

METHOD FOR COOKING FOOD IN AN OVEN

PRIORITY CLAIM

The present application claims priority under 35 U.S.C. § 119(e)(1) to non-provisional application number 13/367,164 filed on February 6, 2012, the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates to ovens in general, and in particular to a method for cooking food in an oven.

2. Description of Related Art

Conventional ovens generally use a temperature feedback mechanism to maintain oven temperature relatively constant at a set temperature. The temperature feedback mechanism turns on the heating source when the oven temperature is less than the set temperature, and turns off the heating source when the oven temperature is greater than the set temperature. Basically, the only information that matters is the oven temperature, and the only action taken based on the oven temperature information is to turn the heating source on or off in order to maintain the oven temperature as close to the set temperature as possible.

Once the oven temperature of an oven has reached a steady state (*i.e.*, the set temperature), a user can at any time put a food item into the oven. The amount of time the food item should be in the oven may be determined by the internal temperature at

1 which the food item has reached. Once the food item has reached a predetermined internal
2 temperature, the food item is considered to be "done." In other words, for conventional
3 ovens, once the oven has achieved the set temperature, the only other variable is time. A
4 food item is considered to be done when it has been placed in the oven operating at the
5 proper set temperature for the desired amount of time.

6
7 Rapid-cook ovens operate almost entirely based on time. Once a rapid-cook
8 oven has reached its set temperature, for example, if a user pushes a button on a user
9 interface that says "pepperoni pizza," a set of previously entered cooking instructions that
10 correspond to that selected food item are executed. Those cooking instructions may
11 include: cook food item with a microwave on 50% power and a blower on 100% power
12 for 1.5 minutes, and then continue to cook food item with the microwave on 100% power
13 and the blower on 80% power for another 3 minutes. At the end of the 4.5 minute period,
14 the cooking of the food item is deemed to have been completed because the allotted
15 cooking time at the desired temperature and cook profile conditions have been met.

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17 The present invention provides an improved method for cooking food items
18 in an oven.

SUMMARY OF THE INVENTION

In accordance with a preferred embodiment of the present invention, a history of instant oven temperatures is initially obtained during a cook of a first food item. A salient representation of the oven temperature history is stored in a non-volatile memory. The salient representation includes multiple average oven temperatures, each selected to represent a summary of the instant oven temperatures at various specific time periods throughout the cook of the first food item. During a cook of a second food item that is substantially similar to the first cook item, a set of instant oven temperatures is obtained at the same various specific time periods during the cooking of the first cook item, and the current cook settings are dynamically adjusted during the cook of the second food item based on the results of a comparison between the obtained instant oven temperatures and the stored average oven temperatures in order to duplicate the result of the cook of the first item.

All features and advantages of the present invention will become apparent in the following detailed written description.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention itself, as well as a preferred mode of use, further objects, and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a front view of an oven in which a preferred embodiment of the present invention can be incorporated;

Figure 2 is a flowchart of a method for developing a cook setting for a food item during a cook_setting_development mode of the oven from Figure 1, in accordance with a preferred embodiment of the present invention; and

Figure 3 is a flowchart of a method for cooking a food item using a cook setting during a cook_with_setting mode of the oven from Figure 1, in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings and in particular to Figure 1, there is depicted a front view of an oven in which a preferred embodiment of the present invention may be incorporated. As shown, an oven **10** is defined by a housing **11** having a cavity **12**. Oven **10** includes a heating and airflow system (not shown) to supply heat to cavity **12** for heating up any food items that have been placed inside cavity **12**.

Oven **10** also includes a user interface panel **15**. User interface panel **15** is preferably implemented with touchscreens but they can also be implemented with keypads and liquid crystal displays. A user can enter commands, such as cooking temperature within cavity **12**, cooking time, blower speed, microwave, steam amount, etc., via user interface panel **15** to effectuate cooking controls on any food items placed within cavity **12**. In addition, oven **10** includes various electronic devices (not shown), such as a controller, volatile memories, and non-volatile memories, for providing various functions related to oven operations.

In accordance with a preferred embodiment of the present invention, an oven operates under at least two different modes, namely, `cook_setting_development` mode and `cook_with_setting` mode. During the `cook_setting_development` mode, various cook settings for different food items can be developed and stored in a non-volatile memory within the oven. During the `cook_with_setting` mode, a specific cook setting corresponding to a food item to be cooked is recalled from the non-volatile memory, and the food item is cooked in the oven with the specific cook setting.

I. `Cook_setting_development` mode

When a cook is performed on a first food item during the `cook_setting_development` mode, instant oven temperatures are measured throughout the cook cycle of the first food item, and all the measured instant oven temperatures are stored in a memory

array within a volatile memory of the oven, as shown in block **21** of Figure **2**. Preferably, each entry of the array contains the instant oven temperature at each one second of the cook cycle. The array is to be viewed to have ten equal-sized sections. So, for a four-minute cook cycle, the array will contain $4 \times 60 = 240$ instant oven temperature data points, and each of the ten sections contains $240/10 = 24$ instant oven temperature data points. As another example, if the cook cycle is six minutes, then the array will contain $6 \times 60 = 360$ instant oven temperature data points, and each of the ten sections contains $360/10 = 36$ instant temperature data points.

After the cook cycle has been completed, the array should be populated with instant oven temperatures accordingly, and the number of temperature data points depends on the length of time of the cook cycle. At this point, if the temperature data points within the array are not saved by a user, such as a chef, the temperature data points within the array will eventually be discarded or overwritten by new temperature data points during a subsequent cook, as depicted in block **22** of Figure **2**.

However, if the chef is completely satisfied with the quality of the cooked first food item and considers the first food item is perfectly cooked, the chef can press a button on a user interface, such as user interface panel **15** from Figure **1**, to cause the average temperature of each of the ten sections within the array to be calculated, and to cause the ten average temperatures to be stored in the non-volatile memory along with the cook setting that was previously used to achieve the perfectly cooked food under a cook setting name such as Cook_setting X, as shown in block **23** of Figure **2**.

II. Cook_with_setting mode

When cooking a second food item, which is substantially similar to the first cook item, under the cook_with_setting mode, cook setting Cook_setting X is initially recalled from the non-volatile memory within the oven. During the cook cycle of the second food item, the instant oven temperatures are measured during the cook cycle, as

1 shown in block 31 of Figure 3. An average value of the measured instant oven
2 temperatures is obtained at or near the end of each tenth segment of the cook cycle, as
3 depicted in block 32 of Figure 3. The average oven temperature value obtained at the end
4 of each tenth segment of the cook cycle is compared to the stored average temperature
5 value associated with Cook_setting X for the same time segment of the cook cycle, as
6 shown in block 33 of Figure 3.

7
8 If the average oven temperature value of the "current" cook for the second
9 food item is different from the stored average temperature value, then the time duration of
10 that tenth segment of the cook cycle is extended or reduced by a *correction factor* of the
11 time duration of that tenth segment of the cook cycle, as depicted in block 34 of Figure 3.
12 In essence, when cooking the second food item, the cook setting of the oven is dynamically
13 adjusted according to the comparison of the average oven temperature values to the stored
14 average values associated with Cook_setting X at the same time segments during the cook
15 of the first food item.

16
17 For example, suppose the total cook time for the second food item, which
18 is similar to the first food item, is five minutes (*i.e.*, 300 seconds). If the stored average
19 temperature value for the first tenth segment of the five-minute cook cycle (*i.e.*, 30
20 seconds) is 450 degrees, and the measured average temperature value for the first tenth
21 segment of the current cook (*i.e.*, 30 seconds) is 441 degrees, that means there is a $450 -$
22 $441 = 9$ degrees (or $9/450 \times 100\% = 2\%$) difference between the stored and measured
23 average temperature values. Based on that, the first tenth segment of the current cook can
24 be extended by using a correction factor. When a correction factor of 2 is employed, then
25 the first tenth segment of the current cook is extended by twice that amount, *i.e.*, $2 \times 2\%$
26 $\times 30 \text{ seconds} = 1.2 \text{ seconds}$. Thus, if the measured average temperature value in each of
27 the ten segments of the current cook is 9 degrees (or 2%) lower than its stored average
28 temperature value counterpart, then the total cook time for the second food item will be
29 extended by $10 \times 1.2 \text{ seconds} = 12 \text{ seconds}$.

1 Although a correction factor of 2 is used in the above-mentioned example,
2 it is understood by those skilled in the art that the correction factor can be any numerical
3 value. In addition, while the difference between the measured and stored average
4 temperature values in each of the ten segments of the current cook is shown to be the same
5 (*i.e.*, 9 degrees lower) in the above-mentioned example, it is understood by those skilled
6 in the art that the average temperature difference may vary from one segment to another,
7 and from one cook cycle to another.

8
9 It is also understood by those skilled in the art that the difference between
10 the measured and stored average temperature value can be a positive number, a negative
11 number or zero. A positive number will result in a reduction of the corresponding tenth
12 segment of the current cook cycle. A negative number will result in an extension of the
13 corresponding tenth segment of the current cook cycle. A zero means nothing needs to be
14 changed to the corresponding tenth segment of the current cook cycle. A total cook cycle
15 can have any of the positive, negative and zero average temperature differences. Thus, an
16 entire current cook cycle for the second food item may have, for example, 3 time
17 extensions (to increase the corresponding tenth segments of the current cook cycle by a
18 total of 10 seconds) and 2 time reductions (to reduce the corresponding tenth segments of
19 the current cook cycle by a total of 8 seconds) for a net change in the total cook time of
20 an additional 2 seconds.

21
22 As has been described, the present invention provides an improved method
23 of cooking in an oven. While all conventional ovens capture an instant oven temperature
24 and use it in the temperature feedback loop, then discard it immediately thereafter, the
25 method of the present invention captures a history of instant oven temperatures for a
26 "perfect" cook, and compares each subsequent cook to that perfect cook as the cook is
27 unfolding and makes a series of small adjustments to the cook cycle based on those
28 differences so that the conditions that resulted in the "perfect" cook can be duplicated as
29 closely as possible.

1 Those skilled in the art will appreciate that the mechanisms of the present
2 invention are capable of being distributed as a program product in a variety of recordable
3 type media such as compact discs and digital video discs.

4
5 While the invention has been particularly shown and described with reference
6 to a preferred embodiment, it will be understood by those skilled in the art that various
7 changes in form and detail may be made therein without departing from the spirit and scope
8 of the invention.

CLAIMS

What is claimed is:

1. A method of cooking items in an oven, said method comprising:

obtaining a history of instant oven temperatures during a cook of a first food item;

storing a salient representation of said oven temperature history in a non-volatile memory, wherein said salient representation includes a plurality of average oven temperatures, each selected to represent a summary of instant oven temperatures at various specific time periods throughout said cook; and

during a cook of a second food item that is substantially similar to said first cook item, obtaining instant oven temperature values at said various specific time periods, and dynamically adjusting current cook settings during said second cook of said second food item based on the results of a comparison between said obtained instant oven temperature values and said stored average oven temperature values in order to duplicate the result of said cook of said first item.

2. The oven of Claim 1, wherein said storing further includes storing said plurality of average oven temperatures in a non-volatile memory.
3. The oven of Claim 2, wherein said storing further includes storing said plurality of average oven temperatures along with a cook setting that was used to cook said first food item.
4. The oven of Claim 3, wherein said storing further includes storing said plurality of average oven temperatures along with a cook setting that was used to cook said first food item under a cook setting name.

5. A computer-readable medium having a computer program product for cooking items in an oven, said computer readable medium comprising:

program code for obtaining a history of instant oven temperatures during a cook of a first food item;

program code for storing a salient representation of said oven temperature history in a non-volatile memory, wherein said salient representation includes a plurality of average oven temperatures, each selected to represent a summary of instant oven temperatures at various specific time periods throughout said cook; and

program code for, during a cook of a second food item that is substantially similar to said first cook item, obtaining instant oven temperature values at said various specific time periods, and dynamically adjusting current cook settings during said second cook of said second food item based on the results of a comparison between said obtained instant oven temperature values and said stored average oven temperature values in order to duplicate the result of said cook of said first item.

6. The computer-readable medium of Claim 5, wherein said program code for storing further includes program code for storing said plurality of average oven temperatures in a non-volatile memory.

7. The computer-readable medium of Claim 6, wherein said program code for storing further includes program code for storing said plurality of average oven temperatures along with a cook setting that was used to cook said first food item.

8. The computer-readable medium of Claim 7, wherein said program code for storing further includes program code for storing said plurality of average oven temperatures along with a cook setting that was used to cook said first food item under a cook setting name.