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(54) **Burner for a household gas cooktop and household gas cooktop**

(57) A burner (2) for a household gas cooktop (1) comprising one or more combustion units (4), one or more gas partial ducts (7) connected to each of the combustion units (4), a regulating valve (8) of the gas passage in the partial duct (7), air (11, 12, 13) feeding means to the gas flow (9) in the partial duct (7).

The burner (1) further comprises a enhancement device (14) with a forced suction unit (15) to suck a second air volume (16) from an area which is different from the area of the first air volume (10), a ventilation duct (17) connecting the forced suction unit (15) to an enhanced combustion unit (4) of said combustion units (4) in order to supply the second air volume (16) to the enhanced combustion unit (4), an auxiliary duct (18) connected to the ventilation duct (17) and adapted to supply a second gas flow (19) to the second air volume (16), an auxiliary valve (20) to regulate the second gas flow (19) in the auxiliary duct (18).

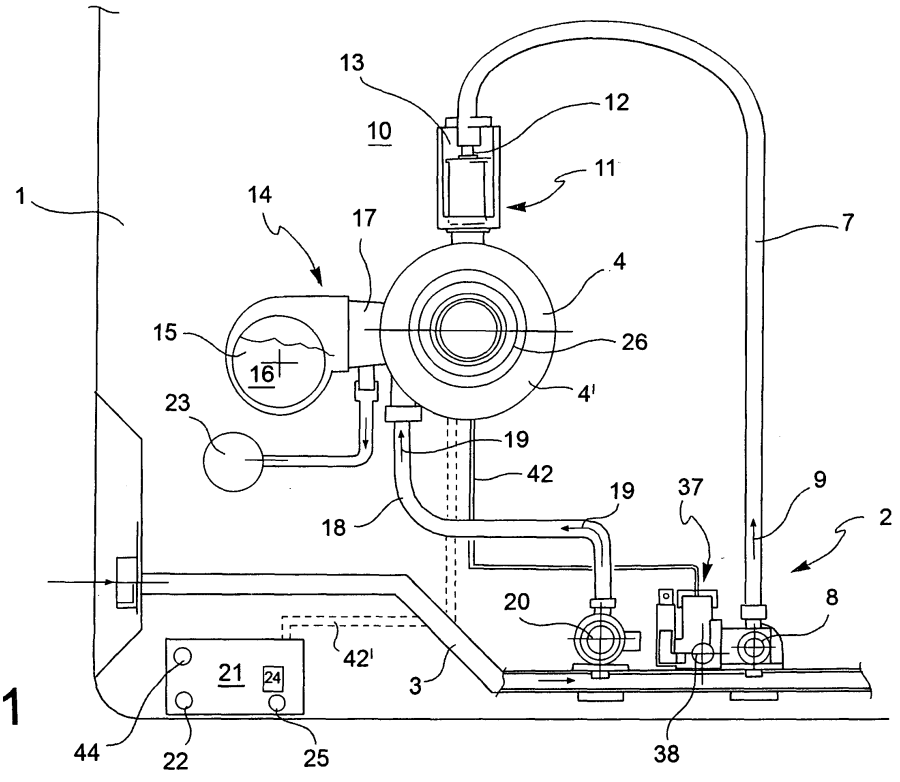

FIG. 1

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Description

[0001] The present invention relates to a burner for a household gas cooktop and to a household gas cooktop having such burner.

[0002] Gas cooktops are known to comprise a supporting and containing structure, a support grid for containers, e.g. pots, and one or more fuel gas burners so configured as to generate a series of flames to heat the containers supported by the support grid.

[0003] The burner usually comprises a main gas supply duct connectable to an external fuel gas source, for example to the gas pipe network or a gas cylinder. One or more burner combustion units are connected to the main duct through one or more partial gas ducts, respectively. A regulating valve (usually called the gas tap) is associated to each of the gas partial ducts, which is so configured as to regulate the gas passage through the partial duct between a closing position and a maximum opening position. In addition to the regulating valve, a safety valve is provided to cut the gas passage off through the partial duct in response to a signal indicating an incorrect operation of the combustion unit. Such safety valve can be either arranged upstream or downstream the regulating valve (in relation to the gas flow direction from the main duct to the combustion unit), or integrated in the valve body of the regulating valve.

[0004] A known safety valve comprises an elastically stressed shutter in a rest position in which it closes a gas passage opening (closed configuration), and a manual actuation device so configured as to allow the user moving the shutter, against the elastic force, from the rest position to an operative position in which it clears the gas passage opening (opened configuration). An electromagnet electrically connected to a thermocouple sensor arranged in the proximity of the combustion unit is so configured as to maintain the shutter in the operative position (opened configuration) in case the temperature which the thermocouple is exposed to does not drop below a limit value (indicating a correct operation of the combustion unit or, in other terms, ignited flame). In the event of an accidental extinction of the flame, the temperature of the combustion unit drops below the limit value, and the electric current generated by the thermocouple is no longer sufficient to maintain the shutter in the operative position. As a result, the shutter is elastically pushed to the rest position (closed configuration).

[0005] In known household gas cooktops, the burner is a non-aerated burner, or an atmospheric air burner (called *induced* air burner), in which a venturi tube mixer is provided which is arranged in the partial duct upstream the combustion unit and adapted to suck a primary air amount in the gas partial flux. A further volume of secondary air is needed for an efficient combustion, which is drawn by the same flames from the free space under the pot.

[0006] The burners for household gas cooktops, while being satisfactory as regards safety and reliability, have the drawback that a same combustion unit is not adjustable for a broad range of heating power. In order to obviate this drawback, combustion units have been proposed which have more crowns, able of being supplied individually or concomitantly. Since the flames of each crown have to draw from a determined secondary air volume, the so-called multi-crown solutions are very bulky, both in width and in clear height beneath the pot plane, just in order to provide the secondary (atmospheric) air volume for each of the flame crowns.

[0007] This technical limitation excludes, for example, the use of the cooktop for the ultra-rapid heating of small and medium diameter pots, and requires an overdimensioning of the whole cooktop, for a given number of combustion units.

[0008] Therefore, object of the present invention is to provide a burner for a household gas cooktop having such characteristics as to obviate at least some of the drawbacks cited with reference to the prior art.

[0009] Within the scope of the main object, a further object of the present invention is to propose a burner for a household gas cooktop which allows the modulation of the combustion inside a broad power range for a given dimension (pot bottom width and height) of the space for the combustion unit, and for a given dimension of the whole cooktop constant.

[0010] A further object of the present invention is to provide a burner for a household gas cooktop which allows keeping a fuel gas - oxidizing air ratio essentially constant, both for a low power and a high power operation.

[0011] These and other objects are achieved by a burner for a household gas cooktop according to the claim 1.

[0012] Advantageous embodiments are the object of the dependant claims.

[0013] In order to better understand the present invention and appreciate the advantages thereof, some embodiments thereof will be described below, by way of non-limiting example, with reference to the annexed Figures, in which:

[0014] Fig. 1 schematically illustrates a cooking plate with a burner according to an embodiment of the invention;

[0015] Fig. 2 schematically illustrates a cooking plate with a burner according to a second embodiment of the invention;

[0016] Fig. 3 is a perspective view of the assembly of a combustion units, an air supply device and a forced ventilation device of a burner according to an embodiment of the invention;

[0017] Fig. 4 is a bottom view of the assembly in Fig. 3;

[0018] Fig. 5 is a top view of the assembly in Fig. 3;

[0019] Fig. 6 is a side view of the assembly in Fig. 3;

[0020] Fig. 7 is a sectional view of the assembly in Fig. 3;

[0021] Fig. 8 is a top view of a diffuser body of an enhanced combustion unit of the burner according to an

embodiment;

[0022] Fig. 9 is a side view of the diffuser body in Fig. 8;

[0023] Fig. 10 is a sectional view along the X-X line in Fig. 8;

[0024] Fig. 11 is a perspective view of the diffuser body in Fig. 8;

[0025] Fig. 12 is a partial sectional view along the XII-XII line in Fig. 8;

[0026] Fig. 13 is a partial sectional view along the XIII-XIII line in Fig. 8;

[0027] Fig. 14 is a top view of a detail of the enhanced diffuser body of the burner according to an embodiment;

[0028] Fig. 15 is a side view of the detail in Fig. 14;

[0029] Fig. 16 is a sectional view of the detail in Fig. 14;

[0030] Fig. 17 is a perspective view of the detail in Fig. 14;

[0031] Fig. 18 is a circuital scheme for the control of the burner according to an embodiment of the invention;

[0032] Figs. 19 and 20 illustrate in schematic section a safety device of the burner according to an embodiment.

[0033] With reference to the Figures, a household gas cooktop is generally designated with the reference numeral 1. The cooktop 1 comprises a burner 2 with a main gas supply duct 3 which can be connected to an external fuel gas source, and one or more combustion units 4 with a plurality of flame outlet holes 5, 6 defining the flame configuration of the burner 2. One or more partial ducts 7 connect the main duct 3 to each of the combustion units 4, and a regulating valve 8 associated to the partial duct 7 allows a preferably continuous regulation of the gas passage through the partial duct 7 between a closed position and a maximum opening position.

[0034] In the partial duct 7 air feeding means are provided so configured as that, during the operation, the gas flow 9 in the partial duct and/or the same flame draw a first oxidizing air volume 10. The air feeding means comprise, for example, a venturi tube device 11 with a gas passage having a throttled section portion 12 and one or more passages 13 for the air 10 which open in the proximity of the throttled section portion 12, so that the gas acts as a driving fluid to draw the first air volume 10 into the partial gas flow 9.

[0035] According to an aspect of the invention, the burner 2 comprises a enhancement device 14 with a forced suction unit, for example a motor-rotor unit 15, adapted to suck a second air volume 16 from an area other than the area of the first air volume 10. A ventilation duct 17 connects the forced suction unit 15 to an enhanced combustion unit 4 (which can be the only combustion unit, or one of a plurality of combustion units 4, 4' of the burner), so as to be able to supply the second air volume 16 to the enhanced combustion unit 4. An auxiliary duct 18 is connected to the ventilation duct 17 which is adapted to supply a second gas flow 19 to the second air volume 16. The auxiliary duct 18 is provided with an auxiliary valve 20 to regulate the flow rate of the second gas flow 19 in the auxiliary duct 18 between a closed position (corresponding to a flow rate equal to zero) and a maximum opening position (corresponding to a maximum flow rate).

[0036] The enhancement device 14 further comprises enhancement actuating means in order to activate the forced ventilation unit 15 and the auxiliary valve 20 in order to supply the second air volume 16 together with the second gas flow 19 to the enhanced combustion unit 4.

[0037] According to an embodiment, the enhancement actuating means comprise actuating means of the forced ventilation unit 15, sensing means so configured as to detect a quantity indicative of the flow inside the ventilation duct 17, and actuating means of the auxiliary valve 20 causing the closure and opening of the auxiliary duct 18 as a function of the flow 16 in the ventilation duct 17. Such enhancement actuating means are implemented, by way of example, by a control unit 21, a enhancement actuating member, for example a handle or a push button 22 that can be operated by the user and being connected to the control unit 21, as well as a pressure sensor, e.g. a pressure switch 23 arranged in flow communication with the ventilation duct 17 and connected to the control unit 21.

[0038] The control unit 21 drives the forced suction unit 15 and the auxiliary valve 20 so as to actuate the suction unit 15 in response to an actuation of the enhancement activation push button 22 and to open the auxiliary duct 18 only when the flow inside the ventilation duct 17 is sufficient to drive the mixture of the second air volume 16 and the second gas flow 19 in the enhanced combustion unit 4. However, when the flow inside the ventilation duct 17 is insufficient (e.g. due to obstructions or malfunction of the electric motor), the control unit 21 provides for a closure of the auxiliary duct 18.

[0039] In accordance with an embodiment, the enhancement actuation member 22 comprises a enhancement adjusting member, preferably an adjustment handle, and the control unit 21 is so configured as to vary the air flow rate 16 in the ventilation duct 17 dependent from the adjustment position of the handle 22 and also to vary the flow rate of the second gas flow 19 by means of the auxiliary valve 20 dependent from the adjustment position of the adjustment handle 22 and/or dependent from a quantity indicative of the air flow 16 detected by the pressure sensor 23.

[0040] In accordance with a further embodiment, timing means 24 are provided, for example, being integrated in the control unit 21, and so configured as to automatically deactivate the enhancement device 14 after a predetermined maximum time interval. This allows actuating the burner in the enhancement mode in order to achieve an ultra-rapid initial heating of the dish and a successive operation in the standard (non enhanced) mode in order to keep the desired cooking temperature.

[0041] According to a further aspect of the invention, the timer 24 provides further a safety device which provides for automatically turning off the enhancement de-

vice after the above-mentioned preset period of time. According to an embodiment, the timing means 24 comprise adjustment means, for example a push button or a handle 25 to allow the user selecting the activation time of the enhancement device 14 within the maximum time interval.

[0042] With reference to an embodiment, illustrated e.g. in the Figs. 3, 6, 7, 9, and 11, the enhanced combustion unit 4 comprises a first series of flame outlet holes 5 in communication with the partial duct 7, and a second series of flame outlet holes 6 in communication with the ventilation duct 17, in which the ventilation duct 17 and the second series of flame outlet holes 6 are divided from the partial duct 7 so as to prevent a forced air back-flow in the partial duct 7.

[0043] The first series of flame outlet holes 5 and the second series of flame outlet holes 6 are arranged so that the flame configurations they determine are so close that they are able to heat the same container, e.g. the same pot. In other terms, the functions of the traditional operation and the enhanced operation are integrated in the same enhanced combustion unit 4.

[0044] Advantageously, the first series of flame outlet holes 5 and the second series of flame outlet holes 6 are formed in a same diffuser body 26 of the enhanced combustion unit 4. According to an embodiment (Figs. 9 - 11), the diffuser body 26 is formed as one piece.

[0045] Advantageously, the flame outlet holes of the first series 5 and the flame outlet holes of the second series 6 are arranged in annular, preferably circular, successions, and the second series of flame outlet holes 6 is radially arranged inside the first series of flame outlet holes 5. Furthermore, at least part of the flame outlet holes of the second series 6 is outwardly radially oriented, so that, once the enhancement device 14 has been activated, the flames of the second series of flame outlet holes 6 are ignited by the flames of the first series of flame outlet holes 5.

[0046] It is important to notice that the flame crown which are enhanced by means of forced air ventilation is the radially inner one, while the crown of flames which are supplied in the traditional manner is radially arranged outwardly. This results in a considerable reduction of the size of the enhanced combustion unit as compared with multi-crown solutions of the prior art, and it allows an automatic ignition of the enhanced flame crown, by means of the outer flame crown supplied in the traditional manner.

[0047] According to an embodiment, the diffuser body 26 comprises a base portion 27 having the shape of an annular disk, with a first essentially frustoconical outer circumferential surface 28. An intermediate annular portion 29 is connected to the base portion 27 with a second circumferential outer surface 30 which is essentially cylindrical and co-axial to the first outer surface 28. The second outer surface 30 has a lower diameter than the diameter of the first outer surface 28.

[0048] An annular upper portion 31 is connected to the intermediate portion 29 with a third essentially frustoconical outer surface circumferential 32 with a lower edge which is the main base of the frustum of cone, and which matches an upper edge of the second outer cylindrical surface 30.

[0049] The first series of flame outlet holes 5 is arranged in an annular succession and opens in the first outer surface 28 of the base portion. The second series of flame outlet holes 6 comprises two upper annular successions 6', spaced apart in the axial direction in relation to the diffuser 26, and opening in the third outer surface 30 of the upper portion 31 and an intermediate annular succession 6'' which opens in the second outer surface 30 of the intermediate portion 29.

[0050] Advantageously, a circumferential projection 33 is formed along an upper edge of the base portion 27 adapted to lower the flames of the first series 5 of flame outlet holes.

[0051] Similarly, a circumferential projection 34 can be formed along an upper edge of the upper portion 31 of the diffuser 26 to lower the flames of the second series 6 of flame outlet holes. Such lowering of the flames and, as a result, the concentration of the flame pattern which is indispensable so that they are able to concentrate a high power in a confined space, becomes possible just thanks to the forced air-gas supply of the enhancement device 14.

[0052] In accordance with an embodiment, the enhanced combustion unit 4 internally defines a central space 35 in flow connection to the auxiliary duct 18 and the second series 6 of gas outlet holes, as well as an annular space 36 which is co-axial to the central space 25 and divided therefrom, in flow connection with the partial duct 7 and with the first series 5 of gas outlet holes.

[0053] A safety device 37 is further provided, so configured as to cut the gas passage off through the partial duct 7 in response to a signal indicative of an incorrect operation of the combustion units 4. The safety device 37 comprises a safety valve 38 with a shutter 39 elastically stressed in a rest position (fig. 20) in which it closes a gas passage opening in the partial duct 7. A loading device 40 is associated to the safety valve 38 which is so configured as to allow the user moving the shutter 39, against the spring elastic force 41, from the rest position to an operative position (fig. 19) in which it clears the passage opening. A thermocouple sensor 42 is arranged in the proximity of the combustion units 4 and an electromagnet 43 electrically connected to the thermocouple sensor 42 is configured so as to keep the shutter 39 in the operative position only when the temperature which the thermocouple is exposed to 42 does not drop below a limit value indicative of a correct operation (flames ignited) of the combustion units 4.

[0054] Advantageously, the regulating valve 8 is operatively connected to the safety device 37, so that the actuation, by the user, of the regulating valve 8 results in a temporary switching of the safety device 37 in a opening configuration, in order to allow an initial gas flow in

the partial duct 7 in the absence of combustion and/or to bring the shutter of the safety valve to the operative position ("loading" the safety device 37).

[0055] According to an embodiment illustrated in Fig. 2, the auxiliary duct 18 connects the ventilation duct 17 to the partial duct 7 in a point downstream the safety device 37, so that, in the event of an incorrect operation of the enhanced combustion unit 4, the safety device closes both the partial duct 7 and the auxiliary duct 18.

[0056] According to an alternative embodiment, illustrated in Fig. 1, the auxiliary duct 18 connects the ventilation duct 17 to the main duct 3.

[0057] In this case, an auxiliary safety device can be provided for, which is so configured as to cut the gas passage off through the auxiliary duct 18 in response to a signal indicative of an incorrect operation of the enhanced combustion unit 4. The auxiliary safety device can be integrated in the control unit 21, which receives, for example, from the thermocouple 42, a signal indicative of an incorrect operation (e.g. extinguished flame) of the enhanced combustion unit 4 and drives the auxiliary valve 20 as a function of the received signal.

[0058] Alternatively, an auxiliary safety device can be provided (not shown), analogue to the previously described safety device 37.

[0059] The enhancement actuating device, in particular the activation member 22, can be operatively connected to the auxiliary safety device, so that the activation of the enhancement device 14, by the user, results in a temporary switching of the auxiliary safety device in a opening configuration, in order to allow a gas flow in the auxiliary duct and/or to "load" the auxiliary safety device.

[0060] The so far described burner can be provided with an ignition device 44 in order to generate a spark in the proximity of the flame outlet holes 5, 6. Such ignition device 44 is advantageously operatively connected to the safety device 37, so that a single ignition operation generates the ignition sparks and results in a temporary switching of the safety device 37 in an opening configuration, in order to allow an initial gas flow in the partial duct 7 also in the absence of combustion.

[0061] The burner 2 for household gas cooktop 1 and the cooktop 1 have a number of advantages. Due to the forced flow of the air-gas mixture, it is possible to considerable reduce the dimensions of the combustion units, since, at a high power, the combustion does not require anymore the atmospheric air volume adjacent to the flames. Furthermore, thanks to the fact of being able to actuate the enhanced combustion unit both only by means of the supply through the partial gas duct, and by means of a supply through the partial gas duct and the forced ventilation duct, in turn supplied by the gas auxiliary duct, it is possible to modulate the combustion in a very broad power range (for example from about 400W to about 7kW). This allows carrying out an ultra-rapid heating of pots having any dimensions, (by means of the double supply) and a successive maintaining of the temperature of the pot, only by means of the partial gas supply and without forced ventilation.

[0062] It shall be clear that those skilled in the art, to the aim of meeting contingent, specific needs, will be able to make further modifications and variations to the burner 2 for household gas cooktop 1 and to the cooktop 1 according to the present invention, which are all also covered by the protection scope of the invention, as defined by the following claims.

Claims

1. A burner (2) for a household gas cooktop (1) comprising:

- a main gas supply duct (3) connectable to an external fuel gas source,
- one or more combustion units (4) with a plurality of flame outlet holes (5, 6, 6', 6'') defining the flame configuration of the burner (2),
- one or more partial ducts (7) connecting said main duct (3) to each of said combustion units (4),
- a regulating valve (8) so configured as to regulate the gas passage through said partial duct (7) between a closed position and a maximum opening position,
- air feeding means (11, 12, 13) configured so that, during the operation, the gas flow (9) in said partial duct (7) and/or the same flame draw a first oxidizing air volume (10),

characterized in that said burner (2) comprises a enhancement device (14) comprising:

- a forced suction unit (15) adapted to suck a second air volume (16) from an area other than the area of the first air volume (10),
- a ventilation duct (17) connecting said forced suction unit (15) to an enhanced combustion unit (4) of said combustion units (4) so as to be able to supply said second air volume (16) to said enhanced combustion unit (4) ,
- an auxiliary duct (18) connected to said ventilation duct (17) and adapted to supply a second gas flow (19) to said second air volume (16),
- an auxiliary valve (20) so configured as to regulate said second gas flow (19) in said auxiliary duct (18) between a closed position and a maximum opening position,
- enhancement actuating means (21, 22, 23, 24, 25) adapted to activate said forced ventilation unit (15) and said auxiliary valve (20) to supply said second air volume (16) together with said second gas flow (19) to said enhanced combustion unit (4).

2. The burner (2) according to the claim 1, wherein said

enhancement actuating means (21, 22, 23, 24, 25) comprise:

- actuating means of the forced ventilation unit (15),
- sensing means (23) adapted to detect a quantity indicative of the flow inside the ventilation duct (17),
- actuating means of the auxiliary valve (20) so configured as to close and open said auxiliary duct (18) as a function of the flow in the ventilation duct (17).

3. The burner (2) according to any preceding claims, wherein said enhancement actuating means (21, 22, 23, 24, 25) comprise:

- a control unit (21),
- a enhancement actuating member (22) that can be actuated by the user and connected to said control unit (21),
- a pressure sensor (23) arranged in flow communication with said ventilation duct (17) and connected to said control unit (21),

wherein said control unit (21) drives said forced suction unit (15) and said auxiliary valve (20) so as to:

- actuating said suction unit (15) in response to an actuation of the enhancement actuating member (22), and
- closing the auxiliary duct (18) when the flow inside the ventilation duct (17) is insufficient, and
- opening the auxiliary duct (18) when the flow inside the ventilation duct (17) is sufficient to drive the second air volume (16) and the second gas flow (19) mixture in the enhanced combustion unit (4).

4. The burner (2) according to the claim 3, wherein said enhancement actuating member (22) comprises a enhancement adjusting member (22), preferably a adjustment handle (22), and said control unit (21) varies the air flow rate in the ventilation duct (17) according to the adjustment position of the enhancement adjusting member (22) and varies the flow rate of said second gas flow (19) by means of said auxiliary valve (20) according to the adjustment position of the enhancement adjusting member (22) and/or according to a quantity indicative of the air flow detected by said pressure sensor (23).

5. The burner (2) according to any preceding claims, wherein said enhancement actuating means (21, 22, 23, 24, 25) comprise timing means (24) so configured as to automatically deactivate said enhancement device (14) after a preset maximum time interval.

6. The burner (2) according to the preceding claim, wherein said timing means (24) comprise adjustment means (25) to select the activation time of the enhancement device (14) within said maximum time interval.

7. The burner (2) according to any preceding claims, wherein said enhanced combustion unit (4) comprises:

- a first series of flame outlet holes (5) in communication with said partial duct (7),
- a second series of flame outlet holes (6, 6', 6'') in communication with said ventilation duct (17),

wherein said second series of flame outlet holes (6, 6', 6'') is divided from said partial duct (7) so as to prevent a forced air back-flow in the partial duct (7).

8. The burner (2) according to the claim 7, wherein said first series (5) of flame outlet holes and said second series (6, 6', 6'') of flame outlet holes are arranged so that the flame configurations they determine are so close that they are able to heat the same container.

9. The burner (2) according to the claim 7 or 8, wherein said first series (5) of flame outlet holes and said second series (6, 6', 6'') of flame outlet holes are formed in a same diffuser body (26) of said enhanced combustion unit (4).

10. The burner (2) according to the claim 9, wherein said diffuser body (26) is formed in a single block unit.

11. The burner (2) according to any claims 7 to 10, wherein said flame outlet holes of the first series (5) and said flame outlet holes of the second series (6) are arranged in annular, preferably circular, successions, and said second series (6) of flame outlet holes is radially arranged inside said first series (5) of flame outlet holes.

12. The burner (2) according to the claim 11, wherein at least part (6'') of the flame outlet holes of said second series (6) is outwardly radially oriented, so that, once the enhancement device (14) has been activated, the flames of the second series (6) of flame outlet holes are ignited by the flames of the first series (5) of flame outlet holes.

13. The burner (2) according to the claim 9 or 10, wherein said diffuser (26) comprises:

- a base portion (27) having the shape of an annular disk with a first essentially frustoconical outer circumferential surface (28),
- an intermediate annular portion (29), adjacent

to the base portion (27), with a second outer circumferential surface (30) which is essentially cylindrical and co-axial to said first outer surface (28), said second outer surface (30) having a diameter which is lesser than the diameter of the first outer surface (28),
- an annular upper portion (31), co-axial and adjacent to the intermediate portion (29), with a third essentially frustoconical outer circumferential surface (32) with a lower edge which constitutes the main base of the frustum of cone and which matches to an upper edge of said second outer cylindrical surface (30),

wherein:

- said first series (5) of flame outlet holes forms an annular succession and opens into said first outer surface (28) of the base portion (27),
- said second series (6) of flame outlet holes comprises:

  - two upper annular successions (6') mutually spaced apart in the axial direction of the diffuser (26) and opening in said third outer surface (32) of the upper portion (31),
  - an intermediate annular succession (6'') opening in said second outer surface (30) of the intermediate portion (29).

14. The burner (2) according to the claim 13, wherein a first circumferential projection (33) is formed along an upper edge of the base portion (27), which is adapted to lower the flames of the first series (5) of flame outlet holes.

15. The burner (2) according to the claim 13 or 14, wherein a second circumferential projection (34) is formed along an upper edge of the upper portion (31), which is adapted to lower the flames of the second series (6) of flame outlet holes.

16. The burner (2) according to any claims 7 to 15, wherein said enhanced combustion unit (4) defines internally a central space (35) in flow connection with said auxiliary duct (18) and with said second series (6) of gas outlet holes, as well as an annular space (36) which is co-axial to the central space (35) and divided therefrom, in flow connection with said partial duct (7) and with said first series (5) of gas outlet holes.

17. The burner (2) according to any preceding claims, wherein said regulating valve (8) of the partial duct (7) allows a continuous regulation between said closed position and said maximum opening position.

18. The burner (2) according to any preceding claims, wherein said air feeding means (11, 12, 13) comprise a venturi tube device (11) with a gas passage having a throttled section portion (12) and one or more passages (13) for the air which open in said venturi tube device (11) in the proximity of said throttled section portion (12), so that the gas acts as a driving fluid to draw said first air volume (10) in the partial gas flow (9).

19. The burner (2) according to any preceding claims, comprising a safety device (37) so configured as to cut the gas passage off through the partial duct (7) in response to a signal indicative of an incorrect operation of the combustion units (4).

20. The burner (2) according to the claim 19, wherein said safety device (37) comprises:

- a safety valve (38) with a shutter (39) elastically stressed in a rest position wherein it closes a gas passage opening in said partial duct (7),
- a loading device (40) so configured as to allow the user moving the shutter (39), against the elastic force, from the rest position to an operative position wherein it clears said passage opening,
- a thermocouple sensor (42) arranged in the proximity of the combustion unit (4),
- an electromagnet (43) electrically connected to said thermocouple sensor (42) and so configured as to keep the shutter (39) in the operative position only when the temperature which the thermocouple is exposed to (42) does not drop under a limit value indicative of a correct operation of the combustion unit (4).

21. The burner (2) according to any preceding claims since dependant from the claim 19, wherein said regulating valve (8) is operatively connected to said safety device (37), so that the actuation, by the user, of the regulating valve (8) results in a temporary switching of the safety device (37) to a opening configuration, in order to allow an initial gas flow in said partial duct (7) in the absence of combustion and/or to "load" said safety device (37).

22. The burner (2) according to any preceding claims, wherein said auxiliary duct (18) connects said ventilation duct (17) to said partial duct (7) in a point downstream said safety device (37), so that, in the event of an incorrect operation of the enhanced combustion unit (4), said safety device (37) closes both the partial duct (7) and the auxiliary duct (18).

23. The burner (2) according to any preceding claims, wherein said auxiliary duct (18) connects said ventilation duct (17) to said main duct (3).

24. The burner (2) according to the claim 23, comprising an auxiliary safety device so configured as to cut the gas passage off through the auxiliary duct in response to a signal indicative of an incorrect operation of the enhanced combustion unit.

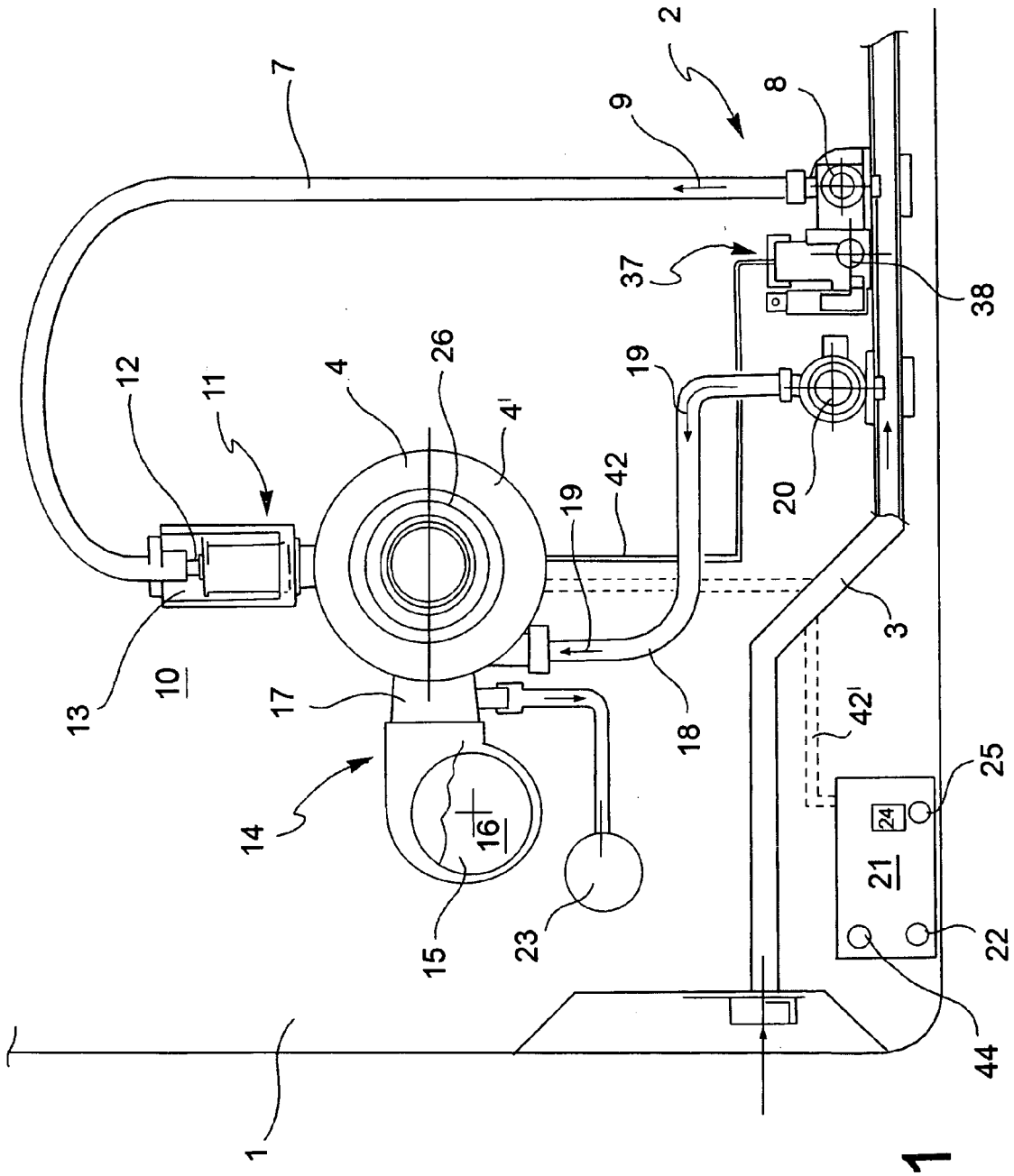
25. The burner according to the claim 24, wherein said enhancement actuating device is operatively connected to said auxiliary safety device, so that the activation of the enhancement device, by the user, results in a temporary switching of the auxiliary safety device in an opening configuration, in order to allow a gas flow in said auxiliary duct and/or to "load" said auxiliary safety device.

26. The burner (2) according to any preceding claims since dependant from the claim 19, wherein said safety device (37) interacts with said control unit (21) or with said auxiliary valve (20) so that said auxiliary valve (20) cuts said second gas flow (19) off in said auxiliary duct (18) in response to a signal indicative of an incorrect operation of the enhanced combustion unit (4).

27. The burner (2) according to any preceding claims, comprising an ignition device (44) adapted to generate a spark in the proximity of said flame outlet holes (5, 6).

28. The burner (2) according to the claim 27, wherein said ignition device (44) is operatively connected to said safety device (37), so that a single operation of ignition generates the ignition sparks and results in a temporary switching of the safety device (37) to an opening configuration, in order to allow an initial gas flow in said partial duct (7) in the absence of combustion.

29. Household gas cooktop (1) comprising a burner (2) according to any preceding claims.


1
2
3
4
4'
7
8
9
10
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12
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21
22
23
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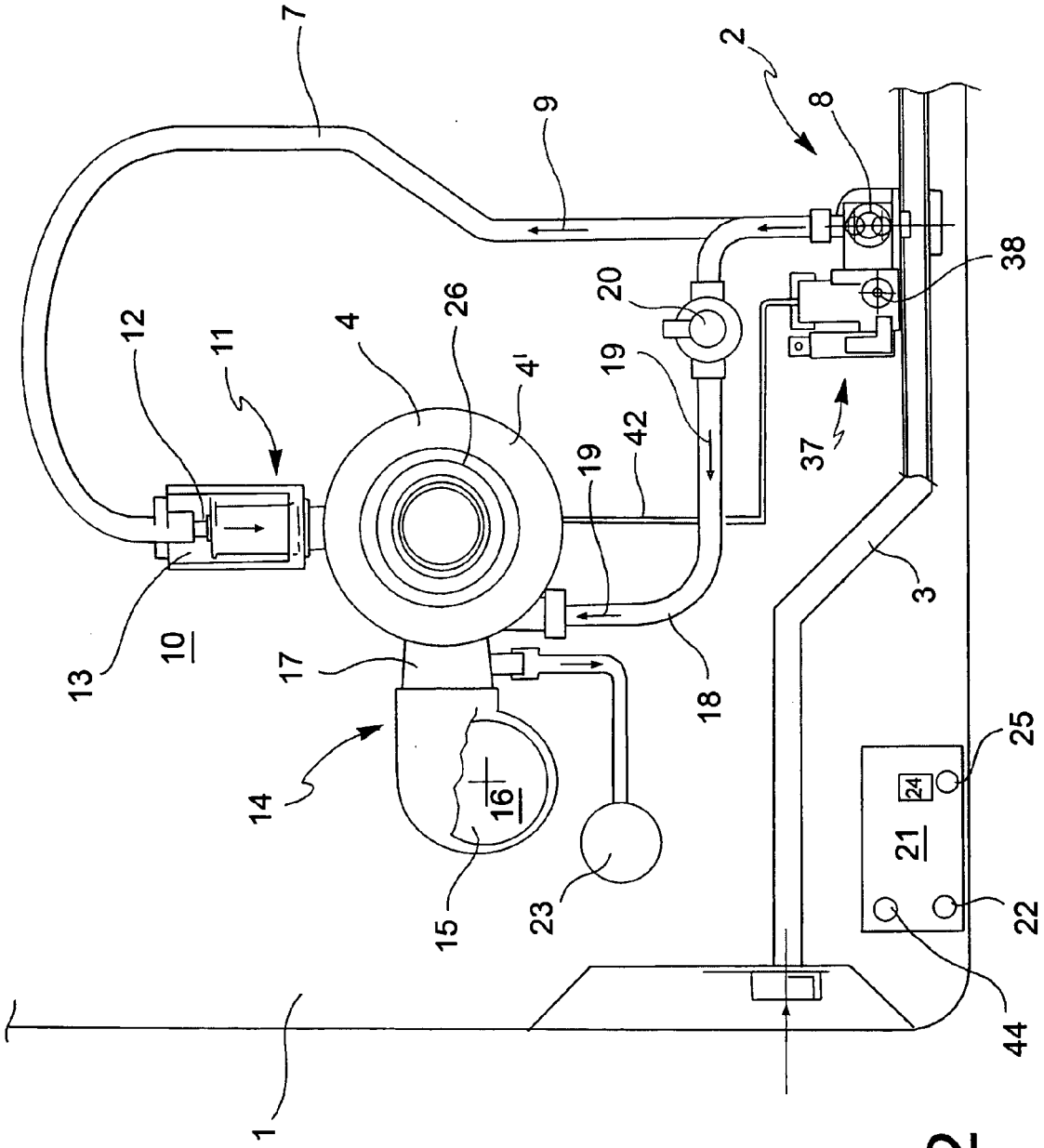
25
26
37
38
42
42'
44

FIG. 1


7
2
9
8
38
20
12
11
4
26
4'
19
42
37
19
3
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14
16
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24
21
22
15
23
44
1

FIG. 2

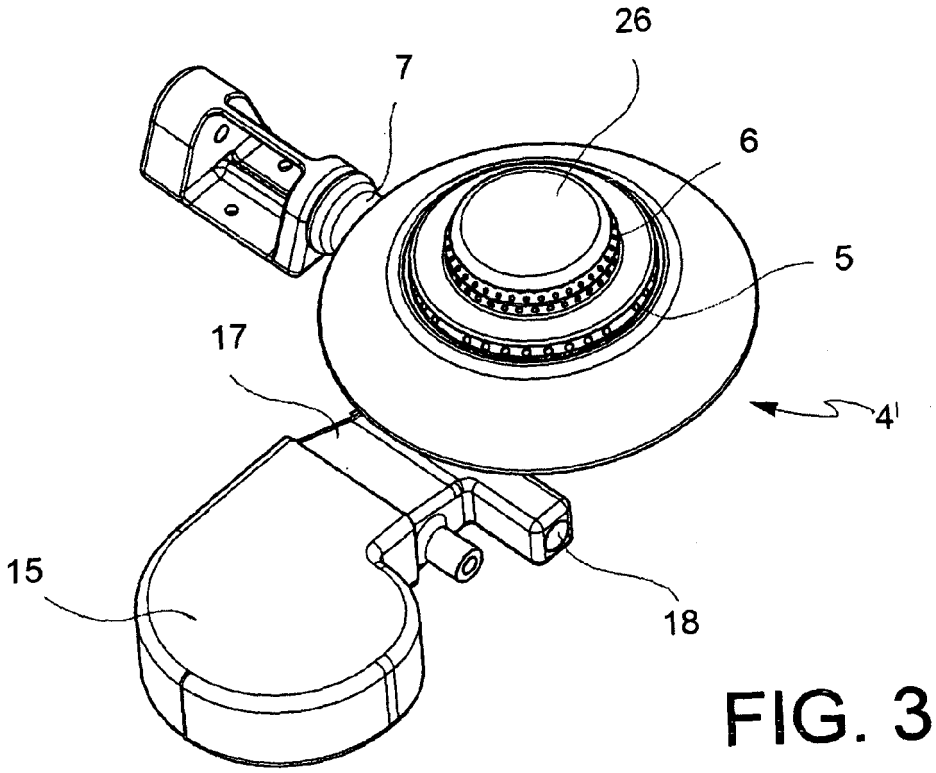


FIG. 3

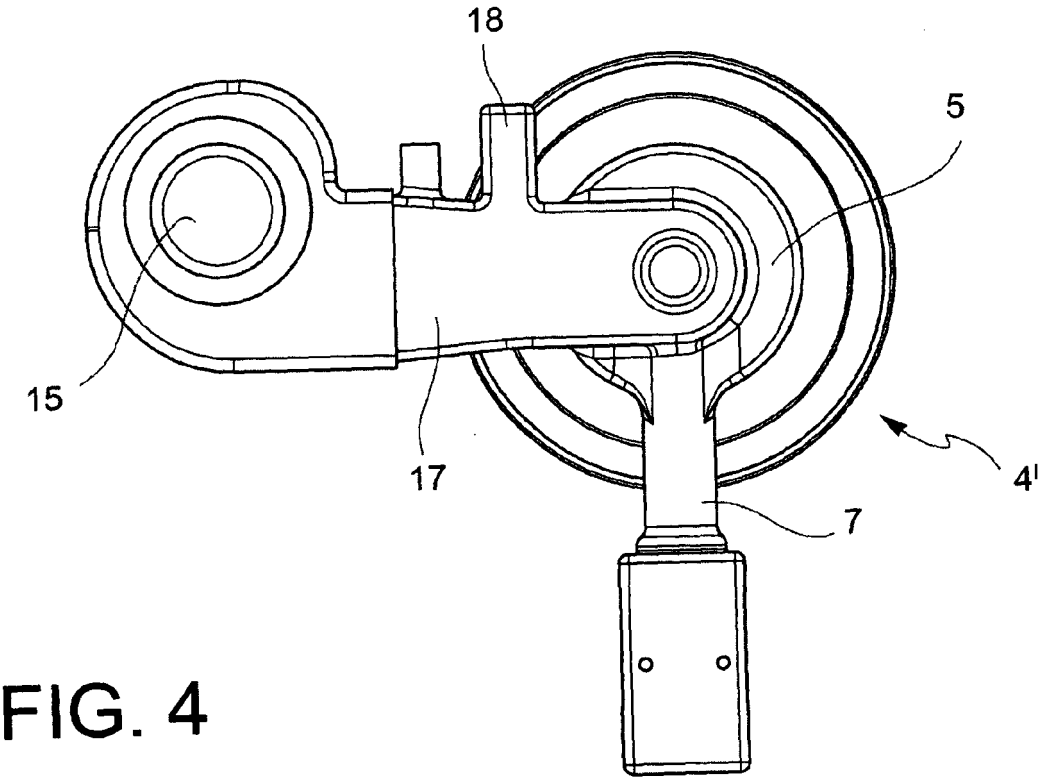


FIG. 4

FIG. 5

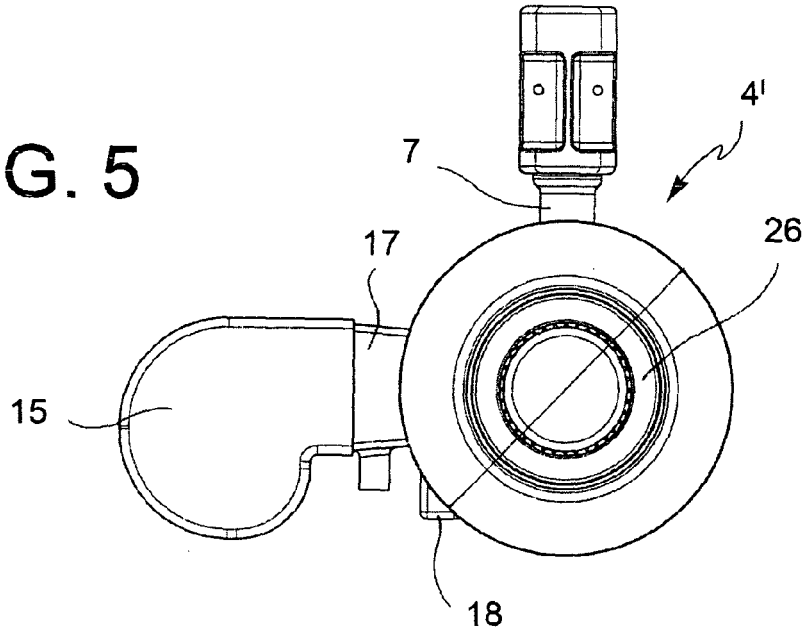


FIG. 6

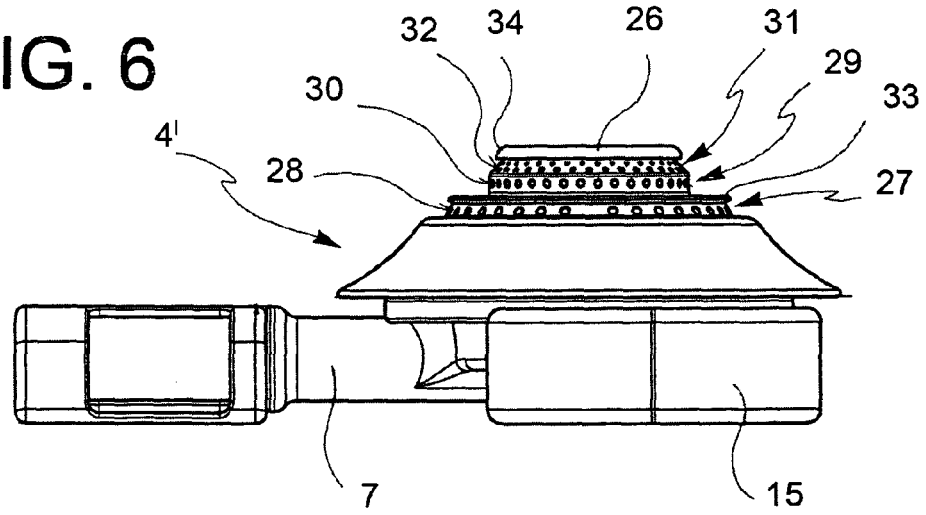
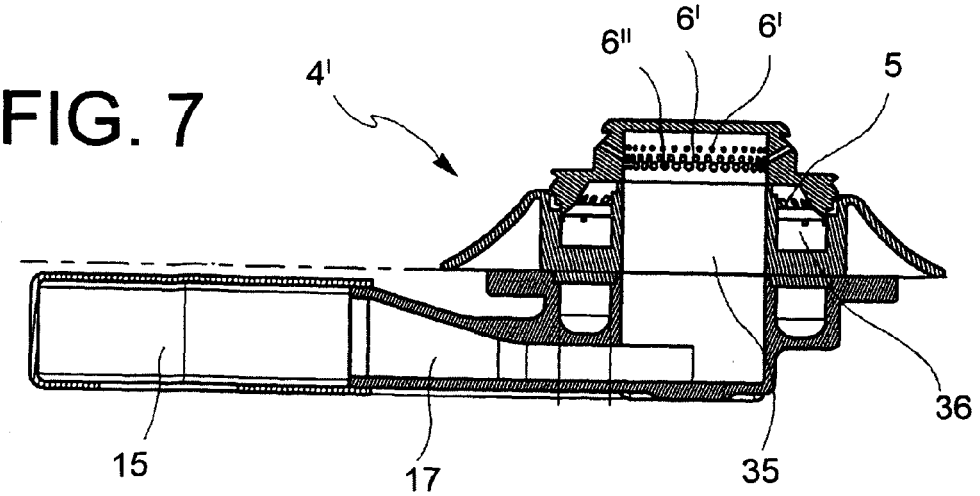
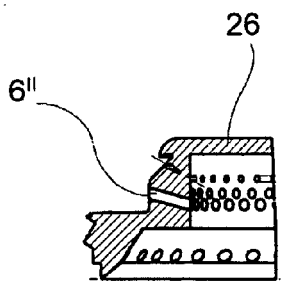


FIG. 7





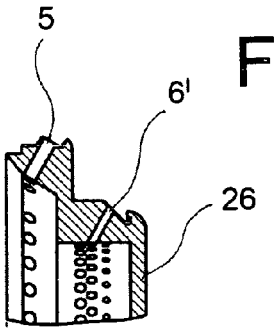


FIG. 13

FIG. 12

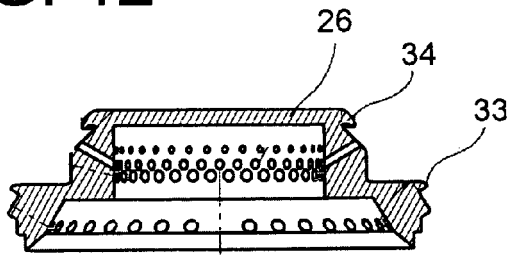


FIG. 10

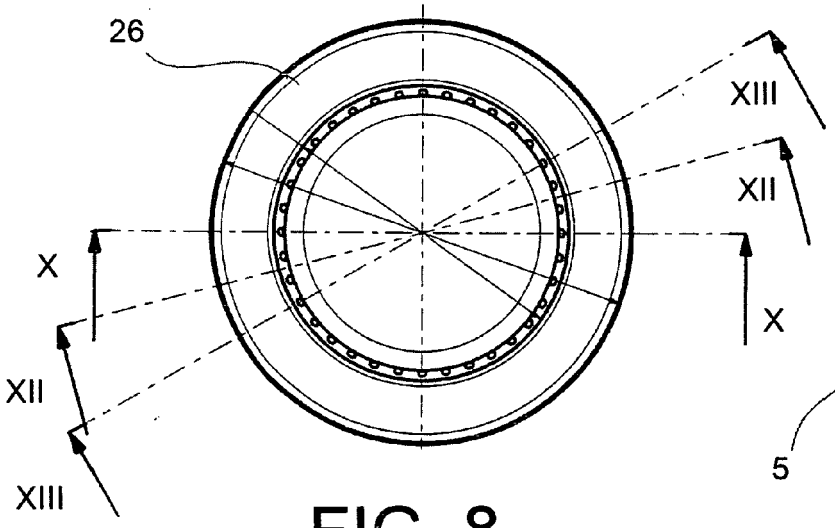


FIG. 8

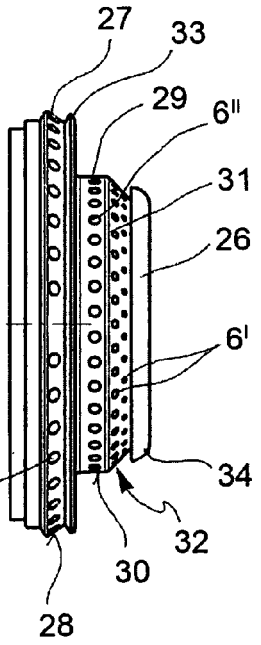


FIG. 9

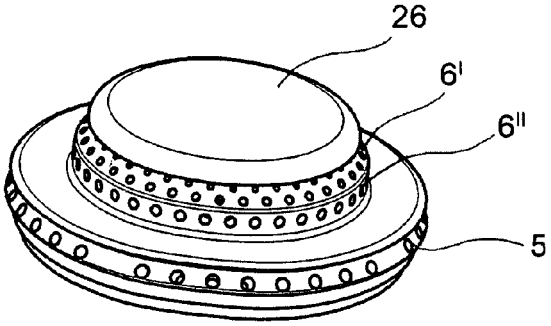


FIG. 11

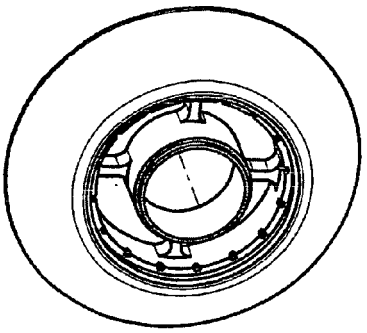


FIG. 17

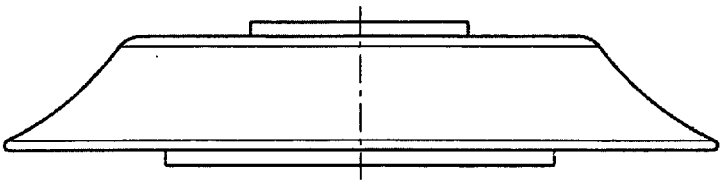


FIG. 15

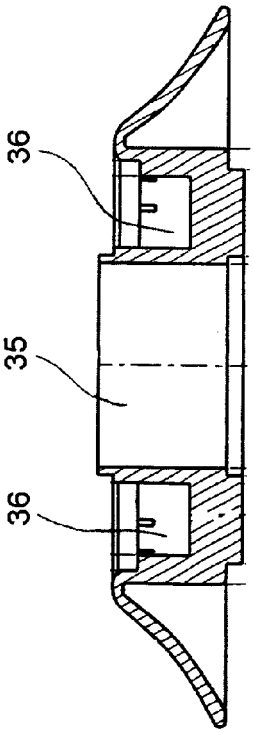


FIG. 16

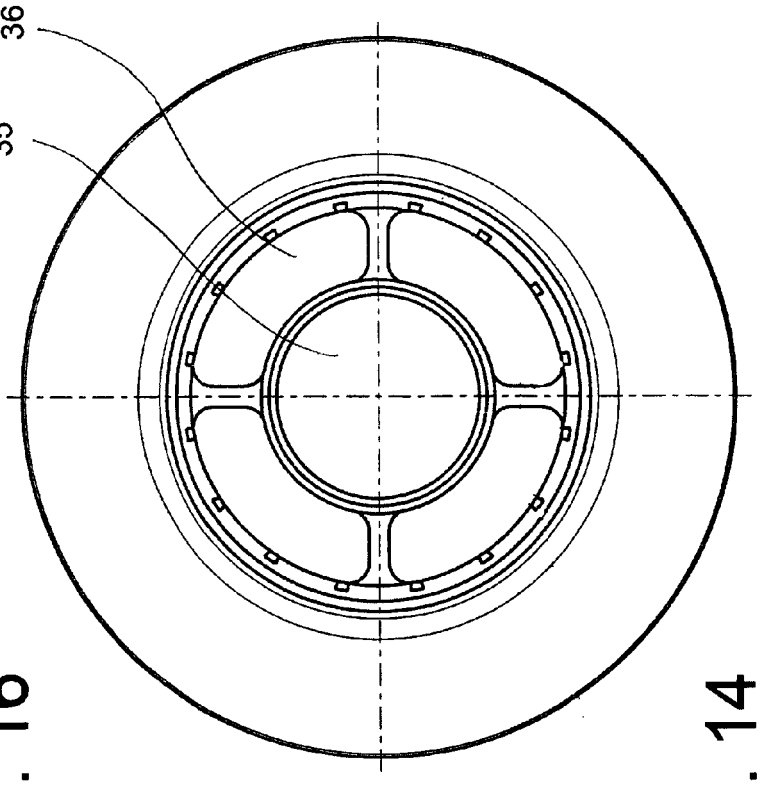


FIG. 14

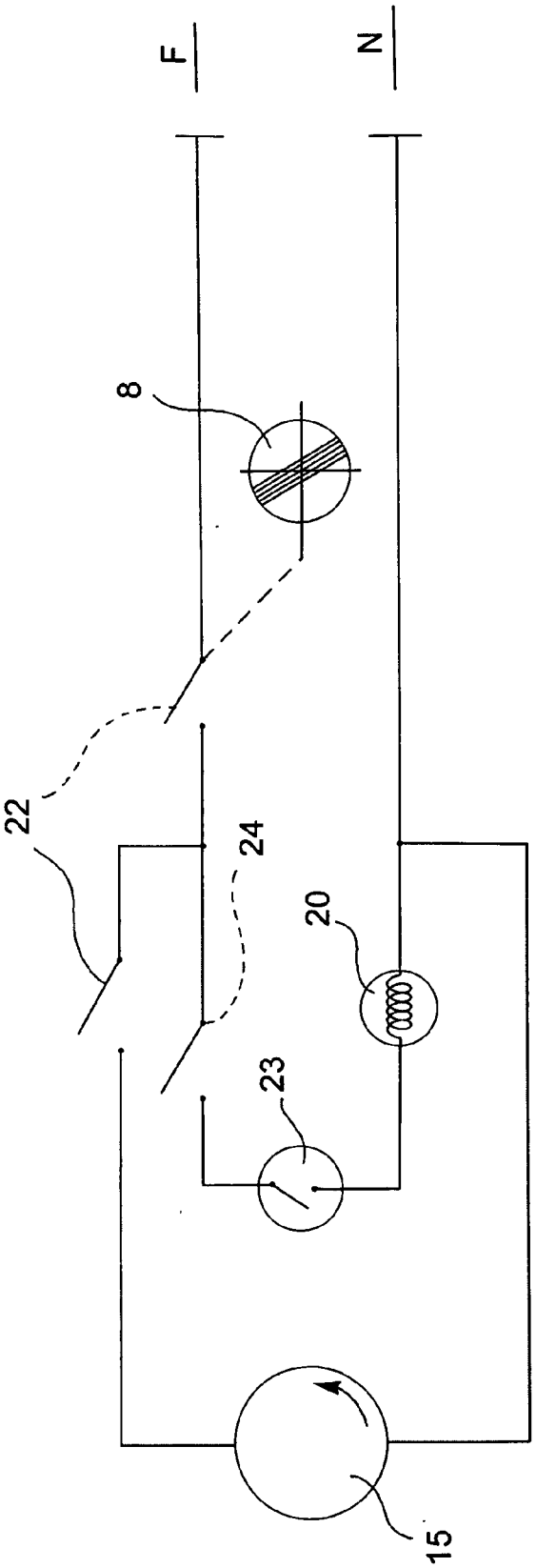


FIG. 18

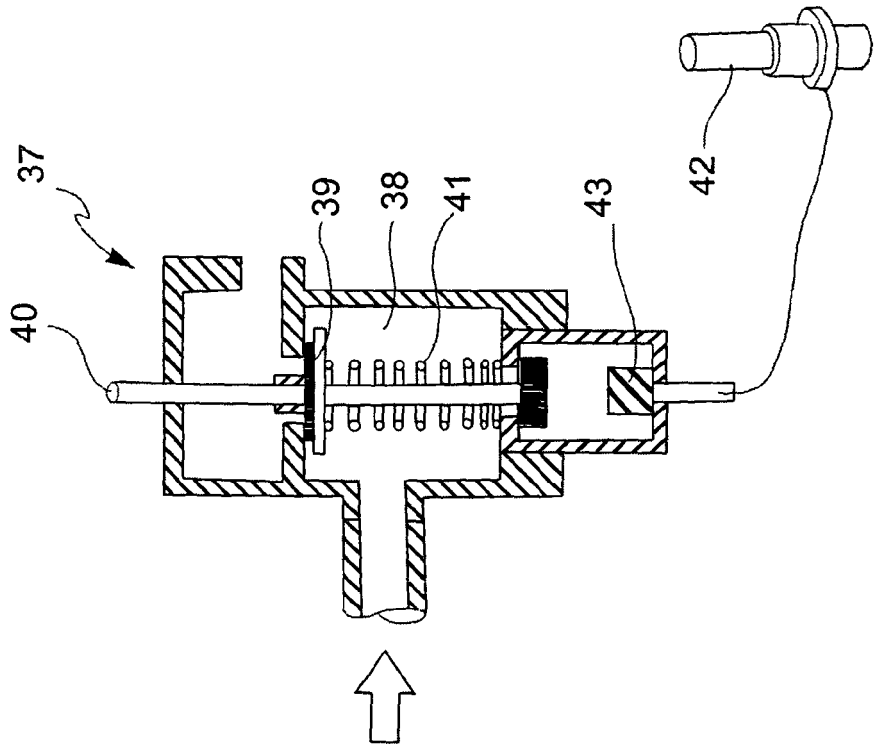


FIG. 20

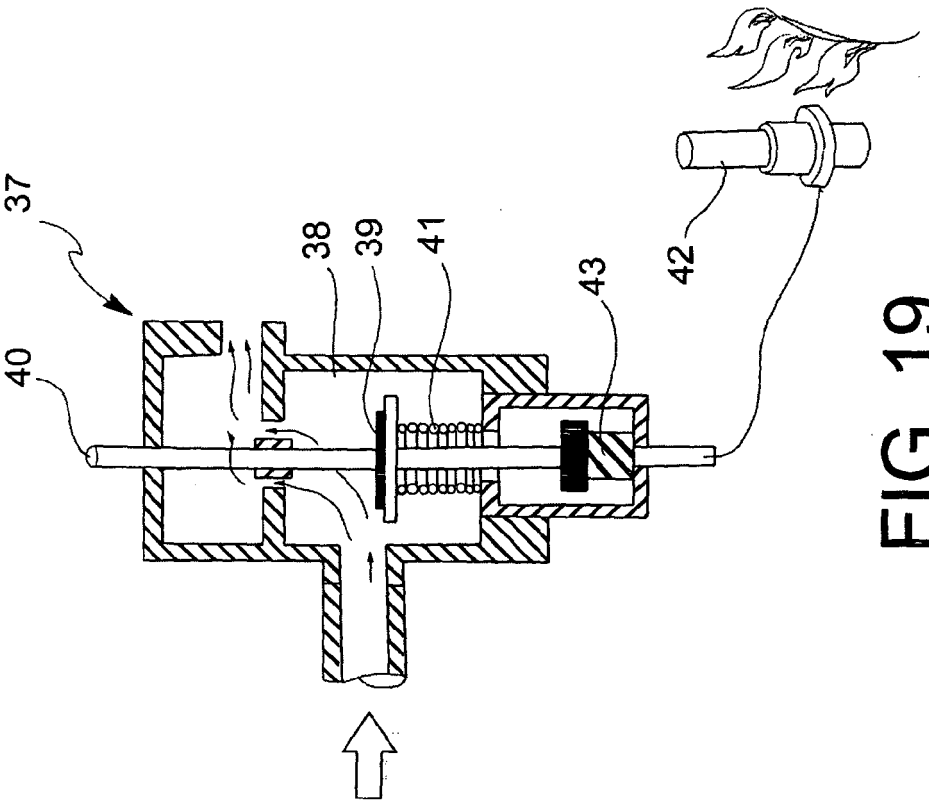


FIG. 19

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EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5791

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	JP 2006 258304 A (PALOMA KOGYO KK) 28 September 2006 (2006-09-28) * figure 1 *	1	
Y	JP 11 063843 A (INAX CORP) 5 March 1999 (1999-03-05) * abstract *	2	
E	JP 2008 089229 A (MATSUSHITA ELECTRIC IND CO LTD) 17 April 2008 (2008-04-17) * paragraph [0034] *	2	
A	JP 63 038811 A (MATSUSHITA ELECTRIC IND CO LTD) 19 February 1988 (1988-02-19) * the whole document *		TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 December 2008	Rodriguez, Alexander

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