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(54) IMPROVED MICROWAVE LEAKPROOF DOOR FOR COMBINATION CONVECTION/MICROWAVE OVEN

VERBESSERTE MIKROWELLENDICHTE TÜR FÜR KONVEKTIONS-/MIKROWELLEN-KOMBINATIONSOFEN

PORTE ÉTANCHE AUX MICRO-ONDES AMÉLIORÉE POUR FOUR À CONVECTION/MICRO-ONDES COMBINÉ

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(73) Proprietor: **Arçelik Anonim Sirketi**
34445 Istanbul (TR)

(72) Inventors:
- **GUR, Metin**
  34950 Istanbul (TR)
- **GOCER, Mehmet Baris**
  34950 Istanbul (TR)
- **YAMAN, Yalcin**
  34950 Istanbul (TR)

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Description

[0001] The present invention relates to a combination convection/microwave oven.

[0002] The microwave cooking technology enables rapid and energy efficient cooking of food. In the microwave cooking technology the food is subjected to microwave radiation which causes polarized molecules in the food to vibrate and produce heat. As the microwave radiation easily penetrates into the food, the entire food can be instantly and uniformly heated. Thereby the food can be quickly and uniformly cooked.

[0003] A drawback of the microwave cooking technology is that the oven must be properly sealed to prevent the microwave radiation from leaking to an outside. The cooking cavity acts as a Faraday cage. However, a small fraction of the microwave radiation typically leaks through the apertures between the door and the cooking cavity. The microwave radiation which leaks to an outside poses severe risks to the health of users and can cause burns and permanent damages. Therefore, compliance with the maximum permissible leakage limit is of utmost importance. This leakage limit is generally prescribed by the competent authorities.

[0004] A commonly known technique is to seal the aperture between the door and the cooking cavity by utilizing a microwave sealing choke which is usually mounted on a periphery of the door so as to oppose a metal front wall around the opening of the cooking cavity. The microwave sealing choke includes a plurality of resonant cavities which receive the microwave radiation which propagates along the metal front wall to an outside. The radiation is attenuated by the resonant cavities.

[0005] EP1333703A2 discloses a microwave oven which has a microwave sealing choke. The microwave sealing choke is arranged onto the periphery of the door so as to oppose the metal front wall. US4053731 discloses an energy seal for a microwave oven. US2005/0057006 A1 discloses a door sealing strip for a cooking device.

[0006] Another drawback of the microwave cooking technology is that it is not possible to obtain gastronomic results that can be typically obtained by conventional cooking ovens which utilize convective heat transfer. Therefore, the so called "combination ovens" have devised which allow cooking by convective heat transfer and/or microwave radiation. Thereby, the user can selectively apply any of the above-mentioned cooking technologies to the food to achieve the best cooking results.

[0007] In general, the temperatures reached during microwave cooking are relatively lower than the temperatures reached during cooking by convective heat transfer. Therefore, in a combination convection/microwave oven, when the food is cooked by convective heat transfer, the temperature reached inside the cooking cavity reaches relatively high levels in particular during baking, grilling or the like in comparison to sole microwave cooking. The heat produced in the cooking cavity is radiated off by conductive heat transfer to the front metal wall, and therefrom to the critical electrical components like the user-interface, the control unit or the like which are typically installed into the front wall. Certain temperature limits must be observed for the proper operation of these electrical components. Therefore, the electrical components parts must be suffiently cooled. However, the cooling process increases the energy consumption of the oven.

[0008] To reduce the demand for cooling, the front wall could be modified to become less heat conductive. However this impairs electrical conductivity of the front wall and, in turn, the microwave sealing performance degrades. Thus, it becomes difficult to comply with the standard requirements on the maximum permissible microwave leakage limits.

[0009] An objective of the present invention is to provide a combination convection/microwave oven which overcomes the aforementioned drawbacks of the prior art and which is improved both in thermal and microwave leakproofing.

[0010] This objective has been achieved by the combination convection/microwave oven according to the present invention as defined in claim 1. Further achievements have been attained by the subject-matters respectively defined in the dependent claims.

[0011] In the combination convection/ microwave oven of the present invention, a first metal lining which forms the cavity wall and a second metal lining which forms the front wall respectively have an inwardly bent first segment and an inwardly bent second segment which abut each other outside the cooking cavity circumferentially around an opening of the cooking cavity. Thus, the heat transfer from the cavity wall to the front wall has been diminished through the discontinuously abutting segments. The door has an inner metal wall which includes a straight portion and an inwardly bent portion. In the door, the straight portion is configured to circumferentially oppose directly the inwardly bent first segment and the inwardly bent second segment through a gap whereas the inwardly bent portion is configured to circumferentially protrude into the cooking cavity along an edge of the opening so as to directly oppose the first metal lining through a gap. The inwardly bent portion contributes via the straight portion to the sealing performance of a microwave sealing choke formed on the lateral metal walls of the door which is configured to circumferentially oppose the front wall through a gap. Thus, the inwardly bent portion, the straight portion and microwave sealing choke arranged on the lateral metal walls effectively act as a single microwave sealing choke. Thereby, the reduction in the sealing performance of the microwave sealing choke arranged on the lateral metal walls due to the deterioration of the thermal and the electrical conductivity across the abutting segments has been compensated by the inwardly bent portion.

[0012] In an embodiment, the overall shape of the inwardly bent portion is convex or alternatively concavo-convex.

[0013] In another embodiment, a penetration depth of the inwardly bent portion which protrudes into the cooking cavity is equal to or less than a critical value where the inwardly bent portion starts to function like a waveguide. This is determined with respect to a cut-off frequency of the inwardly bent portion. The critical value largely depends, among others, on a main frequency of the magnetron which is typically around 2.45 GHz. In a version of this embodiment, the critical value is about eight millimeters, and an optimum sealing performance is attained the when the penetration depth ranges from two millimeters to eight millimeters.

[0014] In another embodiment, the inwardly bent first segment and the inwardly bent second segment are spot welded at predetermined intervals circumferentially around the opening of the cooking cavity. Thereby the heat conductivity is effectively reduced. In an alternative embodiment, the inwardly bent first segment and the inwardly bent second segment are connected by mechanical means such as screws, snap-fittings, claws, or the like.

[0015] In another embodiment, the door has a monolithic metal frame. Thereby a manufacturing of the door has been simplified. In addition, this improves the overall microwave sealing performance.

[0016] By the present invention, a combined convection/microwave cooking oven has been provided in which the front wall has been protected from excessive thermal radiation of the cooking cavity. By the present invention, a microwave sealing choke has been provided which reduces microwave leakage below a maximum permissible leakage limit. Thereby, optimum operation conditions for the electrical components have been established without compromising the microwave sealing performance.

[0017] Additional advantages of the combination convection/microwave oven of the present invention will become apparent with the detailed description of the embodiments with reference to the accompanying drawing in which:

Figure 1 - is a schematic cross sectional partial side view of a combination convection/microwave oven according to an embodiment of the present invention, taken along a vertical direction.

[0018] The reference signs appearing on the drawings relate to the following technical features.

1. Door
2. Oven
3. Cooking cavity
4. Cavity wall
5. First metal lining
6. Opening
7. Front wall
8. Second metal lining
9. First segment
10. Second segment
11. Lateral metal wall
12. Sealing choke
13. First gap
14. Inner metal wall
15. Straight portion
16. Second gap
17. portion
18. Edge
19. Third gap
20. Third metal lining
21. Doorframe
22. Screen portion
23. Tapered shoulder
24. Arc-shaped shoulder
25. LC resonant cavity
26. Slot

[0019] The door (1) is suitable for use in a combination convection/microwave oven (2). The combination convection/microwave oven (2) comprises a cooking cavity (3) which is enclosed by a cavity wall (4), wherein the cooking cavity (3) has an opening (6), and wherein the cavity wall (4) is formed from a first metal lining (5), the door (1) which is pivotably arranged to open/close the opening (6) of the cooking cavity (3), a front wall (7) which is formed from a second metal lining (8), one or more than one electrical resistance (not shown) for convectively heating food inside the cooking cavity (3), a microwave magnetron (not shown) for radiative heating of food inside the cooking cavity (3), a user interface (not shown) for receiving user inputs and for audibly and/or visually outputting information and a control unit (not shown) for controlling the electrical resistance, the magnetron and the user interface .

[0020] In the combination convection/microwave oven (2) according to the present invention the first metal lining (5) and the second metal lining (8) respectively have an inwardly bent first segment (9) and an inwardly bent second segment (10) which abut each other outside of the cooking cavity (3) and circumferentially around the opening (6). Thereby, the heat conductivity from the cavity wall (4) to the front wall (7) is effectively reduced and the heat dissipation from the cooking cavity (3) to the front wall (7) is improved.

[0021] The door (1) comprises lateral metal walls (11) which include a microwave sealing choke (12) configured to circumferentially oppose the front wall (7) through a first gap (13).

[0022] The door (1) further comprises an inner metal wall (14) which includes a straight portion (15) and an inwardly bent portion (17). The straight portion (15) is configured to circumferentially oppose directly the inwardly bent first segment (9) and the inwardly bent second segment (10) through a second gap (16). The inwardly bent portion (17) is configured to circumferentially protrude into the cooking cavity (3) along an edge (18) of the opening (6) so as to directly oppose the first metal lining (5) through a third gap (19).

[0023] In an embodiment, the overall shape of the inwardly bent portion (17) is convex. In an alternative em-

bodiment, the overall shape of the inwardly bent portion (17) is concavo-convex.

[0024] In another embodiment, the lateral metal walls (11) and the inner metal wall (14) are integrally formed from a third metal lining (20). In this embodiment, the microwave sealing choke (12), the straight portion (15), and the inwardly bent portion (17) constitute a monolithic metal doorframe (21). In a version of this embodiment, the monolithic doorframe (21) is formed by pressing and bending. Thereby, a manufacturing process of the door (1) becomes simple and cost effective.

[0025] According to the invention, the inner metal wall (14) further includes a perforated metal screen portion (22). The preformation is suffiently large to enable a user to observe the cooking cavity (3) and sufficiently small to keep the microwave leakage below permissible limits i.e., maximum 1.4 mW/cm^2. In this embodiment, the perforated metal screen portion (22) is circumferentially surrounded by the inwardly bent portion (17).

[0026] According to the invention, the perforated metal screen portion (22) is outwardly offset relative to the inwardly bent portion (17) by a predetermined distance. Thereby an inner volume of the cooking cavity (4) is increased, and a microwave sealing performance of the inwardly bent portion is increased.

[0027] In another embodiment, the perforated metal screen portion (22) and the straight portion (15) lie in a same plane.

[0028] In another embodiment, the inwardly bent portion (17) includes one or more than one tapered shoulder (23) and an arc-shaped shoulder (24). In this embodiment, the tapered shoulders (23) adjoin the perforated metal screen portion (22) whereas an arc-shaped shoulder (24) joins the straight portion (15). In this embodiment, the overall shape of the inwardly bent portion (17) is concavo-convex. In a version of this embodiment, the arc-shaped shoulder (24) and the edge (18) have matching outlines in order to improve the microwave sealing performance.

[0029] In another embodiment, a penetration depth (D) of the inwardly bent portion (17) which protrudes into the cooking cavity (3) ranges between two millimeters to eight millimeters. This specific range largely depends, among others, on a size and shape of the cooking cavity (3). Above eight millimeters, the inwardly bent portion (17) may start functioning like a waveguide, and thus the sealing performance may degrade. Similarly below 2 millimeters the sealing performance may be insufficient. Thus an optimum sealing performance is attained the when the penetration depth (D) ranges from two millimeters to eight millimeters.

[0030] In another embodiment, the microwave sealing choke (12) includes a plurality of LC resonant cavities (25) which are successively formed at predetermined intervals along a circumferential direction on the lateral walls. Each LC resonant cavity has one or more than one slot (26) which opposes the front wall (7). The resonant frequency is adjusted in accordance with a main frequency of the magnetron. A typical value for the magnetron frequency is 2.45 GHz.

[0031] In another embodiment, the inwardly bent first segment (9) and the inwardly bent second segment (10) are spot welded at predetermined intervals circumferentially around the opening (6) of the cooking cavity (3). Throughout the predetermined interval, the first/second segments (9, 10) are not continually welded. Thereby, the conductive heat transfer can be considerably reduced. The predetermined interval largely depends on the size of the front wall (7), the cavity wall and the wattage of the oven (2).

[0032] In another embodiment, the predetermined interval which separates two successive spot-welding is equal to or less than four centimeters.

[0033] In another embodiment, the predetermined interval is about three centimeters. In a version of this embodiment the predetermined interval is exactly three centimeters.

[0034] In another embodiment, the control unit and the user interface are arranged on the front wall (7). By virtue of the improved thermal dissipation, the electrical components of the control unit and the user interface can be operated within optimum temperature limits.

[0035] In another embodiment, the control unit has a plurality of modes including at least three modes. The first mode is suitable for cooking food by convective heat transfer only. The second mode is suitable for cooking food by microwave radiation only. The third mode is suitable for cooking food by convective heat transfer and microwave radiation in combination.

[0036] By the present invention, a combined convection/microwave cooking oven has been provided in which the front wall has been protected from excessive thermal radiation of the cooking cavity. By the present invention, a microwave sealing choke has been provided which reduces microwave leakage below a maximum permissible leakage limit. Thereby, optimum operation conditions for the electrical components have been established without compromising microwave sealing. By the present invention, the oven can be reliably operated even at the highest designated operation temperatures. Hence the temperature of the exposed parts and the internal parts can be safely kept below critical threshold values.

Claims

1. A combination convection/microwave oven (2) comprising a cooking cavity (3) enclosed by a cavity wall (4) which is formed from a first metal lining (5), wherein the cooking cavity (3) has an opening (6) and a front wall (7) which is formed from a second metal lining (8), wherein the first metal lining (5) and the second metal lining (8) respectively have an inwardly bent first segment (9) and an inwardly bent second segment (10) which abut each other outside the cooking cavity (3) circumferentially around the open-

ing (6), a door (1) comprising lateral metal walls (11) which include a microwave sealing choke (12) configured to circumferentially oppose the front wall (7) through a first gap (13), the door (1) further comprising an inner metal wall (14) which includes

- a straight portion (15) configured to circumferentially oppose directly the inwardly bent first segment (9) and the inwardly bent second segment (10) through a second gap (16) and
- an inwardly bent portion (17) configured to circumferentially protrude into the cooking cavity (3) along an edge (18) of the opening (6) so as to directly oppose the first metal lining (5) through a third gap (19),

wherein the inner metal wall (14) further includes a perforated metal screen portion (22), wherein the perforated metal screen portion (22) is circumferentially surrounded by the inwardly bent portion (17), and
wherein the perforated metal screen portion (22) is outwardly offset relative to the inwardly bent portion (17) by a predetermined distance.

2. The combination convection/microwave oven (2) according to claim 1, **characterized by** the door (1) wherein the lateral metal walls (11) and the inner metal wall (14) are integrally formed from a third metal lining (20) such that the microwave sealing choke (12), the straight portion (15), and inwardly bent portion (17) constitute a monolithic metal door frame (21).

3. The combination convection/microwave oven (2) according to claim 1 or 2, **characterized by** the door (1) wherein the perforated metal screen portion (22) and the straight portion (15) lie in a same plane.

4. The combination convection/microwave oven (2) according to any one of claims 1 to 3, **characterized by** a door (1) wherein the inwardly bent portion (17) includes one or more than one tapered shoulder (23) which adjoins the perforated metal screen portion (22) and an arc-shaped shoulder (24) which joins the straight portion (15).

5. The combination convection/microwave oven (2) according to any one of claims 1 to 4, **characterized by** the door (1) wherein a penetration depth (D) of the inwardly bent portion (17) which protrudes into the cooking cavity (3) ranges between two millimeters to eight millimeters.

6. The combination convection/microwave oven (2) according to any one of claims 1 to 5, **characterized by** the door (1) wherein the microwave sealing choke (12) includes a plurality of LC resonant cavities (25) which are successively formed at predetermined intervals along a circumferential direction onto the lateral walls, wherein each LC resonant cavity has one or more than one slot (26) which opposes the front wall (7).

7. The combination convection/microwave oven (2) according to any one of claims 2 to 5, **characterized by** the door (1) wherein the monolithic door frame (21) is formed by pressing and bending.

8. A combination convection/microwave oven (2) according to any of claims 1 to 7, the combination convection/microwave oven (2) comprising a microwave magnetron for radiative heating of food inside the cooking cavity (3), a user interface for receiving user inputs and for audibly and/or visually outputting information and a control unit for controlling the electrical resistance, the magnetron and the user interface, the combination convection/microwave oven (2) being **characterized by** further comprising a door (1) which is pivotably arranged to open/close the cooking cavity (3).

9. The combination convection/microwave oven (2) according to any of the claims 1 to 8, **characterized in that** the inwardly bent first segment (9) and the inwardly bent second segment (10) are spot welded at predetermined intervals circumferentially around the opening (6) of the cooking cavity (3).

10. The combination convection/microwave oven (2) according to claim 9, **characterized in that** said predetermined interval is equal to or less than four centimeters.

11. The combination convection/microwave oven (2) according to claim 9 or 10, **characterized in that** said predetermined interval is about three centimeters.

12. The combination convection/microwave oven (2) according to any one of claims 1 to 11, **characterized in that** the control unit and the user interface are installed into the front wall (7).

13. The combination convection/microwave oven (2) according to claim 12, **characterized in that** the control unit has a plurality of modes including a first mode for cooking food by convective heat transfer only, a second mode for cooking food by microwave radiation only and a third mode for cooking food by convective heat transfer and microwave radiation in combination.

Patentansprüche

1. Ein kombinierter Konvektions-/ Mikrowellenofen (2)

umfasst einen Garraum (3), der von einer Hohlraumwand (4) umschlossen ist und aus einer ersten Metallauskleidung (5) gebildet ist, wobei der Garraum (3) eine Öffnung (6) und eine Vorderwand (7), die aus einer zweiten Metallverkleidung (8) gebildet ist, wobei die erste Metallverkleidung (5) und die zweite Metallverkleidung (8) jeweils ein nach innen gebogenes erstes Segment (9) und zweites Segment (10) aufweisen, die außerhalb von dem Garraum (3) in die Umfangsrichtung um die Öffnung (6) aneinander anstoßen; eine Tür (1) mit seitlichen Metallwänden (11), die eine Mikrowellendichtungsdrossel (12) aufweisen und die so konfiguriert ist, dass sie in die Umfangsrichtung der Vorderwand (7) über einen ersten Spalt (13) in Umfangsrichtung gegenüberliegt, wobei die Tür (1) ferner eine innere Metallwand (14) aufweist, die Folgendes umfasst

- einen geraden Abschnitt (15), der so konfiguriert ist, dass er dem nach innen gebogenen ersten Segment (9) und dem nach innen gebogenen zweiten Segment (10) durch einen zweiten Spalt (16) in Umfangsrichtung direkt gegenüberliegt; und
- einen nach innen gebogenen Abschnitt (17), der so konfiguriert ist, dass er in die Umfangsrichtung entlang einer Kante (18) der Öffnung (6) in den Garraum (3) hineinragt, so dass er der ersten Metallauskleidung (5) durch einen dritten Spalt (19) direkt gegenüberliegt, wobei die innere Metallwand (14) zunächst einen perforierten Metallschirmabschnitt (22) besitzt, wobei der perforierte Metallschirmabschnitt (22) in Umfangsrichtung von dem nach innen gebogenen Abschnitt (17) umgeben ist.

2. Der kombinierte Konvektions-/ Mikrowellenofen (2) wie in Anspruch 1 aufgeführt, ist durch die Tür (1) gekennzeichnet, wobei die seitlichen Metallwände (11) und die innere Metallwand (14) kompakt aus einer dritten Metallauskleidung (20) gebildet ist, so dass die Mikrowellendichtungsdrossel (12), der gerade Abschnitt (15) und der nach innen gebogene Abschnitt (17) einen monolithischen Metalltürrahmen (21) bilden.

3. Der kombinierte Konvektions-/ Mikrowellenofen (2) wie in Anspruch 1 oder 2 aufgeführt, ist **dadurch gekennzeichnet, dass** die Tür (1) bei dem perforierten Metallgitterabschnitt (22) und der gerade Abschnitt (15) in einer gleichen Ebene liegen.

4. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in den Ansprüchen 1 bis 3 aufgeführt, ist **dadurch gekennzeichnet, dass** eine Tür (1), bei der der nach innen gebogene Abschnitt (17) eine oder mehr als eine sich verjüngende Schulter (23) aufweist, die an das perforierte Metall angrenzt Siebabschnitt (22) und eine bogenförmige Schulter (24), die sich an den geraden Abschnitt (15) anschließt.

5. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in einem der Ansprüchen 1 bis 4 aufgeführt, ist **dadurch gekennzeichnet, dass** die Tür (1) eine Eindringstiefe (D) nach innen gebogenem Abschnitt (17) in den Garraum (3) hineinragt und bis zu einem Abstand von zwei bis acht Millimetern reicht.

6. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in einem der Ansprüchen 1 bis 5 aufgeführt, ist **dadurch gekennzeichnet, dass** die Tür (1), bei der die Mikrowellen-Dichtungsdrossel (12) eine Vielzahl von LC-Resonanzhohlräumen (25) enthält und nacheinander an vorbestimmten Stellen ausgebildet sind und an bestimmten Abständen entlang einer Umfangsrichtung auf die Seitenwände auf, wobei jeder LC-Resonanzhohlraum eine oder mehrere Schlitze (26) aufweist, der der Vorderwand (7) gegenüberliegt.

7. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in einem der Ansprüchen 2 bis 5 aufgeführt, ist **dadurch gekennzeichnet, dass** die Tür (1) durch einen monolithischen Türrahmen (21), durch Pressen und Biegen gebildet ist.

8. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in einem der Ansprüchen 1 bis 7 aufgeführt, ist **dadurch gekennzeichnet, dass** der kombinierte Konvektions- / Mikrowellenofen (2) ein Mikrowellen Magnetron zum Strahlungserhitzen von Nahrungsmitteln im Innenraum des Garraums (3) und eine Benutzerschnittstelle zum Empfangen von Benutzereingaben und zur akustischen und / oder visuellen Ausgabe von Informationen umfasst und eine Steuereinheit, die zur Steuerung des elektrischen Widerstands, des Magnetrons und Benutzerschnittstelle dient, wobei der kombinierte Konvektions-/ Mikrowellenofen (2) darüber hinaus einer Tür (1) umfasst, die schwenkbar ist und den Garraum (3) öffnet / schließt.

9. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in einem der Ansprüchen 1 bis 8 aufgeführt, ist **dadurch gekennzeichnet, dass** das nach innen gebogenem erstem Segment (9) und das nach innen gebogenem zweitem Segment (10) in vorbestimmten Abständen in Umfangsrichtung um die Öffnung (6) des Garraums (3) herum punktgeschweißt sind.

10. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in Anspruch 9 aufgeführt, ist **dadurch gekennzeichnet, dass** das vorbestimmte Intervall gleich oder kleiner als vier Zentimeter ist.

11. Der kombinierte Konvektions-/ Mikrowellenofen (2),

wie in Anspruch 9 oder 10 aufgeführt, ist **dadurch gekennzeichnet, dass** das vorbestimmte Intervall ungefähr drei Zentimeter beträgt.

12. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in Anspruch 1 bis 11 aufgeführt, ist **dadurch gekennzeichnet, dass** die Steuereinheit und die Benutzerschnittstelle in die Vorderwand (7) eingebaut sind.

13. Der kombinierte Konvektions-/ Mikrowellenofen (2), wie in Anspruch 12 aufgeführt, ist **dadurch gekennzeichnet, dass** die Steuereinheit eine Vielzahl von Modi aufweist, einschließlich einen ersten Modus zum Kochen von Nahrungsmitteln lediglich durch konvektive Wärmeübertragung, einen zweiten Modus zum Kochen von Nahrungsmitteln nur durch Mikrowellenstrahlung und einen dritten Modus zum Kochen von Lebensmitteln durch konvektive Wärmeübertragung und Mikrowellenstrahlung in Kombination.

Revendications

1. La combinaison convection / four micro-ondes (2) comprenant une cavité de cuisson (3) entourée par une paroi de cavité (4) formée d'un premier revêtement métallique (5), la cavité de cuisson (3) comportant une ouverture (6) et une paroi frontale (7) formée à partir d'un second revêtement métallique (8), le premier revêtement métallique (5) et le second revêtement métallique (8) présentant respectivement un premier segment courbé vers l'intérieur (9) et un segment courbé vers l'intérieur un second segment (10) qui se touchent mutuellement à l'extérieur de la cavité de cuisson (3) autour de l'ouverture (6) de manière circonférentielle, une porte (1) comprenant des parois métalliques latérales (11) comprenant un étranglement à micro-ondes (12) configuré pour s'opposer de manière circonférentielle au paroi frontale (7) à travers un premier espace (13), la porte (1) comprenant en outre une paroi métallique interne (14) qui comprend

- une partie droite (15) configurée pour s'opposer de manière circonférentielle directement au premier segment plié vers l'intérieur (9) et au deuxième segment plié vers l'intérieur (10) à travers un second espace (16) et
- une partie courbée vers l'intérieur (17) configurée pour faire saillie de manière circonférentielle dans la cavité de cuisson (3) le long d'un bord (18) de l'ouverture (6) afin de s'opposer directement au premier revêtement métallique (5) à travers un troisième espace vide (19),

dans lequel la paroi métallique interne (14) comprend en outre une partie d'écran perforée (22), dans laquelle la partie d'écran perforée (22) est entourée de manière circonférentielle par la partie courbée vers l'intérieur (17), et
dans lequel la partie d'écran en métal perforé (22) est décalée vers l'extérieur par rapport à la partie courbée vers l'intérieur (17) d'une distance prédéterminée.

2. La combinaison convection / four micro-ondes (2) selon la déclaration 1, **caractérisé par** la porte (1) dans laquelle les parois métalliques latérales (11) et la paroi métallique interne (14) sont intégralement formées à partir d'un troisième revêtement métallique (20) de telle sorte que l'étranglement d'étanchéité à micro-ondes (12), la partie droite (15) et la partie courbée vers l'intérieur (17) constituent un cadre de porte métallique monolithique (21).

3. La combinaison convection / four micro-ondes (2) selon la déclaration 1 ou 2, **caractérisée par** la porte (1) dans laquelle la portion d'écran perforée en métal (22) et la portion droite (15) se situent dans un même plan.

4. La combinaison convection / four micro-ondes (2) selon l'une quelconque des déclarations 1 à 3, **caractérisé par** une porte (1) dans laquelle la partie courbée vers l'intérieur (17) comprend un ou plusieurs épaulements effilés (23) qui jouxte la partie d'écran perforée en métal (22) et un épaulement en forme d'arc (24) qui relie la partie droite (15).

5. La combinaison convection / four micro-ondes (2) selon l'une quelconque des déclarations 1 à 4, **caractérisé par** la porte (1) dans laquelle une profondeur de pénétration (D) de la partie courbée vers l'intérieur (17) qui fait saillie dans la cavité de cuisson (3) est compris entre deux et huit millimètres.

6. La combinaison convection / four micro-ondes (2) selon l'une quelconque des déclarations 1 à 5, **caractérisé par** la porte (1) dans laquelle l'inductance d'étanchéité à micro-ondes (12) comprend une pluralité de cavités résonantes LC (25) qui sont formées successivement à des intervalles prédéterminés le long d'une direction circonférentielle sur les parois latérales, chaque cavité résonante LC ayant une ou plusieurs fentes (26) opposées à la paroi antérieure (7).

7. La combinaison convection / four micro-ondes (2) selon l'une quelconque des revendications 2 à 5, **caractérisée par** la porte (1), dans laquelle le cadre de porte monolithique (21) est formé par pressage et pliage.

8. La combinaison convection / four micro-ondes (2)

selon l'une quelconque des déclarations 1 à 7, la combinaison convection / four micro-ondes (2) comprenant un magnétron à micro-ondes pour le chauffage radiatif d'aliments à l'intérieur de la cavité de cuisson (3), une interface utilisateur pour recevoir des entrées d'utilisateur et pour émettre de manière audible et / ou visuelle des informations et une unité de commande pour commander la résistance électrique, le magnétron et l'interface utilisateur, la combinaison convection / four micro-ondes (2) étant **caractérisé en ce qu'**il comprend en outre une porte (1) qui est de manière pivotante pour ouvrir / fermer la cavité de cuisson (3).

9. La combinaison convection / four micro-ondes (2) selon les déclarations 1 à 8, **caractérisé en ce que** le premier segment coudé vers l'intérieur (9) et le second segment plié vers l'intérieur (10) sont soudés par points à des intervalles prédéterminés de manière circonférentielle autour de l'ouverture (6) de la cavité de cuisson (3).

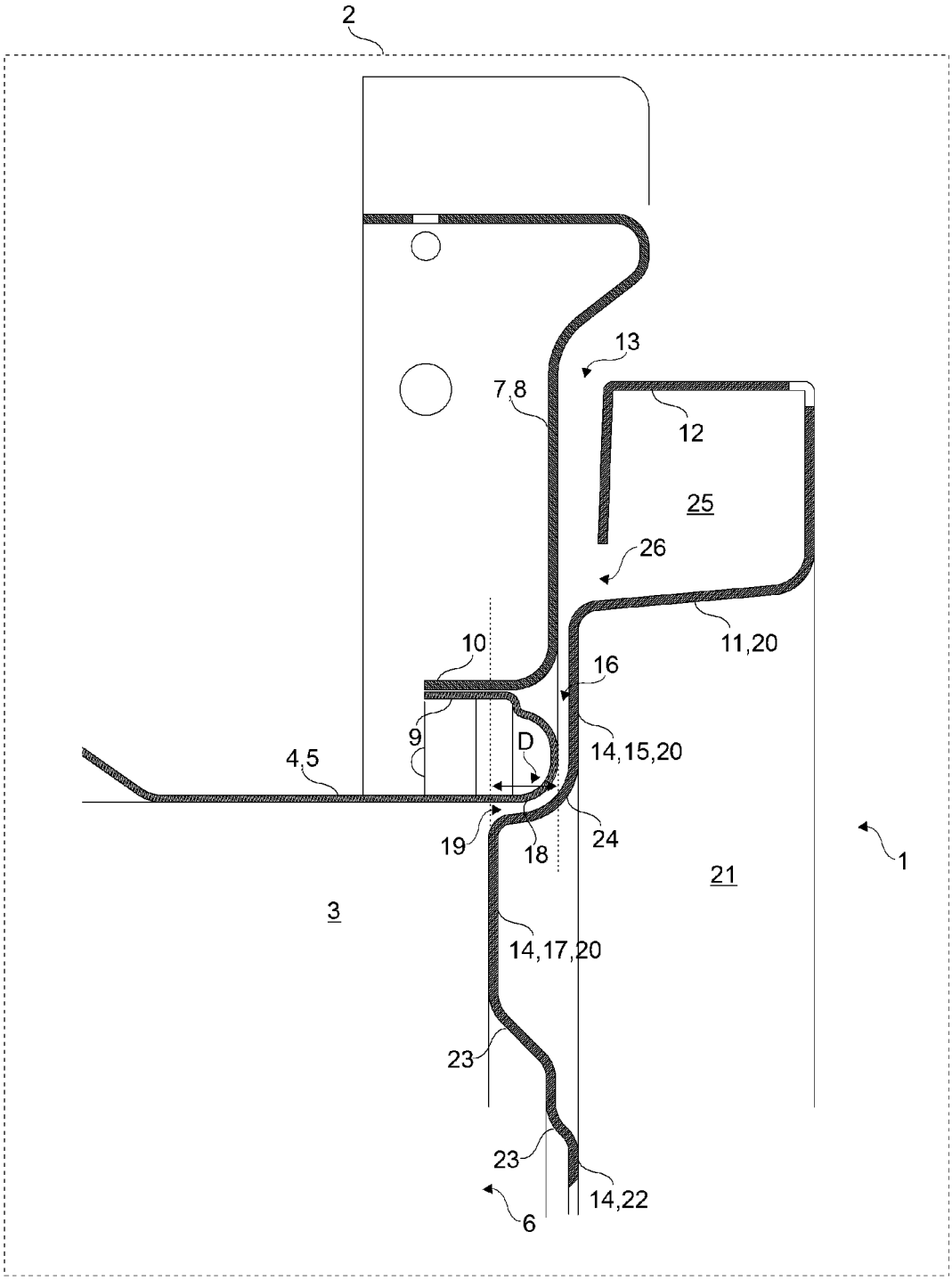
10. La combinaison convection / four micro-ondes (2) selon la déclaration 9, **caractérisée en ce que** ledit intervalle prédéterminé est égal ou inférieur à quatre centimètres.

11. La combinaison convection / four micro-ondes (2) selon la déclaration 9 ou 10, **caractérisée en ce que** ledit intervalle prédéterminé est d'environ trois centimètres.

12. La combinaison convection / four micro-ondes (2) selon l'une quelconque des déclarations 1 à 11, **caractérisée en ce que** l'unité de commande et l'interface utilisateur sont installées dans la paroi frontale (7).

13. La combinaison convection / four micro-ondes (2) selon la déclaration 12, **caractérisé en ce que** l'unité de commande comporte plusieurs modes comprenant un premier mode de cuisson d'aliments uniquement par transfert de chaleur par convection, un second mode de cuisson d'aliments uniquement par rayonnement micro-ondes et un troisième mode de cuisson d'aliments par transfert de chaleur par convection et rayonnement micro-ondes en combinaison.

Fig. 1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REFERENCES CITED IN THE DESCRIPTION

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