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(54) **CIRCULATOR COOKER WITH ALARM SYSTEM**

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See application file for complete search history.

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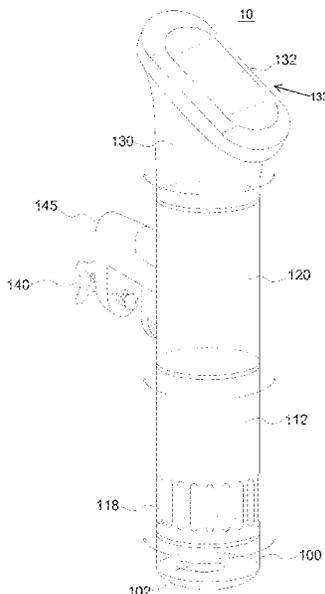
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(57) **ABSTRACT**

A sous-vide circulator cooker that sounds an audible alarm when the system raises the temperature of the water to a determined temperature. The sous-vide circulator cooker includes temperature sensors, heaters and a pump to circulator temperature controlled fluids. The system also contains a speaker or buzzer that can play alarms or music when the system comes to a predetermined temperature. In at least one embodiment, the sous-vide circulator can also distinguish between self-heating and user-induced temperature changes, and will sound alarms accordingly.

17 Claims, 3 Drawing Sheets



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Entire patent prosecution history of U.S. Appl. No. 14/559,530, filed Dec. 3, 2014, entitled, "Circulator Cooker With Alarm System," now U.S. Pat. No. 9,826,855, issued Nov. 28, 2017.

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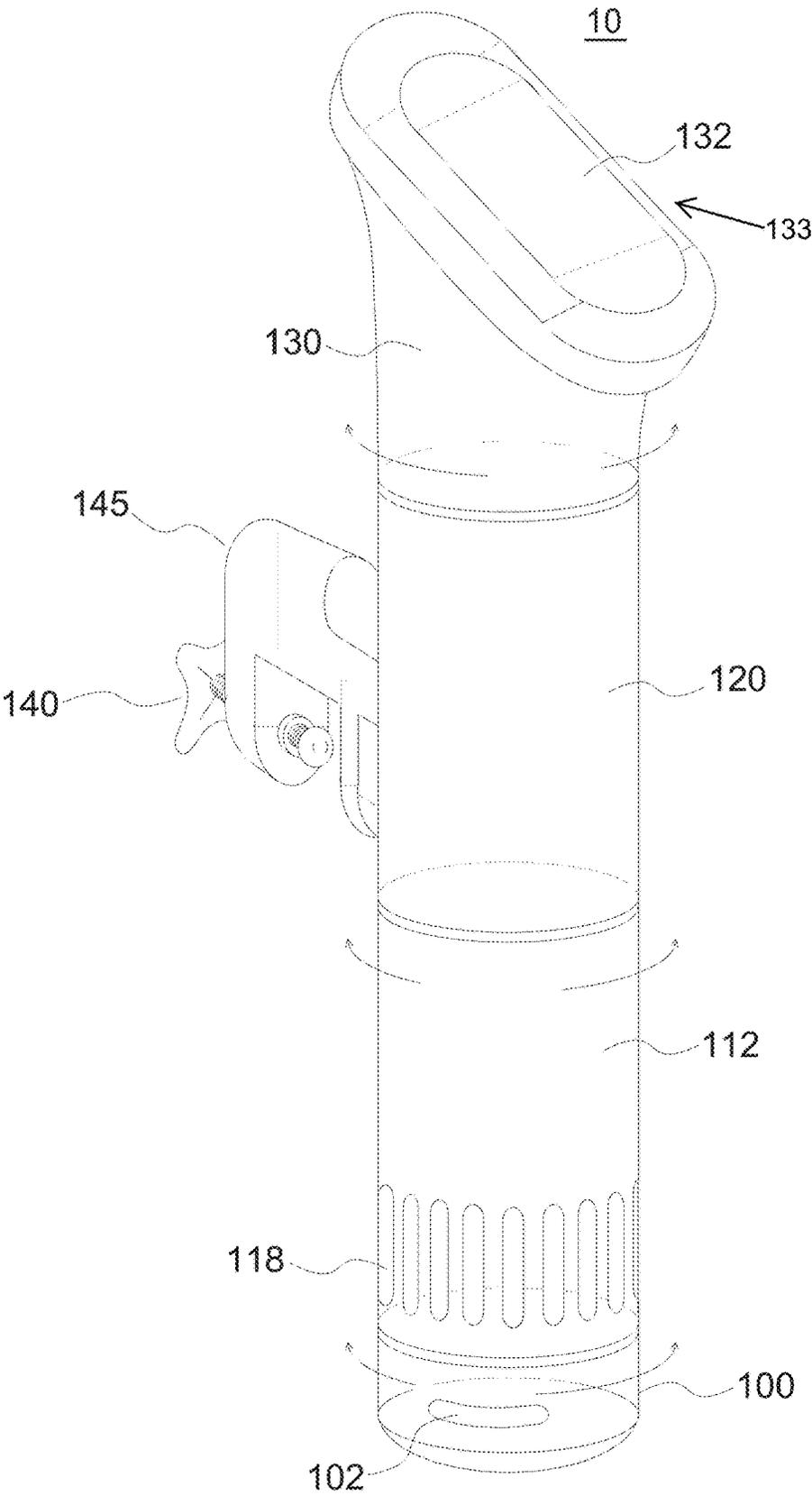


FIG. 1

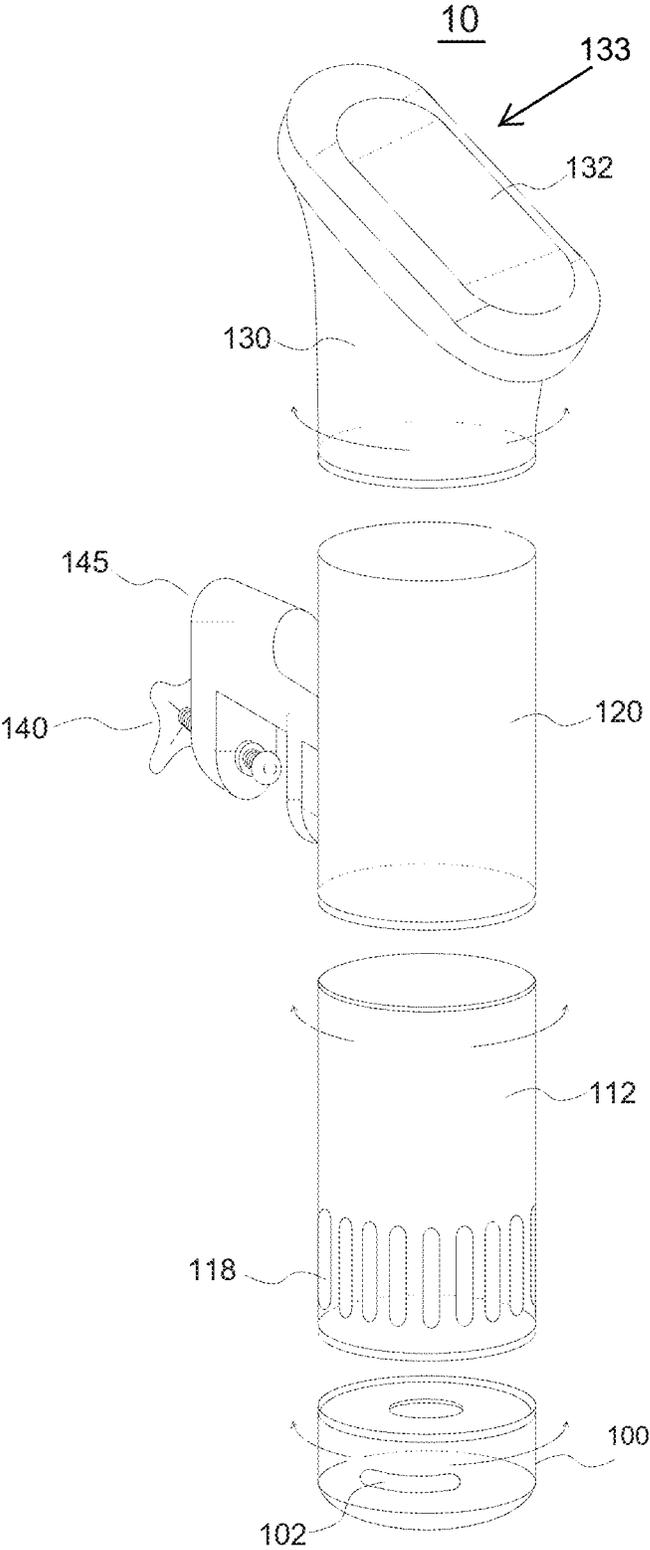


FIG. 2

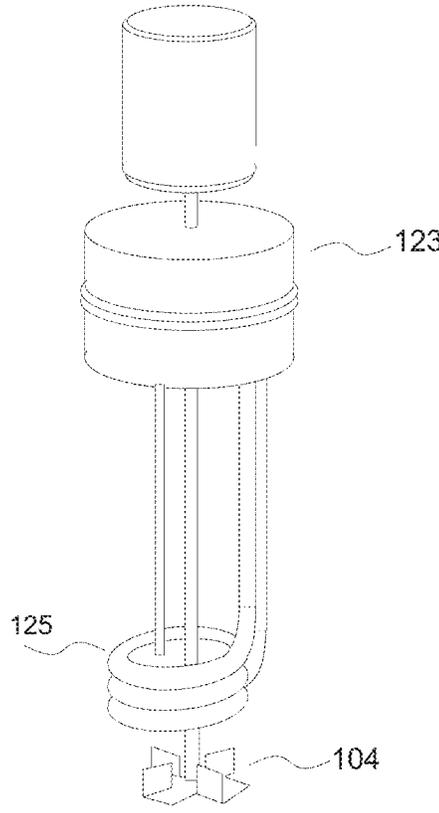


FIG. 3

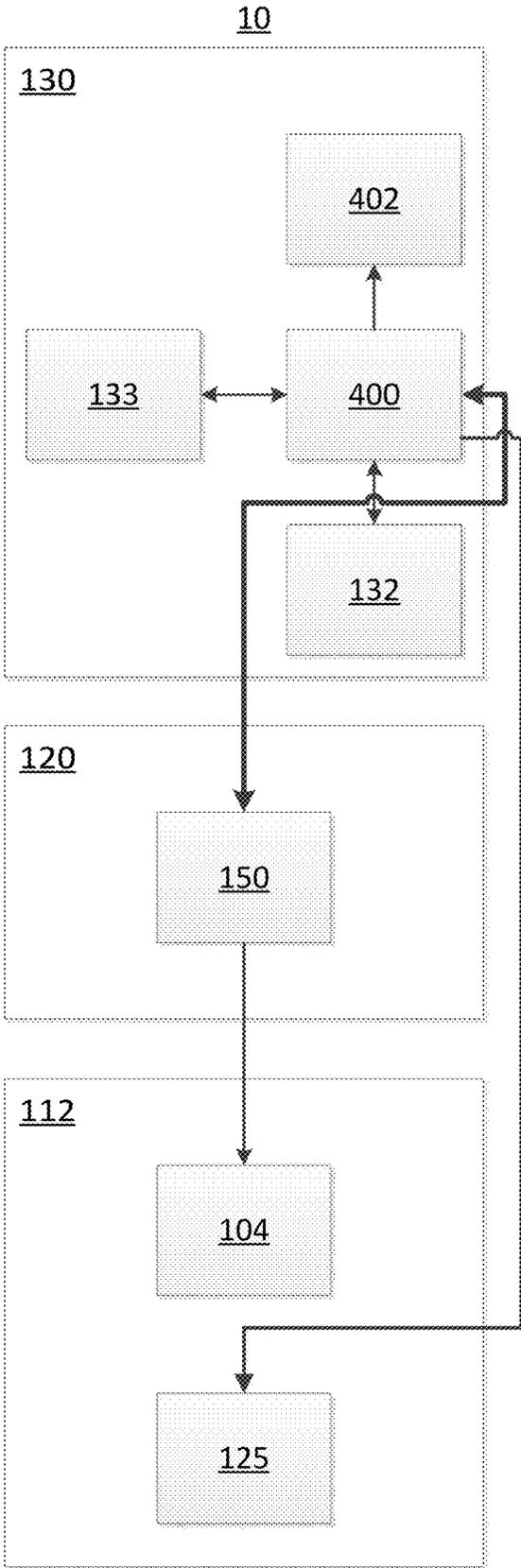


FIG. 4

CIRCULATOR COOKER WITH ALARM SYSTEM

Matter enclosed in heavy brackets [] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of U.S. patent application Ser. No. 14/559,530, filed Dec. 3, 2014, which is a continuation-in-part of U.S. Pat. No. 9,687,104, filed as U.S. application Ser. No. 13/935,971 on Jul. 5, 2013, which claims priority to U.S. Provisional Application No. 61/764,984, filed Feb. 14, 2013, and also claims priority to U.S. Provisional Application No. 61/911,384, filed Dec. 3, 2013, the contents of *all of* which are entirely incorporated by reference herein.

FIELD OF TECHNOLOGY

The present disclosure relates generally to food cooking devices, and more specifically, to precision temperature control water heaters and water pump circulator appliances having an alarm system, or alert system, or both.

BACKGROUND

Sous-vide is a method of cooking food sealed in airtight plastic bags in a water bath for longer than normal cooking times at an accurately regulated temperature much lower than normally used for cooking, typically around 55° C. (131° F.) to 60° C. (140° F.) for meats and higher for vegetables.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to describe a manner in which features of the disclosure can be obtained, reference is made to specific embodiments that are illustrated in the appended drawings. Based on an understanding that these drawings depict only example embodiments of the disclosure and are not intended to be limiting of scope, the principles herein are described and explained with additional specificity and detail through the use of the accompanying drawings in which:

FIG. 1 is a fluidic temperature control device in accordance with an example embodiment;

FIG. 2 is a fluidic temperature control device in accordance with an example embodiment;

FIG. 3 is a lower portion of a fluidic temperature control device in accordance with an example embodiment; and

FIG. 4 is a block diagram of a fluidic temperature control device 10 for sous-vide cooking.

DETAILED DESCRIPTION

Various embodiments of the disclosure are discussed in detail below. While specific implementations are discussed, it should be understood that this is done for illustration purposes only. A person skilled in the relevant art will recognize that other components and configurations may be used without departing from the scope of the disclosure.

Several definitions that apply throughout this document will now be presented. “Circulating” means agitating, blending or mixing of one or more fluids. Hence a “circulator” is a device which can be configured to agitate, blend or mix a fluid. Fluids will be understood to comprise liquids. “Coupled” is defined as connected, whether directly or indirectly through intervening components and is not necessarily limited to physical connections. Coupled devices are devices which are in signal communication with one another. “Connected” means directly connected or indirectly connected.

Broadly speaking, this disclosure relates to sous-vide circulator cookers for cooking food.

In at least one embodiment, a sous-vide circulator cooker has a speaker or other suitable alert device connected to the controller in the control head to sound audible alarms when the bath fluid has reached cooking temperature.

In at least one embodiment, the speaker can also be a single tone buzzer.

In at least one embodiment, a sous-vide circulator alarm’s controller can be recognize the difference between normal heating and user induced temperature changes such as caused by adding hot water or ice which may lead to overshoot of the temperature. In this case the alarm would not sound.

In at least one embodiment, a sous-vide circulator cooker has a turn-able or rotatable information display and control head. The control head can be configured to keep electronics housed therein away from steam and to enable easy viewing from different angles.

In at least one embodiment, a sous-vide circulator cooker includes a detachable single or dual-section stainless steel skirt which allows for cleaning the skirt itself and cleaning of a heater and pump covered by the skirt. The provision of a stainless steel skirt can also act to ensure that no plastic components are directly wetted during use of the cooker. In at least one embodiment, the sous-vide circulator cooker’s removable skirt also exposes the water pump impellers allow users to clean out food and debris in case of bag breakage.

In at least one embodiment a sous-vide circulator cooker includes a Wi-Fi/Blue tooth radio for recipe specification uploads from phone, tablet or PC and direct remote control and monitoring. Thus, in at least one embodiment of this disclosure a fluidic temperature controller can include a non-volatile memory that stores a plurality of recipe specifications and user generated data files as well as a control interface that enables a user of the sous-vide circulator cooker to select and recall recipe specifications. In at least one embodiment of this disclosure, a sous-vide circulator cooker can search for recipes that match certain specification criteria.

In another embodiment, the system interface has dynamically color changing, icons, objects or background to notify an operator of system regarding temperatures and tank water levels. Additionally the controller may contain a speaker to sound music alarms and reminders.

According to one aspect of this disclosure, a sous-vide circulator cooker can rotate the head controller. Storing most microelectronics within such a rotatable structure enables the microelectronics to be located away from the steam source. An interface on the head controller can also turn to enable a user to adjust a viewing angle.

FIG. 1 illustrates an example embodiment of a fluidic temperature control device 10. The temperature control device 10 comprises a head portion 130, a middle portion 120, and a lower portion 112. The lower portion 112 can also

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include a pump housing **100**. The middle portion **120** includes a motor and heater base **123**. The head portion **130** can include a display device **132** which can display information such as the temperature of the fluid in which the lower portion **112** is at least partially immersed or the speed at which an impeller housed within the lower portion is spinning. The head portion **130** can also include an input device **133** such as one or more buttons or controls which can enable a user to select a temperature for the water in which the lower portion is immersed. The lower portion **16** can be configured with openings **118** through which the heated water can be drawn by an impeller or other agitation device **104** located within the pump housing **100**. The head portion **130** can house an alarm or alert system which is coupled to the controller.

FIG. 2 illustrates another example embodiment of a fluidic temperature control device **10**. The device **10** can include a removable, tool-less screw-on or clamp-on skirt **112** with the circulator pump housing **100**. The skirt **112** and pump housing **100** can be composed of stainless steel or other suitable materials. The skirt can be removable screw-on or clamp-on device on the middle portion **120**. The device can also include a liquid ejection (flow-out) opening **102** at the side of the bottom of the device **10** through which fluid can pass. The pump housing can be removable screw-on or clamp-on device on skirt **112**. The skirt **112** and pump housing **100** can rotate in order to let the opening **102** aim to various directions in the water tank. The skirt **112** can be configured with one or more liquid intake (flow-in) openings **118**. The middle portion **120** can comprise a pump motor base **123**, the motor being configured to drive a pump or impeller to agitate the cooking fluid. The middle portion **120** can also comprise a fan to blow out steam, if any, inside the middle portion **120**. Atop the device **10** is an up to 360 degree rotating control and display head **130**. The display head can include a LCD display **132** with touch controls. As illustrated, the device **10** can also include a clamping hanger **140** by which the device **10** can be removably attached to a vessel containing the fluid being heated by the device **10**. Also as illustrated the clamping hanger **140** can be connected to the middle portion of the device via a clamp joint **145**. A convenient power jack is located in a clamp joint **145**.

FIG. 3 illustrates a detail view of the lower portion **112** of an embodiment of a circulator cooker (fluidic temperature control device **10**). As discussed above, the device **10** includes a removable, tool-less screw-on or clamp-on circulator skirt **112** and a removable, tool-less screw-on or clamp-on circulator pump housing **100** composed of stainless steel or other suitable materials. Also as discussed above, the lower portion **112** of the device includes at least one liquid ejection (flow-out) opening **118**. Substantially within the lower portion **112** is a circulator pump **100** including an impeller **104** which can be used to mix or circulate a fluid or liquid such as cooking water. As discussed above, the device **10** can include an easily removable, tool-less screw-on or clamp-on stainless steel skirt **112**. The skirt **112** can be configured with one or more liquid intake (flow-in) openings **118**. The circulator pump impeller **106** is connected to a pump motor shaft **125** which is in turn connected to the motor housed within the motor housing **120** (see FIG. 1). The lower portion can include one or more temperature detection sensors or thermometers or both.

In at least one embodiment, a sous-vide circulator cooker **10** includes a stainless steel skirt that can be removed without tools for cleaning. In another embodiment, the

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sous-vide circulator cooker stainless steel skirt, once removed, will expose the water pump's impellers for cleaning

In at least one embodiment, a sous-vide circulator cooker **10** can receive recipe specifications from external devices like phones, tablets and PCs. The specifications can then direct the cook time, water pump speed and cook temperature of the device **10**.

In at least one embodiment, a sous-vide circulator cooker **10** stores a plurality of recipe specifications and user generated data files. Users of the device **10** can recall recipe specifications from an internal recipe book. In at least one embodiment, the sous-vide circulator cooker **10** categorizes stored recipe specifications and user generated data files which can be searched based on specification.

In at least one embodiment, a sous-vide circulator cooker **10** interface dynamically changes color depending on temperature of the water circulated by the impeller or other agitation device.

In at least one embodiment, a sous-vide circulator cooker **10** includes a housing that defines the shape or form of the device. The housing also encloses and supports internally various electrical components (including motors, fans, and electronics). The housing and shape can also be various shapes rather than cylindrical in appearance.

In one or more embodiments, there is disclosed herein a fluidic temperature control device for sous-vide cooking which includes an upper portion including a controller, a display device and an input device coupled to the controller; a middle portion connected to the upper portion, the middle portion housing a motor coupled to the controller; a steam-removal fan coupled to the motor; a lower portion connected to the middle portion, the lower portion housing a fluid agitation device coupled to the motor, a heating element coupled to the controller, and the lower portion configured for at least partial immersion in a fluid.

In some embodiments, the upper portion of the fluidic temperature control is configured to protect the controller, display device and input device from steam during use. In some embodiments, the agitation device is an impeller, or a rotatable blade.

In some embodiments, the lower portion the fluidic temperature control device wherein is composed of at least stainless steel. Additionally, the lower portion can contain slits running along at least a portion of a length of the lower portion. In some embodiments, the lower portion is removable from the middle portion and removal of the middle portion exposes the agitation device. In some embodiments, the upper portion of the fluidic temperature control device is rotatable with respect to the middle portion.

In some embodiments, the heating element **125** is proximate the agitation device. Additionally, the heating element can be housed substantially within the agitation device. In some embodiments, the controller is configurable to control the temperature of the heating element. In some embodiments, the controller is configurable to control the speed of the agitation device. In some embodiments, the controller is configurable to receive data inputs inputted via the input device, the inputs comprising control commands to control the temperature of the heating element. In one or more embodiments, there is disclosed herein a sous-vide circulator cooker which includes a rotatable head controller; a stainless steel skirt connected to the rotatable head controller; a wireless radio device within the rotatable head controller; and recipe specifications stored in non-volatile

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memory within the rotatable head controller. In some embodiments the rotating head controller can turn left or right.

In some embodiments the stainless steel skirt can be removed without tools. Additionally, in some embodiments, removal of the stainless steel skirt exposes pump impellers. In some embodiments the rotatable head controller includes a Wi-Fi/Blue tooth radio device. Additionally, in some embodiments, the rotatable head controller is configurable to also store user-input specifications. Moreover, in some embodiments the head controller includes display elements that change color based on water temperature. In some embodiments the head controller is configurable to search stored recipes based on the stored user-input specifications.

At least one embodiment within this disclosure is a fluidic temperature control device for sous-vide cooking. The control device can include an upper portion including a controller, a display device, an input device and speaker/buzzer coupled to the controller. The control device can also include a middle portion connected to the upper portion. The middle portion can in some embodiments, house a motor coupled to the controller. The control device can also include a lower portion which is connected to the middle portion, the lower portion housing a fluid agitation device coupled to the motor, a heating element coupled to the controller. The lower portion can be configured for at least partial immersion in a fluid.

In at least one embodiment, the upper portion can contain a speaker or a visual alarm or both that is connected to the controller. The controller can be configured to send a signal to the speaker to sound an alarm, or send a signal to the visual alarm, when a detected temperature of the device rises to a first predetermined temperature.

In at least one embodiment, the controller can be configured to send a signal to the speaker (or other suitable apparatus) to sound an alarm when a detected temperature of the device cools to a second predetermined temperature. In at least one embodiment, the cooling to the second predetermined temperature can be caused naturally by convective cooling.

In at least one embodiment, the controller can be configured to recognize a user-induced heating and a user-induced cooling, and can be further configured to override the above discussed alert signals until the detected temperature begins to normalize. In at least one embodiment, the normalization of the detected temperature can be determined by estimating temperature trends of a fluid within the lower portion.

In at least one embodiment, the upper portion can contain a radio transmitter that is connected to the controller. The controller can be configured to send a signal to the radio transmitter to send an alert signal to an electronic device in signal communication with the radio transmitter when a detected temperature of the fluidic temperature control device rises to a first predetermined temperature, such as a suitable cooking temperature.

In at least one embodiment, the controller can be configured to send a signal to the radio transmitter to send an alert signal to the electronic device in signal communication with the radio transmitter when a detected temperature of the fluidic temperature control device cools to a second predetermined temperature. As above, the cooling to the second predetermined temperature can be caused naturally by convective cooling.

In at least one embodiment, the controller can be configured to recognize a user-induced heating and a user-induced cooling, and can be configured to override the previously discussed alert signals until the detected temperature begins

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to normalize. Again, the normalization can be determined by estimating temperature trends of a fluid within the lower portion.

FIG. 4 is a block diagram of a fluidic temperature control device 10 for sous-vide cooking comprising: an upper portion 130 including a controller 400, and a display device 132 and an input device 133 which are coupled to the controller 400; a middle portion 120 connected to the upper portion 130, the middle portion 120 housing a motor 150 coupled to the controller 400; and a lower portion 112 connected to the middle portion 120. As shown, the lower portion 112 can house a fluid agitation device 104 coupled to the motor 150, and a heating element 125 coupled to the controller 400. The lower portion 112 can be configured for at least partial immersion in a fluid. Also as shown in FIG. 4, the upper portion 130 can contain a speaker 402 that is connected to the controller 400. The controller 400 can be configured to send a signal to the speaker to sound an alarm when a detected temperature of the device 10 rises to a first predetermined temperature.

The various embodiments described above are provided by way of illustration only and should not be construed to limit the scope of the disclosure. Modifications and changes that may be made using the principles described herein without departing from the scope of the disclosure or the following claims.

The invention claimed is:

1. A sous-vide circulator cooker comprising:

- a head portion comprising a display;
- a middle portion extending from the head portion and having a pump motor therein;
- a lower portion extending from a top opening to a bottom opening, the top opening being attached to the middle portion, with the middle portion between the head portion and the lower portion, the lower portion having a heating element therein and one or more liquid intake openings;
- a pump housing attached at a distal end of the bottom opening of the lower portion below the heating element, the pump housing having an inlet opening and an outlet opening passing therethrough;
- a pump impeller rotatably mounted within the pump housing below the heating element and operatively connected to the pump motor, the pump impeller being positioned between the inlet opening and the outlet opening and configured, upon activation of the pump motor, to generate a flow of liquid through the one or more liquid intake openings, past the heating element, into the pump housing through the inlet opening, and out through the outlet opening.

2. The sous-vide circulator of claim 1, wherein the lower portion comprises a stainless steel skirt.

3. The sous-vide circulator of claim 1, wherein the lower portion is removable from middle portion.

4. The sous-vide circulator of claim 2, wherein the pump housing is removable from the skirt.

5. The sous-vide circulator of claim 1, wherein the pump housing is movable relative to the middle portion to position the outlet opening at different orientations relative to the middle portion.

6. The sous-vide circulator of claim 2, wherein the skirt is movable relative to the middle portion to position the outlet opening at different orientations relative to the middle portion.

7. The sous-vide circulator of claim 1, wherein the pump impeller is operatively connected to the pump motor by a pump motor shaft.

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8. The sous-vide circulator of claim 7, wherein the heating element comprises a coil and the pump motor shaft passes through the coil.

9. The sous-vide circulator of claim 1, further comprising a clamp extending laterally from the middle portion and configured to secure the sous-vide circulator to a container. 5

10. The sous-vide circulator of claim 1, wherein the head portion is rotatable relative to the clamp.

11. The sous-vide circulator of claim 1, further comprising a steam evacuation fan located in the middle portion. 10

12. The sous-vide circulator of claim 1, wherein the display is configured to indicate a temperature of a fluid in which the sous-vide circulator is at least partially immersed.

13. The sous-vide circulator of claim 1, wherein the head portion comprises an input device configured to receive user input. 15

14. The sous-vide circulator of claim 1, wherein the pump housing comprises a cylindrical body having an upper surface facing the lower portion.

15. The sous-vide circulator of claim 14, wherein the inlet opening comprises a circular opening through the upper surface. 20

16. A sous-vide circulator cooker comprising:

a head portion comprising a display;

a middle portion extending from the head portion and having a pump motor therein; 25

a lower portion extending from the middle portion, with the middle portion between the head portion and the lower portion, the lower portion having a heating element therein and one or more liquid intake openings; 30

a pump housing attached at a distal end of the lower portion, the pump housing having an inlet opening and an outlet opening passing therethrough;

a pump impeller rotatably mounted within the pump housing and operatively connected to the pump motor,

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the pump impeller being positioned between the inlet opening and the outlet opening and configured, upon activation of the pump motor, to generate a flow of liquid through the one or more liquid intake openings, past the heating element, into the pump housing through the inlet opening, and out through the outlet opening,

wherein the lower portion includes a skirt that is movable relative to the middle portion to position the outlet opening at different orientations relative to the middle portion.

17. A sous-vide circulator cooker comprising:

a head portion comprising a display;

a middle portion extending from the head portion and having a pump motor therein;

a lower portion extending from the middle portion, with the middle portion between the head portion and the lower portion, the lower portion having a heating element therein and one or more liquid intake openings; a pump housing attached at a distal end of the lower portion, the pump housing having an inlet opening and an outlet opening passing therethrough;

a pump impeller rotatably mounted within the pump housing and operatively connected to the pump motor, the pump impeller being positioned between the inlet opening and the outlet opening and configured, upon activation of the pump motor, to generate a flow of liquid through the one or more liquid intake openings, past the heating element, into the pump housing through the inlet opening, and out through the outlet opening; and

a steam evacuation fan located in the middle portion.

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