

Description

The present invention relates to cooking apparatus according to the prior art portion of claim 1 and 3 respectively for the household kitchen.

5 Many labor-saving and time-saving devices have been devised to assist the home cook. Some such devices are used for preparing the ingredients prior to cooking. These include devices for chopping, grinding and mixing of ingredients and range from the familiar variable-speed electric mixer and blender to the more elaborate food processor with interchangeable blades for preparing such items as chopped onions, sliced potatoes and julienne carrots in a matter of seconds. Other such devices are specially adapted to assist in cooking the prepared ingredients. These include devices dedicated to particular types of food, such as toaster ovens and electric corn poppers, and devices for controlling cooking temperature, such as electric frying pans and woks and electrically heated, insulated crocks for long, slow simmering.

Advances in solid-state electronics and microprocessors have also benefited the experienced home cook and the non-cook alike. For example, kitchen stoves are available with solid state monitoring apparatus for keeping the cook apprised of the temperature in the stove's oven during cooking. Programmable microwave ovens may be used first to defrost and then to cook frozen cuts of meat or frozen pre-prepared dinners.

Although devices of the above sort are of great assistance, the home cook must still interpret and execute a written recipe. The following recipe for a chicken dish known as coq au vin illustrates the cooking steps to be followed without the use of the present invention.

20 First, roughly three tablespoons of butter are melted in an appropriate pan situated on the top of a stove or in an electric frying pan. To the pan are added one-quarter pound minced salt pork, three-quarters cup chopped onions, one sliced carrot, one peeled clove of garlic, and, if desired, three minced shallots. These ingredients are lightly stirred until browned. The temperature for browning is left to the cook's judgment. The vegetables are then removed, and a disjointed chicken or boned and cut-up chicken breasts are browned in the fat, the temperature and cooking time again being left to the cook's judgment. After the chicken is browned, the temperature is reduced and the following ingredients are added while the contents of the pan are stirred intermittently: two tablespoons flour, two tablespoons minced parsley, and appropriate amounts of chopped fresh chervil, thyme, salt, pepper, the perfunctory bay leaf, and the previously browned vegetables. Finally, one and one-half cups of dry red wine are added. The mixture is simmered, covered, over low heat for roughly one hour. One-half pound of sliced mushrooms is added for the last five minutes of cooking.

For those unpolished in the cooking arts, yet no less appreciative of coq au vin, the above recipe is more difficult to follow than would appear from the printed word. Notwithstanding all the features of known cooking apparatus, inexperienced cooks tend to burn the vegetables and overbrown the chicken. The inexperienced cook, completing the initial steps and leaving the mixture to simmer for one hour, will generally be in need of rest and want to undertake activity unrelated to cooking while waiting to add the mushrooms. The tendency is to rest longer than one hour with sometimes disastrous results if the cooking liquid should boil off.

Even for the experienced cook, to whom the above recipe presents no special difficulty, the preparation calls for constant attention, at least during the initial period, and that is time better put to other uses.

40 The present invention relates to a computer-controlled integrated cooking apparatus for automatically cooking a culinary preparation according to a predetermined recipe stored in a microcomputer. The cooking apparatus can be programmed to perform all of the necessary steps for heating, stirring, and adding ingredients as called for by the recipe. Apparatus according to invention includes a cooking vessel, and a dispensing structure, generally compartmentalized so as to hold the various ingredients called for by the recipe. The dispensing structure is caused to dispense the various ingredients at the proper times into the cooking vessel upon command from the pre-programmed apparatus. The temperature of an associated heating unit is set and adjusted upon command by the program according to the recipe. The ingredients of the cooking vessel are automatically cooked for prescribed times at prescribed temperatures and stirred where called for by the recipe at rates which are appropriate for the nature of the particular ingredients. When the dish has thoroughly cooked, the heating unit is automatically turned off.

50 Apparatus of that type is seen in US-A-4503502, where an open-topped wok has mounted generally above it both a stirrer and means which separately dispense liquid and solid ingredients to the wok.

In contrast, the present invention provides an apparatus according to claim 1 and 3 respectively. Particular embodiments of the invention are set out in dependent claims 2 and 4 to 11.

55 The cooking vessel may have an openable and closeable closure member, this being, together with the dispenser and stirrer, under the control of the control means so that ingredients are dispensed into the vessel while the closure is open but the vessel may be automatically closed in accordance with the recipe.

If an alternative, this common dispenser has chambers of two distinct types, a first being for holding and dispensing solid ingredients and a second for holding and dispensing liquid ingredients; this dispenser being not-

able under the control of control means to bring chambers of either type to a discharge position at which their contents respectively are dispensed to the vessel. For ease of exposition, the term "stirring" is used herein in a broad sense to encompass not only a stirring motion but also other forms of mixing or agitating motions, and no limitation to a particular stirring motion or speed is intended.

5 In one embodiment the cooking vessel is provided with a tight-fitting lid having an open chute positioned in registration with the dispensing aperture. For uncovered cooking the chute is left open ; for covered cooking it is blocked off by a closure member automatically driven by the same mechanism as the stirring means. Although in this embodiment the stirring means and chute-closure member cannot be controlled independently of one another, the embodiment is advantageous in that it eliminates the need for a separate motor or gearing and clutch mechanism for the chute-closure member.

10 In alternative embodiments of the invention, the apparatus can be arranged to store a number of recipes and can include display means for alphanumeric displays listing ingredients or giving special instructions for the particular recipe selected from storage. To assist the operator in devising new recipes or adapting favorite recipes to the present apparatus, the apparatus may also have a manual mode in which it is operated by key commands from the user. The apparatus may also be adapted to receive removable recipe cartridges contain-
15 ing a read-only memory with control instructions and comments or "prompts" to be displayed to the operator for preparation of the included recipes.

In the drawings :

Fig. 1 is perspective view of apparatus embodying the invention.

20 Fig. 2 is a side cross-sectional view of apparatus embodying the invention.

Fig. 3 is a rear elevational view, partially cut away, of the apparatus of Fig. 2.

Fig. 4 is a plan view of one embodiment of a dispensing carousel.

Figs. 5A-D comprise a cartoon sequence illustrating the dispensing of liquid ingredients.

Fig. 6 is a block diagram illustrating the system electronics.

25 Figs. 7 and 8A-H are flowcharts illustrating program control logic used in the invention.

Fig. 1 illustrates a cooking vessel 10 resting on a heating unit 11 and a compartmentalized dispensing structure 12 in the form of a carousel for holding the culinary ingredients called for by a prescribed recipe and for dispensing those ingredients in proper sequence into the cooking vessel 10. Extending into the cooking vessel is a stirring member 13 for stirring the contents. The lower portion 14 of the apparatus housing contains the heating unit 11, and the upper portion 15 which provides support for the dispensing carousel 12. The upper portion 15 also houses portions of the drive mechanisms for the carousel and the stirring member and defines an aperture 16 (see Fig. 2) through which the ingredients held by the carousel 12 are dispensed into the cooking vessel. The central or "tower" portion 17 houses one or more drive motors for the carousel 12 and the stirring member 13 as well as the system electronics, including a memory for storing recipes and control instructions.
30 Mounted on the central portion 17 is a control/display panel including a key pad 18 for entering control or recipe instructions and an alphanumeric display panel 19.

The mechanical details of the specific embodiment of Fig. 1 will now be described with further reference to Figs. 2-4. Fig. 4 illustrates a carousel dispensing unit in which the size and number of the chambers can be varied. The carousel dispensing unit is comprised of an outer cylindrical wall 21 and means, interior to wall 21, defining a plurality of chambers for holding various food ingredients required by the prescribed recipe. In the specific embodiment illustrated in Fig. 4, the carousel includes three fixed interior partitions 22, which also support a centrally disposed hub member 23. The interior portion of the hub member 23 is formed to receive a star cam for driving the carousel and causing it to rotate. The outer face of the hub member 23 and the inner face of the cylindrical wall 21 are formed with pairs of opposed, radially aligned grooves 24 and 24' for receiving either removable partitions 26 or preformed liquid-dispensing units 27. The fixed partitions 22 and removable partitions 26 (and the walls of liquid-dispensing units 27) define a plurality of chambers for holding the solid ingredients called for by the recipe. The number and size of these chambers can be varied by selectively positioning the removable partitions 26. In lieu of a removable partition 26, the outer face of a wall of a receptacle 27 can also serve to define a chamber for solid ingredients.
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50 As described thus far, the carousel assembly is open at its bottom. A separate member 31 provides a solid bottom for the carousel. The bottom member 31 extends radially outward beyond the carousel wall 21 and radially inward beyond the outer face of the central hub member 23. The bottom member 31 includes an aperture bounded on its edges by a continuous lip 33, which extends into the dispensing aperture 16 and engages the walls defining the aperture 16 so as to hold the member 31 in fixed position. The aperture defined by the lip 33 generally follows the shape of a sector and preferably subtends an angle of 60° to provide a sufficiently large opening that bigger food ingredients (such as chunks of stew beef) as might be held in a larger chamber will not become jammed in the opening. The outline of the opening defined by lip 33 is shown in phantom in Fig. 4.
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The carousel unit may be enclosed on the top by lid 36 including a handle 37 and snap-on lid retaining assembly 38.

Liquid ingredients are retained in the carousel unit 12 by liquid-dispensing units 27, which may be locked into position as a unit between a pair of opposing grooves 24 and 24'. As best seen in the side cross-sectional view of Fig. 2, a liquid-dispensing unit includes a bottom wall 41 defining an aperture 42 in its outer reaches and sloping slightly downward towards the aperture to facilitate drainage of the liquid into the cooking vessel. The aperture 42 is closed by a resilient stopper 43. The stopper is biased toward its closed position by a compression spring 44 acting through shaft 46. The opening and closing of the stopper 43 is further described below.

The upper arm 15 of the housing provides support for the carousel unit 12. In the specific embodiment illustrated herein, the upper arm 15 is mounted in cantilever fashion on the tower portion 17 of the apparatus housing. The upper housing portion 15 is mounted to pivot about pin 47. Pin 48 provides a stop to support this housing portion in its cantilevered configuration. The upper support arm 15 includes a side wall 49 which defines the dispensing aperture 16. Aperture 16 is appropriately dimensioned to snugly receive the lip 33 of the bottom member 31 so as to hold the member 31 stationary with respect to the support 15 while the carousel 12 is caused to rotate.

To "uncork" the fluid receptacles 27 at the appropriate time, a camming mechanism is mounted on side wall 49 which extends into aperture 16. The camming mechanism includes an opener cam 50 having a plurality of lobes for contacting the stoppers 43 and a detent cam 51 mounted for rotation with the opener cam 50 and having detents in correspondence with the lobes of the opener cam 50. The detent cam 51 is held in its specified positions by a spring mechanism (not shown). Camming mechanisms of this sort are well known to those skilled in the mechanical arts and thus are not disclosed in further detail herein. Detent cam 51 serves to maintain opener cam 50 in a neutral position, in which a lobe is extending vertically upwards, when no forces are exerted on the opener cam.

Figs. 5A-D provide a cartoon sequence illustrating the manner in which liquid ingredients are dispensed into the cooking vessel. In the sequence the fluid receptacle 27 is moving from left to right and opener cam 50 rotates in a clockwise direction about a fixed position. Detent cam 51 (not visible in Figs. 5A-D) maintains opener cam 50 in a position with a lobe extending vertically upwards when not in the vicinity of a fluid receptacle 27. In Fig. 5A the projection 52 at the leading edge of the drain hole engages the vertically extending lobe 53. In Fig. 5B the opener cam 50 continues to rotate until the next adjacent lobe 54 contacts the bottom of stopper 43, forcing it upward into the interior of the receptacle. When the lobe 54 is vertical, the carousel drive is stopped for a sufficient time or rotates sufficiently slowly to allow the contents of the receptacle to drain into the cooking vessel 10. After a suitable dwell time (if the carousel is stopped), the carousel drive is reactivated if called for by the recipe. In Fig. 5C the projection 55 at the trailing edge of the drain hole engages the lifting lobe 54. In Fig. 5D the lobe 54 is rotated away from stopper 43, which is urged back into its closure position by closure spring 44. The next trailing lobe is meanwhile rotated into vertical position and maintained in that position by detent cam 51 in readiness for the next liquid-dispensing unit 27, if there is one, mounted in the dispensing carousel.

In the illustrated embodiment the chambers holding the liquid and food ingredients are rotated into dispensing position over the dispensing aperture 16. To produce this rotation, the apparatus includes a carousel drive spline 56, which is driven by a carousel drive motor 57 through pulleys 58 and 59 and a carousel drive belt 61. A bearing block 26 mounted in the upper housing portion 15 supports drive spline 56 and pulley 59.

The rotation of the dispensing carousel 12 is controlled by a microswitch 63 (see Fig. 4) mounted on the upper support arm 15 and projecting upward through an opening in the bottom member 31 of the carousel so as to be tripped by a partition as the carousel rotates. The position of the microswitch with respect to the aperture through the bottom member 31 defined by the lip 33 is illustrated in Fig. 4. The microswitch is preferably the low-lying type having a domed cap, which can be depressed by a corner of a passing partition, but which will not be depressed by food ingredients being pushed over the microswitch by an advancing partition. As will be explained more fully below, when the recipe calls for the ingredients of the "next up" chamber to be dispensed, the carousel drive motor will be actuated on command by the control electronics, causing the carousel to rotate in the direction indicated by the arrow 64 in Fig. 4. The trailing wall of the chamber (the wall 65 in Fig. 4) pushes the contents of the chamber over the opening in the bottom member. The rotation will continue until the trailing wall 65 trips the microswitch 63, which provides a signal indicating that the carousel drive motor is to be deactivated. The microswitch is positioned and the control mechanisms are timed so that the trailing wall 65 comes to rest at the edge of the bottom opening.

Those skilled in the art will now recognize alternative mechanisms for signaling the stopping of the carousel rotation. For example, a carousel can be used having fixed partitions angularly spaced at 30° intervals and the rotation can be advanced in predetermined 30° steps. In this alternative, a camming mechanism may be mounted in operative association with the carousel pulley 59 to indicate a "home" position of the carousel. The

carousel, in turn, can be keyed to the drive spline 56 so as to be mounted on the drive spline with a well defined home position with respect to the bottom opening. In this alternative the carousel drive motor 57 may be provided by a stepper motor for rotating the carousel through a fixed angle corresponding to a fixed number of steps before automatically coming to a stop.

5 The contents of the cooking vessel will have to be stirred, mixed, or otherwise agitated from time to time as dictated by the particular recipe. Fig. 2 illustrates a stirring blade 66 mounted on shaft 67, which is inserted into spline 68 mounted in lid 69 of the cooking vessel. The shaft/spline assembly is supported by bearing block 71 mounted in upper support arm 15 and is driven by drive motor 72 through pulleys 73 and 74 and drive belt 75.

10 For control purposes, described more fully below, the apparatus includes a homing mechanism for determining a "home" position of the stirrer drive assembly. For example, a homing cam and microswitch assembly can be mounted in operative association with the stirrer drive pulley 74 as indicated symbolically at 76 in Fig. 2 to indicate a home position of the spline 68.

The cooking vessel lid 69 is formed with a generally cylindrical wall 77 defining a chute 78 opening into the vessel. The chute is positioned in registration with the dispensing aperture 16. The chute 78 serves both to guide dispensed food ingredients into the cooking vessel and to partially uncover the cooking vessel for those recipes which call for uncovered cooking. Lid 69 is also provided with a chute-closure member 79 having sufficient size to completely close off the chute. The closure member 79 is connected to the chute/blade spline 68 and can be rotated into and out of its position closing off the chute as dictated by the recipe. For simplicity of the mechanical apparatus, both the chute-closure member 79 and the stirring blade 66 are driven by the same drive motor 72. Thus while the ingredients of the cooking vessel are being stirred, the chute will be alternately opened and closed. This mode of operation should not have any significant effect on the dish under preparation because the total amount of time spent stirring the ingredients is normally an insignificant fraction of the cooking time. Moreover, this mode of operation differs little from manual cooking, in which the cover must normally be removed to stir the contents of the vessel. When the ingredients are not being stirred, chute-closure member 79 is left in a fully open or fully closed position, as called for by the recipe.

As indicated above, the upper supporting arm 15 of the housing is cantilevered over the cooking vessel 10 and mounted so as to pivot about the hinge pin 47. To remove the cooking vessel once cooking is completed or to remove the agitating member on the end of shaft 67 for cleaning or replacement with a different member, the dispensing carousel 12 is removed from the support arm 15, which is then merely rotated about the hinge pin 47 to disengage the cooking vessel lid and withdraw the stirring assembly from the pot. Drive motors 57 and 72 are coupled to their respective pulleys 58 and 73 through axial couplers 80 and 81, which serve to decouple the pulleys from the drive motors when the upper support arm 15 is in its raised position.

As illustrated in Fig. 2, the cooking vessel 10 is heated by an electrical heating unit 85, in which the heat is generated by electrical heating elements 86. The construction of electrical heating units is well known and will not be described in detail herein. The heating unit in Fig. 2 includes a thermal sensing element 87, which is maintained in contact with the bottom of the cooking vessel 10 by a thermal contact spring 88.

The heating unit 85 in Fig. 2 is included within the lower arm 14 of the housing. Alternatively, the heating unit can be provided by a stand-alone electrical heating unit or a gas unit with gas-control valves. In an alternative embodiment, for example, the apparatus can be fabricated with a detachable heating unit including a temperature sensor for maintaining controlled temperature settings. The detachable unit can then be used as a conventional electric heating unit independently of the automatic cooking control apparatus of the present invention.

45 In this embodiment the lower portion 14 of the housing includes prongs 89 (shown in phantom in Fig. 2) for establishing electrical connection with the heating unit and for connecting the heating unit's temperature sensor with the control apparatus. The heating unit is provided with a mating receptacle for receiving the prongs 89. When it is desired to use the automatic features of the present invention, the detachable unit is merely plugged into position as illustrated in Fig. 2. For stand-alone use the heating unit is provided with a separate electrical power cord with temperature setting controls for connection to a conventional electrical outlet, in the manner of a standard electric frying pan.

50 The various automatic operations of the apparatus are controlled by a microcomputer system as illustrated schematically in Fig. 6. Microcomputer system 91 includes microprocessor 92, and associated memories 93 and 94 for storing the microprocessor control programs and recipe programs. The system control programs reside in memory 93 which may comprise a read-only memory, and the user programs reside in memory 94, which may comprise either a random-access memory or, in the case of an insertable recipe cartridge, a read-only memory. The general principles of construction of microcomputer systems are well known and, apart from their specific application to provide the control called for by the present invention, are not described in detail herein.

Heating elements 86 are illustrated schematically in Fig. 5, where they are designated 86'. Similarly in this figure, drive motors 57 and 72 are designated 57' and 72', thermal sensing element 87 is designated 87', and the microswitch assemblies 63 and 76 are designated 63' and 76'.

Microprocessor 92 communicates with heating elements 86' and motors 57' and 72' through heater power control unit 96 and motor control units 97 and 98, respectively. Although not known to be used for the purposes and in the particular combination of the present invention, microprocessors are commonly used to control motors, heating elements and the like in other areas of endeavor and the structure and operation of appropriate heater power control units and motor control units are well known to those skilled in the art, so that these units need not be described in further detail here.

The signals from the microswitch assemblies 63' and 76' for controlling the dispenser motor and stirrer motor are prepared by the signal conditioner 99 (shown for convenience as a dual signal conditioner) before being applied to microprocessor 92. Temperature sensor 87' communicates with the microprocessor 92 through a signal conditioner 101 and analog-to-digital converter 102. A key pad 18 is provided to enter recipe instructions and to allow for manual control of the apparatus as described in more detail below. The key pad 18 communicates with the microprocessor 92 through a conventional keyboard decoder 103. The display 19 is provided, for example, by a conventional seven-segment display for numeric displays or by other conventional means for alphanumeric displays. The display 19 is coupled to microprocessor 92 by an appropriate conventional display driver 104.

Having described the mechanical aspects and general operation of apparatus according to the invention, a more detailed description is now given of illustrative control logic for the microcomputer system 91.

Figs. 7 and 8A-H provide illustrative control logic flow charts. Fig. 7 shows the main program logic, which controls system initialization, controls selection of the system operating mode, calls appropriate subroutines for controlling specific operations of the apparatus, and, when the heating element is energized, regulates the temperature.

The logic provides for three modes of operation: manual, program, and auto. In the manual mode the various functions of the system are controlled from the keyboard. For example, the carousel is commanded to rotate, the stirrer and heating units are turned on and off, the chute is opened and closed, and the cooking time and temperature are set from the key pad. In this mode the user manually steps through the cooking sequence.

In the program mode a sequence of operational steps is entered into memory, but the system is not mechanically activated. The program steps are entered through key pad 18 as in the manual mode and are stored in designated segments of the recipe memory for future use in the auto mode.

In the auto mode the stored program is called up and executed automatically under the control of a software sequencing routine.

Fig. 7 shows the main control program. When the apparatus is powered up (block 121), the system is automatically initialized (block 122) and then awaits a command from the key pad. The user then enters an appropriate command selecting the mode of operation. At blocks 123a, b and c the key command is sequentially interrogated to determine whether the manual, program, or auto mode has been selected, and a mode flag is then set. In the program and auto modes a recipe name is entered from the keyboard (blocks 124a and b). In the program mode the recipe name provides a label by which a recipe can be called up, and in the auto mode the recipe name entered designates the recipe to be called from memory.

In a simpler embodiment of the invention the microprocessor responds only to key position entries from the key pad. The recipes are labeled by numbers, which serve as address offsets designating the beginning address of the respective recipe in memory 94. In this embodiment the key pad 18 and display 19 can be of much simpler design. For full alphanumeric recipe labels the microprocessor software includes a software interpreter to decode the alphanumeric key entries. Although the alphanumeric capability is more complicated, it has the advantage that descriptive mnemonics may be used and auxiliary comments and prompts may be stored and displayed. The provision of an appropriate software interpreter as well as a software sequencing routine for execution of the stored programs is well within the routine skill of microprocessor programmers. At blocks 126a and b the respective memory address counters are initialized. At this stage in the manual and program modes, a key command is entered from the key pad designating the next opcode (block 127). In the auto mode an opcode is called from memory at the address indicated by the auto memory address counter KT (block 128).

Whether entered from the keyboard or retrieved from memory, the opcode is then subjected to interrogation chain 129 to determine the subroutine to be called. If the END function is indicated, the system executes the END routine and returns control to the start. Otherwise, after calling and executing the indicated subroutine the system checks the heater status. If the heater flag is set, indicating that the heater is on, the system reads the temperature indicated by temperature sensor 87 (87') and compares the reading with a preset temperature level according to the selected recipe. The temperature is controlled by turning the heating elements on or off.

i.e., if the temperature is greater than desired, the heating elements are de-energized, and if less, the heating elements are re-energized. To provide stability to the temperature setting and prevent the microprocessor from continually hunting for the proper temperature setting, the microprocessor will change the status of the heating elements themselves only if the sensed temperature lies outside a specified range about the preset level. The use of such a temperature range is common practice with temperature controllers, and those skilled in the art will readily be able to determine the magnitude of an appropriate range.

After checking the heater status, the system is ready to receive the next opcode. At block 131 the mode flag is checked. If the system is in the manual or program mode, then control is returned to block 127, and the system waits for the next command to be entered from the keyboard. If the system is in the auto mode, then the recipe memory address counter KT is incremented, and control is returned to block 128, where the next opcode is retrieved from memory. The next opcode, whether from the keyboard or from memory, is subjected to interrogation chain 129, and the cycle repeats.

Fig. 8A shows the subroutine for turning on the heater. The HEATER ON routine requires a two-parameter instruction comprising the HTO opcode and a numerical value giving a specific temperature setting or a temperature range such as high, medium or low. Upon entering the subroutine, the mode flag is checked at block 136. If the system is in the manual or auto mode, designated by L = 0 or 2 in the flowcharts, a HEATER ON flag is set at block 137. The main program uses the HEATER ON flag to monitor the temperature and send appropriate signals to the heater power control. The second parameter, i.e., the temperature level, is then entered, either from the keyboard in the manual mode or from the proper address in the recipe memory in the auto mode, and control is returned to the heater monitoring chain in Fig. 7.

In the program mode, the HTO opcode along with the heater level setting are stored in the recipe memory and control is returned to the main program.

Fig. 8B shows the heater off subroutine called by opcode HTF. As in the heater on subroutine, the mode of operation is tested at block 139. In the manual and auto modes the heater flag is reset to its low state indicating the heater is off and a signal is sent to control unit 96 to deenergize the heating elements. In the program mode the HTF opcode is merely stored in memory.

Fig. 8C shows the subroutine, designated in DSO, for activating the dispensing means. In the manual and auto modes a signal is sent to dispenser motor control unit 98 to energize the dispenser drive motor 57. If a sensor is used, such as the microswitch 63, to sense whether the dispenser has rotated to the next dispensing position, then the subroutine contains a test loop for continually testing the position sensor until the dispensing position is reached. At that point a signal is sent to motor control 98 to deenergize the drive motor. Alternatively, dispensing unit 12 can be provided with a specified home position and the microprocessor can keep track of the angle through which dispensing means 12 has rotated as described above. This can be accomplished, for example, by employing a stepper motor for drive motor 57 and monitoring the number of steps the motor undertakes. Those skilled in the art will appreciate that other forms of dispensing means could be employed, for example, means defining chambers which can be opened and closed by solenoidactuated mechanisms. The writing of DSO subroutines appropriate for controlling such other mechanisms is well within the skill of those in the microprocessor programming art, and therefore such other embodiments of the invention are not specifically disclosed herein in detail.

Figs. 8D and E show the subroutines STO and STF for turning on and off the stirring mechanism. In both of these subroutines, in the program mode the opcode is merely stored in memory. In the manual or auto modes an appropriate signal is sent to motor control unit 97 to energize or deenergize the drive motor. These illustrative subroutines provide for only one motor speed. These routines may readily be modified to include several motor speeds and to allow for bidirectional stirring.

Since the chute-closure member 79 is also driven by the same motor as the stirrer member, the STIRRER OFF subroutine contains additional program steps to assure that the stirrer member comes to rest with the chute 78 left open. A separate routine is provided specifically to close the chute 78. Microprocessor 92 receives a closure signal from the homing mechanism at 76 in Fig. 2 indicating when the chute 78 is closed. The home position corresponds to the closed position of chute-closure member 79. In response to the closure signal from the homing mechanism, the microprocessor commands the stirrer drive motor 72, which in this embodiment is preferably provided by a stepper or AC motor, to undergo a predetermined number of steps N and then deactivates the motor. The number N is chosen with the inertial effects of the moving stirring mechanism taken into account so that the stirring mechanism will come to rest with the chute-closure member in an open position.

Fig. 8F shows a subroutine for closing the chute 78. Consistent with the STIRRER OFF subroutine, the chute 78 will always be open when the CHUTE CLOSURE subroutine is called. In the manual and auto modes, the routine begins by activating the stirrer motor. When the home position is sensed, the motor is deactivated. The home position sensor may be offset in its location if necessary to account for any significant continued inertial motion of the chute-closure member before that member comes to rest in its closed position.

Fig. 8G shows a subroutine, designated in TME, for specifying the cooking time. This subroutine calls for a two-parameter instruction. The first is the opcode TME, and the second is the cooking time. In the manual mode the cooking time, measured in hours, minutes or seconds, is entered from the keyboard. The microprocessor initializes a real-time clock and, through a counting loop in the subroutine, counts down for the designated time. When the timing loop is completed, control returns to the main program. The auto mode operates similarly, except that the appropriate time limit is recalled from the memory location indicated by the recipe address counter KT. In the program mode the program address counter CT is incremented, the TME opcode is stored in memory, the address counter is incremented again, and the time limit is stored in memory.

Fig. 8H shows an END subroutine, which turns off the heating unit and stirrer and dispenser motors at the end of the sequence of recipe instructions.

It will be appreciated that the logic flow charts illustrated in Figs. 7 and 8A-G provide only an illustrative control logic scheme according to the invention. Other logic schemes could be used to accomplish the same functions. Indeed, other mechanical arrangements equivalent to the ones illustrated herein may even require different logic schemes.

By way of illustration, the following "recipe" is provided for coq au vin according to the present invention. First, a carousel with its bottom member attached is loaded with the constituent ingredients as follows. In the first compartment to be dispensed is : three tablespoons butter ; in the next compartment : minced salt pork, chopped onions, sliced carrot, garlic and shallots in the proportions indicated above ; in the next compartment: boned and cubed chicken breasts ; in the next compartment : the leafy herbs, namely, the parsley, chervil, and thyme ; in the next compartment : one and one-half cup red wine which has been mixed with two tablespoons flour and with the salt and pepper. This is most easily accomplished by vigorously shaking the wine in a closed jar with the flour, salt and pepper. This compartment will, of course, be provided by a liquid-dispensing unit 27. In the final compartment are placed the mushrooms. The carousel is placed on the drive spline aligned so that the butter will be the first item dispensed. The further steps are then controlled by the following recipe program listing, in which cooking times are given in minutes and seconds (e.g., 01 30 indicates 1 minute 30 seconds) and heating levels are specified on a scale of 1 to 10, with 10 being the hottest.

COQ AU VIN

	<u>Instructions</u>	<u>Comments</u>
	HTO 10	Heat up pot
5	TME 01 00	for 1 minute
	DSO	Dispense butter
	TME 00 30	Melt butter
10	DSO	Dispense vegetables, pork
	TME 00 05	
	STO	Stir vegetables
	TME 00 05	
15	STF	
	TME 00 30	Cook 30 seconds
	STO	Stir vegetables
20	TME 00 05	
	STF	
	TME 00 30	Cook 30 seconds
25	END	Remove vegetables from pot; Add to carousel com- partment with leafy herbs. Continue program.
30	HTO 10	Heat pot for 30 seconds
	TME 00 30	
	DSO	Dispense chicken
35	TME 01 00	Cook 1 minute
	STO	Stir chicken
	TME 00 05	
40	STF	
	TME 01 00	Cook 1 minute
	STO	
	TME 00 05	
45	STF	
	TME 01 00	Cook 1 minute
	HTO 4	Lower heat
50	TME 00 02	
	DSO	Dispense herbs, vegetables
	TME 00 02	
55	STO	Stir

	TME 00 05	
	STF	
5	DSO	Dispense wine
	TME 00 02	
	CHC	Close Chute
10	TME 15 00	Cook 15 minutes
	STO	Stir
	TME 00 10	
	STF	
15	CHC	
	TME 15 00	Cook 15 minutes
	STO	Stir
20	TME 00 10	
	STF	
	CHC	
	TME 15 00	Cook 15 minutes
25	STO	Stir
	TME 00 10	
	STF	
30	CHC	
	TME 10 00	Cook 10 minutes
	STO 00 05	Stir, leave uncovered
	STF	
35	TME 00 02	
	DSO	Dispense mushrooms
	TME 00 02	
40	STO	Stir
	TME 00 05	
	STF	
45	CHC	Close chute
	TME 05 00	Cook 5 minutes
	END	

50 The above program listing is offered as an illustration of the operation of thy present invention and is not offered for its epicurean results. Indeed, it has not yet been optimized to produce an acceptable coq au vin, which requires fine adjustments in the cooking times and heating levels.

While the above provides a full and complete disclosure of the preferred embodiments of the invention, various modifications and equivalents will occur to those skilled in the art given the benefit of this disclosure. 55 It is to be expressly understood that the invention is not intended to be limited only to the specific examples and embodiments disclosed herein, but is defined by the appended claims.

Claims

1. Apparatus for automatically cooking a variety of culinary preparations of prescribed ingredients according to predetermined recipes, including a cooking vessel (10), heating means (11) for heating the vessel, dispensing means (12) generally above the vessel for holding and dispensing solid and liquid ingredients into said vessel, microprocessor control means (91) communicating with said dispensing means (12) and with said heating means (11) for controlling the dispensing of the ingredients and the heating of the vessel according to dispensing and heating schedules predetermined by one of the recipes, stirring means (13) mounted generally above the vessel and extending into the vessel for stirring contents thereof, and memory means (94) for storing control instructions according to the recipes, the apparatus being characterized in that :
 - the dispensing means (12) is disposed substantially directly above the vessel (10) structured and arranged to hold and to dispense both the solid and the liquid ingredient ;
 - the stirring means (13) is mounted substantially directly above the vessel (10) ; and there is a closure member (79) for selectively closing and opening the cooking vessel ;
 - the control means communicating also with the stirring means (13) for controlling the stirring of said contents according to a stirring schedule predetermined by the one recipe, and with the closure member (79) for automatically closing and opening the cooking vessel (10) according to that recipe.
2. An apparatus according to claim 1 wherein there is a lid (69) covering the cooking vessel (10), the lid being formed with a lid aperture (78) through which ingredients are dispensed into said vessel ; and the closure member is mounted for rotation and being responsive to the control means (91) so as to be rotatable upon command into positions opening and closing the lid aperture (78).
3. An apparatus for automatically cooking a variety of culinary preparations of prescribed ingredients according to predetermined recipes, including a cooking vessel (10), heating means (11) for heating the vessel, dispensing means (12) for holding and dispensing solid and liquid ingredients into the vessel, and microprocessor control means (91) communicating with the dispensing means (12) and with the heating means (11) for controlling the dispensing of the ingredients and the heating of said vessel according to dispensing and heating schedules predetermined by one of the recipes, the apparatus being characterized in that dispensing means (12) is structured and arranged to hold and dispense both the liquid and the solid ingredients mounted for rotation disposed directly above the vessel (10), being formed with a plurality of chambers of first and second types, said first type (22, 26) being adapted for holding and dispensing solid ingredients and said second type (27) being adapted for holding and dispensing liquid ingredients ; and
 - rotation of the dispensing means bringing predetermined ones of the chambers sequentially to a discharge position at which their contents respectively are dispensed to the vessel, the rotation being in response to the control means (91).
4. An apparatus according to claim 3 wherein :
 - the cooking vessel (10) is in fixed relation to said heating means ; and
 - a stirring member (66) extends into said vessel and is mounted for rotation about a vertical axis (62) for stirring the contents of said vessel in a generally circular pattern ; and
 - means (73, 74, 75) are provided for rotating the stirring member upon command from said control means (91).
5. An apparatus according to claim 4 wherein the means for rotating the stirring member (66) is operable for bidirectional rotation of the stirring member.
6. An apparatus according to claim 3, claim 4 or claim 5 wherein there is a lid (69) covering the cooking vessel (10), the lid being formed with a lid aperture (78) through which ingredients are dispensed into said vessel ; and
 - a closure member (79) for closing said lid aperture, the closure member (79) being mounted for rotation and being responsive to the control means (91) so as to be rotatable upon command into positions opening and closing the lid aperture (78).
7. An apparatus according to any one of the preceding claims wherein the dispensing means (12) includes a chamber-defining assembly (21, 22, 23) including demountable first (26) and second means (27) for defining a selectable number of first and second types of chambers, respectively.
8. An apparatus according to any one of the preceding claims wherein :
 - the dispensing means (12) defines a dispensing aperture (16, 33) over said vessel and each chamber has an opening at the bottom thereof ; and
 - the rotation of the dispensing means (12) upon command from the control means (91) brings the openings of said chambers sequentially into registration with said aperture at times specified by the selected schedule.
9. An apparatus according to any one of the preceding claims wherein :



a second type (27) of chamber, for holding liquid ingredients, includes a stopper (43) and means (44,48) for biasing said stopper in a position closing the opening (42) at the bottom of said chamber ; and said dispensing means further comprises cam means (50) responsive to rotational movement of the dispensing means (12) for urging the stopper (43) out of said opening when the respective chamber opening is in its discharge position.

10. An apparatus of any one of the preceding claims which further comprises manual key entry means (18) communicating with the microprocessor control means (91) and adapted to manually activate and deactivate the dispensing, heating and stirring means and to manually set a heating level and a heating time for the heating means.

11. The apparatus according to claim 10 wherein the memory means comprises a removable memory cartridge.

Ansprüche

1. Vorrichtung zum automatischen Kochen einer Vielfalt von kulinarischen Zubereitungen aus vorgeschriebenen Ingredienzen nach vorgegebenen Rezepten, umfassend ein Kochgeschirr (10), eine Heizeinrichtung (11) zum Erwärmen des Geschirrs, eine Abgabeeinrichtung (12) im allgemeinen oberhalb des Geschirrs zum Bereithalten und Abgeben von festen und flüssigen Ingredienzen in das genannte Geschirr, eine Mikroprozessorsteuereinrichtung (91), die mit der genannten Abgabeeinrichtung (12) mit der genannten Heizeinrichtung (11) in Verbindung steht, um die Abgabe der Ingredienzen und die Erwärmung des Geschirrs nach Abgabe- und Heiz-Zeitplänen zu steuern, die von einem der Rezepte vorgegeben sind, eine Röhreinrichtung (13), die im allgemeinen oberhalb des Kochgeschirrs angeordnet ist und sich in dieses hinein zum Rühren des Inhalts desselben erstreckt, und eine Speichereinrichtung (94) zum Speichern von Steuerinstruktionen gemäß den Rezepten, welche Vorrichtung dadurch gekennzeichnet ist, daß

die Abgabeeinrichtung (12) im wesentlichen direkt oberhalb des Kochgeschirrs (10) angeordnet und eine gemeinsame Abgabeeinrichtung ist, die dazu ausgebildet und angeordnet ist, sowohl die festen als auch die flüssigen Ingredienzen bereitzuhalten und abzugeben,

die Röhreinrichtung (13) im wesentlichen direkt oberhalb des Kochgeschirrs (10) angeordnet ist und daß ein Verschlusselement (79) für das selektive Schließen und Öffnen des Kochgeschirrs vorgesehen ist ; die Steuereinrichtung auch mit der Röhreinrichtung (13) in Verbindung steht, um das Rühren des genannten Inhalts nach einem Rühr-Zeitplan zu steuern, der von dem betreffenden Rezept vorgegeben ist, und mit dem Verschlusselement (79) in Verbindung steht, um das Kochgeschirr (10) gemäß diesem Rezept automatisch zu schließen und zu öffnen.

2. Vorrichtung nach Anspruch 1, worin ein Deckel (69) vorgesehen ist, der das Kochgeschirr (10) bedeckt, welcher Deckel mit einer Deckelöffnung (78) ausgebildet ist, durch die Ingredienzen in das genannte Kochgeschirr abgegeben werden ; und das Verschlusselement für die drehbar montiert ist und auf die Steuereinrichtung (91) anspricht, so daß es auf Befehl in Stellungen zum Öffnen und Schließen der Deckelöffnung (78) gedreht werden kann.

3. Vorrichtung zum automatischen Kochen einer Vielfalt von kulinarischen Zubereitungen aus vorgeschriebenen Ingredienzen nach vorgegebenen Rezepten, umfassend ein Kochgeschirr (10), eine Heizeinrichtung (11) zum Erwärmen des Kochgeschirrs, eine Abgabeeinrichtung (12) zum Bereithalten und Abgeben von festen und flüssigen Ingredienzen in das Kochgeschirr und eine Mikroprozessorsteuereinrichtung (91), die mit der Abgabeeinrichtung (12) und mit der Heizeinrichtung (11) für die Steuerung der Abgabe der Ingredienzen und der Erwärmung des genannten Kochgeschirrs gemäß von einem der Rezepte vorgegebenen Abgabe- und Heiz-Zeitplänen verbunden ist, welche Vorrichtung dadurch gekennzeichnet ist, daß eine gemeinsame Abgabeeinrichtung (12) ausgebildet und angeordnet ist, um sowohl die flüssigen als auch die festen Ingredienzen bereitzuhalten und abzugeben und drehbar direkt oberhalb des Kochgeschirrs (10) montiert ist und mit einer Vielzahl von Kammern erster und zweiter Art ausgebildet ist, wobei die genannte erste Art (22, 26) dazu ausgebildet ist, feste Ingredienzen bereitzuhalten und abzugeben und die genannte zweite Art (27) dazu ausgebildet ist, flüssige Ingredienzen bereitzuhalten und abzugeben ; und

die Drehung der Abgabeeinrichtung vorgegebene der Kammern aufeinanderfolgend in eine Abgabeposition überführt, in der ihre Inhalte jeweils in das Kochgeschirr abgegeben werden, wobei die Drehung als Reaktion auf die Steuereinrichtung (91) erfolgt.

4. Vorrichtung nach Anspruch 3, worin

das Kochgeschirr (10) in feststehendem Verhältnis zur genannten Heizeinrichtung ist ; und ein Röhrelement (66) sich in das genannte Kochgeschirr hinein erstreckt und für die Drehung um eine vertikale Achse (62) zum Rühren des Inhalts des genannten Kochgeschirrs in einem im allgemeinen kreisförmigen



migen Muster montiert ist ; und

Einrichtungen (73, 74, 75) zum Drehen des Röhrelementes auf Befehl von der genannten Steuereinrichtung (91) vorgesehen sind.

5 5. Vorrichtung nach Anspruch 4, worin die Einrichtung zum Drehen des Röhrelementes (66) zur Drehung des Röhrelementes in beiden Richtungen betätigbar ist.

6. Vorrichtung nach Anspruch 3, 4 oder 5, worin ein Deckel (69) das Kochgeschirr (10) bedeckt und mit einer Deckelöffnung (78) ausgebildet ist, durch die Ingredienzien in das genannte Kochgeschirr abgegeben werden ; und

10 ein Verschlusselement (79) zum Schließen der genannten Deckelöffnung vorgesehen ist, welches Verschlusselement (79) drehbar montiert ist und auf die Steuereinrichtung (91) anspricht, um auf Befehl in Stellungen zum Öffnen und Schließen der Deckelöffnung (78) gedreht zu werden.

7. Vorrichtung nach einem der vorhergehenden Ansprüche, worin die Abgabeeinrichtung (12) eine kammerbegrenzende Anordnung (21, 22, 23) umfaßt, die erste (26) und zweite (27) demontierbare Einrichtungen zur Begrenzung einer wählbaren Anzahl von Kammern der jeweils ersten bzw. zweiten Art zu umfaßt.

15 8. Vorrichtung nach einem der vorhergehenden Ansprüche, worin die Abgabeeinrichtung (12) eine Abgabeöffnung (16, 33) oberhalb des genannten Kochgeschirrs begrenzt und jede Kammer eine Öffnung im Boden derselben aufweist ; und die Drehung der Abgabeeinrichtung (12) auf Befehl von der Steuereinrichtung (21) die Öffnungen der genannten Kammern aufeinanderfolgend in Ausrichtung mit der genannten Öffnung zu Zeitpunkten bringt, die durch den gewählten Zeitplan vorgegeben sind.

20 9. Vorrichtung nach einem der vorhergehenden Ansprüche, worin eine zweite Art (27) von Kammer, zum Bereithalten von flüssigen Ingredienzien, einen Stöpsel (43) und Einrichtungen (44, 46) zum Vorspannen des genannten Stöpsels in eine Stellung zum Schließen der Öffnung (42) am Boden der genannten Kammer aufweist ; und die genannte Abgabeeinrichtung weiters Nockeneinrichtungen (50) umfaßt, die auf die Drehbewegung der Abgabeeinrichtung (12) ansprechen, um den Stöpsel (43) aus der genannten Öffnung zu drücken, wenn die betreffende Kammeröffnung in ihrer Abgabeposition ist.

25 10. Vorrichtung nach einem der vorhergehenden Ansprüche, weiters umfassend manuelle Tasteneingabeeinrichtungen (18), die mit der Mikroprozessorsteuereinrichtung (91) in Verbindung stehen und dazu ausgebildet sind, manuell die Abgabe-, Heiz- und Röhreinrichtung in und außer Betrieb zu setzen und manuell einen Heizwert und eine Heizzeit für die Heizeinrichtung einzustellen.

30 11. Vorrichtung nach Anspruch 10, worin die Speichereinrichtung einen entfernbaren Speichereinsatz umfaßt.

35 Revendications

1. Ustensile pour la cuisson automatique d'une grande variété de préparations culinaires d'ingrédients prescrits selon des recettes prédéterminées, comprenant un récipient de cuisson (10), un moyen chauffant (11) pour chauffer le récipient, un moyen distributeur (12) généralement au-dessus du récipient pour contenir et disperser des ingrédients solides et liquides dans ledit récipient, un moyen de commande à microprocesseur (91) communiquant avec ledit moyen de distribution (12) et avec ledit moyen chauffant (11) pour contrôler la distribution des ingrédients et le chauffage du récipient selon des barèmes de distribution et de chauffage qui sont prédéterminés par l'une des recettes, un moyen d'agitation (13) monté généralement au-dessus du récipient et s'étendant dans le récipient pour agiter son contenu et un moyen à mémoire (94) pour stocker des instructions de contrôle selon les recettes, l'ustensile étant caractérisé en ce que :

45 le moyen de distribution (12) est disposé sensiblement directement au-dessus du récipient (10) et est un moyen courant de distribution structuré et agencé pour contenir et distribuer à la fois les ingrédients solides et liquides ;

50 le moyen d'agitation (13) est monté sensiblement directement au-dessus du récipient (10) ; et il y a un organe de fermeture (79) pour fermer et ouvrir sélectivement le récipient de cuisson ;

le moyen de commande communique également avec le moyen d'agitation (13) pour contrôler l'agitation dudit contenu selon un barème d'agitation prédéterminé dans la recette, et avec l'organe de fermeture (79) pour ouvrir et fermer automatiquement le récipient de cuisson (10) selon cette recette.

55 2. Ustensile selon la revendication 1, où il y a un couvercle (69) couvrant le récipient de cuisson (10), le couvercle présentant une ouverture (78) à travers laquelle les ingrédients sont distribués dans le récipient ; et l'organe de fermeture est monté pour une rotation et répond au moyen de commande (91) pour pouvoir tourner, sur un ordre, en des positions ouvrant et fermant l'ouverture (78) du couvercle.

3. Ustensile pour la cuisson automatique d'une grande variété de préparations culinaires d'ingrédients



prescrits selon des recettes prédéterminées, comprenant un récipient de cuisson (10), un moyen chauffant (11) pour chauffer le récipient, un moyen de distribution (12) pour contenir et distribuer des ingrédients solides et liquides dans le récipient, un moyen de commande par microprocesseur (91) communiquant avec le moyen de distribution (12) et avec le moyen chauffant (11) pour contrôler la distribution des ingrédients et le chauffage dudit récipient selon des barèmes de distribution et de chauffage prédéterminés par l'une des recettes, l'ustensile étant caractérisé en ce qu'un moyen courant de distribution (12) est structuré et agencé pour contenir et distribuer à la fois les ingrédients liquides et solides et est monté pour une rotation pour être disposé directement au-dessus du récipient (10), présentant un certain nombre de chambres de premier et second types, ledit premier type (22, 26) étant adapté à contenir et à distribuer des ingrédients solides et ledit second type (27) étant adapté à contenir et à distribuer des ingrédients liquides ; et

la rotation dudit moyen de distribution portant des chambres prédéterminées séquentiellement à une position d'évacuation à laquelle leurs contenus sont respectivement distribués dans le récipient, la rotation étant en réponse au moyen de commande (91).

4. Ustensile selon la revendication 3, où :

le récipient de cuisson (10) est en relation fixe par rapport aux moyens chauffants ; et un organe d'agitation (66) s'étend dans ledit récipient et est monté pour une rotation autour d'un axe vertical (62) pour agiter le contenu dudit récipient en un schéma généralement circulaire ; et des moyens (73, 74, 75) sont prévus pour faire tourner l'organe d'agitation sur un ordre dudit moyen de commande (91).

5. Ustensile selon la revendication 4, où le moyen pour faire tourner l'organe d'agitation (66) peut être actionné pour provoquer une rotation bidirectionnelle de l'organe d'agitation.

6. Ustensile selon la revendication 3, la revendication 4 ou la revendication 5, où il y a un couvercle (69) couvrant le récipient de cuisson (10), le couvercle présentant une ouverture (78) à travers laquelle les ingrédients sont distribués dans ledit récipient ; et

un organe de fermeture (79) pour fermer ladite ouverture de couvercle, l'organe de fermeture (79) étant monté pour une rotation et répondant au moyen de commande (91) afin de pouvoir tourner, sur un ordre, en des positions d'ouverture et de fermeture de l'ouverture (78) du couvercle.

7. Ustensile selon l'une quelconque des revendications précédentes où le moyen de distribution (12) comprend un assemblage (21, 22, 23) définissant une chambre comportant des premier (26) et second (27) moyens démontables pour définir un nombre sélectionnable de premier et second types de chambres, respectivement.

8. Ustensile selon l'une quelconque des revendications précédentes, où :

la moyen de distribution (12) définit une ouverture de distribution (16, 33) au-dessus dudit récipient et chaque chambre a une ouverture en son fond ; et

la rotation du moyen de distribution (12), sur un ordre du moyen de commande (91), porte les ouvertures desdites chambres séquentiellement en correspondance avec ladite ouverture en des temps spécifiés par le barème choisi.

9. Ustensile selon l'une quelconque des revendications précédentes, où :

un second type (27) de chambre, pour contenir des ingrédients liquides, comprend un bouchon (43) et un moyen (44, 46) pour solliciter ledit bouchon en une position fermant l'ouverture (42) au fond de ladite chambre ; et

ledit moyen de distribution comprend de plus un moyen formant came (50) répondant au mouvement de rotation du moyen de distribution (12) pour solliciter le bouchon (43) hors de ladite ouverture lorsque l'ouverture respective de la chambre est à sa position d'évacuation.

10. Ustensile selon l'une quelconque des revendications précédentes qui comprend de plus un moyen d'entrée manuel à touches (18) communiquant avec le moyen de commande par microprocesseur (91) permettant d'activer et de désactiver à la main les moyens de distribution, chauffage et d'agitation et d'établir à la main un niveau de chauffage et un temps de chauffage du moyen de chauffage.

11. Ustensile selon la revendication 10, où le moyen formant mémoire comprend une cartouche amovible de mémoire.

