(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 806 616 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.11.1997 Bulletin 1997/46

(51) Int Cl.[6]: **F24H 9/02**, F24H 9/14

(21) Application number: **97500054.8**

(22) Date of filing: **19.03.1997**

(84) Designated Contracting States:
DE FR GB IT NL PT

(30) Priority: **10.05.1996 ES 9601064**

(71) Applicant: **FAGOR, S.Coop**
20500 Mondragon (Guipuzcoa) (ES)

(72) Inventors:
- **Larruzea Goienetxe, Kepa**
  48340 Amorebieta (Vizcaya) (ES)
- **Cavia Ortega, José Miguel**
  20570 Bergara (Guipuzcoa) (ES)

(54) Sealed wall-hung boiler with reduced size heating parts

(57) The boiler (1) comprises a casing (2) of reduced height (35) and depth (33) for housing in a cabinet, a small-sized burner (7) and heating parts (6,7,8,8',9) of reduced width and depth, which are situated on one side of the boiler (1) housing, while the water circuit (15) components (16 to 23) are located on the other side. The whole of the air flow (26) needed for combustion, both the primary and the secondary, is channelled from the intake (14) from the exterior by means of a diffuser (12) via a flat conduit (25) attached to the rear panel (32) of the casing, which terminates in a sealed enclosure (25b) below the burner, from where it is distributed.

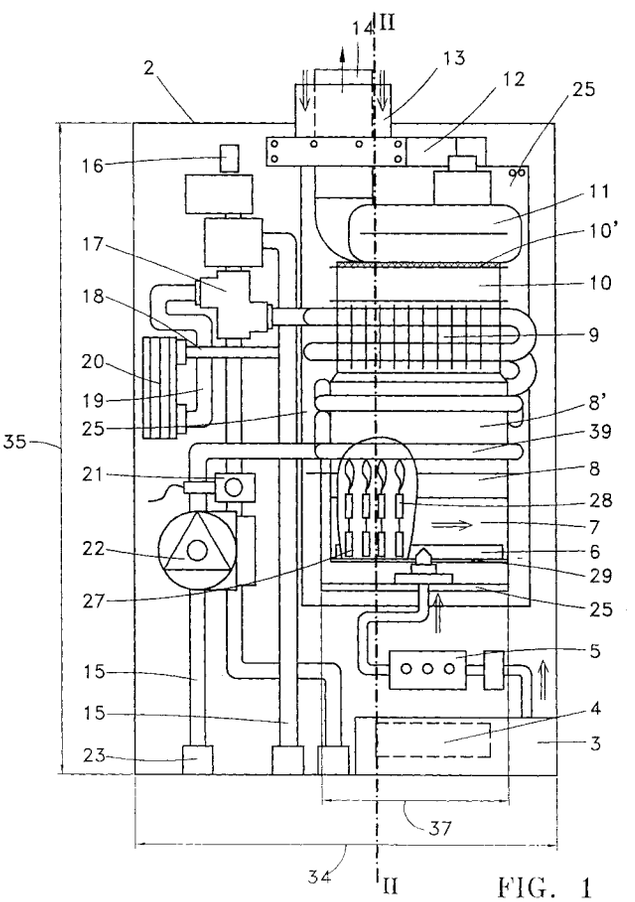

FIG. 1

EP 0 806 616 A2

Description

The present invention relates to a domestic sealed wall-hung boiler, which also supplies instantaneous hot sanitary water and comprises a fan-assisted atmospheric burner, and more particularly relates to the assembly of the burner, the supply of combustion air to the burner and the arrangement of the component parts enclosed in the boiler casing.

Prior art

In the boiler described in EP-596555 the burner is built with a series of aligned flame distributors with an interlaying separation, where the primary air is mixed with the gas by way of a series of apertures in a continuous plate each facing the corresponding venturi of the respective burner, and the secondary air is brought to the combustion chamber by way of holes adjacent to these mixing apertures.

In the JP07269812-A burner the secondary air flow for combustion enters the boiler combustion chamber at high speed from a grille in the base of the burner punched with a specific distribution of holes giving onto the gaps between the flame distributors.

Disclosure of the invention

The subject of the invention is a domestic sealed wall-hung boiler with a compact fan-assisted atmospheric burner, where the whole clean air inflow for combustion is channelled and supplied to the burner by way of its bottom base, comprising:

- a small-sized boiler casing forming a main cavity with no compartments, where space is only taken up by the gas supply solenoid valve and the electronic control unit;
- said burner assembly, which is small-sized and built with a series of flame distributors whose separations form channels for forcing the secondary air at high speed from the base of the burner;
- a flat conduit for the inflow of the clean air needed for combustion, drawn from the fan situated at the top next to the flue conduit, narrowed down to increase the speed of the air and terminated in a sealed distribution enclosure below the burner;
- a grille for the distribution of the amount of air drawn to the burner, which closes its base and forms the roof of this distribution enclosure;
- the heating parts and a fan supporting spacer box characterised by their reduced width and depth, which are housed on one side of the main cavity of the boiler;
- the water circuit control devices, which are housed on the other side of the main cavity;
- said removable rectangular box-shaped fan support, on which the heat-insulated fan is secured, in order to facilitate its removal from the front.

The relatively small size of the burner assembly is achieved in combination with a flat conduit for delivering forced draught air at high speed so as to supply all the secondary air needed for combustion drawn through the small base area of the burner, offering the advantage of the reduced width and thickness of all the heating parts and taking up only half the width of the main cavity in the boiler casing, leaving the other side free for the installation of the control devices, and thereby reducing the overall height and depth of the boiler in order to facilitate its housing in a kitchen furniture.

Description of the drawings

FIG. 1 is a front view of the sealed wall-hung boiler, which is the object of the invention.

FIG. 2 is a cross-section on II-II of the figure 1.

FIG. 3 is a partial view as per figure 2 showing the delivery of air to the boiler burner.

FIG. 4 is a plan view of the boiler burner.

FIG. 5 shows a close view of figure 4.

FIG. 6 is a plan view of the combustion air and fuel gas distribution grille.

FIG. 7 is an elevational view of the fig. 6 grille.

FIG. 8 is a profile view of the fig. 6 grille.

FIG. 9 is a plan view of the exterior air intake diffuser.

Preferred embodiment of the invention

With reference to figures 1 to 10, the sealed wall-hung boiler 1 which is the object of the invention comprises a casing 2 enclosing the boiler, in which are arranged the different components of a common sealed boiler, comprising, in ascending order from the bottom to the roof, the control panel 3, which covers the reduced height control unit 4, the gas solenoid valve 5, the gas distribution conduit 6, the atmospheric burner 7, the combustion chamber 8,8', the heat exchanger 9, the spacer box 10 supporting the centrifugal fan 11, the boiler air intake diffuser 12, the exterior clean air inlet 13, and the vent flue 14. All the above-listed parts of the boiler 1 are arranged on the right-hand side corresponding to the control knob panel 4, taking up approximately half the width of the main cavity in the casing 2 and leaving the space on the left for the installation of the water circuit 15 components, so that the overall width 34 of the boiler is kept within a standard dimension of 425 mm.

These common water circuit 15 control components are arranged in a vertical layout and consist, in descending order from top to bottom, of the air pressure switch 16, the three-way valve 17, which changes over the sanitary water and heating circuits 18,19, the secondary exchanger 20, the water pressure switch 21, the water pump 22 and the connectors 23. The side column arrangement of components 16 to 23 is achieved in a boil-

er casing 2, which has a reduced height dimension 35, namely 675 mm compared with the known domestic boilers of a maximum output equal to 20,000 Kcal/h, while the depth dimension 33 of the boiler, equal to 300 mm, is also reduced owing to the fact that the burner 7 has a height 36 of 120 mm, a width 37 of 120 mm and a depth 38 of 120 mm, approximate values that are highly reduced in comparison with the atmospheric burners used in known boilers of the same heat performance and power. The combustion chamber 8 is completed vertically, with the supplementary casing 8' cooled by two surrounding pipes to prevent overheating of the exchanger 9. Besides preventing fan overheating by means of an insulating layer 10', the fan spacer box provides a support base for the fan 11 so that it may be withdrawn from the front in the event of its being replaced.

Figures 2 and 3 show a longitudinal section of the layout of the combustion air supply system. Its delivery flow, comprising both the primary and secondary air supply, is forced by the fan 11 from the air intake diffuser 12 and channelled by way of the flat conduit until reaching the air distribution enclosure 25b below the burner 7, from where it is split into two branches corresponding to the primary air 41 and the secondary air 42, the former of them mixed with the gas injected by a series of nozzles 6' connected to the gas pipe 6, the mixture being directed to each of the flame distributors 28 by way of the respective venturi 27, and the secondary air 42 distributed to the whole area of the burner 7, for which purpose both the burner and the gas distribution pipe 6 and the air distribution enclosure 25b are encased by a front cover 31, which at the same time seals the distribution enclosure 25b.

The flat air supply conduit 25 runs down the casing 2 attached to the rear wall 32 of the main cavity, occupying a width slightly larger than the width dimension 37 of the burner, and below this it is re-routed in a horizontal direction to form the distribution enclosure 25b.

In a first embodiment of the invention the inflow of clean combustion air along the duct 13 is diffused to the flat conduit by means of a flat diffuser 12, whilst in a second embodiment of the air supply system the air intake diffuser 12b is covering the fan 11 for cooling purposes.

As shown in figures 3 and 4, the 10 mm thick flame distributors 28 are arranged a certain distance apart in the burner area to form the channels 30, of 4 mm thickness, for ducting the secondary air to the combustion chamber 8. The secondary air stream 41 is distributed to the channels 30 from the enclosure 25b via the grille 29, which, as is shown in figures 6 to 8, is made from a punched plate bent at right angles successively at each of the sides so as to form a base of the burner 7 with three plates 29a, 29b, 29c that make up an intermediate step, where the gas distribution pipe 6 and the nozzles 6' are installed. The secondary air 42 flow plate 29a, of a larger area, is provided with a series of holes 43 of 2.5 mm in diameter arrayed in formations away from one another, so that each of them is situated under one of the afore-mentioned ducting channels 30, and it also has three rows of holes 44 of 3.5 mm to 4.5 mm flanking the previous ones, whilst in the secondary air 41 flow plate 29c, of a smaller area, the holes 45 are 3 mm in diameter. Facing the nozzles 6', the vertical plate 29b has elongated apertures 46 for the simultaneous inflow of gas and the primary air stream 41 into the venturis 27.

Claims

1. A domestic sealed wall-hung boiler with a centrifugal fan (11) assisted burner (7), where the clean combustion air is channelled and the whole of the combustion air intake needed, both the primary (41) and the secondary (42), is supplied to the burner (7) by way of a metal grille plate (29) at its base, comprising a boiler casing (2) forming the main housing for the heating parts (6,7,8,8',9), a fan support (10), the gas supply solenoid valve (5), the control unit (4) and the water circuit control devices (16 to 23), the burner (7) being made up of an array of flame distributors (28) separated from one another by the secondary air channels (30), characterised by:

   said boiler casing (2) being of reduced size with no internal compartments where the heating parts (6,7,8,8',9) are situated on one side of the casing (2) cavity, and the water circuit (15) and its components (16 to 23) are situated on the other side;
   the fan support (10) is a rectangular box-shaped (10) being removable from the front and heat-insulated;
   a flat conduit (25) for the clean air intake, which ducts the whole flow (26) of air needed for the combustion from the fan (11) and which terminates in a sealed enclosure (25b), the roof of which is formed by said distribution grille (39);
   said secondary air stream (42) is forced at high speed, separately from the primary air stream (41), from said grille plate (29) to the channels (30) between the flame distributors (28).

2. The sealed wall-hung boiler of claim 1, wherein the heating parts (6,7,8,8',9) are of reduced size (36,37,38), namely 200 mm wide (37), 120 mm deep (38) and 120 mm high (36);

3. The sealed wall-hung boiler of claim 1, wherein the afore-mentioned grille (39) is made from a metal plate (29a,29b, 29c) punched with a series of separate arrays of holes (43,44,45), each below one of the secondary air (42) flow channels (30).

4. The sealed wall-hung boiler of claim 1, wherein the inflow of clean exterior air via the intake conduit (13)

is diffused to the flat conduit (25) ducting the air flow (26) by means of a flat diffuser (12).

5. The sealed wall-hung boiler of claim 1, wherein the inflow of clean exterior air via the intake conduit (13) is diffused to the flat conduit (25) ducting the air flow (26) by means of a diffuser (12b) surrounding the fan (11).

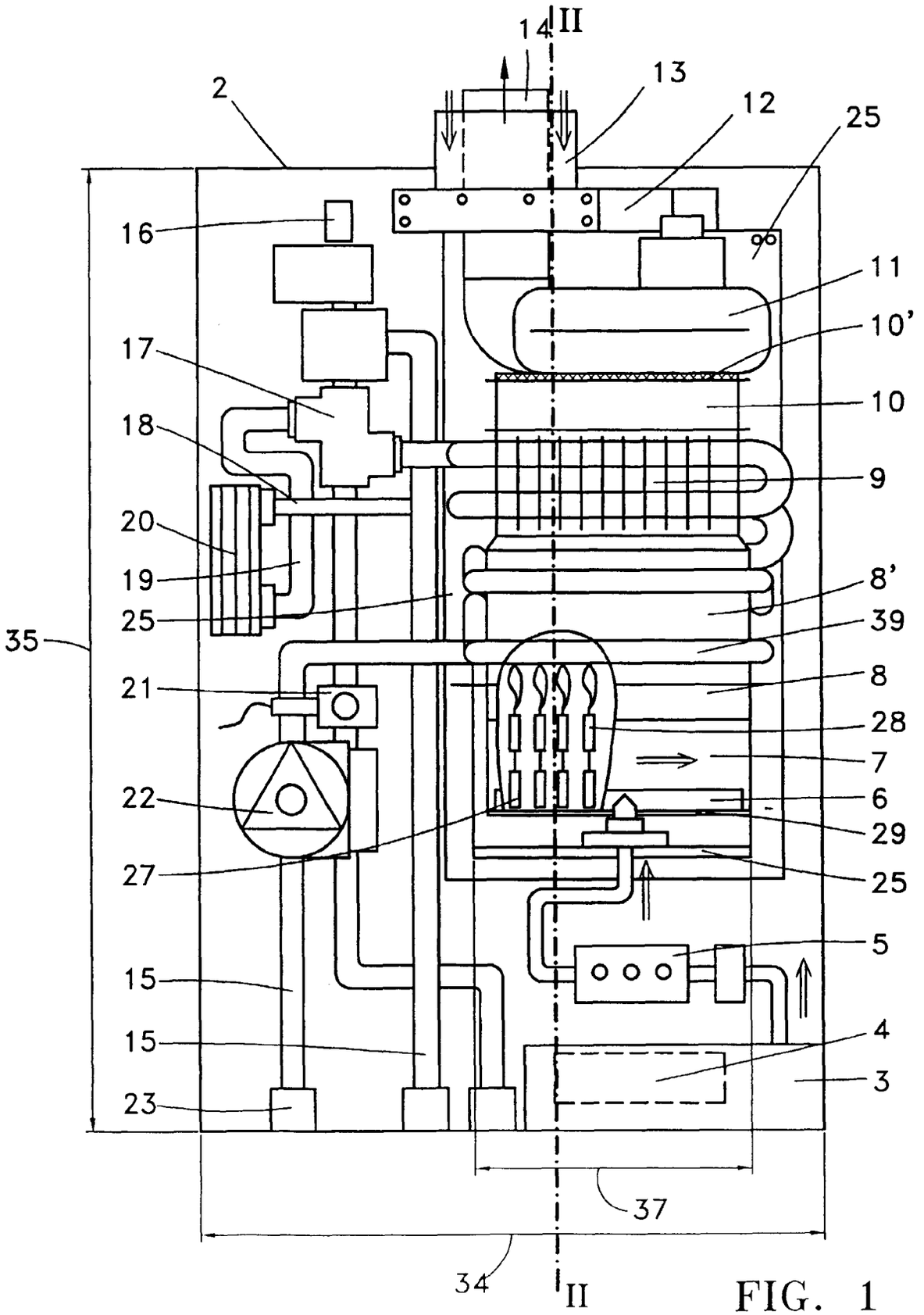
14
II
13
12
25
2
16
11
10'
17
10
18
9
20
19
8'
25
39
35
21
8
28
7
22
6
29
27
25
5
15
4
15
3
23
37
34
II

FIG. 1

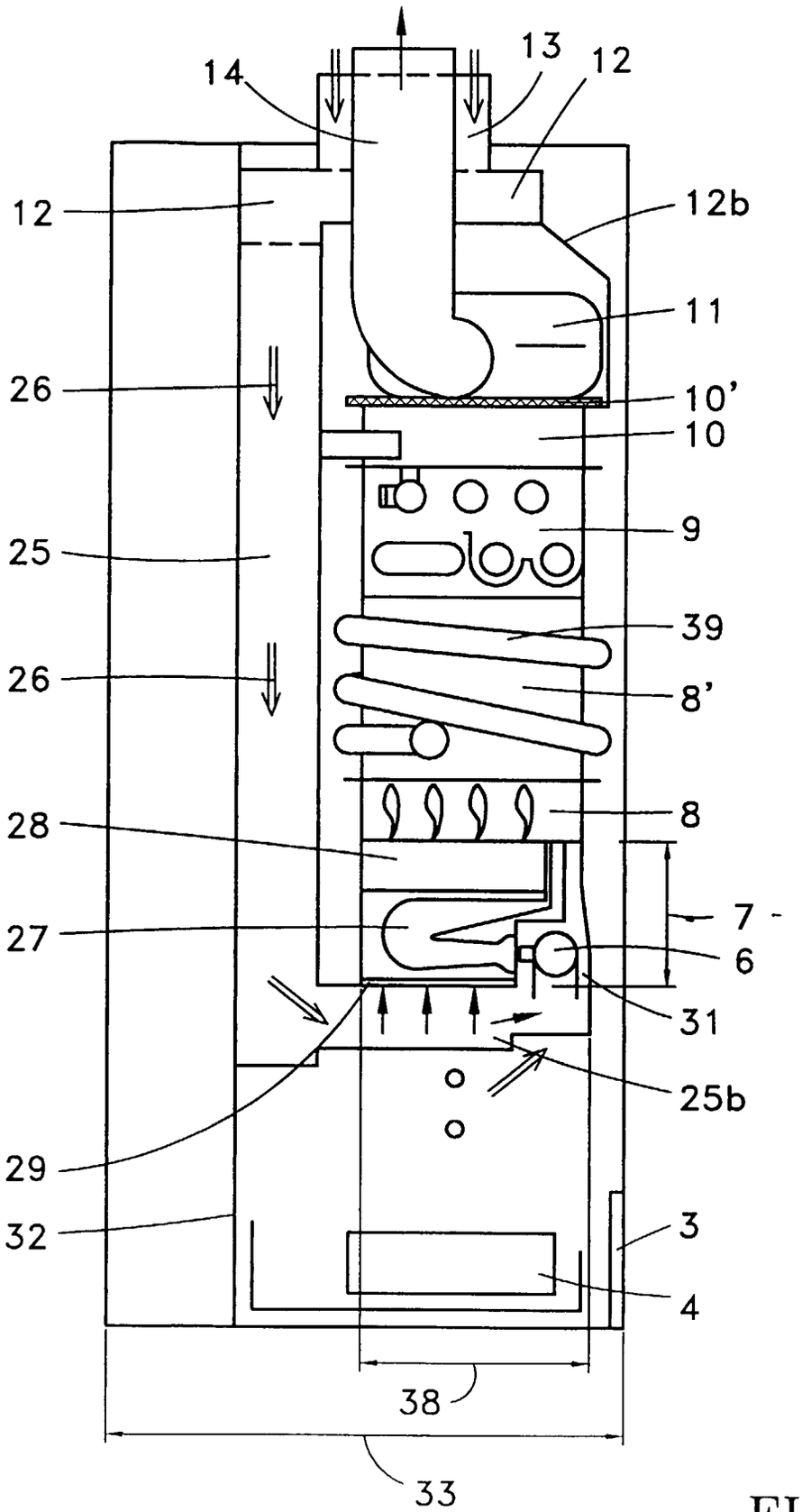

FIG. 2

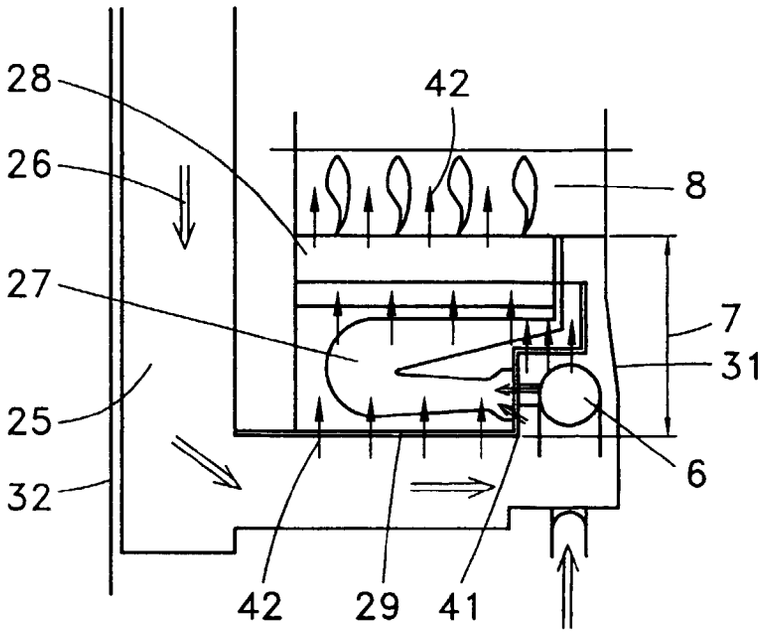

FIG. 3

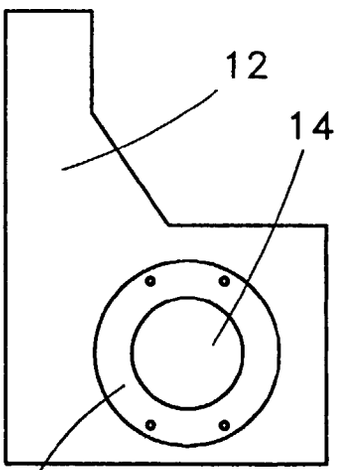

FIG. 9

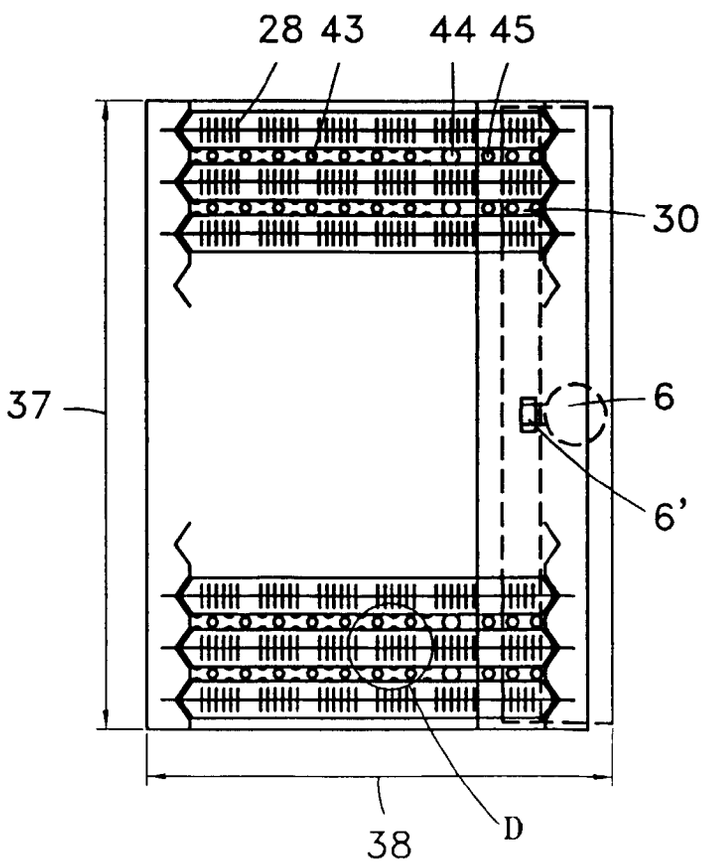

FIG. 4

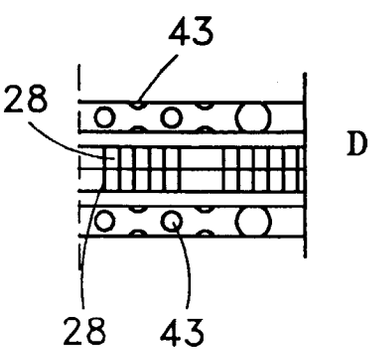

FIG. 5

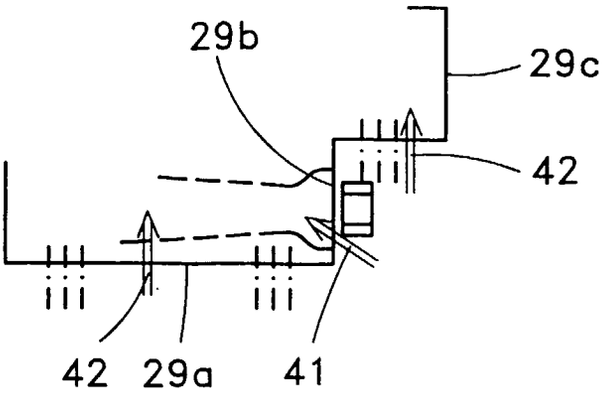

FIG. 8

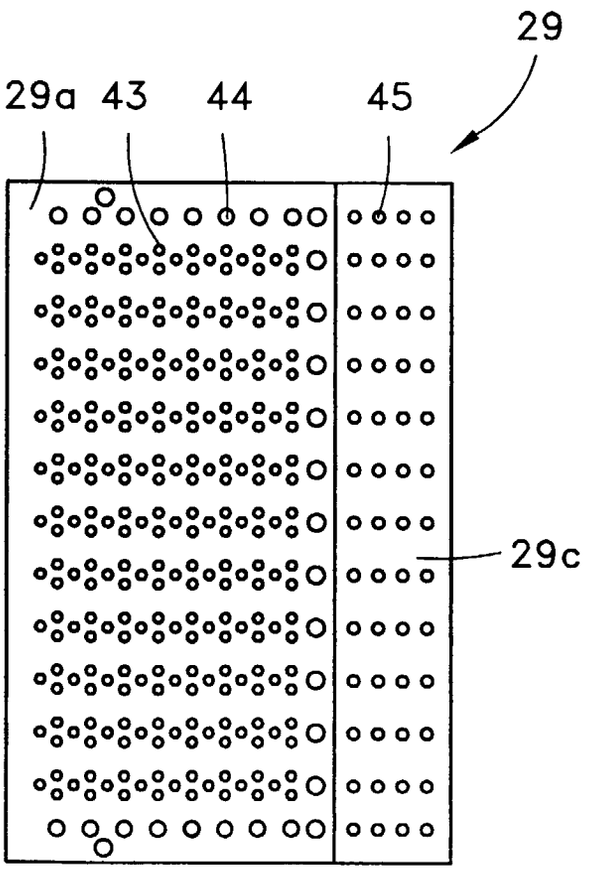

FIG. 6

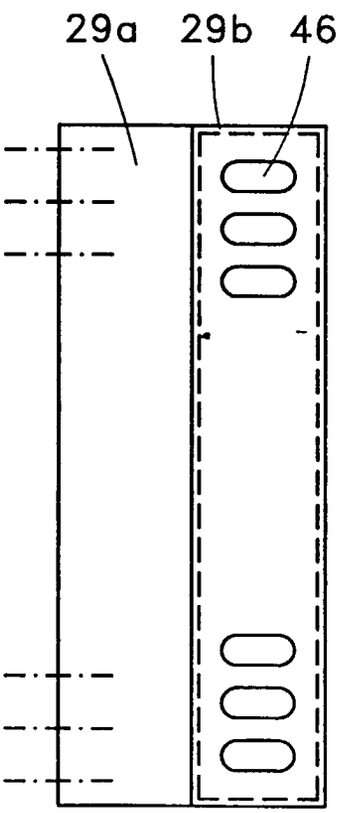

FIG. 7