

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 May 2012 (18.05.2012)

PCT

(10) International Publication Number
WO 2012/063135 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/IB2011/003225

(22) International Filing Date:
14 November 2011 (14.11.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10 2010 051 073.4
12 November 2010 (12.11.2010) DE

(71) Applicant (for all designated States except US): **CON-
VOTHERM ELEKTROGERÄTE GMBH** [—/DE];
Talstrasse 35, 82436 Eglfing (DE).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **RIEFENSTEIN,
Lutz** [DE/DE]; Parchetwiesen 18, 82362 Weilheim i. OB
(DE).

(74) Agent: **KOCH, Carsten**; Liermann-Castell, Guten-
bergstrasse 12, 52349 Düren (DE).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,
KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD,
ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU,
RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ,
TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD,
RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ,
DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT,
LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS,
SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

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



WO 2012/063135 A2

(54) Title: A COOKING DEVICE, AND A PROCEDURE FOR COOKING FOOD

(57) Abstract: In the field of commercial cooking devices such as especially combi-streamers of baking ovens, it is known in the state of art to identify the food to be cooked by RFID tags or by bar codes. The present invention proposes for a commercial cooking device to be equipped with a digital optical food identification means which takes a picture of the food itself.

A Cooking Device, and a Procedure For Cooking Food

[01] The invention is related to a cooking device, and to a procedure for cooking food.

[02] This patent application describes improvements to a commercial cooking device, especially to a combi-steamer or a baking oven, and to the procedure of cooking food with
5 a cooking device of this kind.

[03] In the state of art, it is well known to cook food with commercial devices, especially with a combi-steamer or with a baking oven.

[04] EP 1 193 584 A1 discloses a microwave cooking device with an RFID sensor. The RFID sensor automatically identifies the food to be cooked via an RFID tag which is at-
10 tached to the packaging. The cooking process can then run automatically.

[05] WO 00/49838 A1 discloses a cooking device with a scanner. The scanner identifies a code or a symbol on the food packaging, whereupon an integrated microprocessor ac-
cesses cooking recipe data from a database.

[06] US 6,774,345 B1 shows a cooking device with a bar code reader which is located at
15 a front side of the cooking device. The bar code reader identifies the food by reading a bar code from the packaging of the food. After that, the cooking device permits or denies the cooking of the food.

[07] US 2007/0007279 also reads the bar code from a packaging of the food to be coo-
ked. The cooking device can be connected to an ID infrastructure in order to download
20 further data for the food or for the cooking recipe.

[08] DE 10 2005 040 206 A1 discloses a cooking device system and a procedure for cooking food, wherein an identifier for the food is provided. The identifier can have the form of a bar code reader or of an RFID sensor. Data for the food or for the cooking recipe can be accessed over the internet or from a local database.

[09] US 2002/0026325 A1 also discloses the controlling of a cooking procedure with data from a local network and from the internet. RFID tags are used for identifying the food.

[10] DE 10 2008 031 378 A1 discloses a cooking device with a recognition system for the food via RFID tags, and with an automatic recognition of the tray rail in which the food to be cooked has been inserted.

[11] It is an object of the present invention to provide a commercial cooking device with high simplicity of using.

[12] According to a first aspect of the invention, this goal is reached by a cooking device for commercial use, especially a combi-steamer or a baking oven or a microwave oven, with a digital optical identification means for food to be cooked within the cooking device.

[13] In this context, a “combi-steamer” means a commercial kitchen appliance for cooking with hot air, steam or superheated steam. In general, a combi-steamer comprises at least a cooking chamber, a door closing the cooking chamber, a means for steam generating, a fan, a heating element for heating the cooking chamber, and an electronic control with a user interface.

[14] A “digital optical identification means” is a technical means that includes optics on one hand, and that includes electronic evaluation of the optics on the other hand so that the identification data can be further processed.

[15] The invention is meant to have identifications means “for the food to be cooked”. In other words, the optical identification is managed by the outer appearance of the food itself. Any state of art in which optical recognition means are provided, but no identifying of the food itself by its outer appearance (in which for example a picture of a symbol plate or of a bar code etc. is captured) is not meant to be within the scope of this wording.

[16] Although an optical recognition and identification procedure for the food itself may of course also produce wrong data sometimes, it is possible to reduce the error sources. For example, it will not be a source of error anymore that the personnel can place a wrong tag

onto the food to be cooked. Rather, the proposed cooking device uses first hand information on the type of food, the amount of food, the state of the food etc.

[17] It is proposed that the optical identification means, comprises a picture taking means, for capturing a picture of the food, especially an electronic image sensor, such as a
5 CCD sensor or a CMOS sensor. A "picture" in the context of this application may be a single picture, or a video film.

[18] The optical identification means may comprise a controller having access to picture data captures of the food.

[19] This means that a controller is provided as part of the optical identification means.
10 The controller has access to the picture data, i.e. to digital data which itself embodies the picture of the food or which is calculated from the picture taken of the food.

[20] If a digital picture taking means is provided, the picture data will be in digital format from the beginning. This is the easiest way for the data to be further processed. The picture data can be stored in a data storage, or can be accessed directly by the controller.

15 [21] Also, it is possible to convert the data of the picture taken of the food as the first step. For example, colours can be calculated into shades of grey.

[22] The controller is programmed to make use of the picture data.

[23] In addition to have an access to picture data, the controller may have access to a physical feature data base, so that the controller can compare a picture data to
20 physical features of several food types, the physical features data being stored in the physical feature data base.

[24] In a constellation like this, the controller has two data sources: One source is concerned with the actual picture taken of the food. The other source is concerned with data of typical pictures, or with formerly taken pictures of several different food types, amounts
25 etc.

[25] By having access to two different data sets, the controller can compare the different data sets to one another. As a consequence, the controller can make a deduction whether the food of which a picture has just been taken corresponds to certain sets of data in the physical feature data base.

5 [26] The comparison may be based on picture data directly.

[27] As an alternative or as an additional way, the comparison can be based on features deducted from the pictures. This can e.g. be done by finding certain characteristic contours, colours, contour curvatures, sizes, proportions, numbers of food pieces, colours contrasts, temperature grades etc.

10 [28] For a physical feature identification of food by comparing to significant data, it is proposed for the physical feature data base to comprise data or data storage volume for at least one of the following features of the food: form, colour, size, number, amount of curvature of the outline, surface area, centre of area, structure, kind of packaging, geometry of a food cooking carrier, material, colour, and structure of a food cooking carrier, and surface
15 pattern of the food, etc.

[29] It shall be underlined that although the optical recognition and identification of the food is primarily based on the outer appearance of the food itself, secondary criteria may also be used. For example, a good secondary criterion may be the food carrier. Food having the same shape may be better identified e.g. by the question whether it is placed on a grill-
20 ing grid, a tray, or e.g. in a bowl.

[30] The controller is preferably programmed to calculate a matching probability rank, for a number of data sets in the physical feature data base. It will seldom be the case that picture data taken from food to be inserted will be absolutely identical to the data formerly determined as stored in the physical feature data base. Thus, it will be necessary to actively
25 make a decision for one of the products represented in the physical feature data base.

[31] A good way of finding the decision will be to base it on the highest probability. Therefore, the controller might go through a number of data sets, a few or all, and to calcu-

late a matching probability for every one of them. After that, you calculate one decisive number for every one of the data sets, e.g. by adding the matching probabilities of all single features.

[32] The controller may decide for the most probably matched data set.

5 [33] As an alternative, the controller may give to the user the most probably matched data sets for choosing manually.

[34] The controller is preferably programmed to have a learning ability for identifying food.

10 [35] Especially, the controller can be programmed to perform a learning function, with a user interface being able to initiate a learning function. In the learning function a picture is taken, stored as a known product entity with a name, and a cooking recipe is logically allocated to a known product entity.

[36] Preferably, a series of pictures is taken, so that the food identification means has more data to compare to the data coming from a picture taking means.

15 [37] In a preferred embodiment, during the learning function a video film is taken in order to generate a data basis for an arbitrarily high number of pictures or views of the food product.

[38] In a working example, a learning function can be as follows:

20 [39] A user approaches a cooking device with a food product that is not yet known to the product feature data base. The optical identification means of the cooking device is activated and takes a picture of the food. The controller accesses the picture data taken of the food, compares the data to the physical feature data base, and issues a confirmation that the food is not yet known to the data base. Upon this, the cooking device emits a signal to the user indicating that an automatic cooking of this food is not possible.

25 [40] The user activates a button at the cooking device in order to ask the cooking device to create a new data set for this food product.

[41] Upon request by the cooking device, the user holds the food into a picture capture area of an optics. A picture taking means take a picture of the food, and the controller deducts certain features from the picture to store them for a later recognition of the same kind of food.

5 [42] After that, a dialogue is started with the user, and the user enters a name for the food.

[43] If possible already at that moment, otherwise later, the user adds a cooking recipe for this kind of food. The cooking recipe – as well as typical physical features – can also be downloaded or realtime-accessed at an external data base, especially located in a network
10 or accessed over the internet.

[44] The controller may be programmed to request a user to insert the food in different tray levels, and in different orientations. In all variants, the food will look different from the picture taking means's position. The controller may be programmed to take pictures of several or of all different looks in order to again gain more comparison data.

15 [45] In a preferred embodiment of the cooking device, the user can enter certain physical characteristics, such as temperature or e.g. weight into the data base. This way, the controller will have it easier to identify food which is of the same type, but which is for example of different temperature, piece number or size.

[46] Once the picture, picture features, the name, and a corresponding cooking recipe for
20 a certain food type, are stored in the data base, the cooking device can always identify this food type, and can start the cooking recipe or amend an already running cooking recipe directly after loading. An amendment can especially be made in respect of the cooking time if an already running cooking recipe for another food has a slightly higher or lower cooking temperature than would normally ideal for the newly inserted product.

25 [47] The data gained in the learning mode can be electronically pushed to other cooking devices that are in the same cooking device data group, e.g. neighbored appliances in the same kitchen, or even to remotely located appliances of the same company.

[48] An alternative way for gaining new data is to load new data sets, preferably from the manufacturer of the cooking device. The manufacturer can create new data sets by testing publically available food, or even be testing special food. For example, a fastfood chain company will have a certain product, either already on offer or to be newly introduced to the market. The fastfood chain company can deliver food samples to the cooking device manufacturer, and the manufacturer will have a laboratory in which data sets can be created in the most accurate way possible.

[49] The controller is preferably programmed to signal, upon identification of food, to a user the food name of the food that was identified. This is an easy way for the user to doublecheck whether the food identification means, and therefore the cooking device, made a correct identification.

[50] The name can be shown in text on a display, or it can be pronounced by the controller and a loudspeaker, or a picture of the food can be shown, or several characteristic features can be listed on a screen. Most preferably, more than one way of signalling is used.

[51] Upon a failed identification exempt, the controller may be programmed to show a warning signal to the user. Independently, the controller may be programmed to check upon identification of a food whether the current cooking chamber conditions are suitable for cooking that food, and to otherwise show a warning, especially if the current cooking chamber conditions are outside of a certain range of conditions suitable for cooking that food. The range suitable for cooking that food can be stored in the physical feature database, or together with the cooking recipe.

[52] At the cooking device, a temperature sensor may be provided, preferably based on an infrared light measuring principle. Then, the cooking device can easily amend and adapt a stored cooking recipe for an estimated cooking time for the food starting in this condition.

[53] It is proposed that a motion detector is provided, with a means to activate picture taking means, and to make a controller take access to picture data captured of the food by the picture taking means.

[54] Saving energy is always an important aspect for devices of all kinds, especially for cooking devices. This aspect is not only true for the heating parts of the cooking device but also for the electronics. By providing a motion detector, the electronics for taking pictures or a film in the field of vision, and the electronics to evaluate the optical data can be initiated only after a motion detector signals that something is moving within the field of vision.

[55] The motion sensor can especially be a sensor for detecting a non-closed position of an appliance door leading to the cooking chamber.

[56] Alternatively or additionally, the motion sensor can be provided electronically, by monitoring the incoming data from the picture taking means. E.g., a change of the pixels received by a digital camera can be recognized, and interpreted as a motion.

[57] Independently, a motion detector may be provided, with a means to activate a light source lighting a field of vision of a picture taking means. By activating a light source lighting the field of vision, well repeatable results can be taken by the picture taking means.

[58] It is therefore proposed that a controller and a picture taking means are provided, the controller comprising a means to activate a light source lighting a field of vision of the picture taking means.

[59] The light source can comprise an infrared light source, or can entirely consist of infrared light sources. This avoids possible irritations for the personnel by visible light. If, for example, the picture taking means comprises an optics with a prime lens, the prime lens will preferably have a small aperture so as to enable a high depth of focus. Having a small aperture makes it recommendable to leave a longer exposure time, i.e. a low shutter speed. This results in a longer time span in which the lighting should be activated. Using visible light would therefore possibly irritate the user. By using infrared light which is invisible to the user, much light can be emitted to the food without irritating the personnel.

[60] A recipe data base may be provided, arranged for being accessed by a controller after identification of the food, so that the controller can load information on cooking recipes for the identified food. This aspect was already explained above.

[61] If a high grade of automasation is desired, an automatic start function for a cooking recipe may be provided upon closing of an appliance door. In that case, a sensor is needed for detecting when the door is closed. Upon closing the door, the recipe data base can be accessed, and the cooking process be run according to the cooking recipe.

[62] If it is desired to have a semi-automatic start function, a start function for a cooking recipe may be provided upon actuating a cooking start command element, such as a three-dimensional button or a displayed command on a touch screen.

[63] As far as the picture taking means is concerned, it is proposed that same comprises a photo optics member.

[64] Photo optics are easy and cheap to provide, and they make for a reliable quality in taking picture of the food.

[65] The picture taking means may be located outside of a cooking chamber, preferably directly above or laterally above an opening towards the cooking chamber. From there, a picture taking means has a reliable view onto any food that is moved into the cooking chamber and out of the cooking chamber. Also, chances are high that any food placed on a tray will normally be oriented horizontal directly in front of the tray rack. Therefore, this position seems to be ideal for reliably gaining a best photographic angle towards the food.

[66] If the picture taking means is located at an appliance door, it will also have a good view towards the housing of the cooking device itself, gaining some distance to the housing when the door is opened.

[67] The picture taking means can also be mounted on an extendable and retractable holder, which extends when an appliance door is opened and which retracts when the appliance door is closed. It will be obvious that this is another way to gain a good angle of view onto the opening in the appliance housing towards the cooking chamber.

[68] In a more general aspect, it is proposed that the picture taking means is mounted on the moving means, so that the food can be taken pictures of from two different angles. This makes it easy to gain more optical information about the food, thereby raising chances to securely identify the food.

5 [69] In addition to the picture taking means already described above, a second picture taking means can be provided. It will be obvious that everything described above for the first picture taking means would also be of advantage for a second or for further picture taking means.

[70] In general, it shall be understood that any description within this patent application
10 comprising “a” feature is to be understood as a “minimum one” number of this feature. E.g., speaking about “a picture taking means”, it is to be understood that “at least one picture taking means” should be provided. The same applies for all other features, unless underlined otherwise.

[71] It is proposed that the picture taking means is located outside of an upward path for
15 hot vapour escaping from a cooking chamber.

[72] When an appliance door leading to the cooking chamber is opened, hot vapour contained in the cooking chamber will at least partially escape through the opened door. Being hot, the vapour escaping from the cooking chamber will take an upward path along a front side of the cooking appliance. The picture taking means being located outside of this path
20 will make sure that the picture taking means is not covered by condensing humidity.

[73] Another way to avoid condensation problems, which can also be used in addition, is to heat a surface of the picture taking means.

[74] A picture taking means may generally be oriented with a central capture area axis within a plane parallel to a front side of the cooking appliance, or with an angle versus
25 that plane towards the front side – but preferably offset with a distance to a front side of the appliance.

[75] Every picture taking means will have a certain three-dimensional angle in which it is able to take pictures. This is herein called the “capture area”. Normally, a linear axis can be placed within this three-dimensional area, being the centre of the three-dimensional area. This is called the “central capture area axis”.

5 [76] Whenever the central capture area axis is oriented within a plane parallel to the front side of the cooking device, the picture taking means will – with short words – be oriented looking parallel to the front side of the cooking device.

[77] Having an angle versus that plane towards the front side makes the picture taking means have an angle of view in which the picture taking means can even look into the
10 opening towards the cooking chamber, at least in part.

[78] As an independent thought, a food positioning area may be provided and marked on a front side of the cooking appliance, where a picture taking means is directed to with its field of vision. For example, an abutment, a recess, a carrier or the like may be provided on a front side of the applicace, laterally offset to the appliance door. This makes it easier for
15 the personnel to understand where the food should ideally be placed in order to facilitate the optical recognition and identification. This way, a user wanting to insert a tray with food to be cooked into the cooking chamber will be offered a mechanical means to balance the tray on, with only one hand remaining on the tray, the other hand becoming free in order to open the appliance door.

20 [79] For improving the quality of vision towards the food, the picture taking means may comprise an optics covered by a glass cover, preferably with a de-mister coating.

[80] An optics can comprise a prime lens. Prime lenses are built with a fixed focus width. Although this makes it more difficult to get a good picture of a food product that is not in the focal distance, a prime lens does not have any optical influences coming from the
25 lens itself, and it is very reliable in transporting the light with very little loss. Therefore, a prime lens can provide for highly repeatable optical capture results.

[81] As an alternative, or in addition, a lens with a variable focal width can be used, preferably with an auto focus system.

[82] The picture taking means can comprise a light source in the proximity of an optics, preferably arranged around the optics, so that light can be reliably emitted from the picture taking means towards the food.

[83] It is proposed that the picture taking means or a controller accessing picture data comprises an optical filter.

[84] An “optical filter” can be a mechanical respectively physical filter that is attached to the lens. On the other hand, the optical filter can be a digital filter that is laid upon a data captured of the food.

[85] In a preferred embodiment of the cooking device, an air blower is provided for directing an air stream towards or around a picture taking means, so that any unwanted vapour can be blown out of a picture taking means’s field of vision.

[86] In a constellation like that, it is proposed to provide for a blower activation means which activates the blower whenever the optical identification means operates a picture taking means.

[87] In an independent thought of the invention, a shelf rail marker can be provided, especially in a cooking chamber or at the shelf or rack itself, highlighting positions of shelf rails for a picture taking means.

[88] The shelf rail marker can for example be a strip-like element that is attached along the side of the opening or of the cooking chamber, or at the rack. There, the view toward the shelf rail marker will be easily kept from being obstructed.

[89] The shelf rail marker carries marked positions for the shelf rails. By this, it is easier for the controller to evaluate the data from the picture taking means. This data can especially be used in order to recognise in which shelf a tray with food has been inserted.

[90] The controller is preferably programmed to conduct an optical recognition of a tray level in which a tray is inserted.

[91] An easy alternative would be to provide a mechanical tray detector, in order to detect when a loading level is occupied by a tray.

5 [92] It is proposed that the controller is programmed to differentiate between a movement of the food into or out of the cooking chamber. Such recognition will be easy if numerous pictures are taken, especially if the opening towards the cooking chamber is monitored – with discrete pictures or with a video film – over the whole time in which an appliance door is opened. By way of pattern recognition, the controller will be able to understand whether a piece of food was taken out of the cooking chamber, or was put into the
10 cooking chamber.

[93] A touchscreen may preferably be provided for giving signals to a user, and to receive commands and selections from the user.

[94] In a cooking device as described above, a digital optical quality control means for
15 food having been cooked within the cooking device may be provided.

[95] Having described numerous advantageous features of a cooking device, it will be obvious to the person skilled in the art that all these features can also be of advantage in a procedure of cooking food with such a cooking device at a commercial site, comprising the steps of:

- 20
- a. Approaching food to the cooking device;
 - b. Moving the food through a picture taking means's field of vision;
 - c. Inspecting whether an output concerning the amount, number or kind of food identified by the cooking device correctly corresponds with the amount, number or kind of food that is to be cooked, this step being optional;
25
 - d. Starting a cooking recipe.

[96] This procedure can be further improved by adapting any of the features as previously described.

[97] In the following, three embodiments of the invention are described with reference to the figures. There,

5 Fig. 1 shows a front side of a cooking device in a schematic drawing, which a camera placed centrally over a door leading to a cooking chamber;

Fig. 2 shows a second embodiment, a camera being positioned on a top left corner of a front side of a cooking device, being orientated towards the door at an angle; and

10 Fig. 3 shows a third embodiment, with a camera being placed in the top left corner looking vertically downwards.

[98] In the figures, a commercial cooking device 1, for example a combi-steamer or a baking oven, mainly consist of an appliance housing 2 and a door 3 for closing and opening a cooking chamber (covered by door 3 in the figures).

15 [99] A command panel 4 is provided on a front side of the commercial cooking device 1, so that the commercial cooking device 1 can communicate with a user.

[100] A photo camera 5, 5', 5'' is provided at different locations of the front side of the commercial cooking device 1 in order to capture pictures of food that is being inserted in to the cooking chamber when the door 3 is opened.

20 [101] The data gained by the photo camera 5, 5', 5'' is stored in a temporary data stack memory element (not shown). From there, the data is accessed by a controller (not shown). The controller evaluates the pictures and calculates characteristic data from the pictures with a digital photo filter and with pattern recognition algorithms.

[102] Having gained the calculated data, the controller accesses a physical feature data-
25 base and compares the data that is stored there with the calculated characteristic data.

[103] A software algorithm will first look for a maximum of identical characteristic data, and will – as an alternative – make up a bandwidth or access a predetermined bandwidth for reasonable variation for the data, and control how many of the characteristic data elements are within this bandwidth.

5 [104] By following this procedure, the cooking device has a high probability of being able to identify as many features of the food being inserted into the cooking chamber as possible. As a consequence, the included technology works as a digital optical identification means for food to be cooked.

10 [105] The photo camera 5, 5', 5'' will be able to capture pictures or video takes of any food that is positioned within the commercial cooking device 1. The photo camera 5, 5', 5'' has a fixed orientation, whereby a field of vision (only shown as a two-dimensional capture area, although in practice the field of vision is three-dimensional) is determined, with a central axis 6b, and ranging between two maximum angle directions 6a, 6c.

15 [106] Centrally in the field of vision of the photo camera 5'', there may be a pedestal 7, installed on a front side of the cooking appliance, and laterally offset to the door 3. The pedestal may be stabilized by cantilivers 8 in order to safely carry the weight of a tray edge positioned on the pedestal 7 for as long as it takes a user to open or close the door 3.

Patent claims:

1. A cooking device for commercial use, especially a combi-steamer or a baking oven or a microwave oven, with a digital optical identification means for food to be cooked within the cooking device.
- 5 2. The cooking device of claim 1, wherein the optical identification means comprises a picture taking means for capturing a picture of the food, especially an electronic image sensor.
3. The cooking device of claim 1, wherein the optical identification means comprises a controller having access to picture data captured of the food.
- 10 4. The cooking device of claim 3, wherein the controller has access to a physical feature database, so that the controller can compare the captured picture data to physical features of several food types, the physical feature data being stored in the physical feature database.
- 15 5. The cooking device of claim 4, wherein the physical feature database comprises data or data storage volume for at least one of the following features of the food: form, colour, size, number, amount of curvature of the outline, surface area, center of area, structure, kind of packaging, geometry of a food cooking carrier, material, colour, and structure of a food cooking carrier, and surface pattern of the food.
- 20 6. The cooking device of claim 4, wherein the controller is programmed to calculate a matching probability rank, for a number of data sets in the physical feature data base.
7. The cooking device of claim 6, wherein the controller is programmed to decide for the most probably matched data set as the identified food.
- 25 8. The cooking device of claim 6, wherein the controller is programmed to give to a user a selection of most probably matched data sets for choosing manually.

9. The cooking device of claim 3, wherein the controller is programmed to have a learning ability for identifying food.
10. The cooking device of claim 9, wherein the controller is programmed to perform a learning function, with a user interface being able to initiate the learning function, wherein in the learning function a picture is taken, preferably a series of pictures, stored as a known product entity dataset with a name, and a cooking recipe is logically allocated to the known product entity.
11. The cooking device of claim 9, wherein the controller is programmed to perform a learning function, with a user interface being able to initiate the learning function, wherein in the learning function a video film is taken in order to generate a data basis for a high number of pictures or views of the food product, stored as a known product entity with a name, and a cooking recipe is logically allocated to the known product entity.
12. The cooking device of claim 9, wherein the controller is programmed to request a user to insert the food in different tray levels, and in different orientations.
13. The cooking device of claim 3, wherein the controller is programmed to signal upon identification to a user the food that was identified.
14. The cooking device of claim 3, wherein the controller is programmed to show a warning signal upon a failed identification attempt.
15. The cooking device of claim 3, wherein the controller is programmed to check upon identification of a food whether current cooking chamber conditions are suitable for cooking that food, and to otherwise show a warning.
16. The cooking device of claim 1, wherein a temperature sensor is provided, preferably based on an infrared light contactless measuring principle.

17. The cooking device of claim 1, wherein a motion detector is provided, with a means to activate a picture taking means, and to a controller having access to picture data captured of the food by the picture taking means.
18. The cooking device of claim 1, wherein a motion detector is provided, with a means
5 to activate a light source lighting a field of vision of a picture taking means.
19. The cooking device of claim 1, wherein a controller and a picture taking means are provided, the controller comprising a means to activate a light source lighting a field of vision of the picture taking means.
20. The cooking device of claim 19, wherein the light source comprises an infrared
10 light source, or wherein the light source exclusively consists of an infrared light source.
21. The cooking device of claim 1, wherein a recipe database is provided, arranged for being accessed by a controller after identification of the food, so that the controller can load information on a cooking recipe for the identified food.
- 15 22. The cooking device of claim 1, wherein an automatic start function for a cooking recipe is provided upon closing of an appliance door.
23. The cooking device of claim 1, wherein a semi-automatic start function for a cooking recipe is provided, upon actuating a cooking start command element.
24. The cooking device of claim 1, wherein the picture taking means comprises a photo
20 optics.
25. The cooking device of claim 1, wherein the picture taking means is located outside of a cooking chamber, preferably above or laterally above an opening towards a cooking chamber.
26. The cooking device of claim 1, wherein the picture taking means is located at an
25 appliance door.

27. The cooking device of claim 1, wherein the picture taking means is mounted on an extendable and retractable holder, which extends when an appliance door is opened, and which retracts when the appliance door is closed.
28. The cooking device of claim 1, wherein the picture taking means is mounted on a moving means, so that the food can be taken pictures of from two different angles.
29. The cooking device of claim 1, wherein a second picture taking means is provided.
30. The cooking device of claim 1, wherein the picture taking means is located outside of an upward path for hot vapour escaping from a cooking chamber.
31. The cooking device of claim 1, wherein the picture taking means is oriented with a central capture area axis within a plane parallel to a front side of the cooking device, or with an angle versus that plane towards the front side.
32. The cooking device of claim 1, wherein a food positioning area is provided and marked on a front side of the cooking device, where a picture taking means is directed to with its field of vision.
33. The cooking device of claim 1, wherein the picture taking means comprises an optics covered by a glass cover, preferably with a de-mister coating.
34. The cooking device of claim 1, wherein an optics comprises a prime lens.
35. The cooking device of claim 1, wherein an optics comprises a lens with a variable focal width.
36. The cooking device of claim 1, wherein the picture taking means comprises a light source in the proximity of an optics, preferably arranged around the optics.
37. The cooking device of claim 1, wherein the picture taking means or a controller accessing picture data captured of the food comprises an optical filter.

38. The cooking device of claim 1, wherein an air blower is provided for directing an air stream towards or around a picture taking means, so that any unwanted vapour can be blown out of a picture taking means's field of vision.
39. The cooking device of claim 38, wherein a blower activation means is provided which activates the blower when the optical identification means operates a picture taking means.
40. The cooking device of claim 1, wherein a shelf rail marker is provided, especially in a cooking chamber or at the shelf or rack itself, highlighting positions of shelf rails for a picture taking means.
41. The cooking device of claim 1, wherein the controller is programmed to conduct an optical recognition of a tray level in which a tray is inserted.
42. The cooking device of claim 1, wherein a mechanical tray detector is provided, in order to detect when a loading level is occupied by a tray.
43. The cooking device of claim 1, wherein a touchscreen is provided for giving signals to a user, and to receive commands and selections from the user.
44. The cooking device of claim 1, wherein the controller is programmed to differentiate between a movement of the food into or out of the cooking chamber.
45. A procedure of cooking food with the cooking device of claim 1 at a commercial site, comprising the steps of:
- a. Approaching food to the cooking device;
 - b. Moving the food through a picture taking means's field of vision;
 - c. Inspecting whether an output concerning the amount, number or kind of food identified by the cooking device correctly corresponds with the amount, number or kind of food that is to be cooked;
 - d. Starting a cooking recipe.

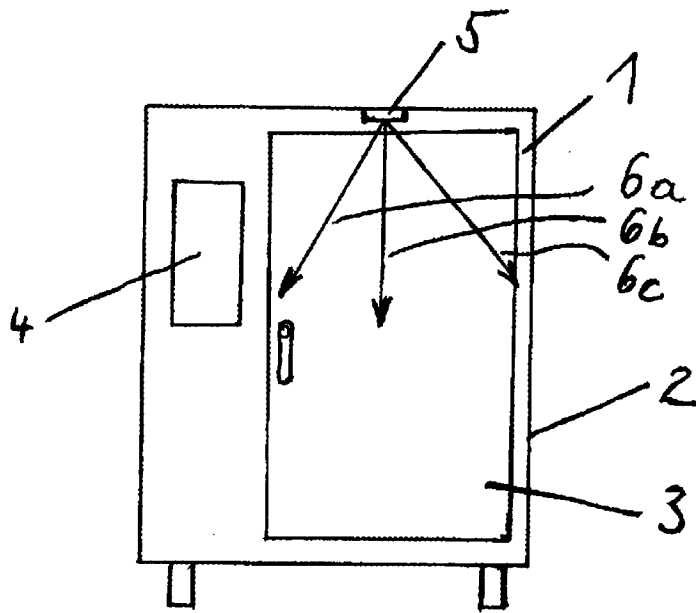


Fig. 1

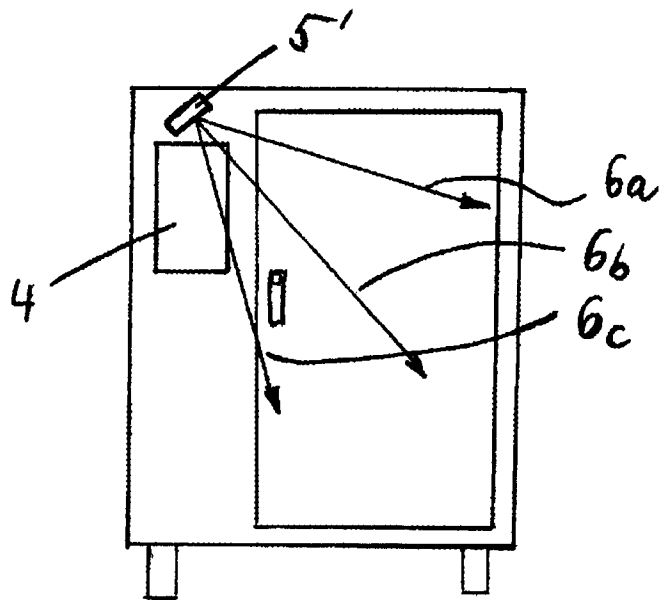


Fig. 2

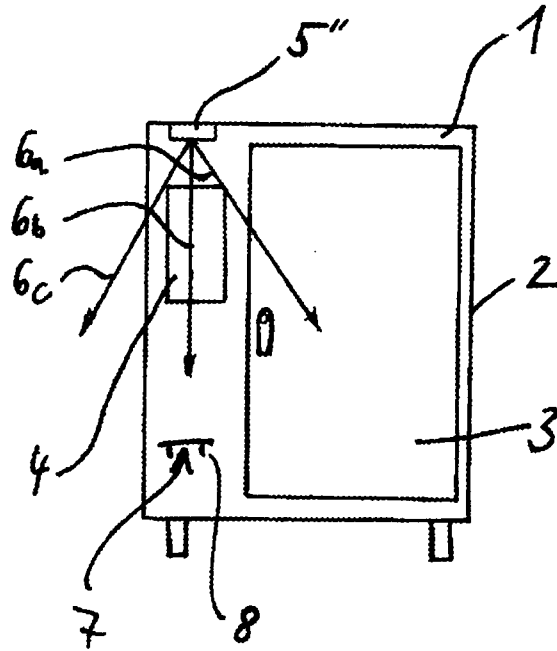


Fig. 3