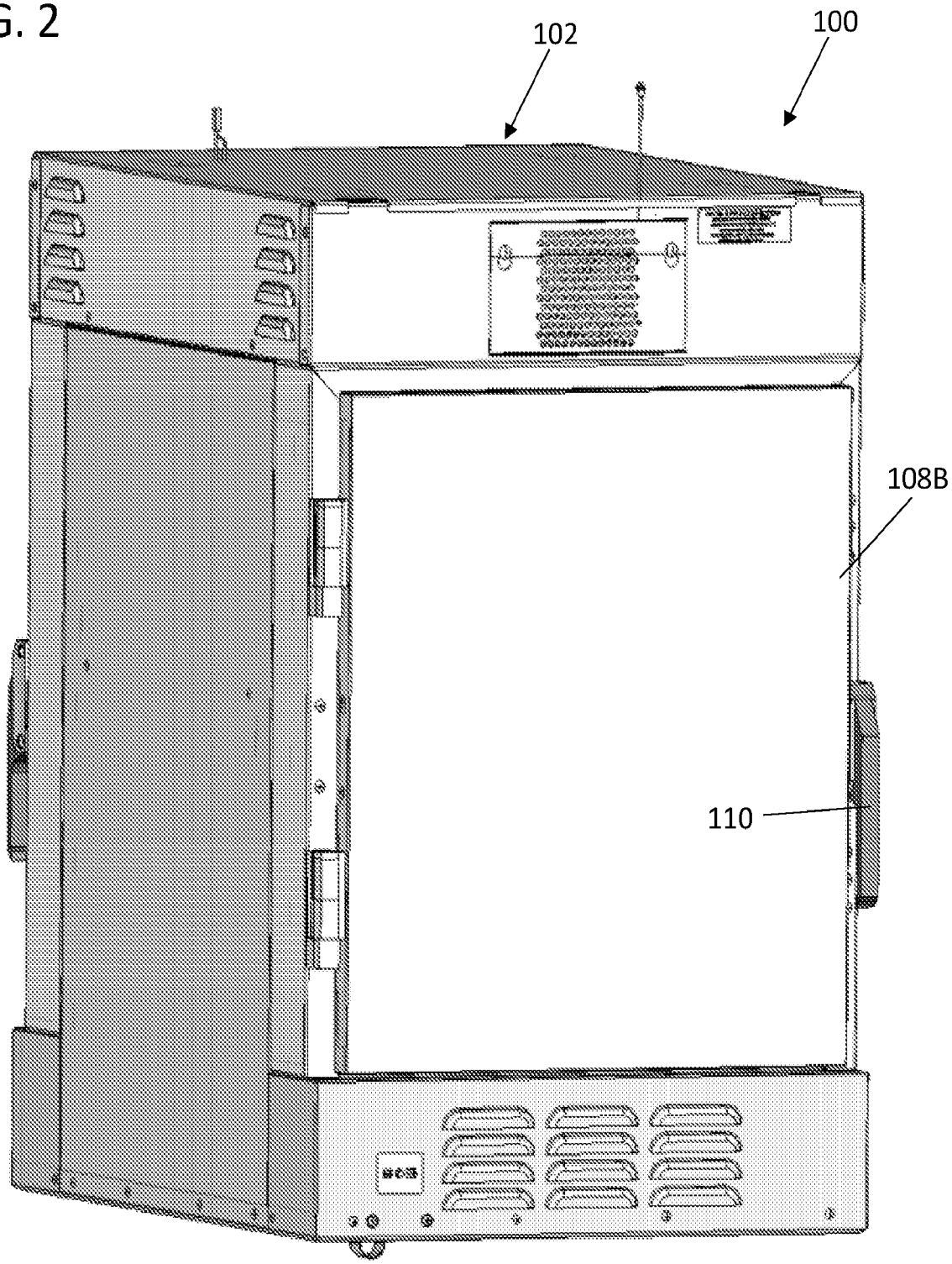


FIG. 3

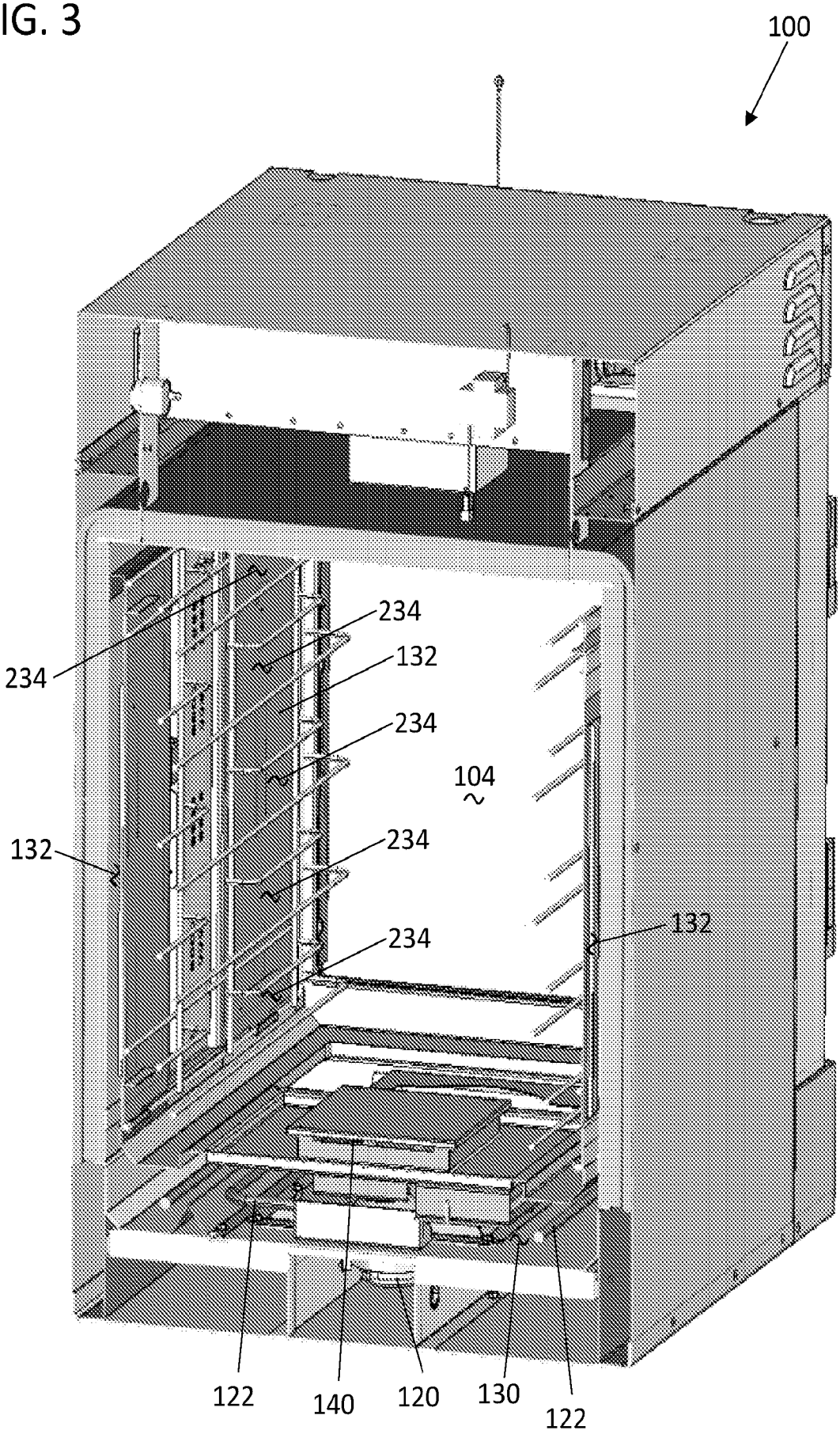


FIG. 4

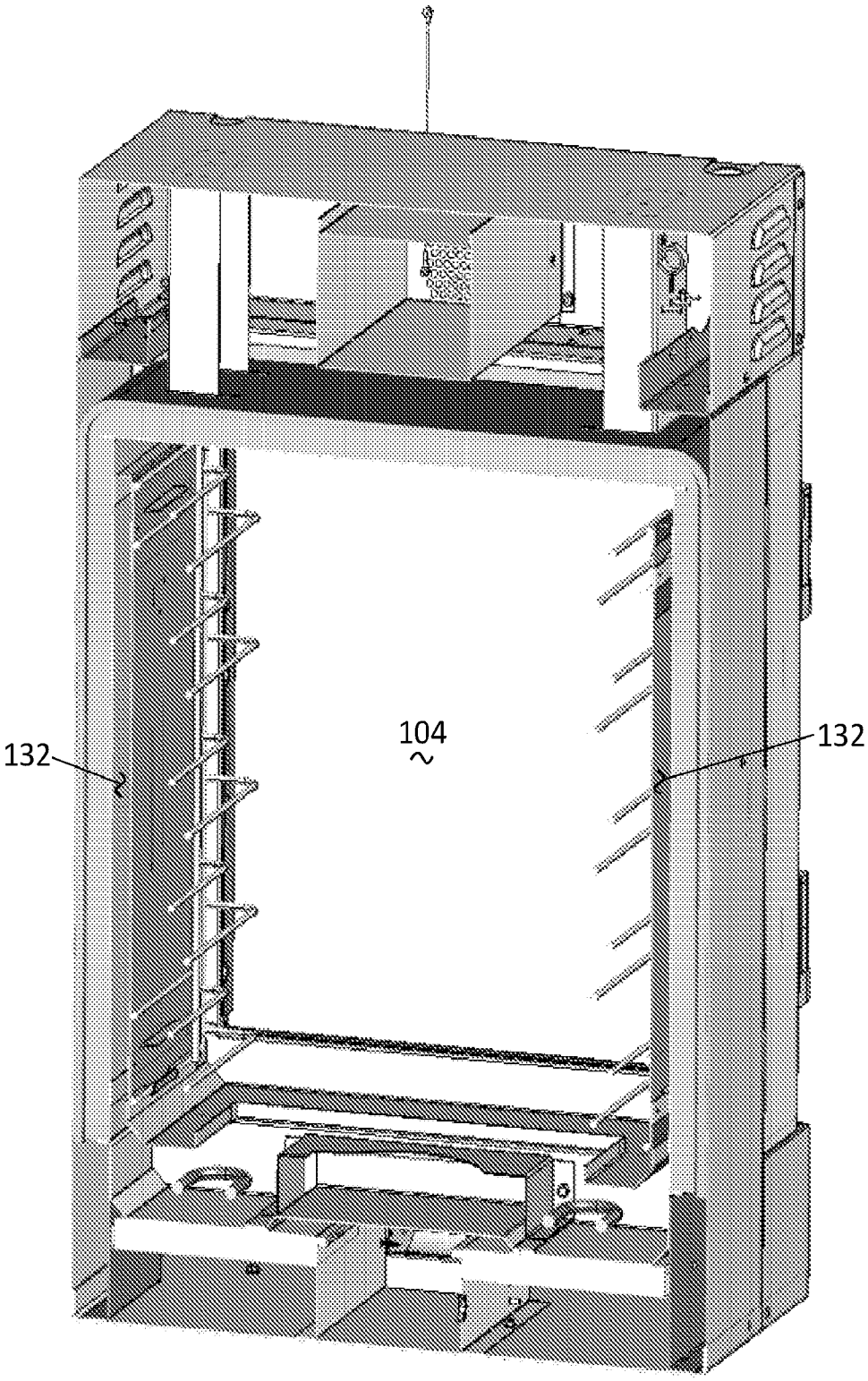


FIG. 5

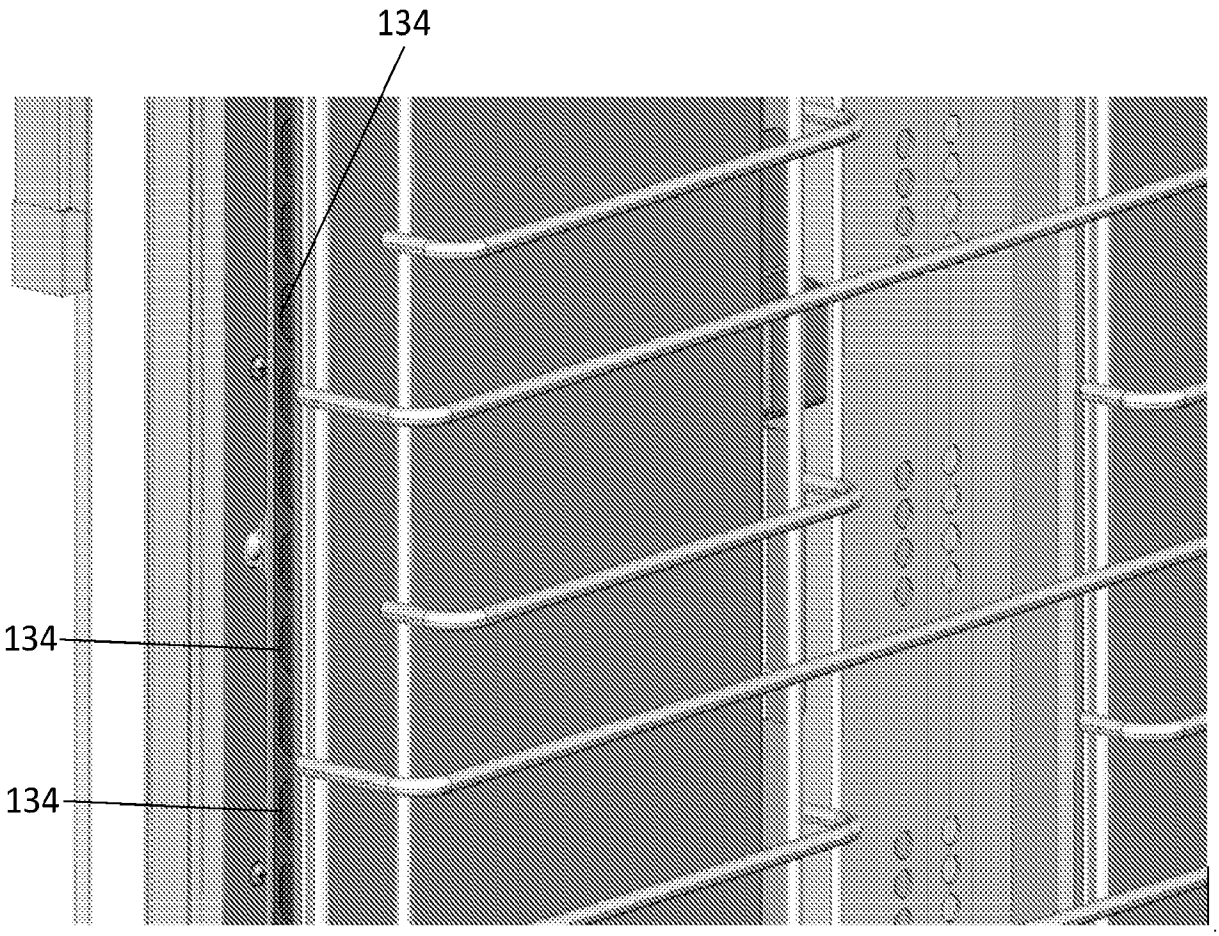


FIG. 6

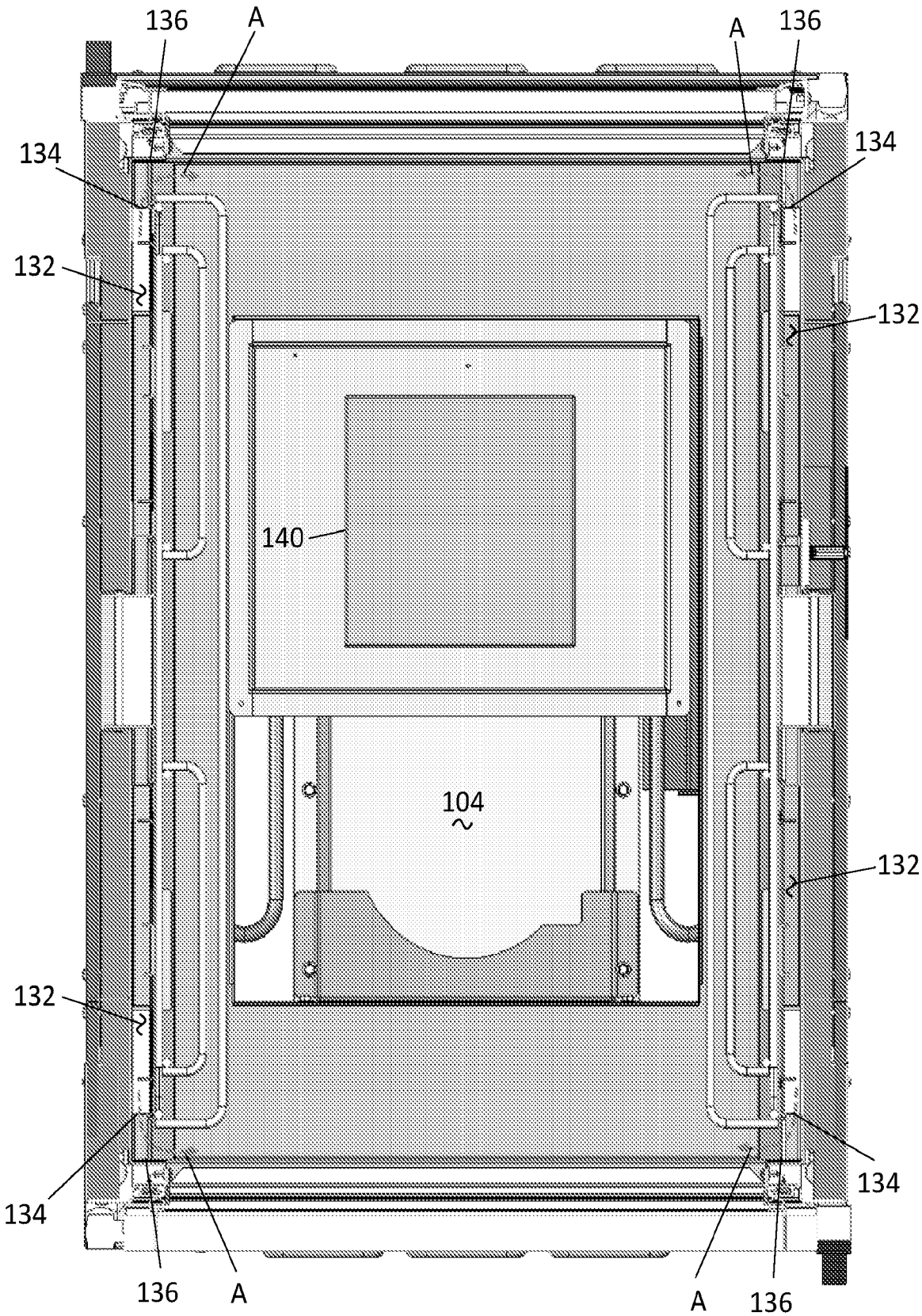


FIG. 7

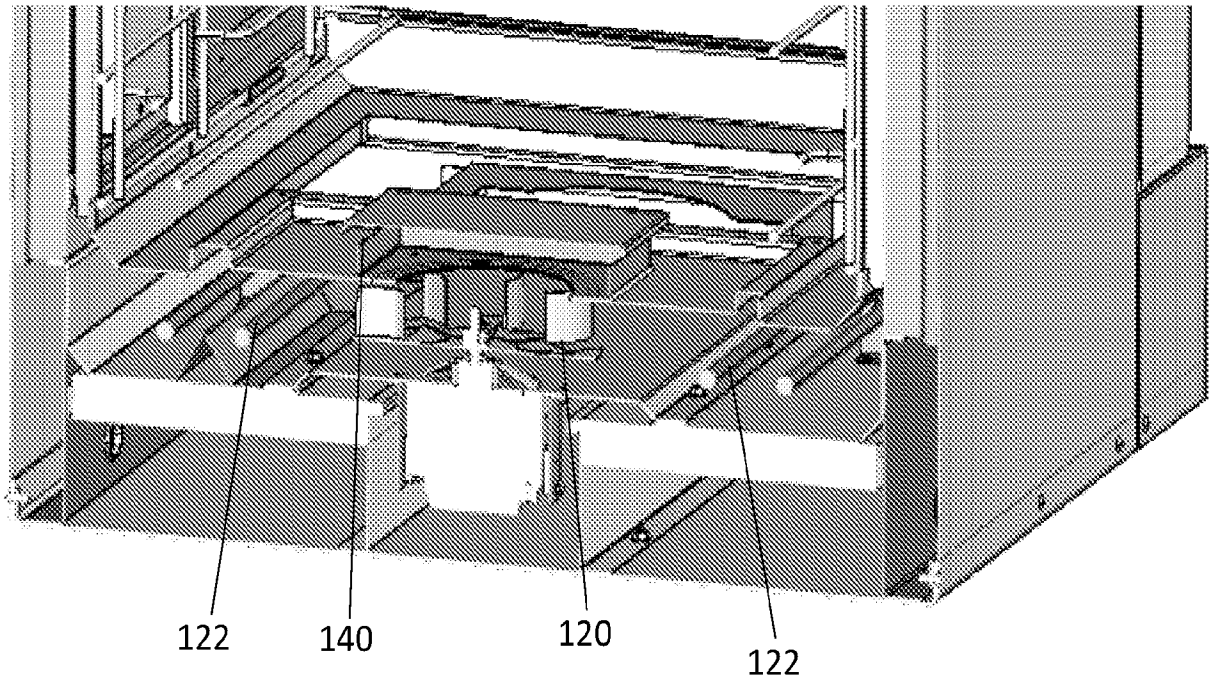


FIG. 8

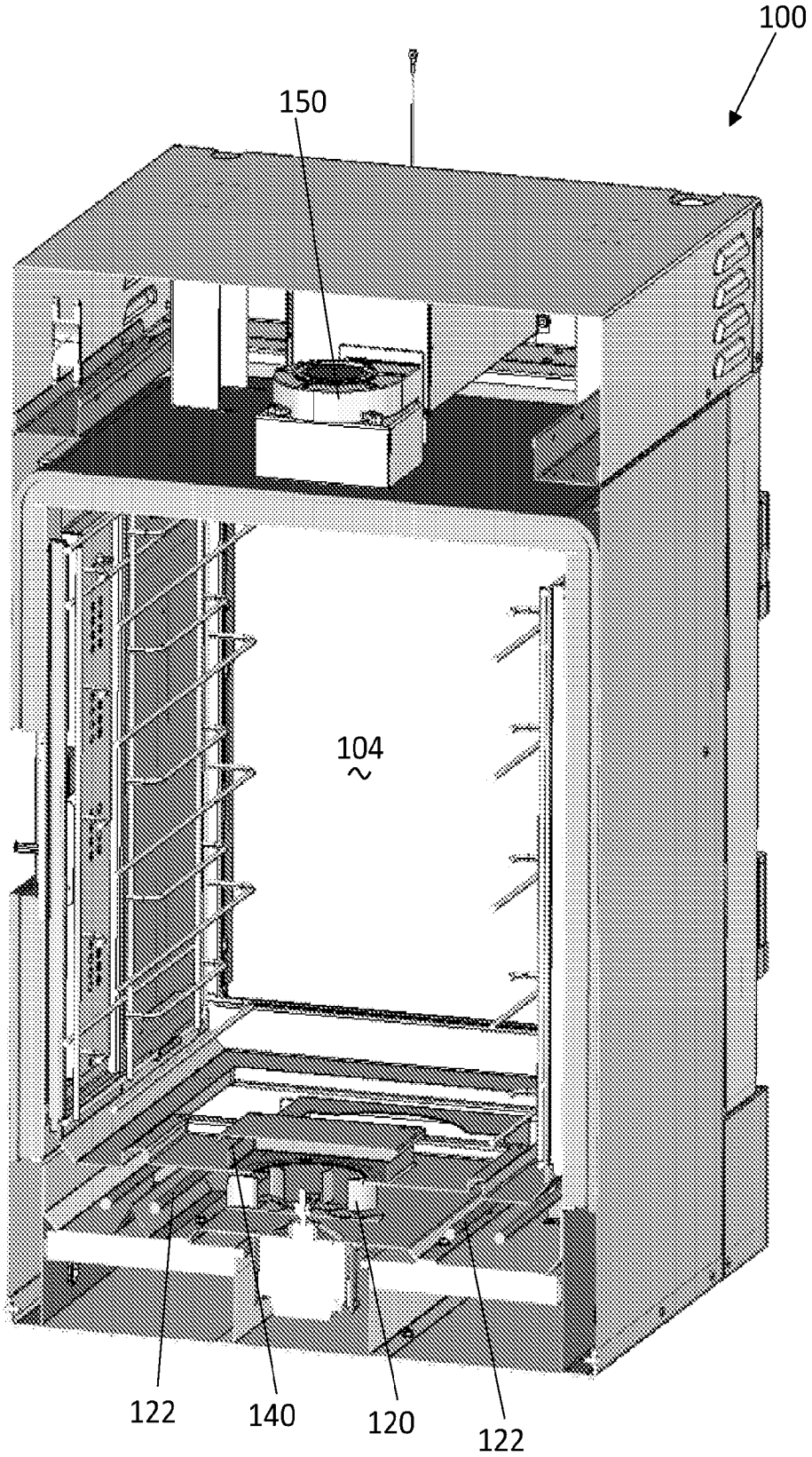


FIG. 9

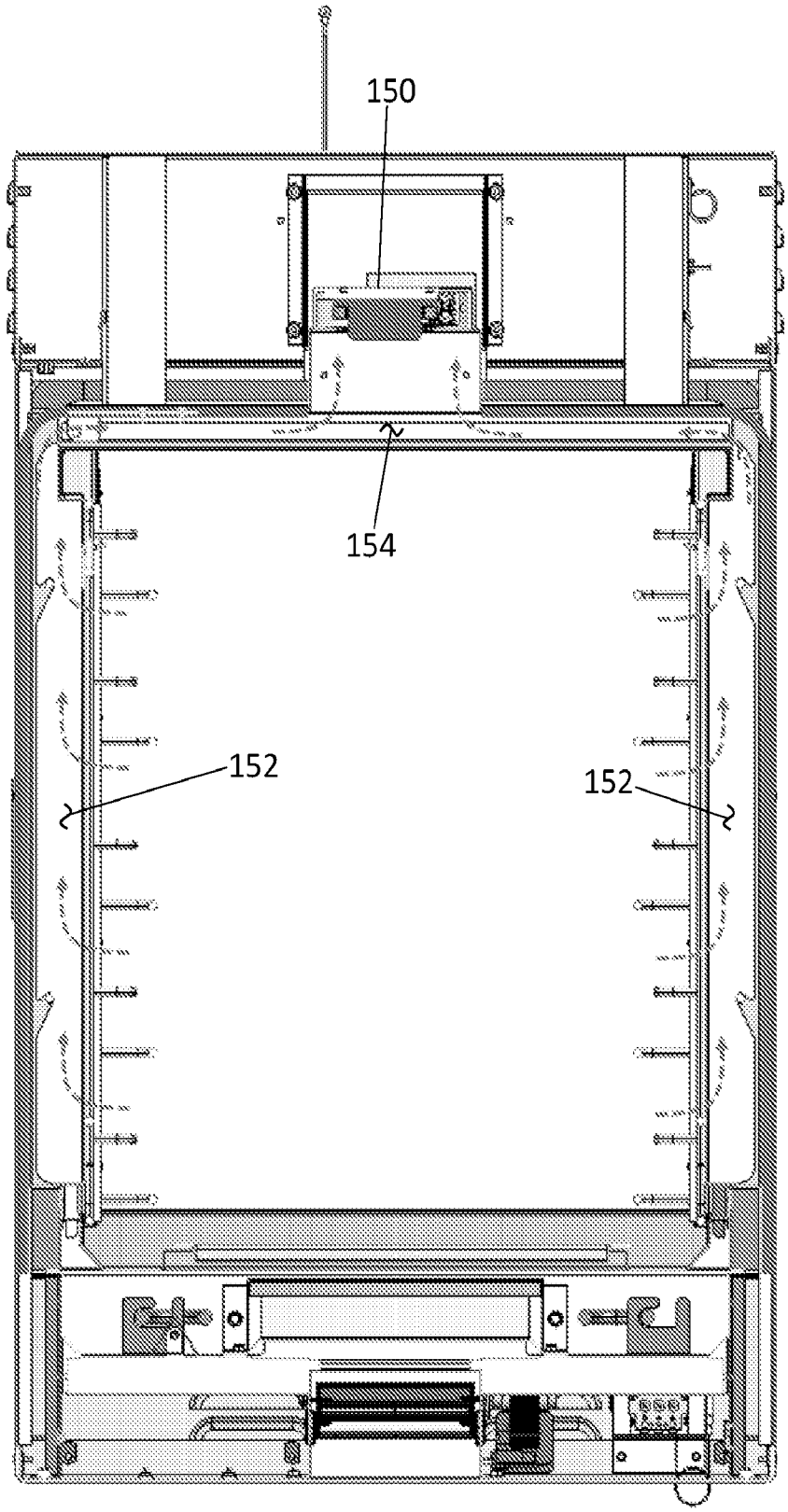


FIG. 10

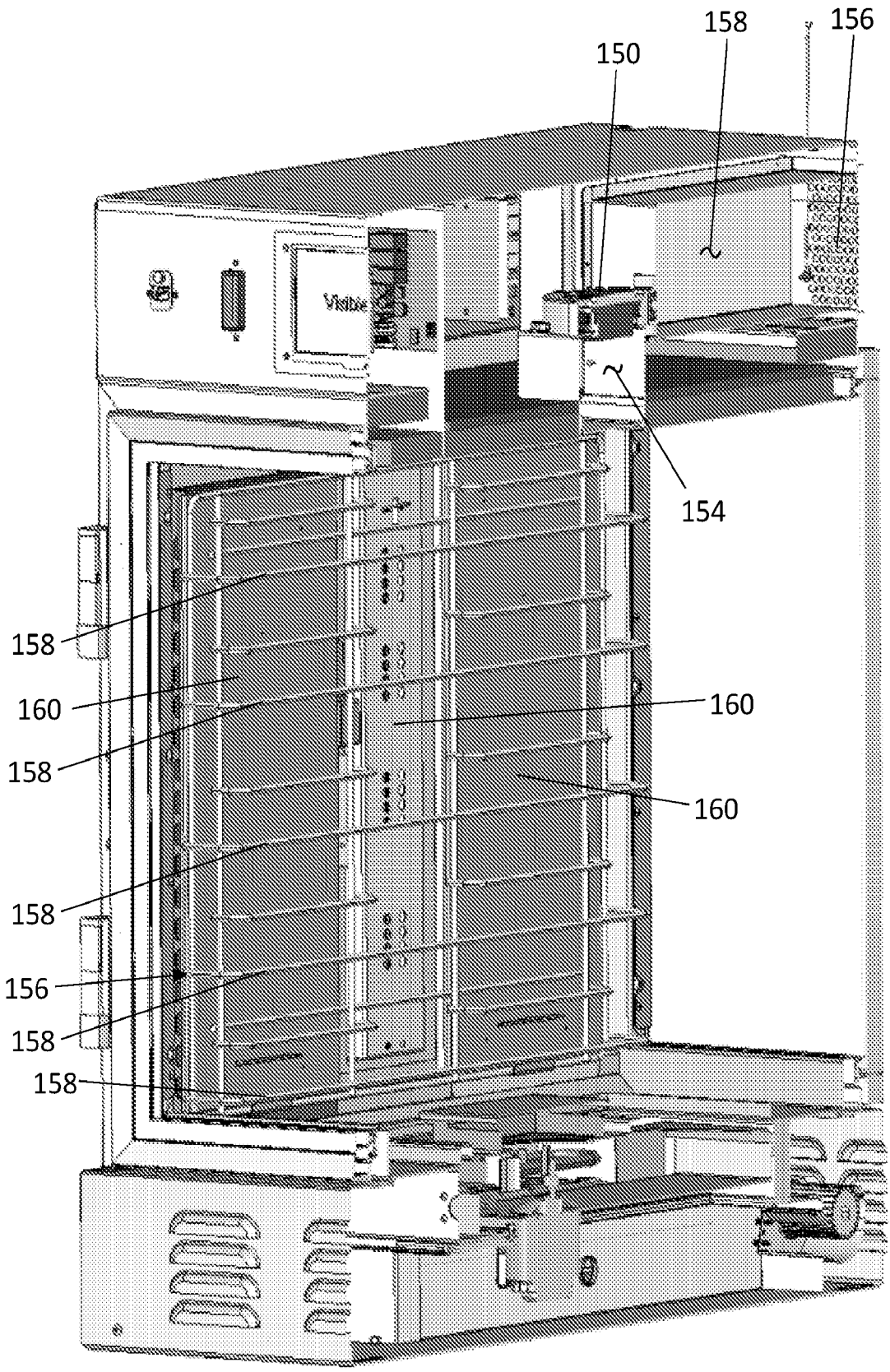


FIG. 11A

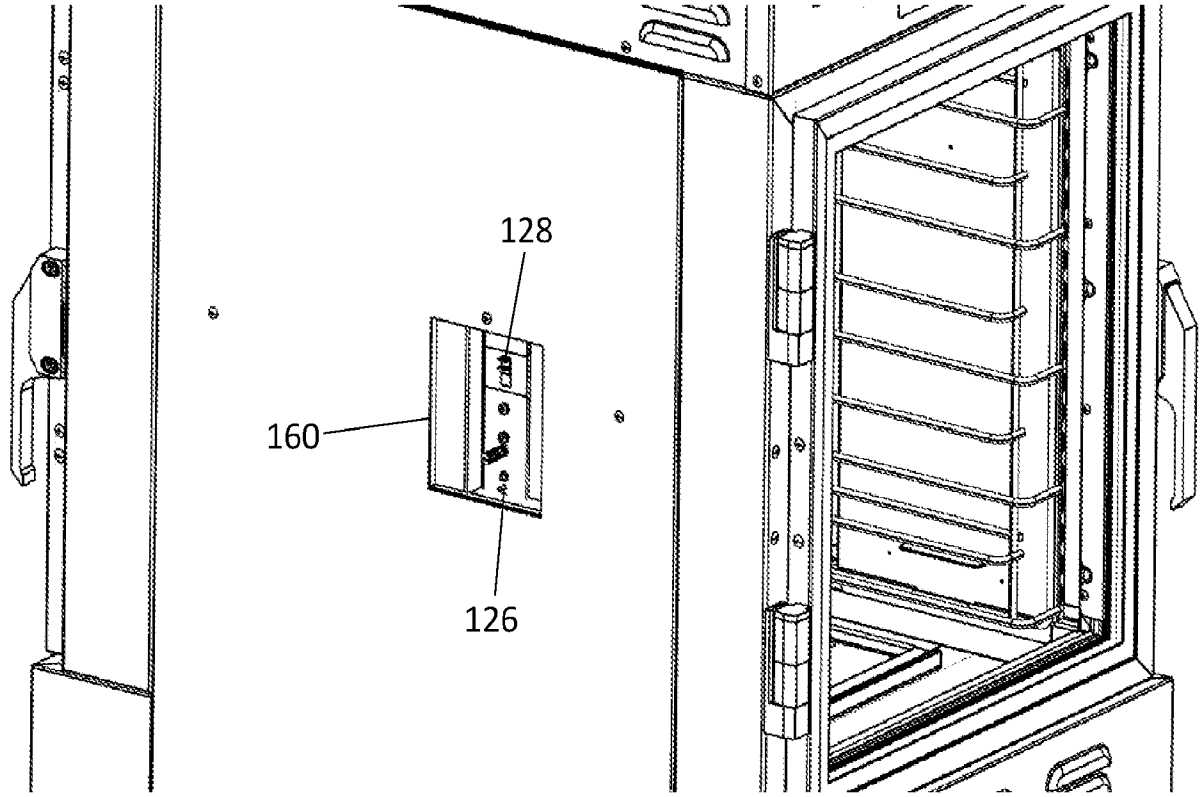


FIG. 11B

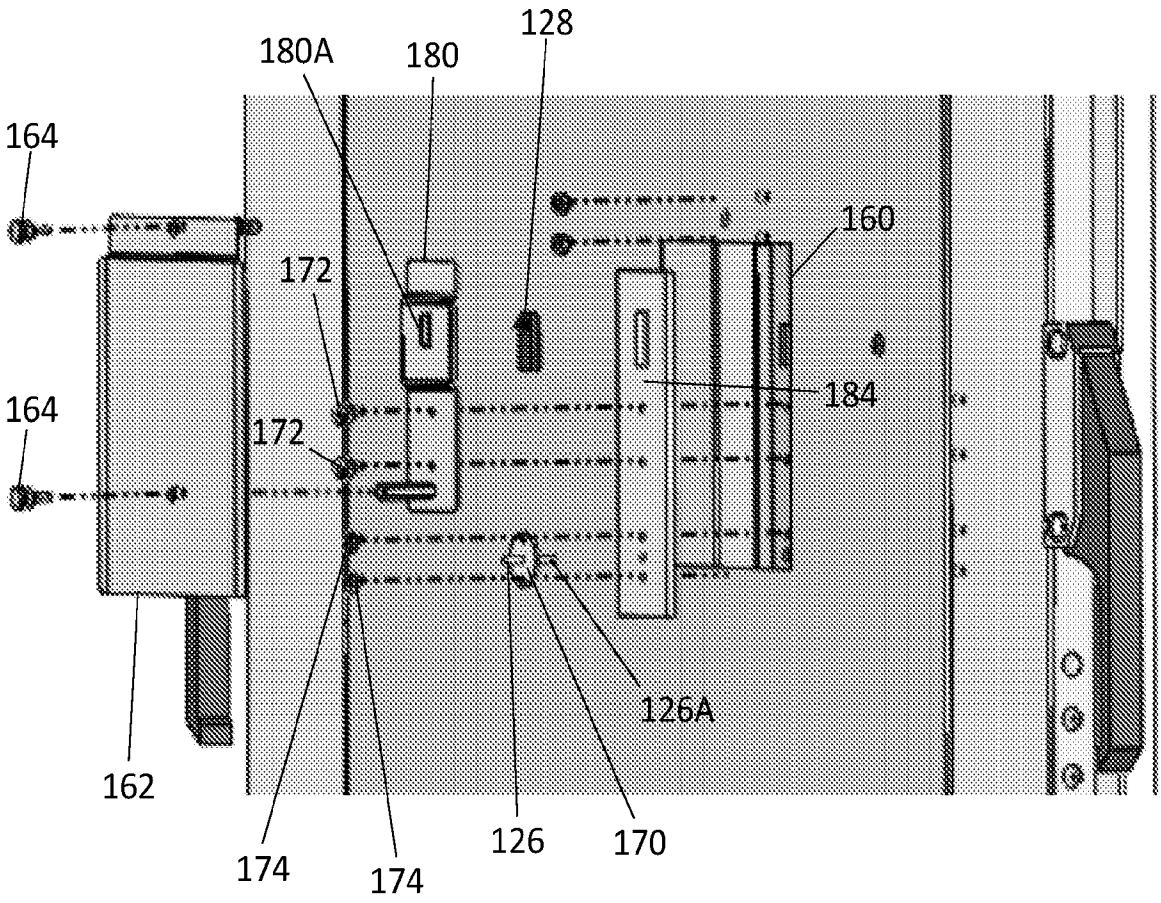


FIG. 12

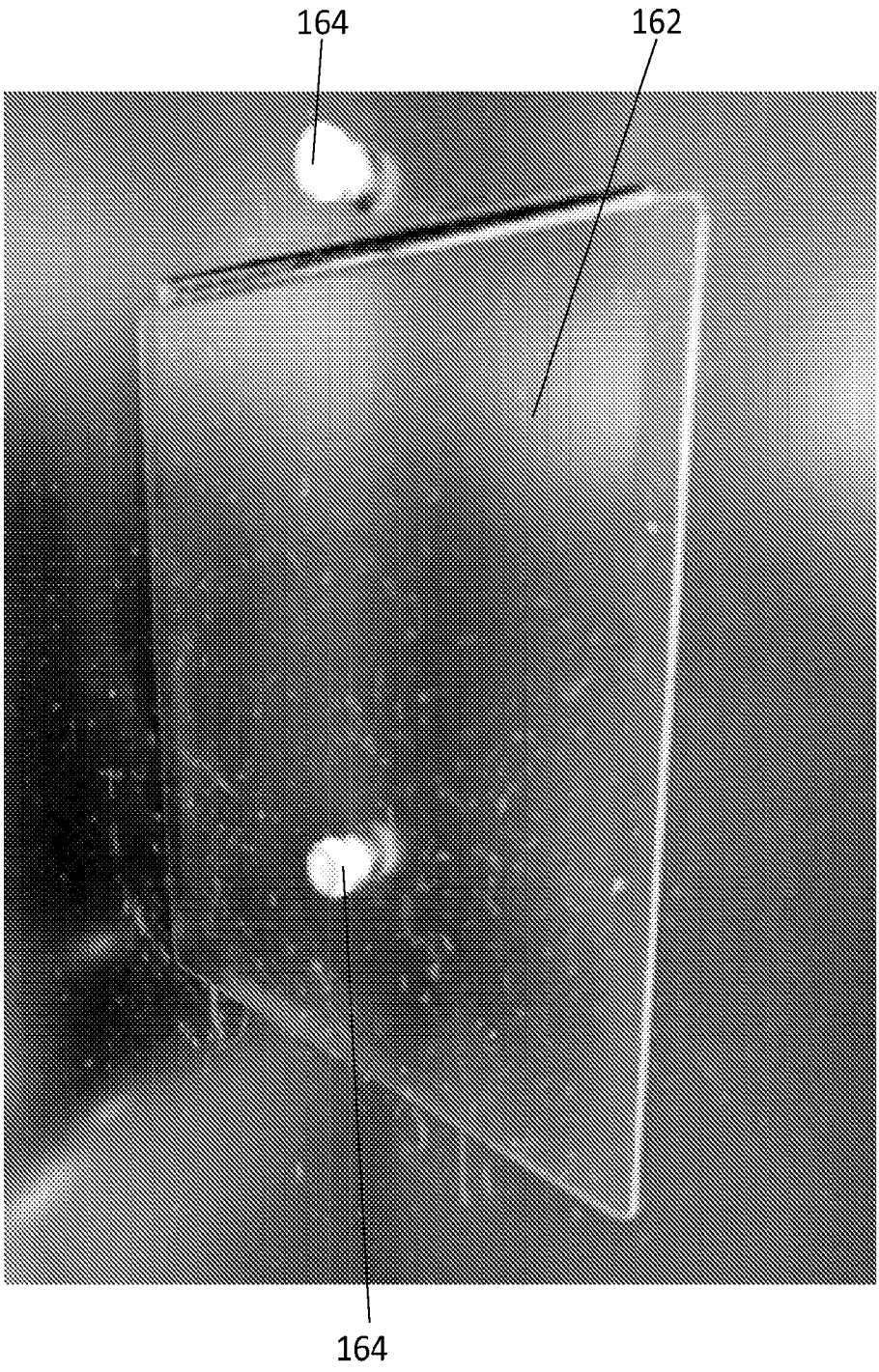


FIG. 13

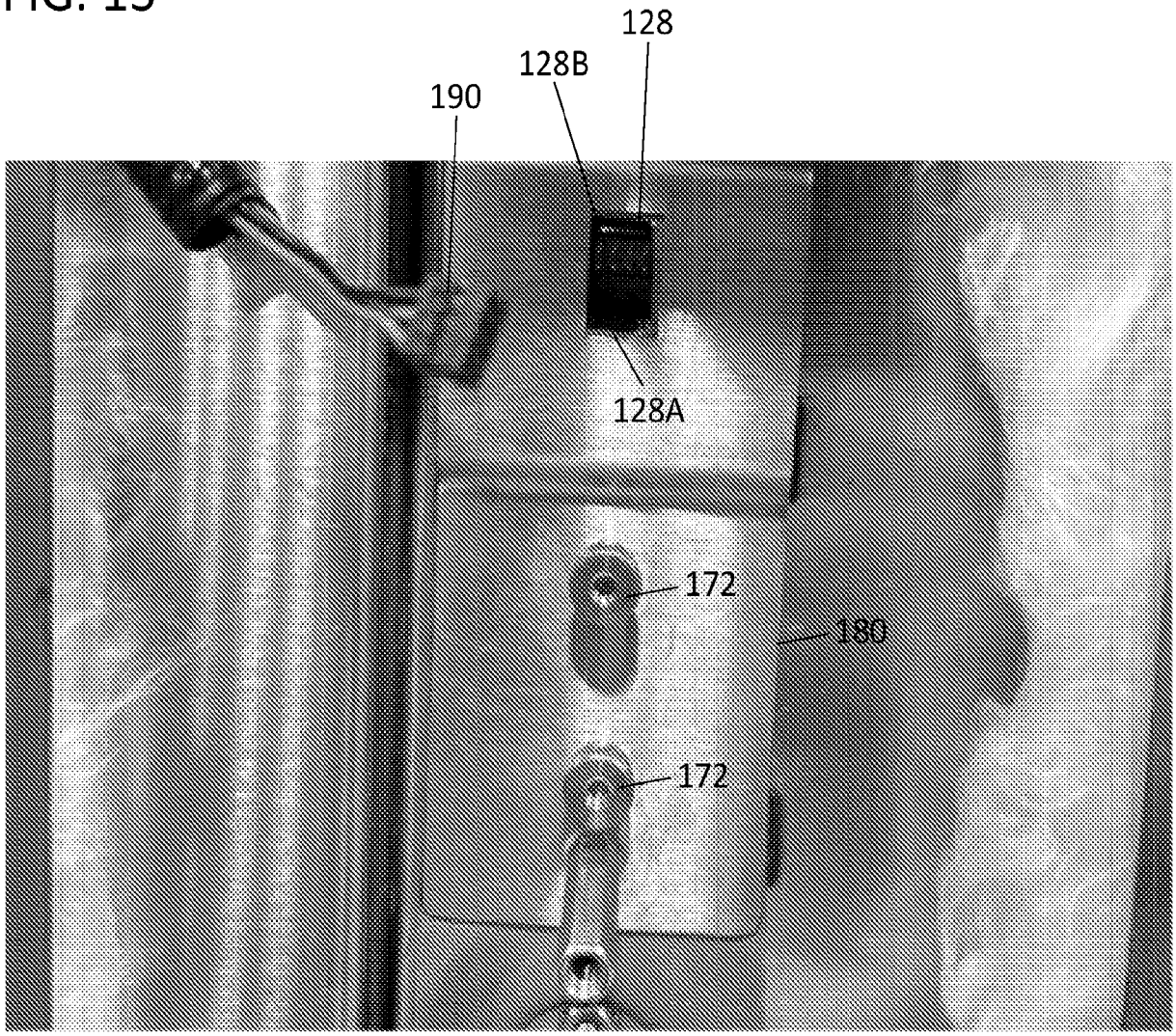


FIG. 14

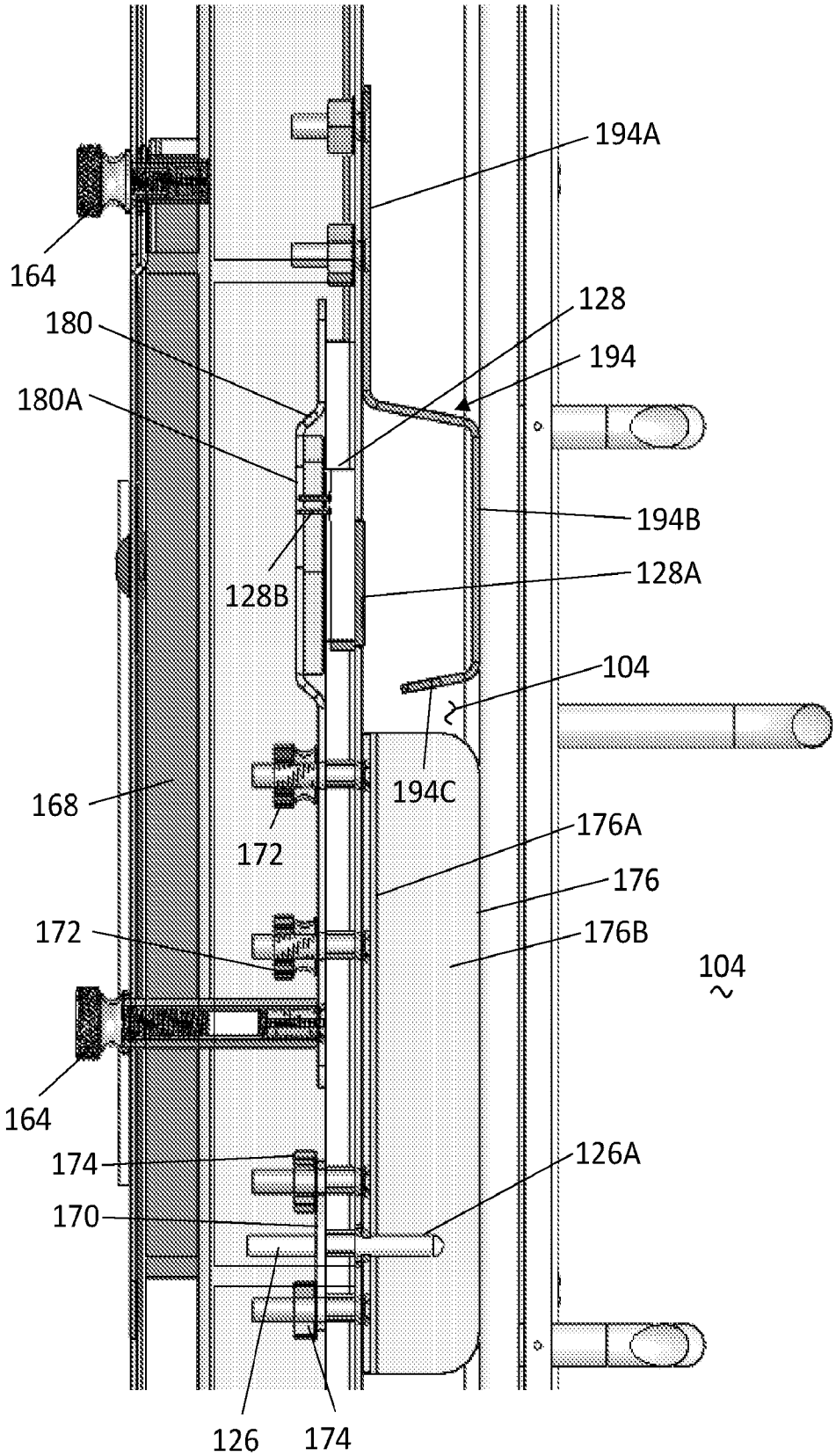

194A
164
128
180
194
180A
194B
128A
128B
104
194C
168
172
176A
176
172
176B
104
164
174
126A
170
126
174

FIG. 15

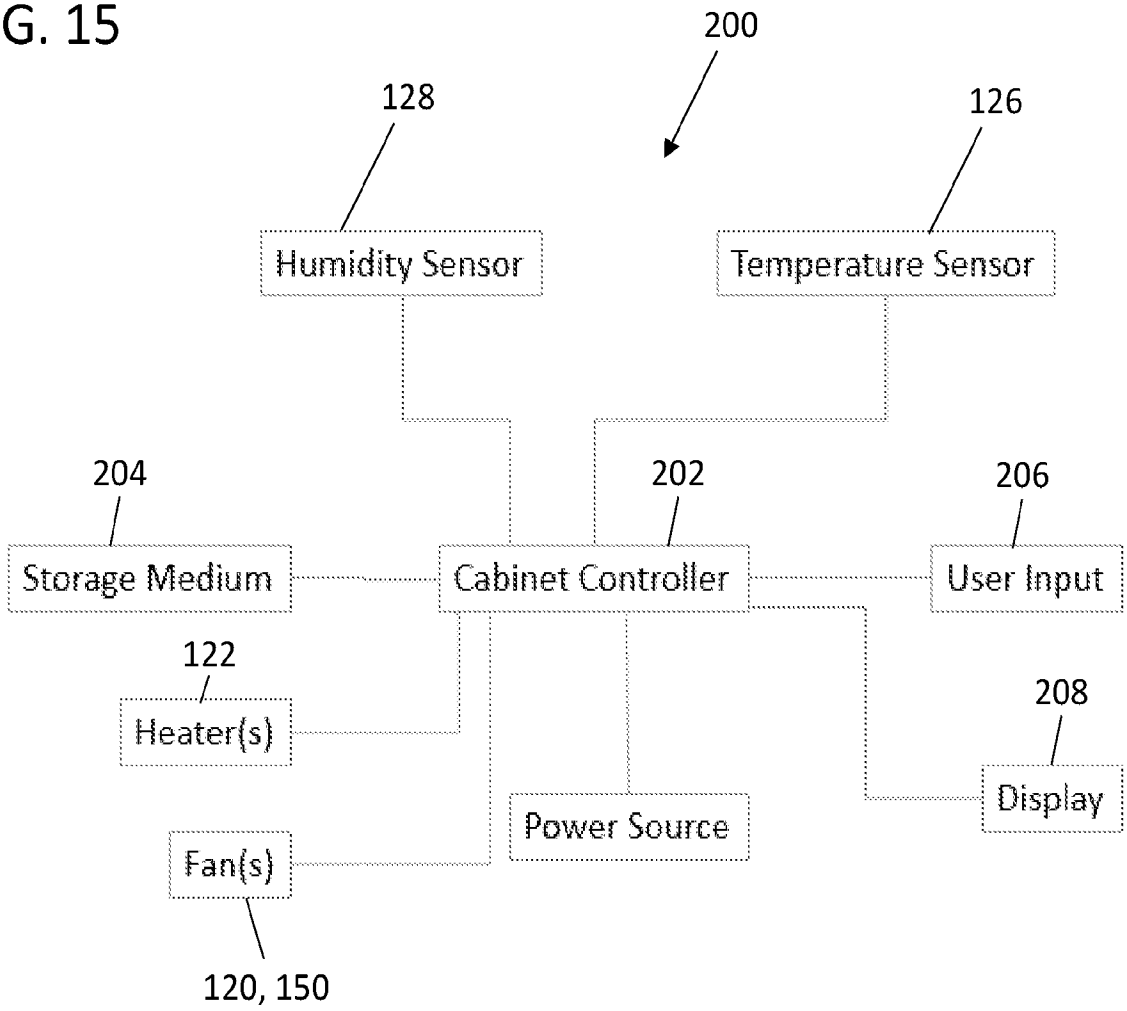

200
128
126
Humidity Sensor
Temperature Sensor
204
202
206
Storage Medium
Cabinet Controller
User Input
122
208
Heater(s)
Display
Power Source
Fan(s)
120, 150

FIG. 16

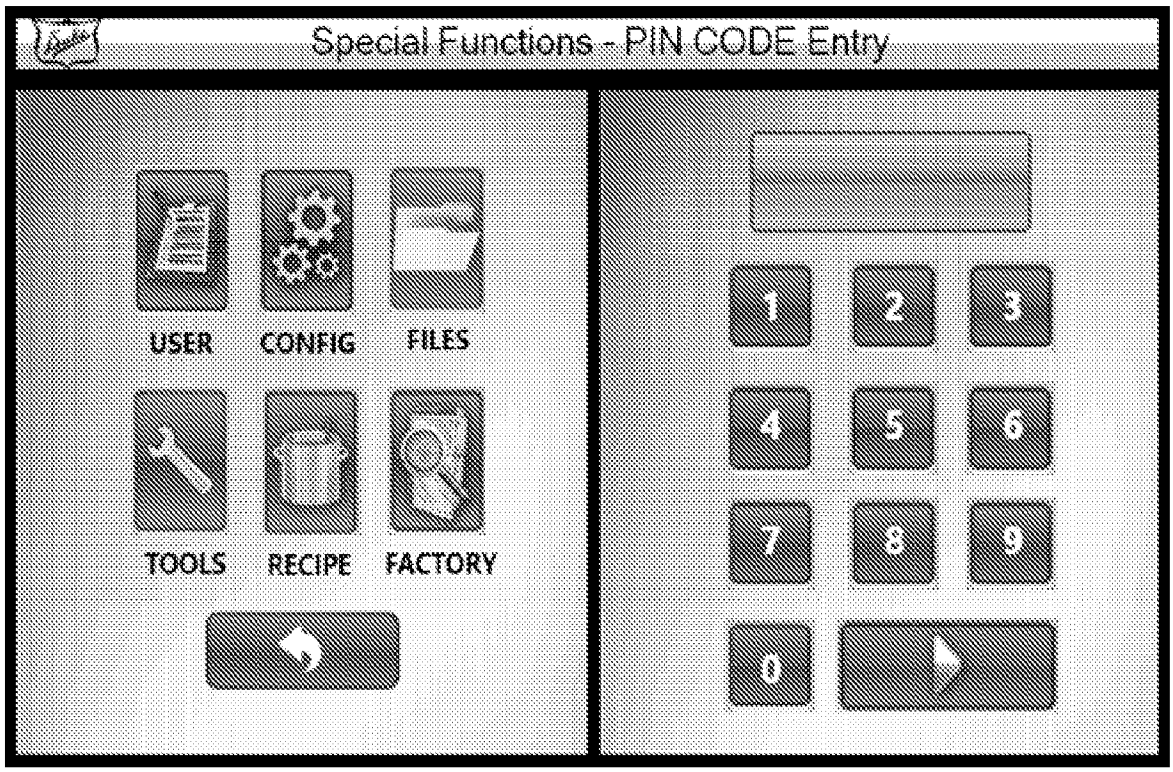

Special Functions - PIN CODE Entry
USER
CONFIG
FILES
TOOLS
RECIPE
FACTORY
1
2
3
4
5
6
7
8
9
0

FIG. 17

FIG. 18

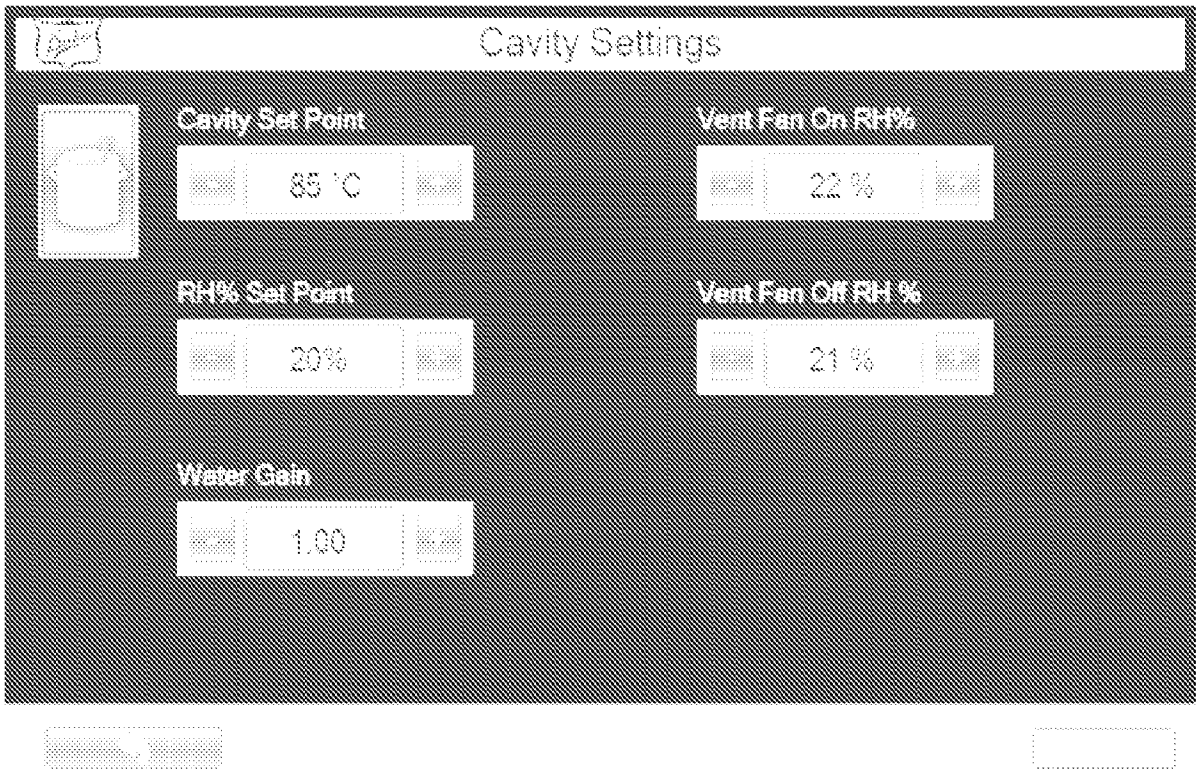

Cavity Settings
Cavity Set Point
85 °C
Vent Fan On RH%
22 %
RH% Set Point
20%
Vent Fan Off RH %
21 %
Water Gain
1.00

FIG. 19

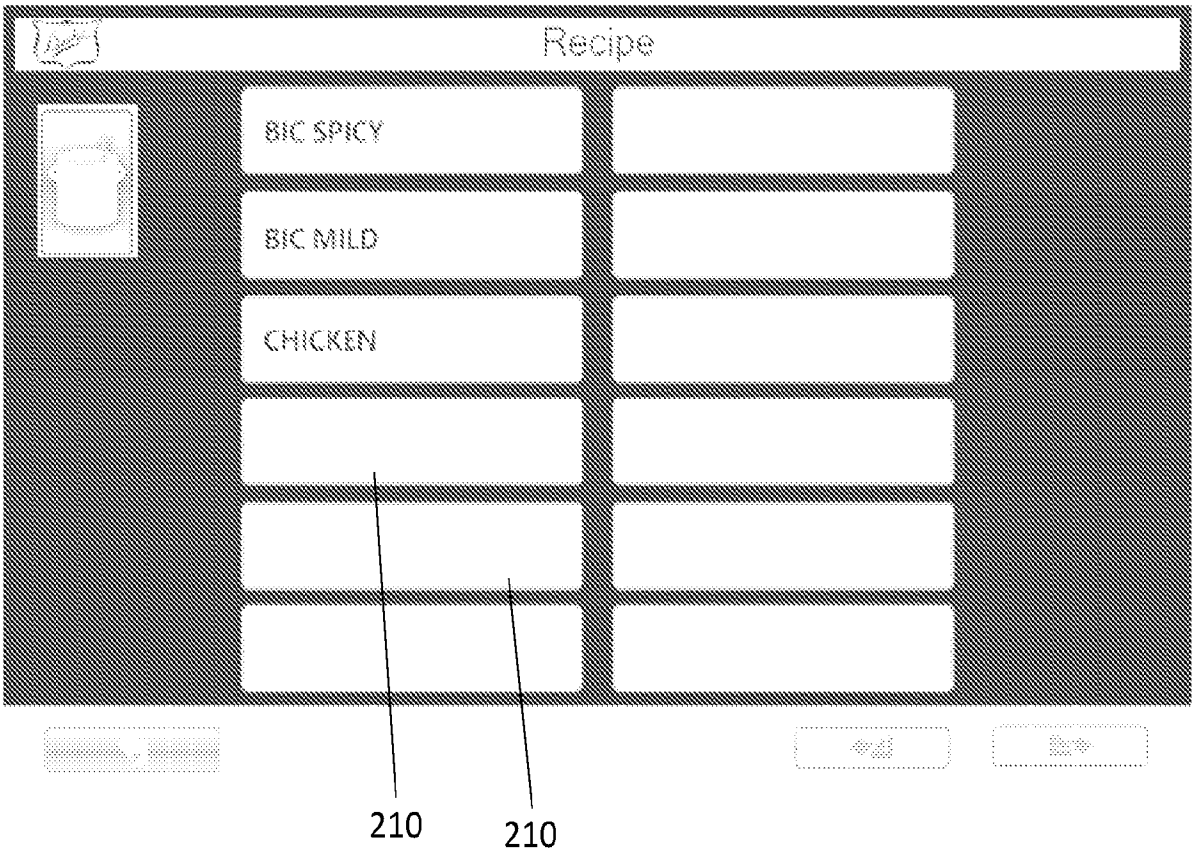


FIG. 20

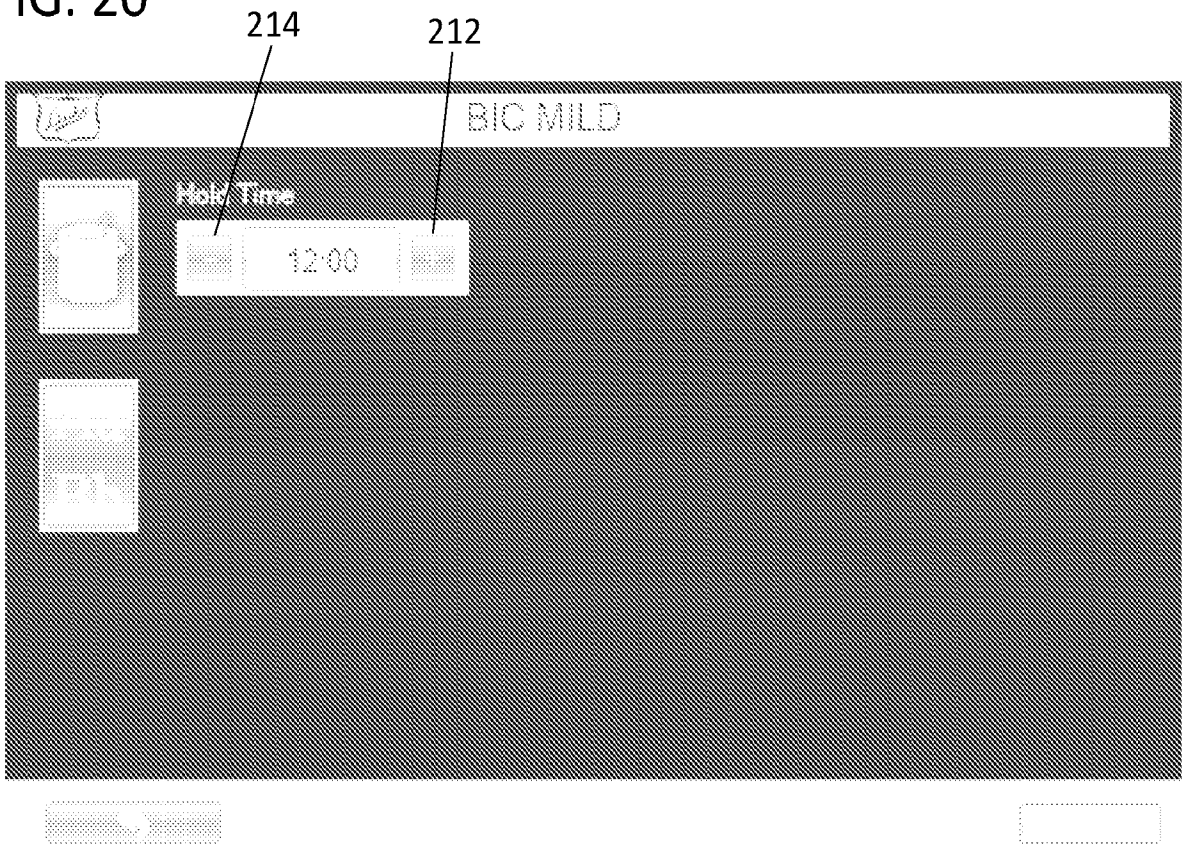


FIG. 21

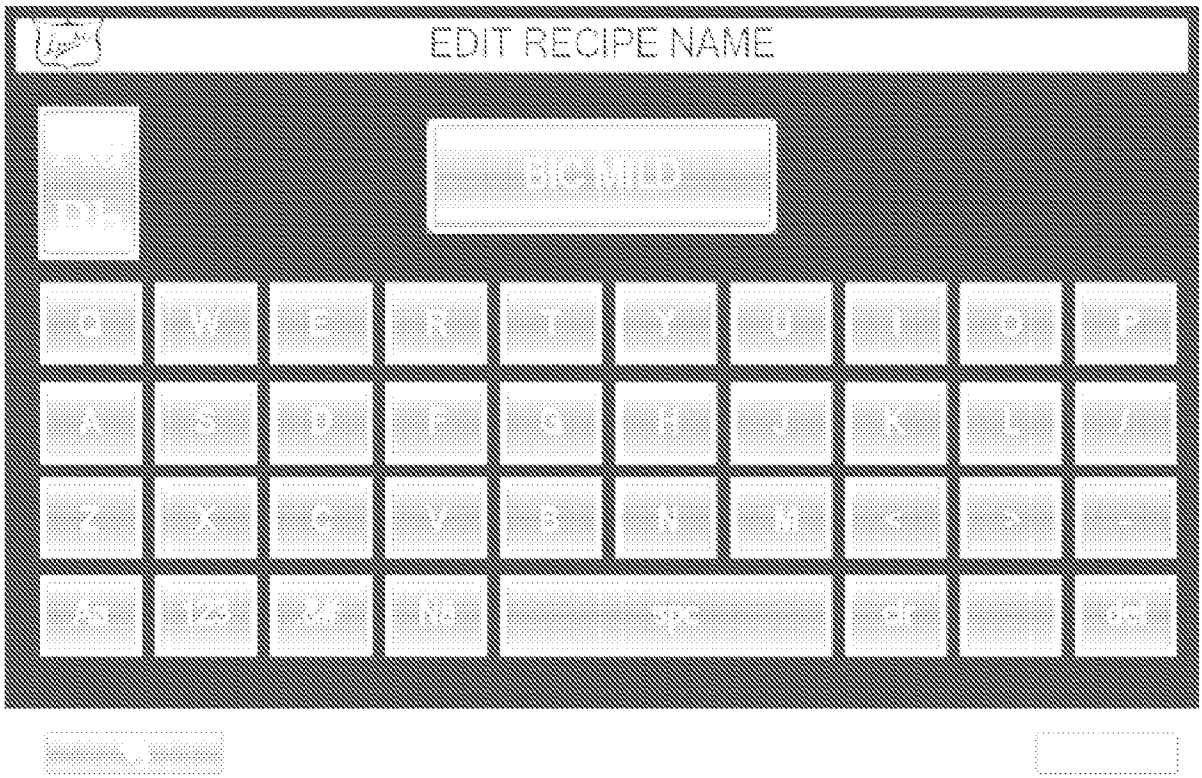


FIG. 22

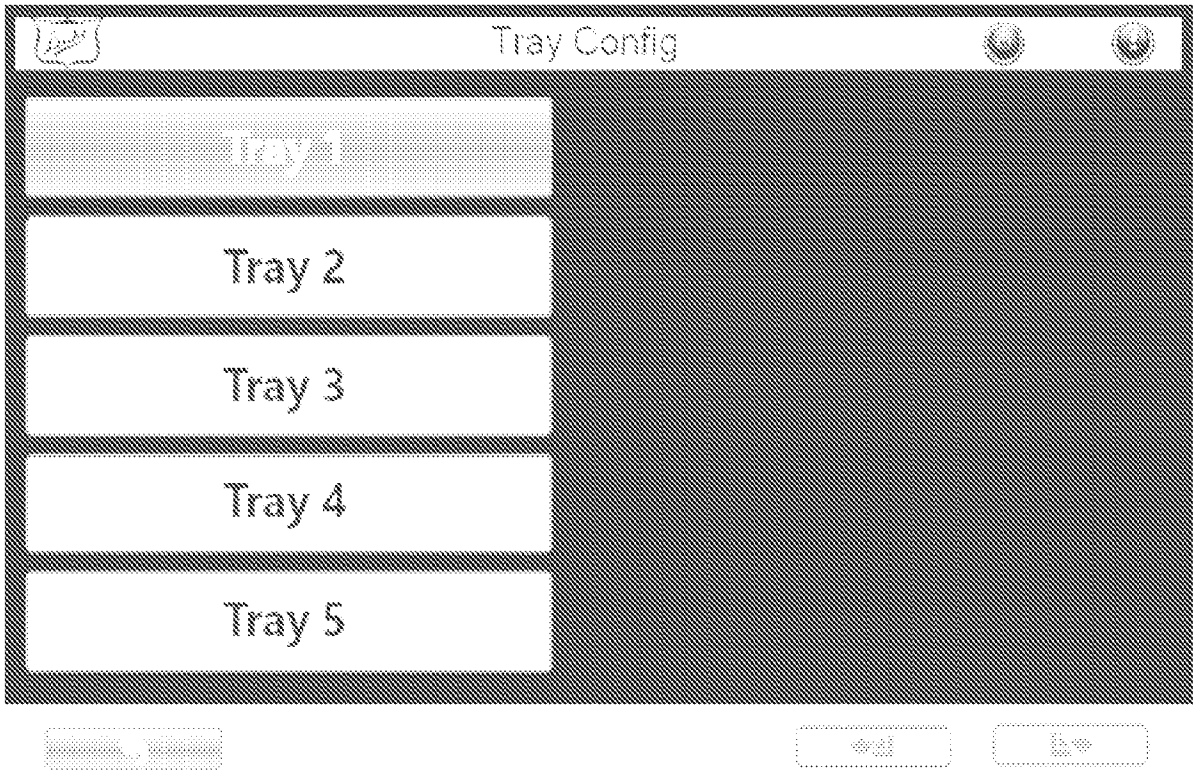


FIG. 23

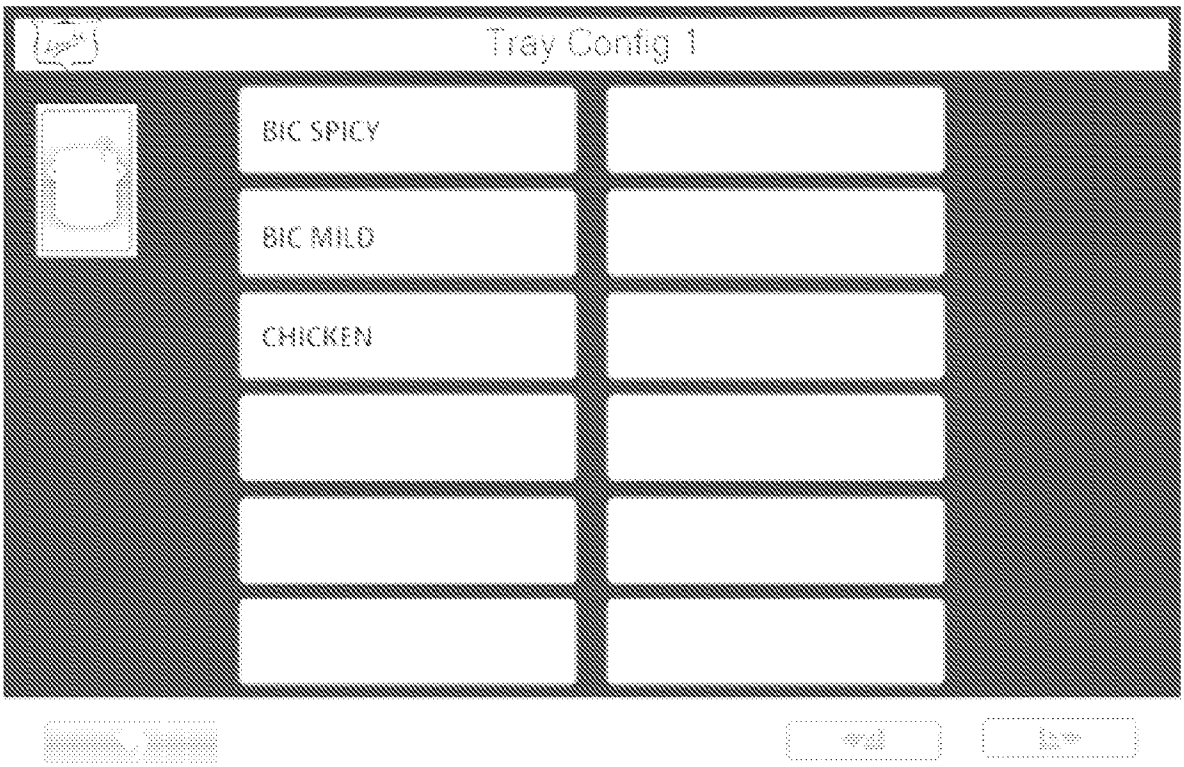


FIG. 24

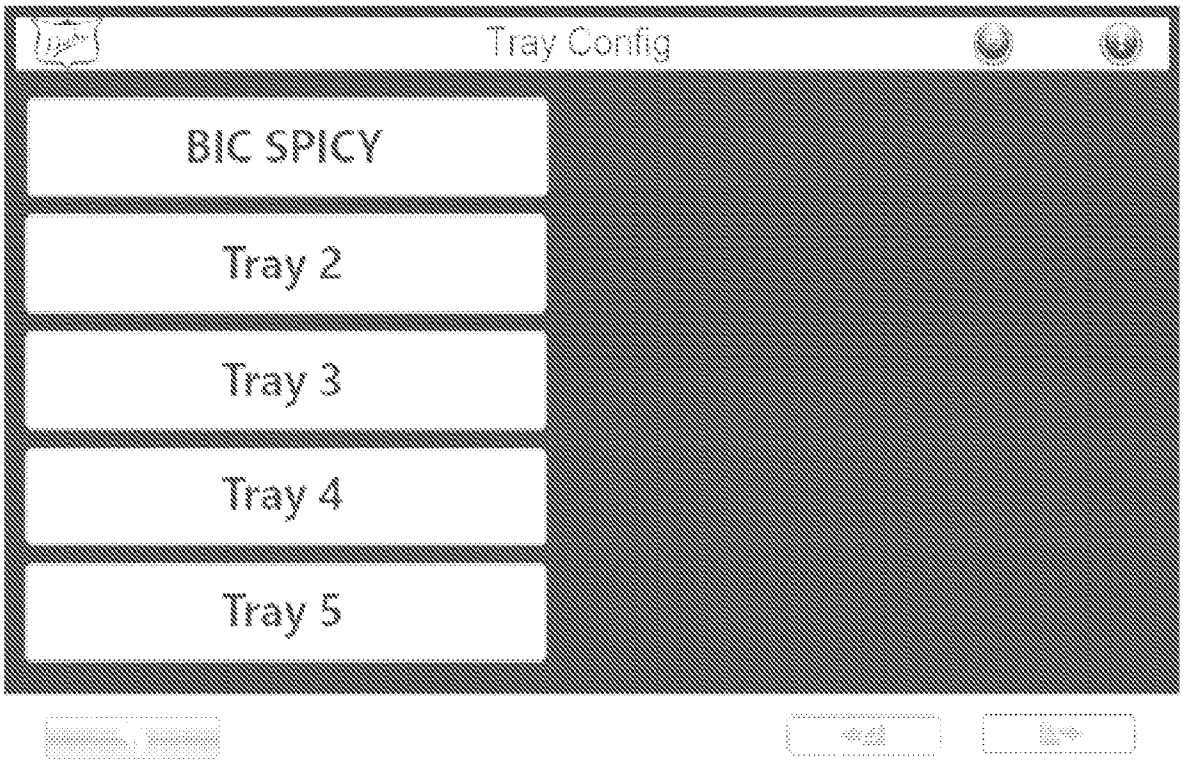


FIG. 25

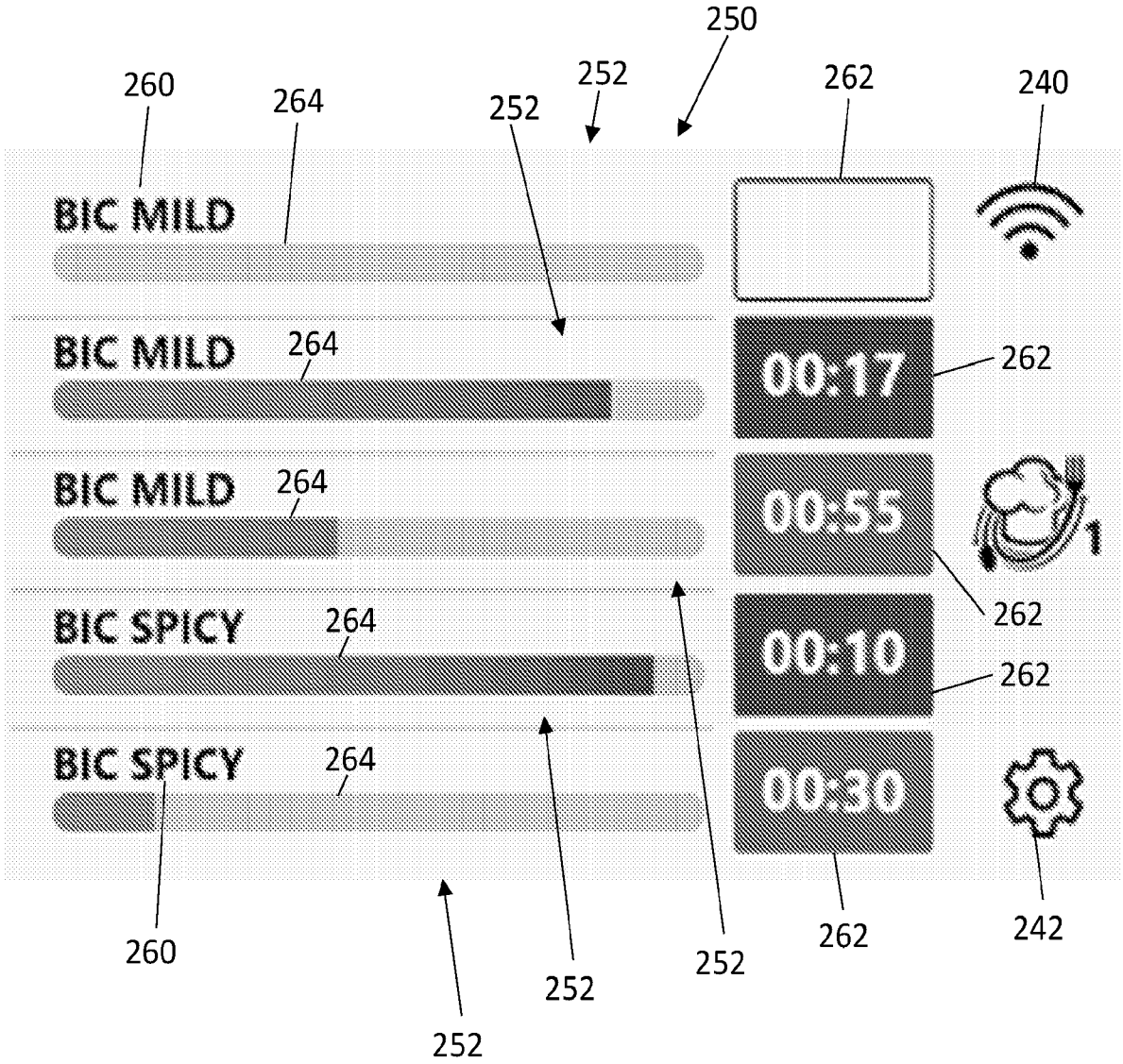

250
260
264
252
252
262
240
BIC MILD
BIC MILD
264
00:17
262
BIC MILD
264
00:55
1
262
BIC SPICY
264
00:10
262
BIC SPICY
264
00:30
260
252
252
252
262
242

FIG. 26

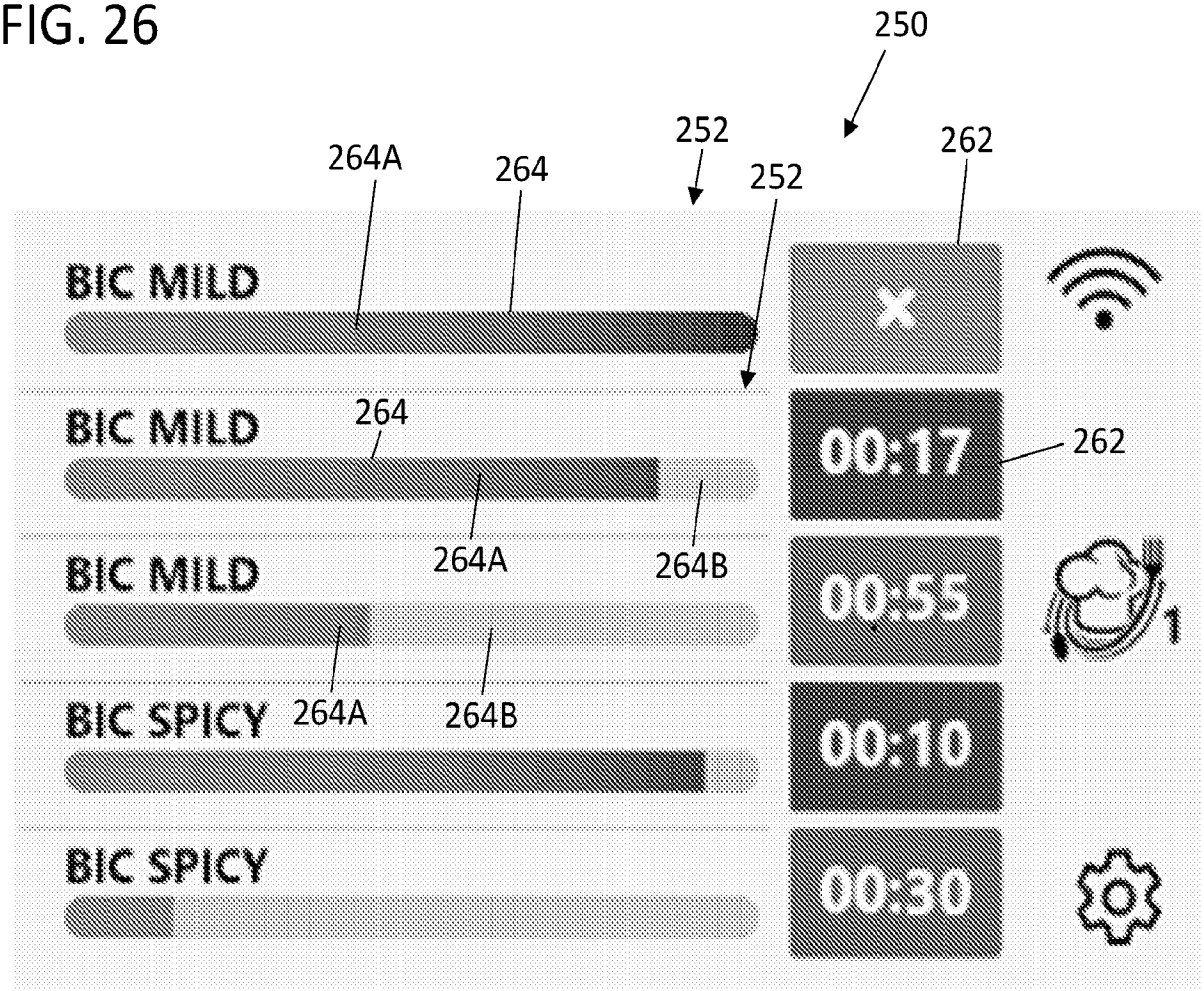

250
252
264A
264
252
262
BIC MILD
BIC MILD
264
00:17
262
264A
264B
BIC MILD
00:55
1
BIC SPICY
264A
264B
00:10
BIC SPICY
00:30

FIG. 27

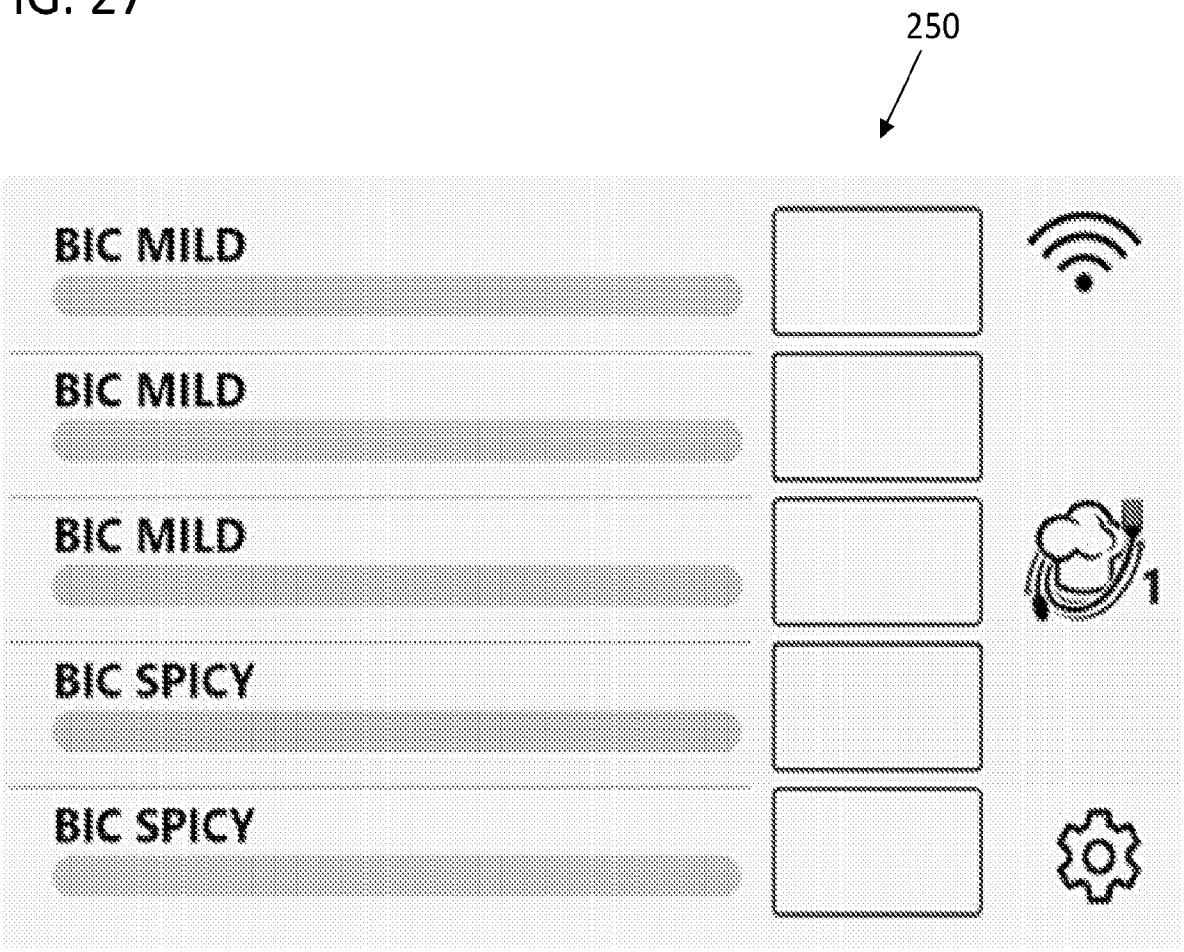


FIG. 28

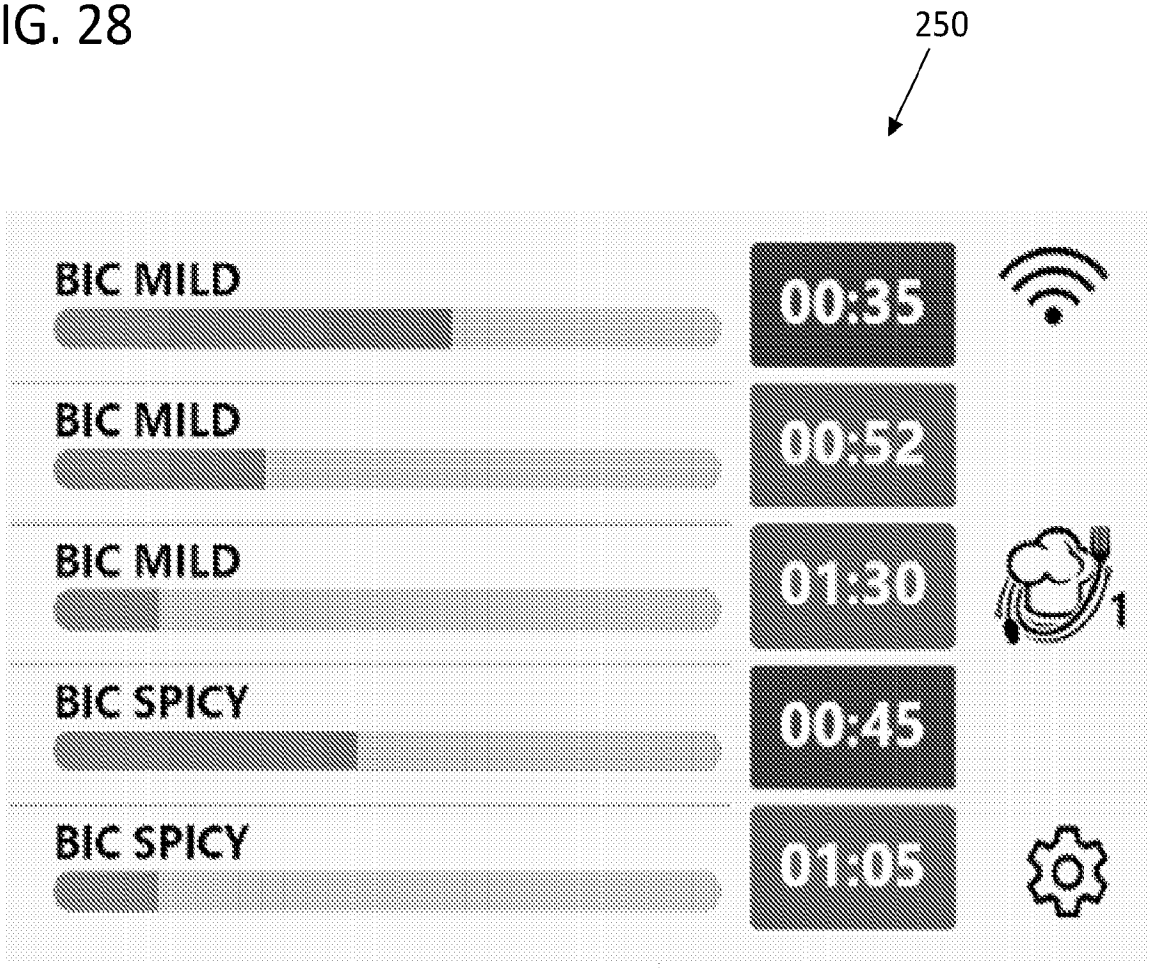

250
BIC MILD
00:35
BIC MILD
00:52
BIC MILD
01:30
1
BIC SPICY
00:45
BIC SPICY
01:05

FIG. 29

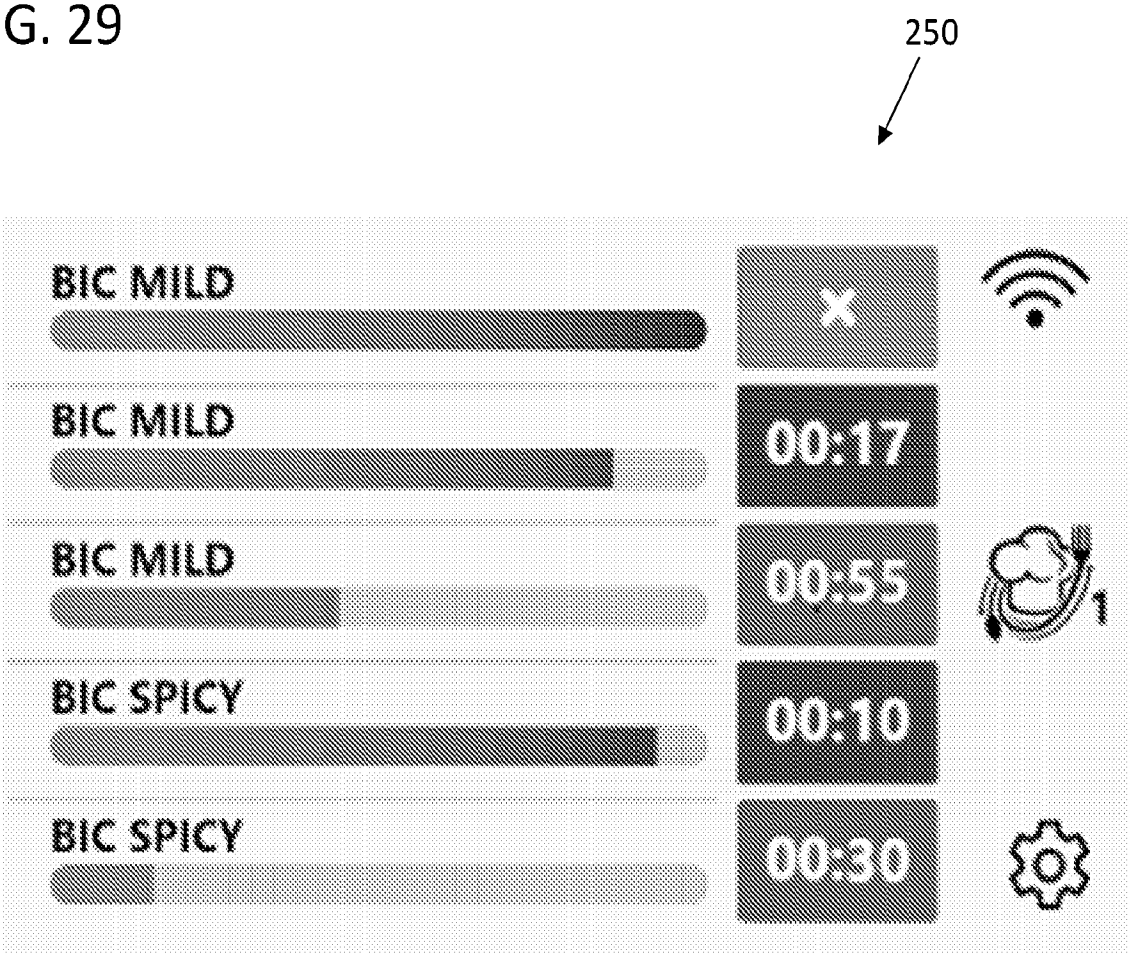

250
BIC MILD
BIC MILD
BIC MILD
BIC SPICY
BIC SPICY
00:17
00:55
00:10
00:30
1

FIG. 30

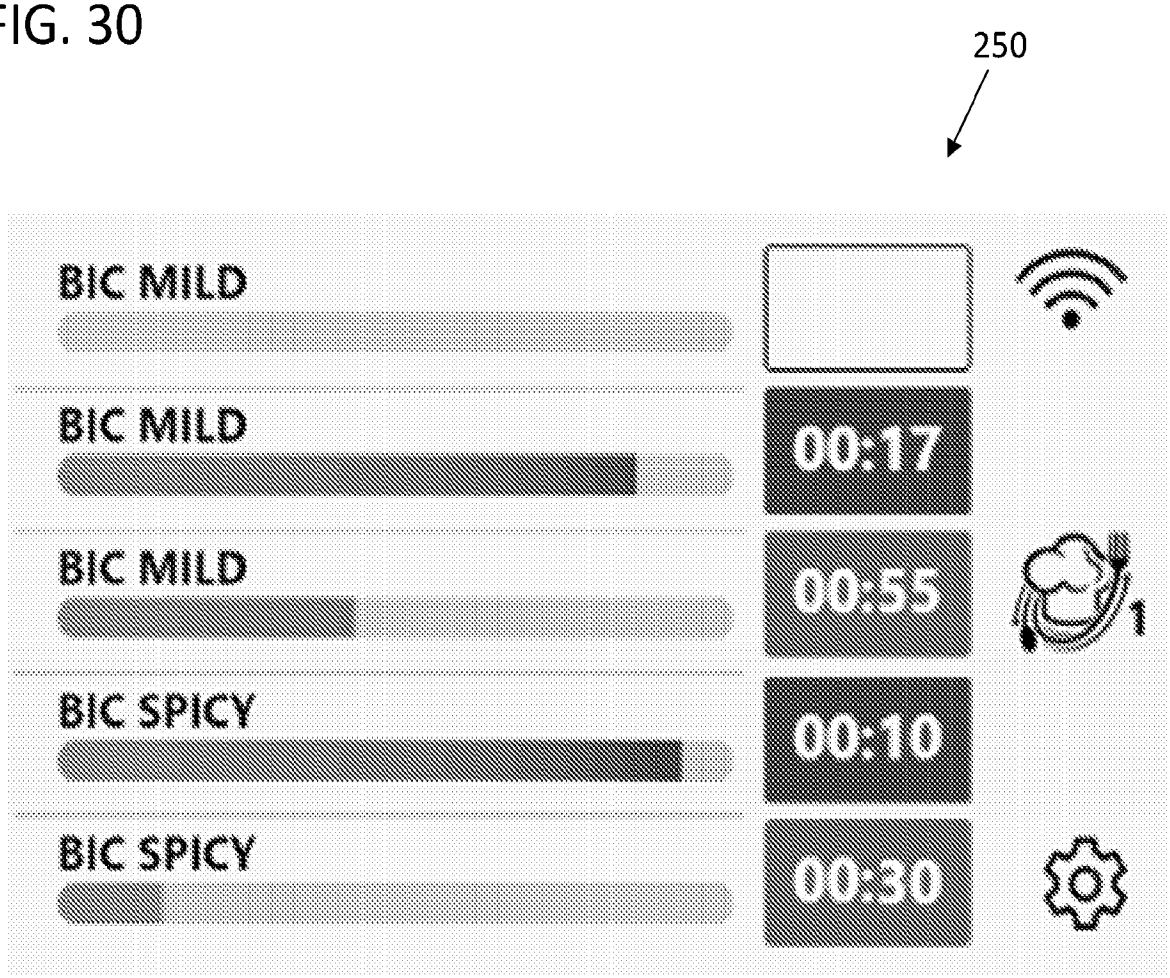

250
BIC MILD
BIC MILD
00:17
BIC MILD
00:55
1
BIC SPICY
00:10
BIC SPICY
00:30

FIG. 31

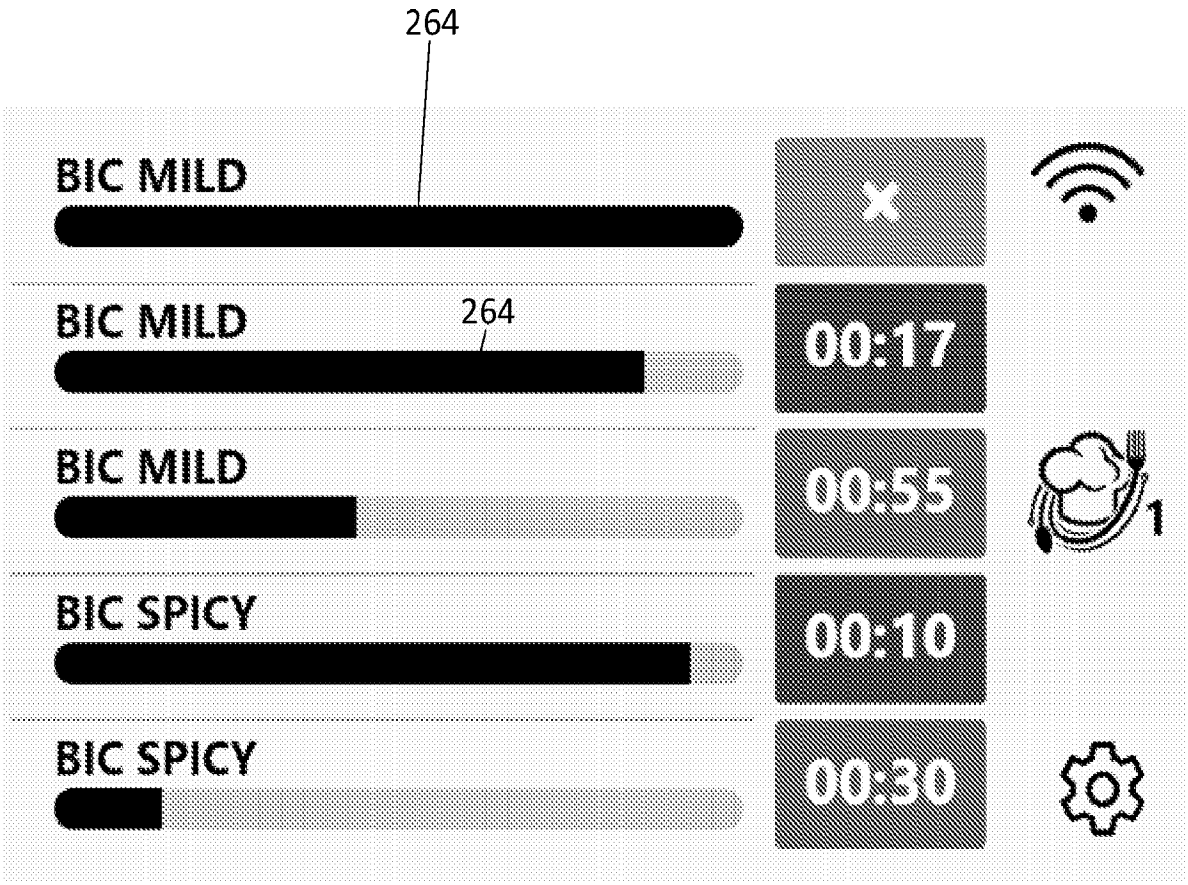

264
BIC MILD
BIC MILD
264
BIC MILD
BIC SPICY
BIC SPICY
00:17
00:55
00:10
00:30
1

FIG. 32

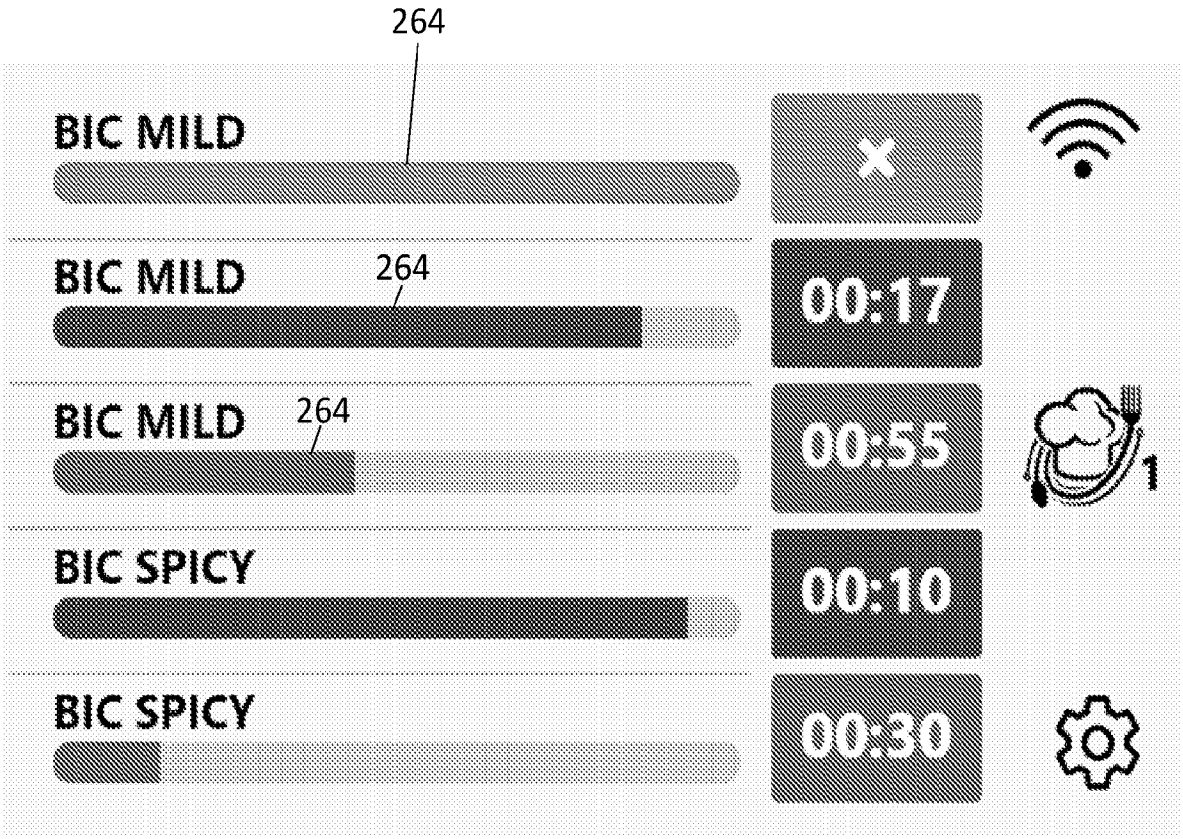

264
BIC MILD
BIC MILD
264
00:17
BIC MILD
264
00:55
1
BIC SPICY
00:10
BIC SPICY
00:30

FIG. 33

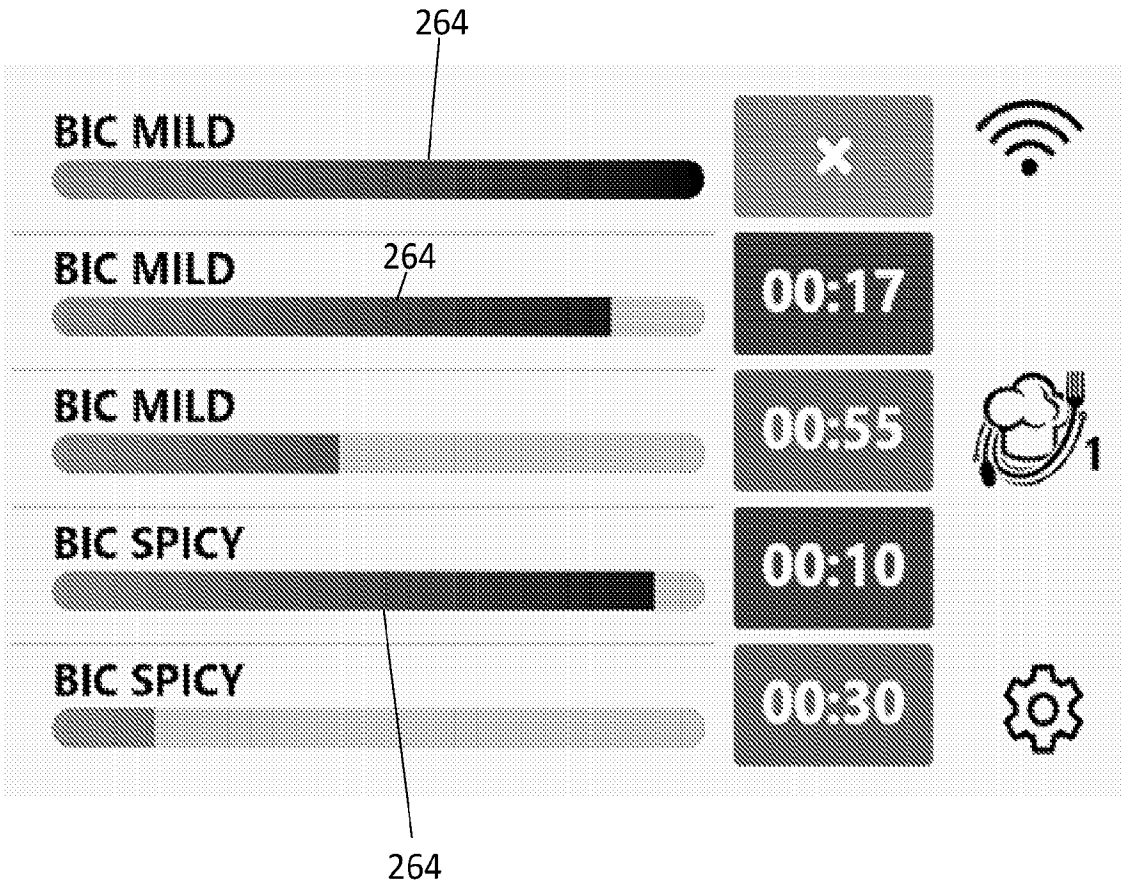

264
BIC MILD
BIC MILD
264
BIC MILD
BIC SPICY
BIC SPICY
00:17
00:55
00:10
00:30
1
264

FIG. 34

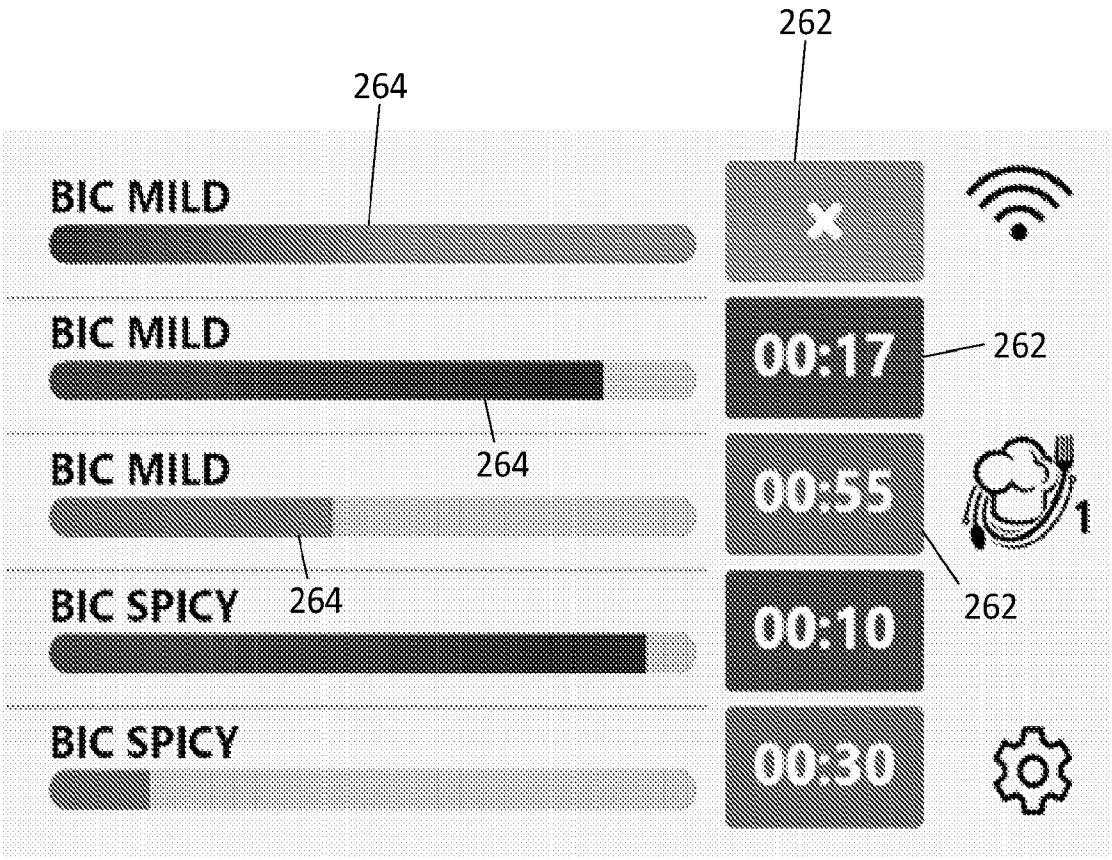

262
264
BIC MILD
BIC MILD
BIC MILD
BIC SPICY
BIC SPICY
264
264
264
262
262
X
00:17
00:55
00:10
00:30
1

FIG. 35

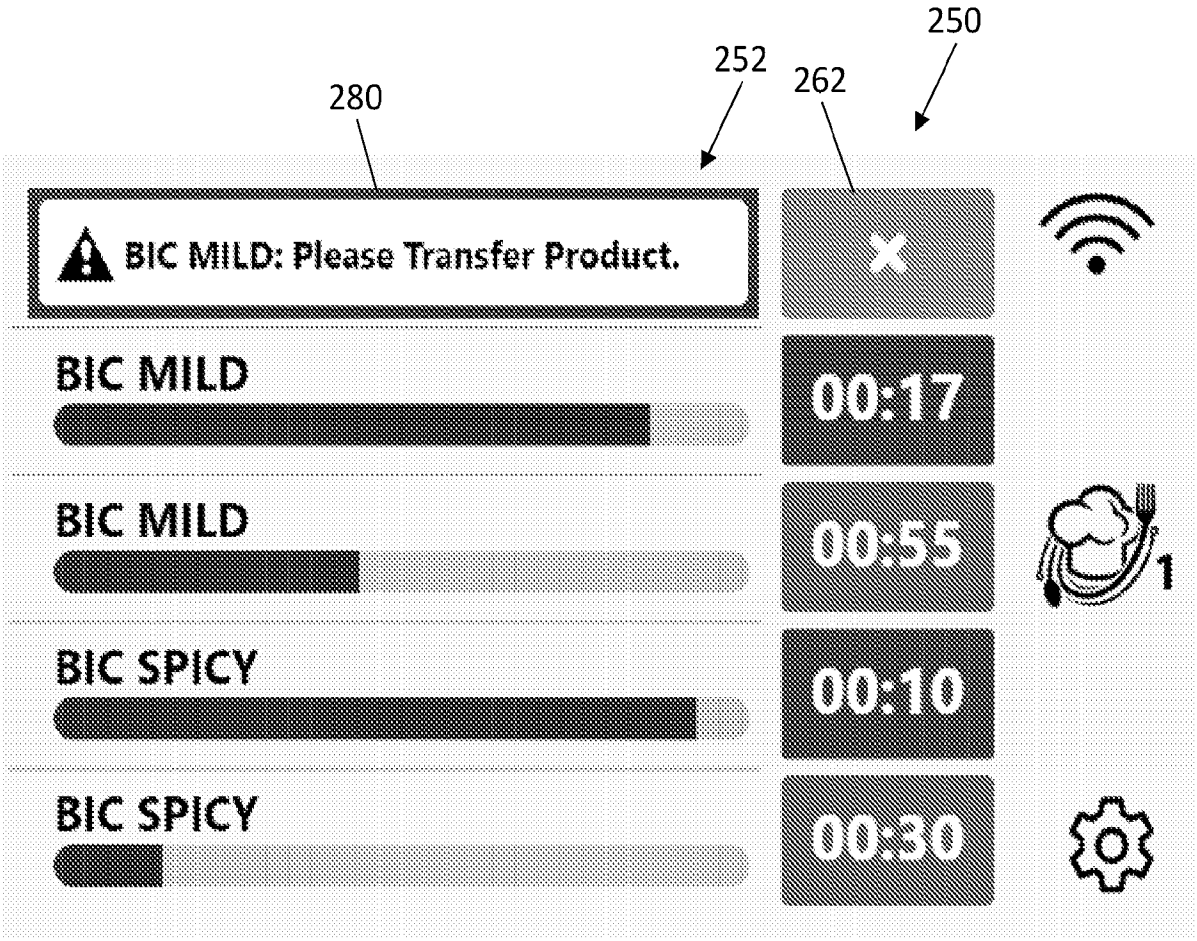

250
252
262
280
BIC MILD: Please Transfer Product.
BIC MILD
00:17
BIC MILD
00:55
1
BIC SPICY
00:10
BIC SPICY
00:30

FIG. 36

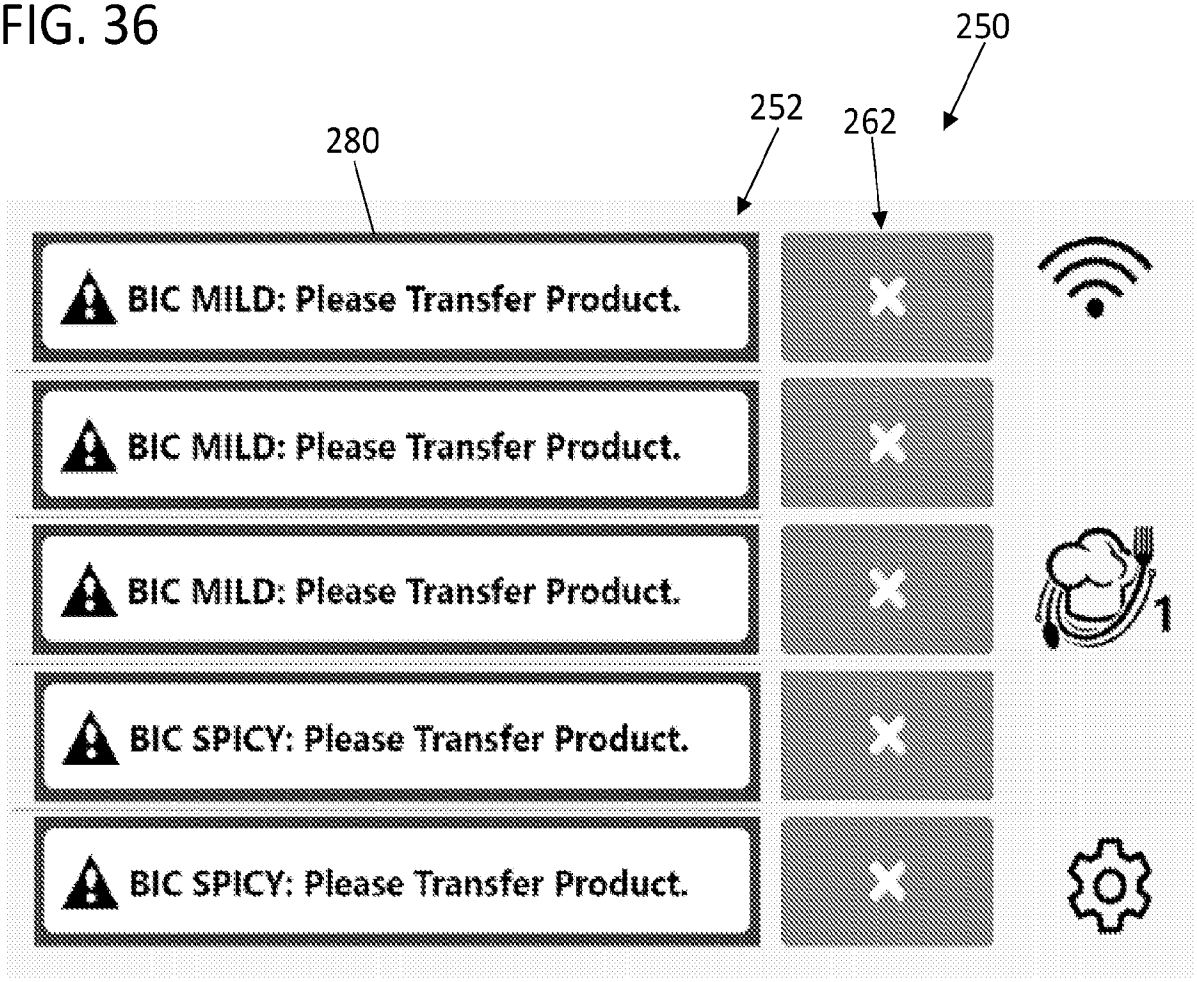

250
252
262
280
BIC MILD: Please Transfer Product.
BIC MILD: Please Transfer Product.
BIC MILD: Please Transfer Product.
BIC SPICY: Please Transfer Product.
BIC SPICY: Please Transfer Product.
1

FIG. 37

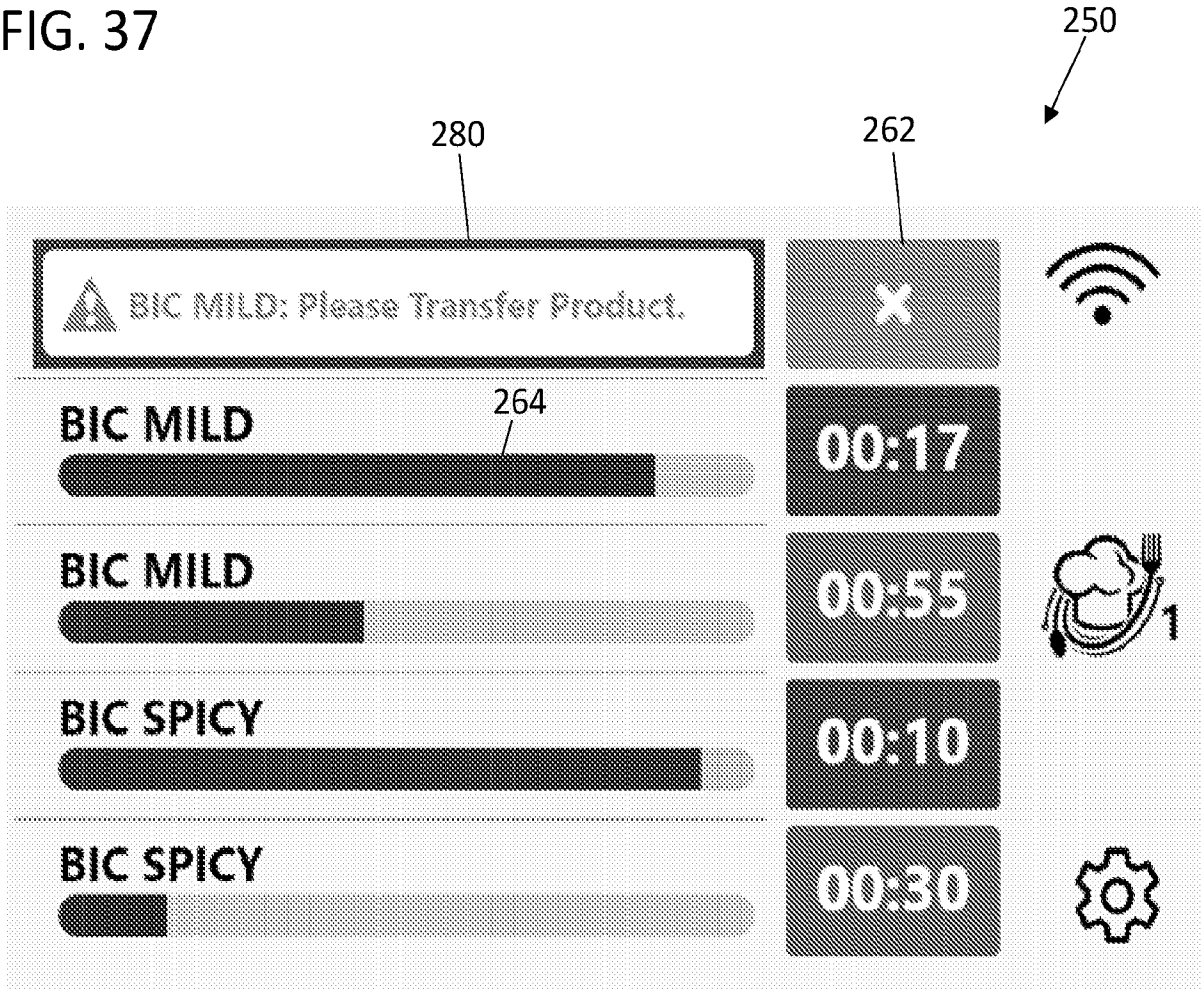

250
280
262
BIC MILD: Please Transfer Product.
264
BIC MILD
00:17
BIC MILD
00:55
1
BIC SPICY
00:10
BIC SPICY
00:30

FIG. 38

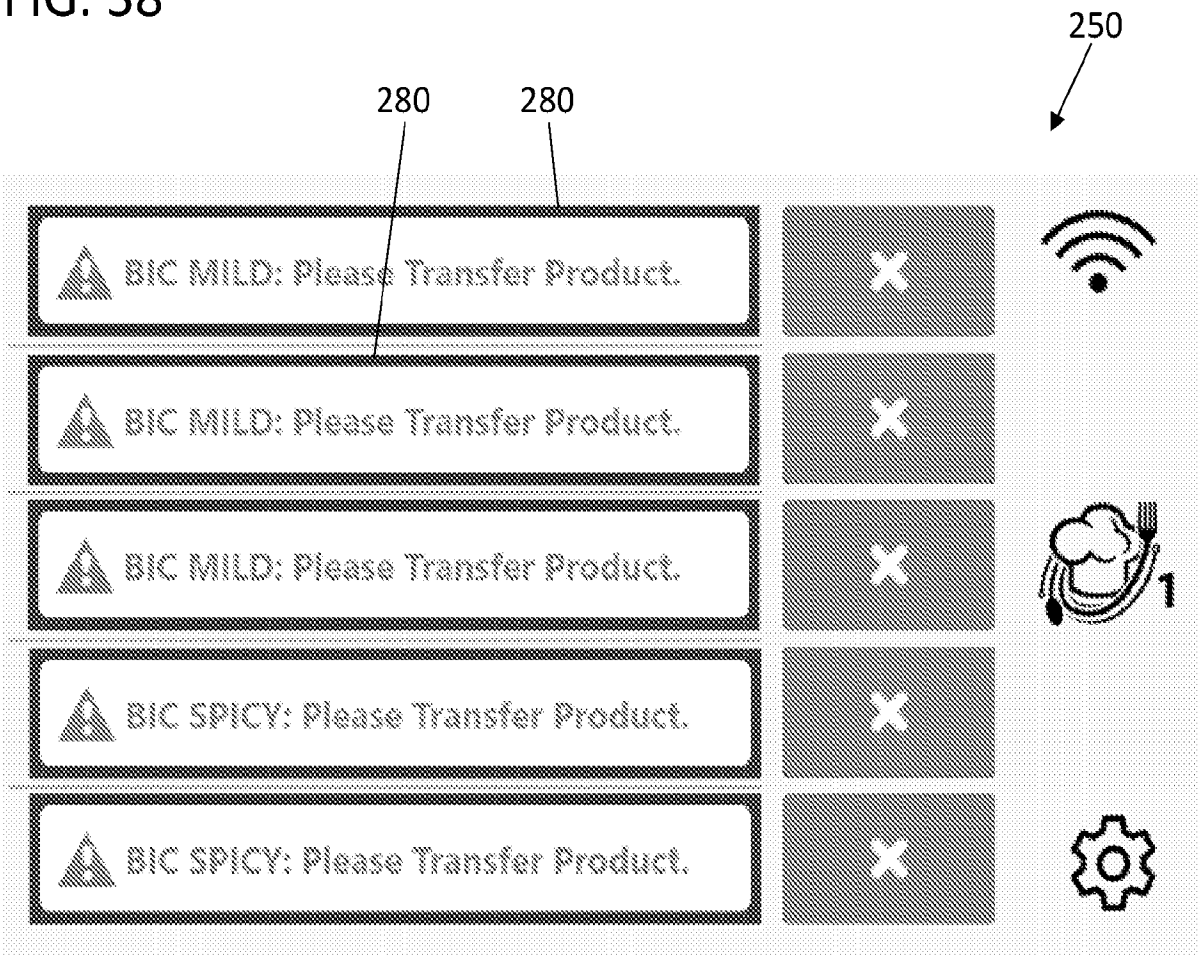

250
280
280
BIC MILD: Please Transfer Product.
BIC MILD: Please Transfer Product.
BIC MILD: Please Transfer Product.
BIC SPICY: Please Transfer Product.
BIC SPICY: Please Transfer Product.
1

FIG. 39

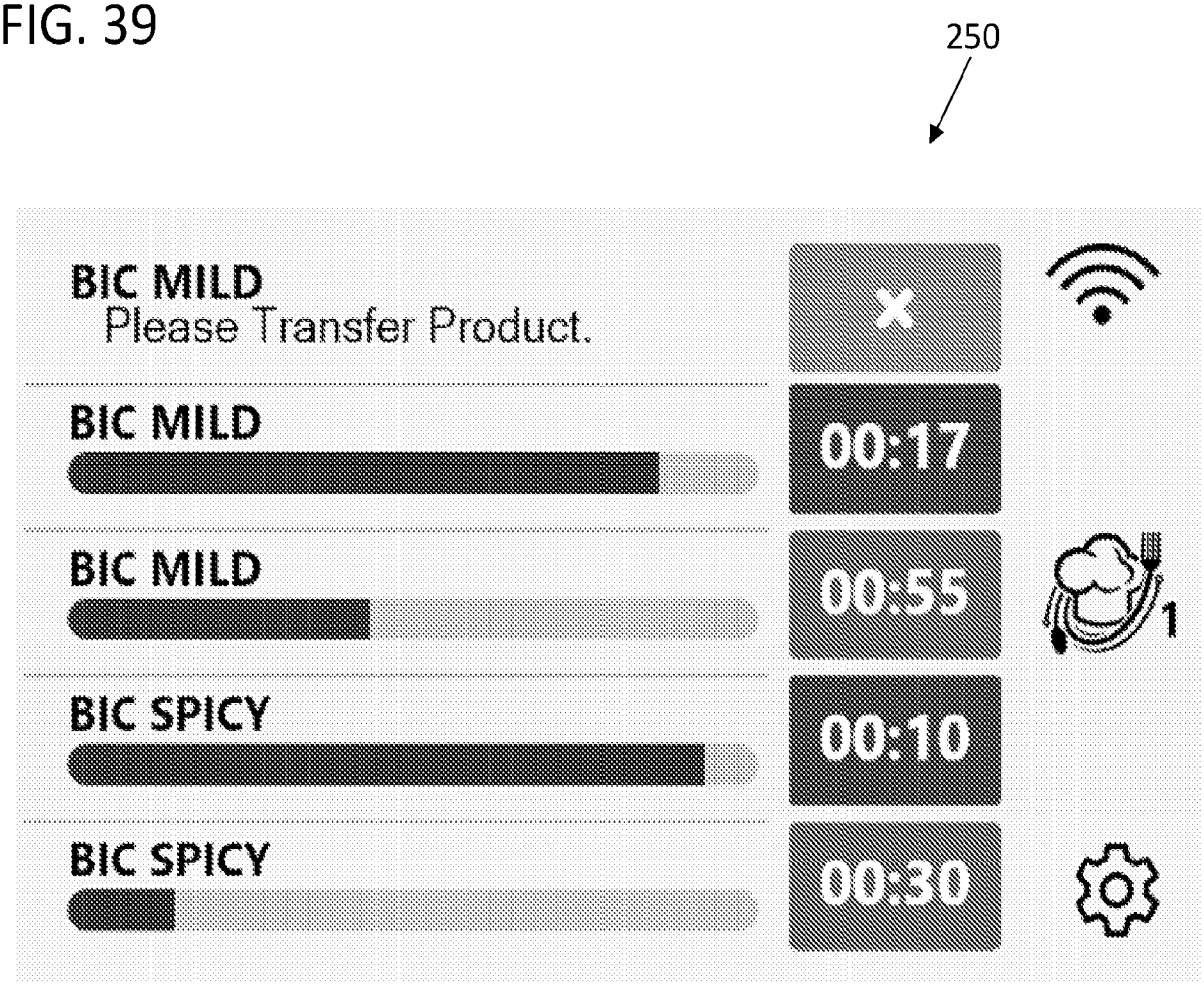

250
BIC MILD
Please Transfer Product.
BIC MILD
00:17
BIC MILD
00:55
1
BIC SPICY
00:10
BIC SPICY
00:30

FIG. 40

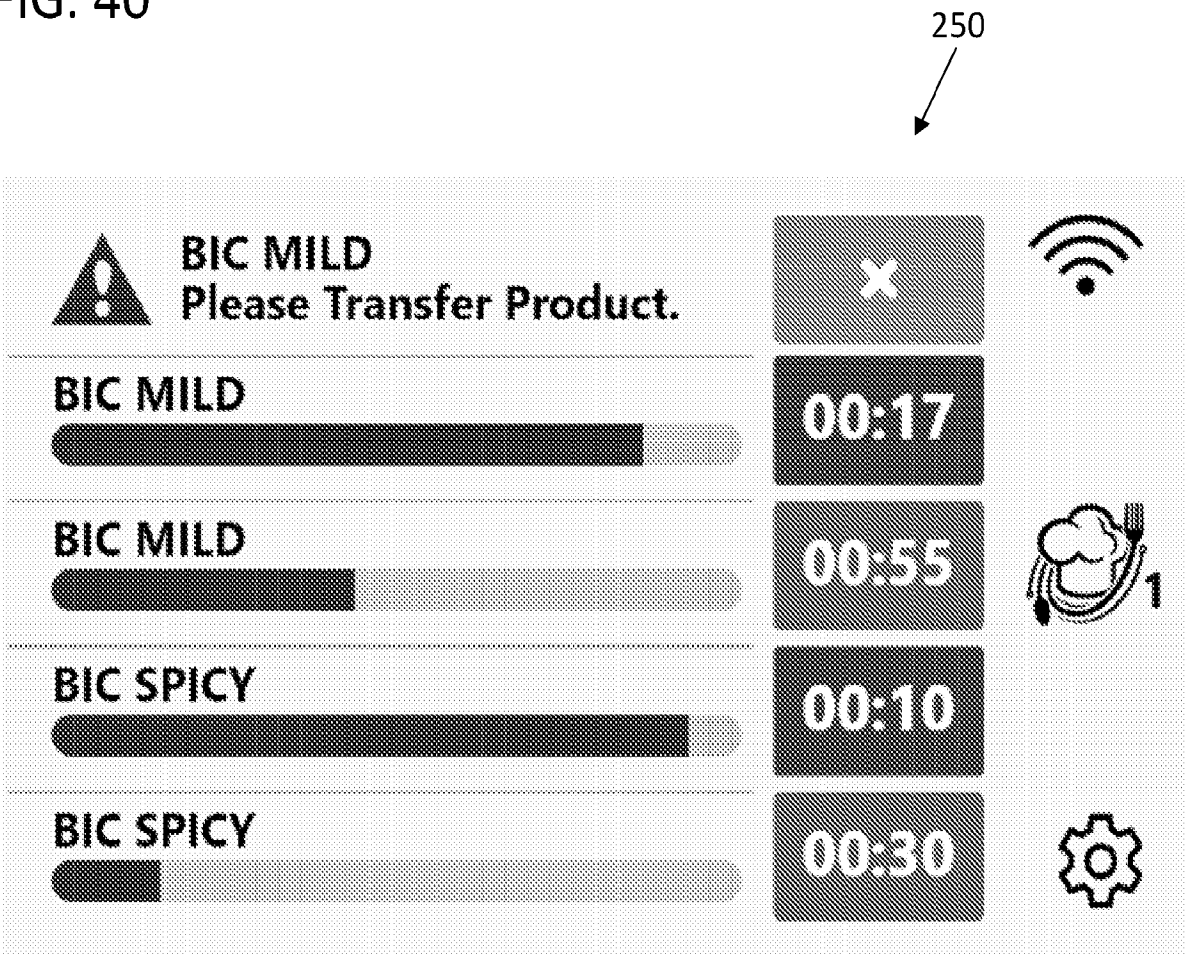

250
BIC MILD
Please Transfer Product.
BIC MILD
00:17
BIC MILD
00:55
1
BIC SPICY
00:10
BIC SPICY
00:30

FIG. 41

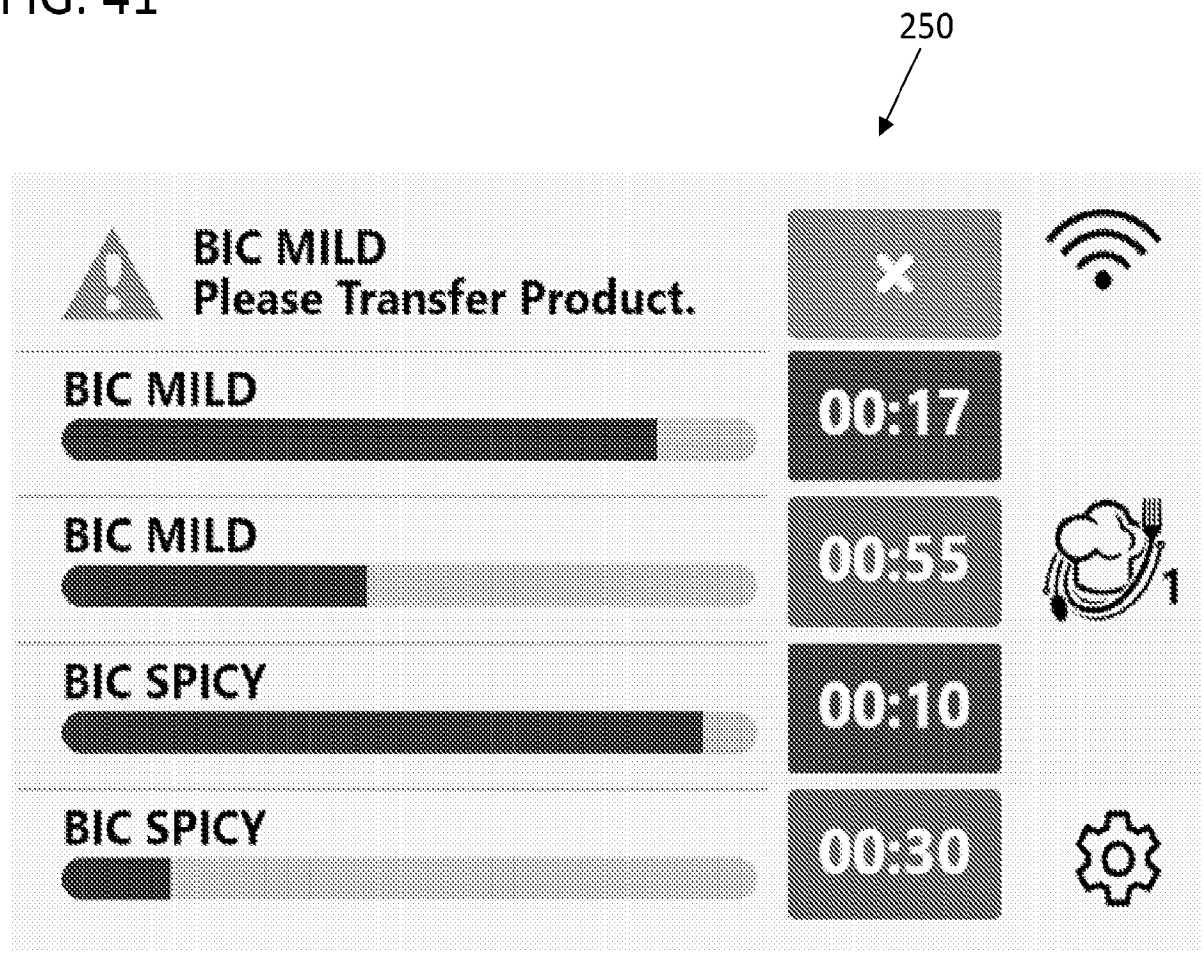
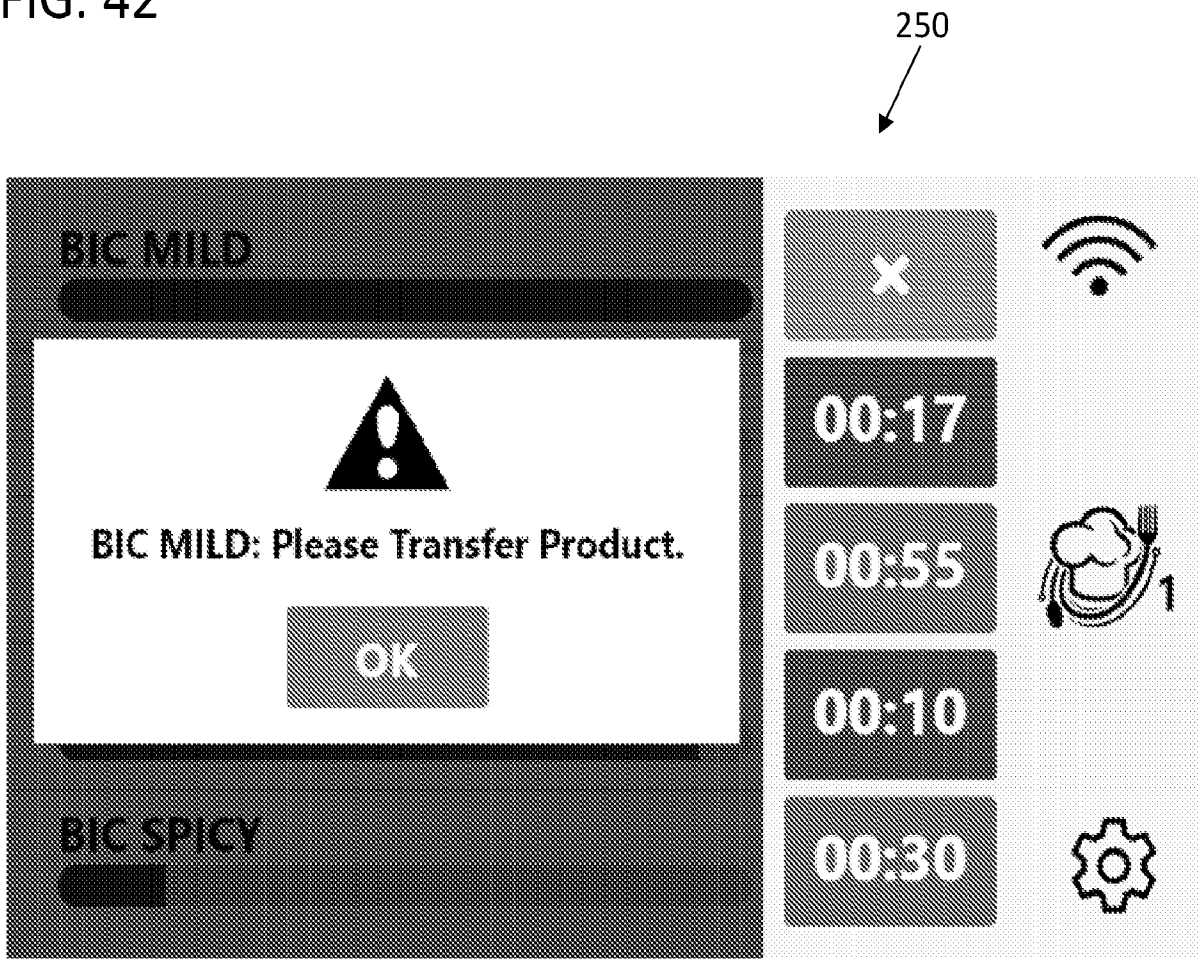

250
BIC MILD
Please Transfer Product.
BIC MILD
00:17
BIC MILD
00:55
1
BIC SPICY
00:10
BIC SPICY
00:30

FIG. 42


250
BIC MILD
BIC MILD: Please Transfer Product.
OK
BIC SPICY
00:17
00:55
00:10
00:30
1