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71 Applicant: **MERLONI ELETTRODOMESTICI S.p.A.**

**Viale Aristide Merloni, 45
I-60044 Fabriano (AN)(IT)**

72 Inventor: **Antonini, Luciano
Via C. Varano 28
I-62032 Camerino (MC)(IT)**
Inventor: **Quintini, Antonio
Via E. Brogarelli 84
I-60044 Fabriano (AN)(IT)**

54 **Gas burner for food cooking.**

57 A gas burner for food cooking is described, of the type comprising a burner body (3) and a flame separator element (7) defining a chamber (8) having an approximately toroidal shape, in particular a burner destined to produce a first flame-crown towards the external of said flame separator element (7) and a second flame-crown towards the interior of said

flame separator element (7). The main characteristic of the described burner is that the secondary air necessary for the combustion of said internal flame-crown is taken from above the cooking plane (P) and that means (12) for supplying said secondary air from the external of the burner (1) to said internal flame-crown are provided.

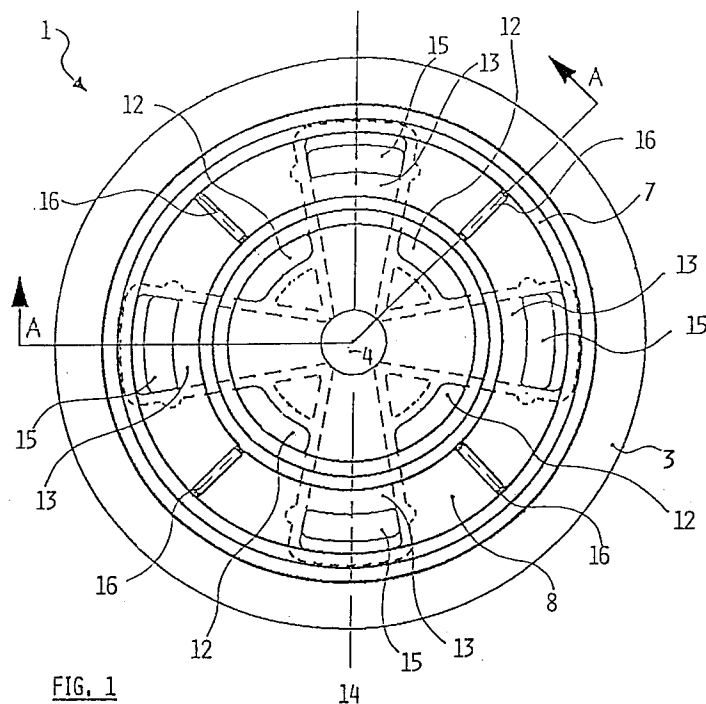


FIG. 1

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The present invention refers to a gas burner for food cooking, in particular a double flame-crown burner.

Burners of the described type are conceived so as to present a flame separator element having the shape of a circular ring (tore), from which two series of flames exit: the first being directed towards the external and the second being directed towards the interior of the ring.

If compared to traditional burners having a single flame-crown, burners of the described type allow to obtain a better heat distribution, and are therefore particularly suitable in the case of use of pans of a large diameter.

Double flame-crown burners of the known type have however some problems, in their functioning and in their installation and maintenance; it is for these reasons, for example, that burners with double flame-crown, of common use in kitchens (in the sense of cooking apparatuses), are rarely applied in built-in appliances.

Such application, in this last case, is made difficult due to the total height of the double flame-crown burners of the known type, which generally present a Venturi tube vertically arranged, within which the mixing of gas and primary air is realised, and under which the gas injector is arranged.

Such realisation determines a significant vertical height of the burner, that does not meet the needs that are the basis of the realisation of cooking hobs, destined to be used in built-in kitchens.

Besides that, it must also be considered the fact that withdrawing the primary air from below the cooking plane determines drawbacks, due to the fact that the air quantity downwardly drawn is difficult to control, with the consequent mixing inconsistency and unsatisfactory combustion.

A further disturbing element is the fact of withdrawing the air from a zone in which turbulence can be present, due to the thermal convection effect and, in the cases where it is foreseen, for effect of forced ventilation which assures any eventual electronic components from reaching dangerous temperatures.

Another problem of the traditional double crown burners, in particular in the case of embodiments with horizontal Venturi, is due to the difficulty of adjustment or replacement of the gas injector; such operations, that are for example necessary when the burner must be able to operate with gases having different characteristics and that it must therefore be possible to be adjusted consequently, are very complicated, due to the actual construction of the burner, whichever is the Venturi arrangement, be it horizontal or vertical.

In any case, one of the greater problems, common to all known burners with double flame-crowns, is the difficulty to allow the secondary air

to reach the internal flame-crown; such difficulty leads to, as a consequence, a poor functioning of the burner.

In fact, as is known, in addition to the primary air requested for the air-gas mixture, the flame of the burner also requires secondary air for the combustion.

Such secondary air is drawn from the environment and reaches the external flame-crown without problems; on the contrary it can reach the internal crown only with extreme difficulty, i.e. when the burner is ignited and the container to be heated is placed above

A possible solution to such a problem is to provide for several openings or vertical channels between the interior of the cooking apparatus and the central zone of the circular ring that realises the flame separator.

With such solution, however, the secondary air is taken from below the cooking plane, and this fact determines functional drawbacks, due to causes substantially similar to those previously described, with reference to the drawing of the primary air from below the cooking plane.

It must finally be noted that all kinds of burners, with single or double crowns, have further functional problems, due to the fact that they are very sensitive to disturbances caused by occasional currents of air.

The aim of the present invention is that of obviating the abovementioned problems and to indicate a gas burner, in particular with a double flame-crown that is of simple realisation and maintenance, that assures greater installation flexibility and that, by means of a constant and correct drawing of the secondary air for the internal flame-crown, and of the primary air for its mixing with the gas, assures a perfect combustion.

A further aim of the present invention is that of indicating a gas burner for food cooking in which the combustion is not affected by occasional currents of air.

To achieve such aim, the present invention has for its subject a gas burner for food cooking, of the type comprising a burner body and a flame separator element defining a chamber having an approximately toroidal shape, in particular a burner destined to produce a first flame-crown towards the external of said flame separator element and a second flame-crown towards the interior of said flame separator element, characterised in that the secondary air necessary for the combustion of said internal flame-crown is taken from above the cooking plane and that means for supplying said secondary air from the external of the burner to said internal flame-crown are provided.

Further aims and advantages of the present invention will result clear from the detailed descrip-

tion that follows and from the annexed drawings, supplied as an explanatory and non-limiting example, wherein:

- in figure 1 schematically represents, in plan and in partial section, the burner object of the present invention;
- in figure 2 schematically represents the section of the burner of Figure 1 along the line A:A.

With reference to the figures, reference number 1 indicates the burner subject of the present invention as a whole; reference number 2 indicates a sump, on which is associated, in a removable way, a burner body, indicated with reference number 3; said body 3, is advantageously realised from two distinctive pieces, coupled between themselves by way of reciprocal references, for simplicity not represented in the drawings.

Said burner body has in its inferior part a central tubular portion 4 and radial centring fins 5, that realise a support plane for the body 3 on the sump 2; said fins 5 delimit radial passages, one of which is indicated with 6, such that the primary air drawn from the exterior can overcome the upper edge of the sump 2, descend in it and then ascend along the central hole of the tubular portion 4. As can be noted from figure 2, such passages 6 allow for the drawing of the air from above the cooking plane, indicated with the letter P.

On the superior part of said burner body 3 a circular ring-shaped flame separator element, indicated with 7, is arranged, which in conjunction with said body 3 defines a chamber having an approximately toroidal shape, indicated with 8.

Said flame separator 7 has two series of slots 9a and 9b for the exit of the flames, realised on the external and internal walls of the ring flame separator; through such slots 9a and 9b the external flame-crown and the internal flame-crown are respectively obtained.

With reference number 10 the duct for supplying the burner with gas is indicated; reference number 11 indicates the injector or nozzle through which the same gas is introduced to the sump 2; the vertical axis of said injector 11 is substantially the same as the tubular portion 4.

Over the passages 6, in the body 3 of the burner, louvers, indicated with 12, are realised, for allowing the drawing and the passage of the secondary air necessary for the correct combustion of the internal flame-crown; such louvers 12 place the central zone of the flame separator element 7 in communication with the exterior of the burner 1, i.e. with its peripheral zone.

With reference number 13 four passages are indicated, obtained in said burner body 3; they extend from the tubular portion 4, and are disposed with a radial symmetry in respect of the axis of the

injector, indicated with 14, but they do not necessarily lie on a plane being perpendicular to said axis. Said passages 13, in union with the tubular portion 4, constitute a mixing element apt at inducing a Venturi effect upon the air-gas mixture.

Through ports 15, said passages 13 meet in the chamber 8, where appropriate partition baffles, indicated with 16, are provided; said baffles 16 delimit circular portions of said chamber 8, in a number being equivalent to those of the passages having a Venturi effect (in the case illustrated in the figures, visible in particular in figure 1, the burner is provided with four passages 13 and four partition baffles 16).

The functioning of the burner object of the present invention is as follows. The gas arrives from duct 10 and, through the injector 11, and enters the sump 2.

The primary air necessary for obtaining the air-gas mixture is drawn from above the cooking plane, from a zone which is not subject to disturbing elements and, through the passages 6, it enters the sump 2, following the path indicated by the arrow of the reference number "6".

Primary air and gas then rise in the tubular portion 4, mix themselves in the passages 13 and the thus obtained mixture passes, through the ports 15, in the toroidal chamber 8; more in detail, the mixture obtained in the tubular portions 4 and in the various passages 13 reaches the corresponding circular portions of the chamber 8, delimited by the baffles 16.

The mixture then flows to the exterior of said portions, through the slots 9a and 9b, in order to be ignited and produce the two flame-crowns, that are in this way functionally divided in a number being equal to the number of passages 13 provided and do not therefore significantly suffer from occasional currents of air.

The secondary air necessary for the combustion of the external flame-crown is drawn from the environment, in the zone proximate to the slots 9a.

On the contrary, the secondary air necessary for the correct combustion of the internal flame-crown is drawn from a zone which is far from the flame separator and from the slots 9b.

More in detail, this secondary air is drawn through the louvers 12, realised through the burner body 3; following the path indicated by the arrow of the reference number "12" said secondary air, from the peripheral zone of the burner 1, reaches the central zone of the ring constituting the flame separator element 7.

The drawing zone for the primary and secondary air, external to the burner and to the cabinet of the cooking apparatus, is thus substantially the same; in order to avoid the mixing of the primary air flow with the secondary air flow, besides appro-

priately choosing the shapes and the sizes of passages 6 and louvers 12, separation shields are advantageously provided, one of which is visible in figure 2 with reference number 17.

Due to the particular embodiment, the burner object of the present invention has a greatly reduced vertical encumbrance; internal operations (for example the replacement or the regulation of the injector 11) can be carried out in a very easy manner, after having manually removed the flame separator 7 and the burner body 3.

The characteristics of the double flame-crown burner object of the present invention are clear from the given description and the annexed drawings; also clear are its advantages. In particular:

- the replacement of the injector, the maintenance of the burner and its regulation are extremely simplified, due to the reduced height of the ensemble of the burner; for the same reason the burner object of the present invention has a great installation flexibility and can be advantageously utilised in built-in cooking hobs;
- the secondary air necessary for the internal flame-crown is drawn from above the cooking plane, a zone which is not subjected to disturbing elements, with the consequent advantages of a correct and constant drawing, that means perfect combustion; for the same reasons, the primary air drawn from above the plane allows for obtaining the correct air-gas mixture;
- the functioning of the burner is shuttered, i.e. in its particular configuration, that provides for several passages of a Venturi effect, so as that the same burner is less sensible to troubles provoked by external currents of air and consequent accidental flame loss; the advantageous embodiment of the baffles, that define within the toroidal chamber circular sectors being in correspondence with each of the passages 13, further increases the reliability of the burner.

It is clear that many changes can be made to the gas burner object of the present invention.

For example, in the case illustrated in the figures, the partition baffles 16 are obtained from the burner body 3, but the same could be obtained directly on the flame separator 7.

Other possible variants could regard the inclination of the passages 13, that in an embodiment being different from that illustrated, may not necessarily be perpendicular to the axis 14 of the injector 11; even the number of such passages 13 could be different from those illustrated: for example they could be only three, placed at 120° between one another.

Furthermore the concept of withdrawing the secondary air necessary for the internal flame-crown from the external of the burner can be advantageously applied also in gas burners in which the primary air may be withdrawn only from below the cooking plane.

With the aim of avoiding accidental flame loss, it is necessary to specify that the idea of shuttering its functioning is applicable to any burner based on the Venturi effect, also for those not being of the double flame crown type; for a burner being of the single flame crown type, it is in fact sufficient to realise (on the burner's body or on the normal single crown flame separators) appropriate walls or baffles, that allow for dividing in a number of parts the distribution chamber (8) of the air-gas mixture. For example a circular wall could be provided, for defining a toroidal chamber within the traditional flame separator, and baffles of the type illustrated in figures 1 and 2; alternatively, still for a single flame crown burner, baffles that radially branch off from the centre of the flame separator to its circumferential wall could be provided for, in a number being equal to the number of passages 13 provided.

It is however clear that numerous other changes can be made by the man skilled in the art to the gas burner described as an example, without departing from the novelty principles of the invention.

Claims

1. Gas burner for food cooking, of the type comprising a burner body (3) and a flame separator element (7) defining a chamber (8) having an approximately toroidal shape, in particular a burner destined to produce a first flame-crown towards the external of said flame separator element (7) and a second flame-crown towards the interior of said flame separator element (7), characterised in that the secondary air necessary for the combustion of said internal flame-crown is taken from above the cooking plane (P) and that means (12) for supplying said secondary air from the external of the burner (1) to said internal flame-crown are provided.
2. Gas burner for food cooking, according to claim 1, characterised in that said means comprise at least one louver (12), passing through said burner body (3), which places in communication the central zone of the flame separator element (7), in which the internal flame-crown is obtained, and the environment to the exterior of the burner (1), above the cooking plane (P).

3. Gas burner for food cooking, according to claim 1, characterised in that also the primary air necessary for the air-gas mixture is taken from above the cooking plane (P), through at least one opening (6). 5
4. Gas burner for food cooking, according to claim 3, characterised in that the air and gas mixture is carried out in a single conduit (4, 13) that is divided into at least two passages (13) that induce a Venturi effect upon the air-gas mixture and are disposed with a radial symmetry in respect of the axis (14) of the gas injector (11) of the burner (1). 10
5. Gas burner for food cooking, according to the preceding claim, characterised in that said passages (13) are realised in said burner body (3). 15
6. Gas burner for food cooking, according to at least one of the preceding claims, characterised in that said single conduit (4, 13) comprises a vertical tubular portion (4), axially centred in respect of the gas injector (11) of the burner (1), from which said passages (13) extend that meet in said chamber (8). 20
7. Gas burner for food cooking, according to at least one of the preceding claims, characterised in that partition baffles (16) are provided that define a corresponding number of circular sectioned portions of said toroidal chamber (8), said baffles (16) being in particular realised on said flame separator (7) or on said body (3). 25
8. Gas burner for food cooking, according to the preceding claim, characterised in that the number of said portions is equal to the number of said passages (13), in a way that the two flame-crowns are functionally divided in a number being equal to the number of passages (13) provided. 30
9. Gas burner for food cooking, according to at least one of preceding claims, characterised in that said primary air and said secondary air are taken substantially from the same zone, to the exterior of the burner and from above the cooking plane (P). 35
10. Gas burner for food cooking, according to the preceding claim, characterised in that between said openings (6) and said louvers (12) shielding means (17) are provided, in order to prevent the re-mixing of the primary air and the secondary air currents. 40
11. Gas burner for food cooking, of the type comprising an injector (11) connected to a gas supply duct (10), a burner body (3), means for mixing said gas with the primary air, a flame separator element (7) defining in union with said body (3) a chamber (8) for distributing the air-gas mixture obtained in the mixing means, characterised in that said mixing means comprise a single conduit (4, 13) that is divided into at least two passages (13) that induce a Venturi effect on said air-gas mixture and that are arranged in radial symmetry with respect to the axis (14) of said injector (11). 45
12. Gas burner for food cooking, according to the preceding claim, characterised in that said passages (13) are realised in said burner body (3). 50
13. Gas burner for food cooking, according to claim 11, characterised in that said single conduit (4, 13) comprises a vertical tubular portion (4), axially centred with respect to the gas injector (11) of the burner (1), from which said passages (13) depart that meet in said distribution chamber (8). 55
14. Gas burner for food cooking, according to at least one of preceding claims, characterised in that said passages (13) are three or four.
15. Gas burner for food cooking, according to at least one of preceding claims, characterised in that said body (3) is arranged on a sump (2) and the primary air necessary for the air-gas mixture is taken from above the cooking plane (P), through at least one louver (6) defined between said body (3) and said sump (2).
16. Gas burner for food cooking, according to at least one of the claims, from 11 to 15, characterised in that said distribution chamber (8) is divided, by way of appropriate partition baffles (16), in at least two separate semi-chambers, said partition baffles (16) being in particular realised on said flame separator (7) or on said body (3).
17. Gas burner for food cooking, according to claim 16, characterised in that the number of said semi-chambers is equal to the number of said passages (13), in such a way that the flame crown obtained by said burner is functionally divided in a number being equal to the number of passages (13) provided.

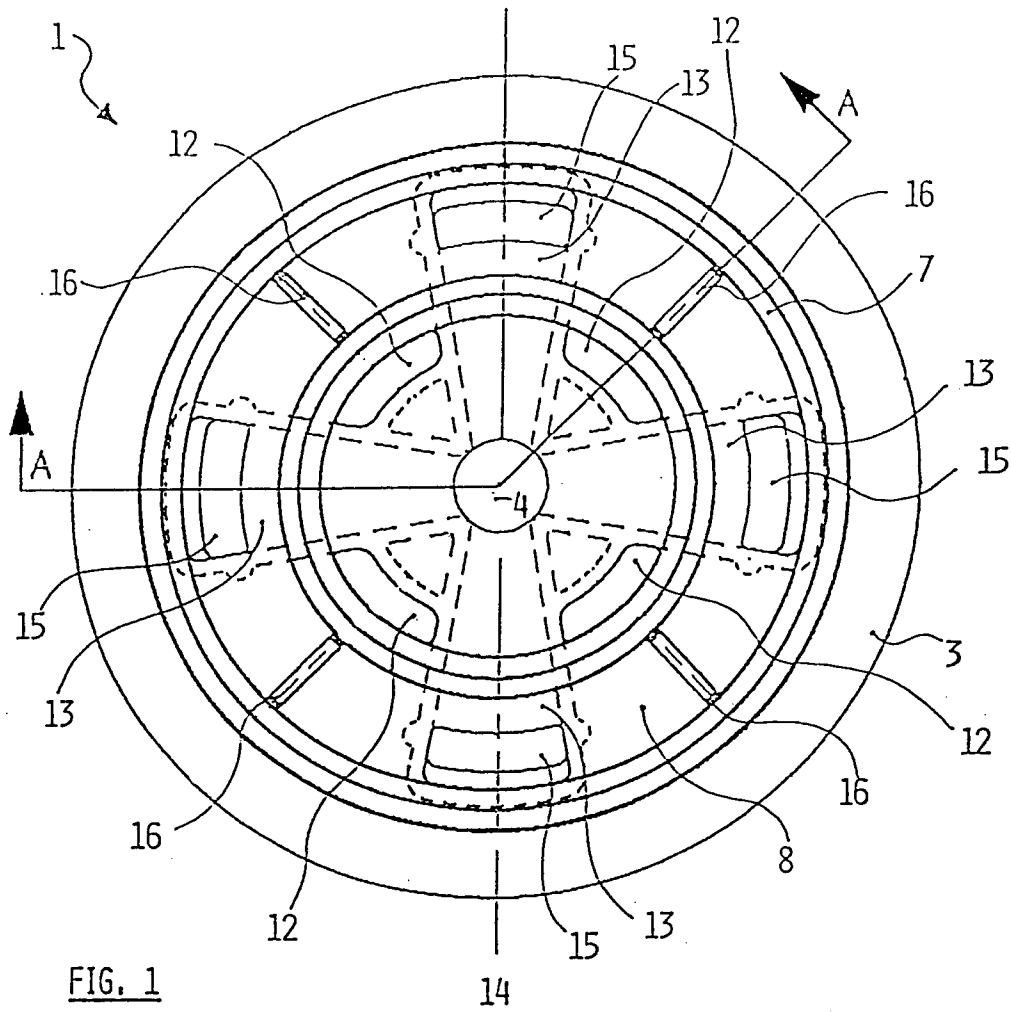


FIG. 1

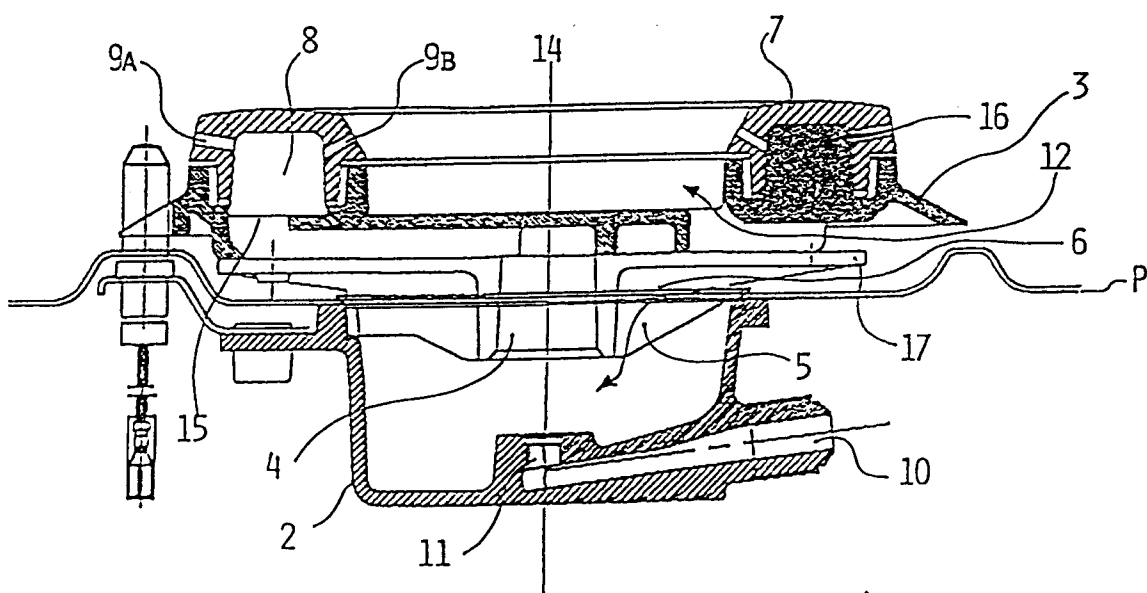


FIG. 2