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(54) **Oven provided with analyzer for the air present in its cooking chamber**

Ofen mit Kochluftanalyse

Four à analyseur de l'air de cuisson

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Description

[0001] The present invention relates to a domestic oven in accordance with the introduction to the main claim.

[0002] Analyzers disposed within cavities of domestic ovens have been known for some time. These analyzers enable, for example, the state of preparation of food positioned in the cooking chamber or cavity of said ovens to be determined; alternatively or additionally, if said ovens are of the type in which pyrolytic cleaning (known per se) takes place, these analyzers enable the degree of completion of this cleaning to be determined by analyzing the gases generated within the cooking chamber during pyrolysis.

[0003] These gas analyzers (or gas sensors) can be of absorption spectrum analysis type or of catalytic/resistive type. They measure the content of CO, CO₂, hydrocarbons (HC) and/or other gaseous compounds present in the cooking chamber, which can derive either from food cooking processes or from the pyrolytic cleaning process.

[0004] Gas analyzers or sensors are used in those ovens in which here is no forced air circulation for cooling the oven. By means of suitable known electrical contacts, said analysis (carried out in known manner, for example by modifying the resistivity or voltage of a component of such analyzers which is related to the absorption of a particular gaseous compound by these latter) is "read" by a usual member for controlling the oven operation; the pyrolytic cleaning is, for example, halted on the basis of this reading.

[0005] These analyzers or gas sensors have been widely used in free-standing ovens; however, up to the present time they have not been used in built-in ovens, or in those ovens in which a fan is present to draw air from the cavity and expel it to the outside, as this forced circulation of the air present within the environment in which the sensor is positioned does not enable the corresponding gas analyzer to make contact with the air drawn from this chamber at a concentration sufficient to allow effective analysis.

[0006] JP-58150720 discloses a gas oven according to the preamble of appended claim 1, in which the movement of air around the analyzer is prevented.

[0007] An object of the present invention is therefore to provide an oven, preferably of built-in type, in which the composition of the air present in the cooking chamber can be analyzed, to enable the extent of cooking of a food present in said chamber or the state of advancement of pyrolytic cleaning (if the oven is prearranged for said cleaning) to be evaluated.

[0008] A further object is to provide an oven in which the air in the cooking chamber can be analyzed reliably and at low cost.

[0009] These and further objects which will be apparent to the expert of the art are attained by an oven in accordance with the accompanying claims.

[0010] The present invention will be better understood

from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a block diagram of the various components of the oven according to the invention;

Figure 2 is a view of a part of the oven of Figure 1, seen from above;

Figure 3 is a side view of the oven part of Figure 2; Figure 4 is a block diagram of a variant of the invention.

[0011] With reference to Figures from 1 to 3, a built-in oven comprises a cooking chamber or cavity 1 connected to a suction member defined by a tangential fan 2. On its suction side the fan is connected via a conduit or channel 3 to the chamber 1 and via a conduit or channel 4 to an exit port B positioned on the upper side of the opening A of the chamber 1 so that the oven outer walls and the compartment in which the oven is mounted are cooled during oven operation. In the interspace defined by said oven outer walls and by the compartment walls there is mounted on the oven an electronic oven control member 5, which is hence cooled by the gas drawn in by the fan 2. The conduits 3 and 4 converge into a conduit 6 directly connected downstream to the fan 2.

[0012] At the exit of the cooking chamber 1 there is positioned in the suction conduit 3 a usual catalyst 10 for purifying the air leaving this chamber.

[0013] According to the invention, a by-pass channel 11 is connected to the conduit 3 and leads to a gas analyzer 12 of known type. This analyzer is connected, via a usual connection member 13, to the oven control member 5 in such a manner as to enable this latter to obtain data on the analysis of the air leaving the cooking chamber 1 and to operate on the oven 1, for example by interrupting the heating of the chamber 1 because the food under preparation therein has reached the desired extent of cooking.

[0014] The by-pass channel 11 comprises an outward conduit or branch 14 and a return conduit 16 connected respectively to the conduit 3 downstream of the catalyst 10 and to the conduit 6 upstream of the tangential fan 2.

[0015] In this manner, during use of the oven in preparing a food, by virtue of the suction action of the cooling fan 2 (which discharges the drawn air into the environment through a channel 15), the air is drawn from the chamber 1, passes through the catalyst 10 and transits towards the conduit 6. During this movement (shown by the arrows present in Figure 1) a portion of the indrawn air also flows into the by-pass channel 11, drawn into it by the fan 2 via the conduit 16. From the channel 11 the air reaches the gas analyzer 12, where it is analyzed known manner.

[0016] The effected analysis is "read" by the control member 5 which on the basis of this acts on the members heating the oven. If this latter is of the pyrolytic cleaning type, the aforesaid analysis can be carried out during this cleaning operation to enable the member 5 to halt the

cleaning when suitable.

[0017] By virtue of the particular manner of connecting the analyzer 12 to the chamber 1, the air leaving this latter is able to encounter the analyzer for a time necessary and sufficient for it to analyze its composition.

[0018] In a variant shown in Figure 4 (in which parts corresponding to those of the already described figures are indicated by the same reference numerals), the return channel or conduit 16 is not connected to the conduit 6, but to the discharge conduit 15 downstream of the fan 2 in the air flow direction shown by the arrows of this figure. In this case the connection region between these conduits can be formed by suitably choosing the cross-section of the conduit 16 to enable the air present in the analyzer to remain therein for the time required for its analysis.

[0019] By means of the invention a gas analyzer can be used safely and reliably within a built-in oven for controlling at least the preparation of the food therein; if the oven is of the type provided with a pyrolytic cleaning member, the invention also enables the cleaning operation to be controlled.

[0020] As an alternative to connecting the exit of the by-pass conduit to a region upstream or downstream of the fan 2, a dedicated pump or fan (not shown) can be used to extract a determined gas throughput or to make it flow through the sensor. The solution according to the invention can be applied in both static and forced-circulation ovens.

Claims

1. An oven comprising an internal cavity or cooking chamber (1) connected to a suction conduit (3) operationally connected to a suction member (2) arranged to withdraw air from the interior of the cooking chamber (1) and to expel it into the environment in which the oven is positioned via a discharge conduit (15), and comprising an analyzer (12) for the air drawn from the cooking chamber (1), **characterised in that** said analyzer (12) is positioned within a by-pass conduit (11) connected to the suction conduit (3).
2. An oven as claimed in claim 1, **characterised in that** the by-pass conduit (11) has a first branch (14) connecting the suction conduit (3) to the analyzer (12) and a return second branch (16) leaving the analyzer.
3. An oven as claimed in claim 2, **characterised in that** the return second branch (16) is connected to an entry conduit (6) to the suction member (2), there being connected to said conduit (6) a conduit (4) connected to an oven control member (5) arranged to cool the oven.

4. An oven as claimed in claim 2, **characterised in that** the return second branch (16) is connected to the discharge conduit (15) leaving the suction member (2), there arriving at this member an entry conduit (6) to which there are connected the suction conduit (3) and a conduit (6) connected to an oven control member (5) arranged to cool the oven.
5. An oven as claimed in claim 1, **characterised in that** the by-pass conduit (11) is connected at its exit to an auxiliary pump or fan arranged to feed a determined gas throughput through the analyzer (12).

Patentansprüche

1. Ofen, umfassend einen inneren Hohlraum oder eine Kochkammer (1), die mit einer Ansaugleitung (3) verbunden sind, welche im Betrieb mit einem Ansaug-element (2) verbunden ist, das so angeordnet ist, dass es Luft aus dem Inneren der Kochkammer (1) zieht und diese in die Umgebung, in der der Ofen positioniert ist, über eine Ausgabelleitung (15) ausstößt, und umfassend einen Analysator (12) für die aus der Kochkammer (1) abgezogene Luft, **dadurch gekennzeichnet, dass** der Analysator (12) innerhalb einer Bypass-Leitung (11) positioniert ist, die mit der Ansaugleitung (3) verbunden ist.
2. Ofen wie in Anspruch 1 beansprucht, **dadurch gekennzeichnet, dass** die Bypass-Leitung (11) eine erste Abzweigung (14) aufweist, die die Ansaugleitung (3) mit dem Analysator (12) verbindet, sowie eine zweite Rückführ-Abzweigung (16), die aus dem Analysator austritt.
3. Ofen wie in Anspruch 2 beansprucht, **dadurch gekennzeichnet, dass** die zweite Rückführ-Abzweigung (16) mit einer Eintrittsleitung (6) zum Ansaug-element (2) verbunden ist und dort mit dieser Leitung (6) eine Leitung (4) verbunden ist, die mit einem Ofensteuerungselement (5) verbunden ist, das dazu angeordnet ist, den Ofen zu kühlen.
4. Ofen wie in Anspruch 2 beansprucht, **dadurch gekennzeichnet, dass** die zweite Rückführ-Abzweigung (16) mit der Ausgabelleitung (15) verbunden ist, die aus dem Ansaug-element (2) austritt, und dort an diesem Element eine Eintrittsleitung (6) aufweist, an der die Ansaugleitung (3) und eine Leitung (6), die mit einem Ofensteuerungselement (5) verbunden ist, das dazu angeordnet ist, den Ofen zu kühlen, angebunden ist.
5. Ofen wie in Anspruch 1 beansprucht, **dadurch gekennzeichnet, dass** die Bypass-Leitung (11) an ihrem Austritt mit einer Hilfspumpe oder einem Gebläse verbunden ist, das dazu angeordnet ist, einen vor-

ab festgelegten Gas-Durchlauf durch den Analysator (12) zu befördern.

Revendications

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1. Four comprenant une cavité intérieure ou chambre cuisson (1) connectée à un conduit d'aspiration (3) connecté fonctionnellement à un élément d'aspiration (2) agencé pour retirer l'air de l'intérieur de la chambre de cuisson (1) et pour l'expulser dans l'environnement dans lequel le four est positionné via un conduit d'évacuation (15), et comprenant un analyseur (12) pour l'air évacué de la chambre de cuisson (1), **caractérisé en ce que** ledit analyseur (12) est positionné dans une conduit de dérivation (11) connecté au conduit d'aspiration (3). 10 15
2. Four selon la revendication 1, **caractérisé en ce que** le conduit de dérivation (11) a une première dérivation (14) reliant le conduit d'aspiration (3) à l'analyseur (12) et une seconde dérivation de retour (16) quittant l'analyseur. 20
3. Four selon la revendication 2, **caractérisé en ce que** la seconde dérivation de retour (16) est connectée à un conduit d'entrée (6) vers l'élément d'aspiration (2), où est connecté au dit conduit (6) un conduit (4) connecté à un élément de commande de four (5) agencé pour refroidir le four. 25 30
4. Four selon la revendication 2, **caractérisé en ce que** la seconde dérivation de retour (16) est connectée au conduit d'évacuation (15) quittant l'élément d'aspiration (2), où arrive à cet élément un conduit d'entrée (6) auquel sont connectés le conduit d'aspiration (3) et un conduit (6) connecté à un élément de commande de four (5) agencé pour refroidir le four. 35 40
5. Four selon la revendication 1, **caractérisé en ce que** le conduit de dérivation (11) est connecté à sa sortie à une pompe auxiliaire ou un ventilateur agencé pour alimenter un débit de gaz déterminé à travers l'analyseur (12). 45

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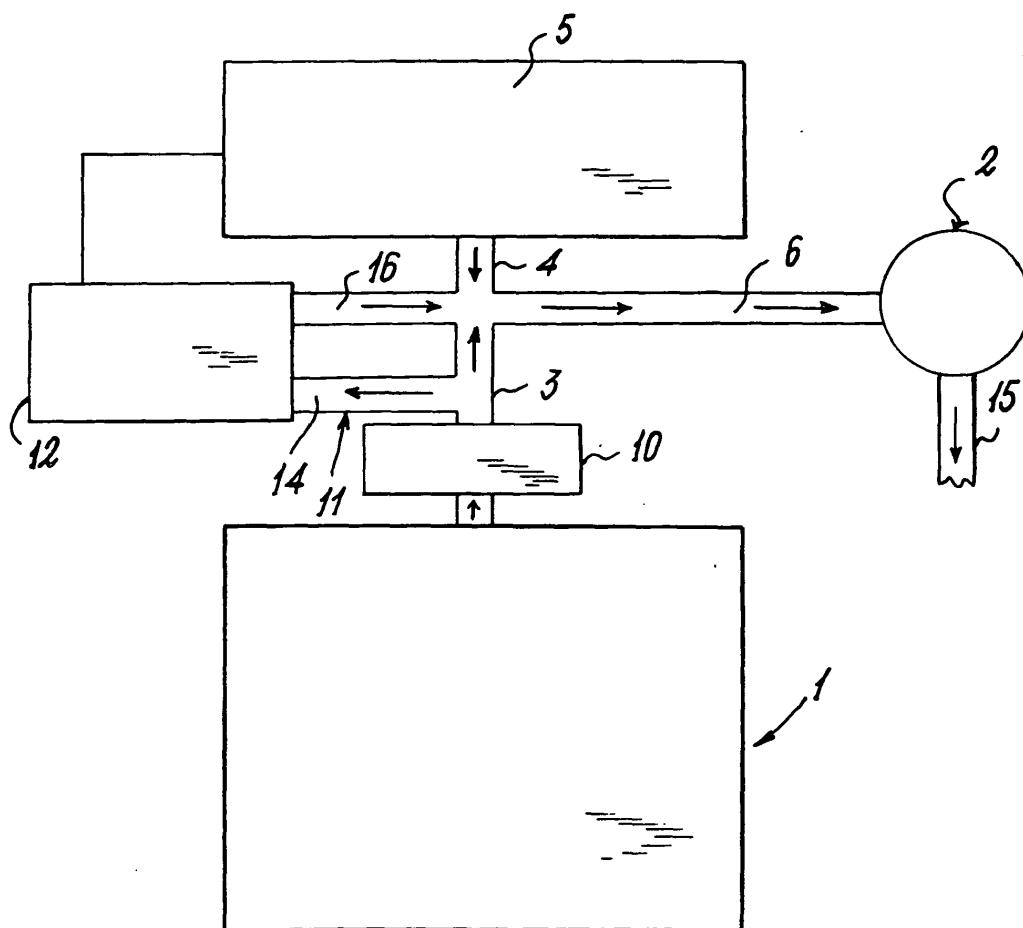


FIG. 1

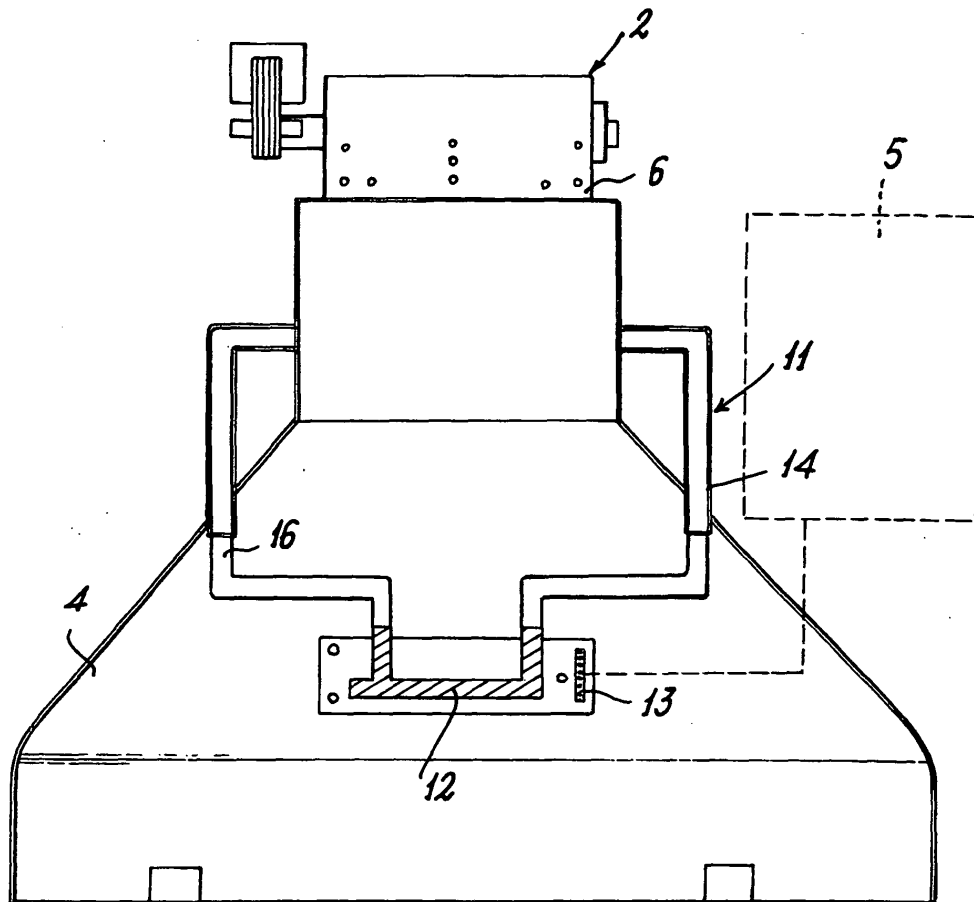


FIG. 2

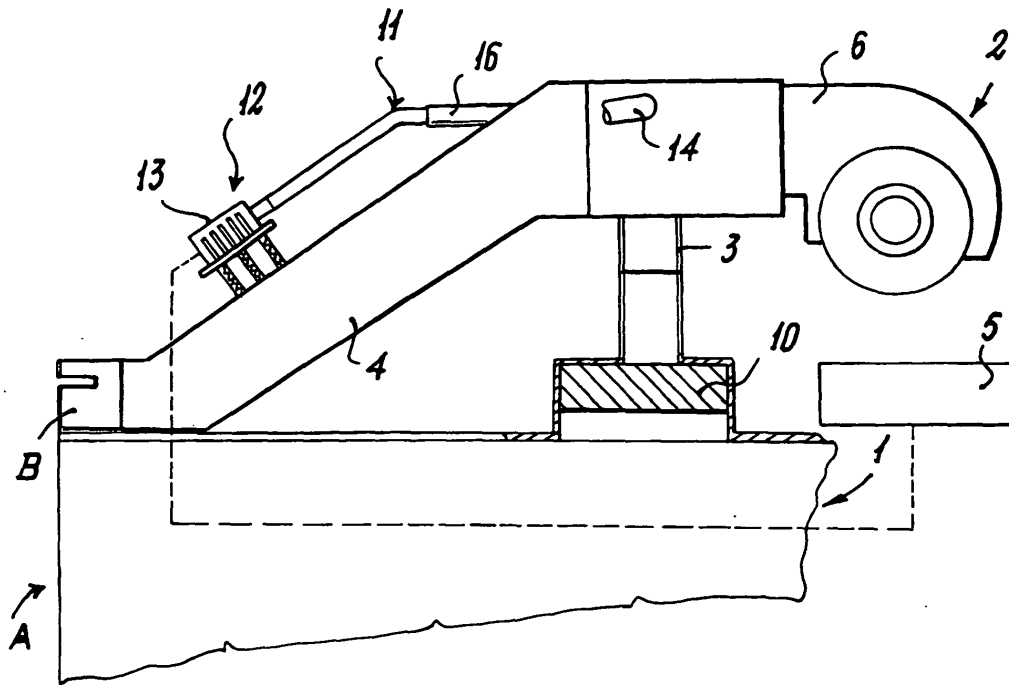


FIG. 3

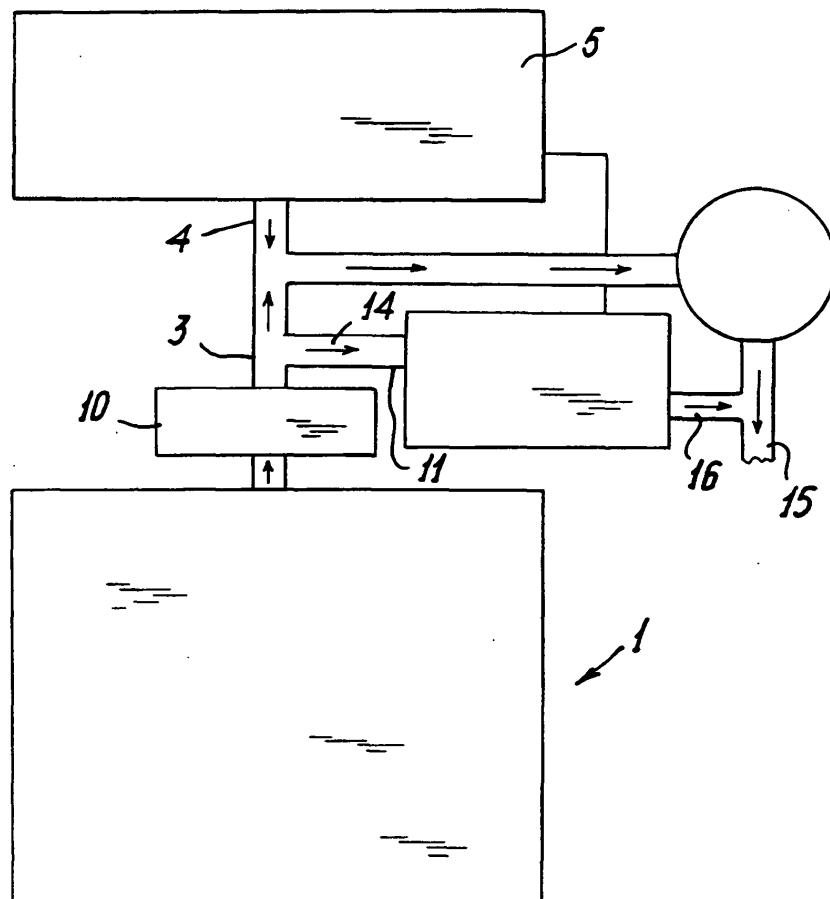


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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