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

(11) Publication number : **0 551 807 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **93100035.0**

(51) Int. Cl.[5] : **F24C 15/32**

(22) Date of filing : **04.01.93**

(30) Priority : **08.01.92 IT TV920002 U**

(43) Date of publication of application :
21.07.93 Bulletin 93/29

(84) Designated Contracting States :
CH DE FR GB LI SE

(71) Applicant : **LAINOX S.R.L.**
Via Schiaparelli 15, Z.I. S. Giacomo di Veglia
I-31029 Vittorio Veneto (TV) (IT)

(72) Inventor : **Lazzer, Natalino**
Via Schiaparelli 15, Z.I. S. Giacomo di Veglia
I-31029 Vittorio Veneto (TV) (IT)

(74) Representative : **D'Agostini, Giovanni, Dr.**
D'AGOSTINI ORGANIZZAZIONE n. 17 via G.Giusti
I-33100 Udine (IT)

(54) Improvement of the combustion chamber, particularly in forced convection ovens for cooking food.

(57) IMPROVEMENT OF THE COMBUSTION CHAMBER, PARTICULARLY IN FORCED CONVECTION FOOD OVENS, of the type essentially comprising : a control panel and the relative electrical and electronic components, an external parallelepiped containment structure with at least one cooking chamber, to which access is possible by an oven door, and a heating unit with a fan surrounded by bands of heat exchange piping located in an intercommunicating ventilation antechamber which is part of the cooking chamber, while below the oven in correspondence to the pipe bands there is a gas burner housed inside a combustion chamber ; characterised by the fact that the said combustion chamber has two spaces in correspondence with at least a part of the base of the cooking chamber, the first of which contains insulating material and the second the end(s) of at least one manifold pipe which is dissociated and coaxial with respect to each pipe in the bands of pipes, and is partly inserted in correspondence with the opening.

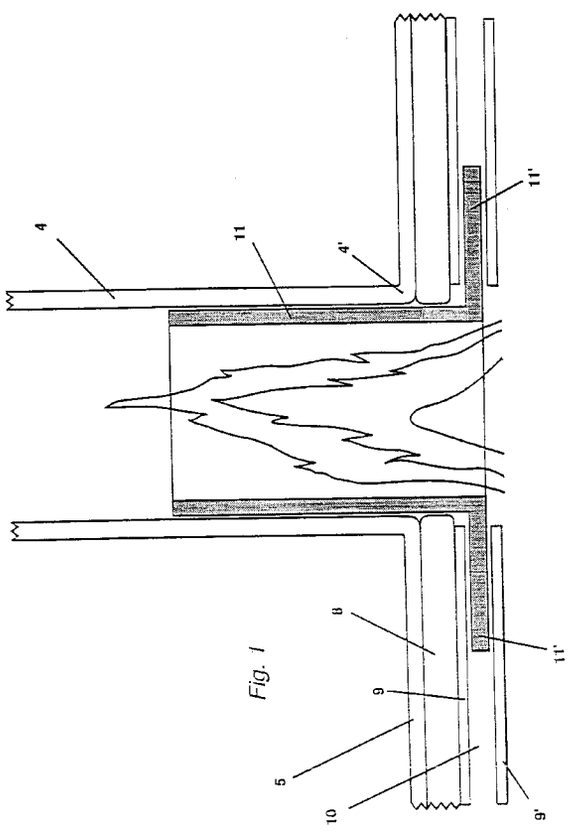

Fig. 1

EP 0 551 807 A1

The object of this invention is to improve the combustion chamber, with particular reference to forced convection food ovens.

The innovation has a particular, but not exclusive, application in industrial kitchens.

In the prior art various types of ovens available for large kitchens are known, but recently demand has generally centred on three models: the first provides heat to the cooking chamber by steam, the second by convection (both electrical and burning) and the third operates like the first, the second, or in both modes at the same time. Schematically, an oven can be composed of the control panel and the relative electrical and electronic components, together with an external parallelepiped containment structure with at least one cooking chamber, to which access is possible by a traditional oven door. The heating of the cooking chamber can also be provided by one of three means: by steam, in which case a traditional type boiler is used, with a steam emission pipe directly in the chamber; by convection, or rather, by a fan placed in a space intercommunicating with the cooking chamber, and conveniently surrounded by bands of thermal exchange tubing; by both steam and convection at the same time. In the second case, the lower part of the oven also contains a gas burner and the associated combustion chamber.

The current applicant also holds the patent No.1158054 of 15.01.1982, the subject of which is a forced convection oven for cooking foods. In particular, in the lower part of the oven, or rather in a space below the bottom of the cooking chamber, there is a combustion chamber, essentially delimited by a parallelepiped structure with a "U" configuration conveniently fixed from below to the base of the cooking chamber, and inside which, with various connections, there is at least one burner arranged longitudinally, so that the flames are directed upwards in direct contact with the lower surface of the cooking chamber's base. The openings for the bands of the heat exchange pipes are welded to the bottom of the cooking chamber and in logical correspondence with the underlying burner. These evacuate the combustion gases and are in direct communication with the combustion chamber. The oven base is made of steel plate and is formed to contact the other sides of the oven and thus define the cooking chamber.

Several drawbacks can be deduced from the above solutions. The most important of these is the fact that the high temperatures commonly reached in the combustion chamber lead to overheating of the overlying area of the base of the cooking chamber, causing surface deformations which can lead to serious structural changes. This problem is most common near the openings of the bands of pipes which, being welded directly to the base plating, suffer from expansion also caused by the constant pressure from the flames, eventually leading to the joints breaking. The influence of the frequency and the conditions of use of the oven are seen with time, in that there is a progressive loss in the oven's cooking capacity due to the slow but relentless loss of efficiency by the heat exchanger.

The aim of the present invention is to prevent the above mentioned drawbacks.

This and other aims are met by innovations which are cited in the claims section and which will now be described. The problems described above are solved by improving the combustion chamber, particularly in forced convection ovens for the cooking of food which are essentially composed of: a control panel and the relative electrical and electronic components, an external parallelepiped containment structure with at least one cooking chamber, to which access is possible by a traditional oven door, and a heating unit comprising : a fan surrounded by bands of heat exchange tubing housed in a ventilation antechamber intercommunicating with the cooking chamber. Below the oven, located to correspond with the position of the said bands of pipes, there is at least one gas burner inside a combustion chamber. In the combustion chamber, located in correspondence with the base of the cooking chamber, there are two spaces, one for insulating material and the other containing the end(s) of at least one manifold pipe which is dissociated and coaxial with respect to each pipe in the bands of pipes, and is partly inserted in correspondence with the opening.

Immediate technical progress results from these creative modifications, leading to several advantages : the efficient insulation of the base of the cooking chamber, thus avoiding deformations and, secondly, a definite reinforcement close to the junctions of the ends of the bands of pipes with the base, at the same time allowing for the necessary expansion and avoiding damage.

These and other advantages appear from the following detailed description of the preferred solution, which also makes use of schematic diagrams, the details of which are not intended to be exhaustive but rather examples.

Figure 1 represents an enlarged detail of the base of the cooking chamber seen close to the openings of the bands of pipes.

Figure 2 represents a frontal view of a forced convection food oven, in which the base and a section of the base can be seen.

Figure 3 shows a cut away view from the front of a convction oven's combustion chamber, in which the arrangement of the burners and their respective distribution nozzles with respect to the overlying pipe bands can be seen.

Figure 4 represents a side view of a combustion chamber as in the preceding Figure.

From the figures, it can be seen that a logically controlled forced convection oven (A), particularly

one for cooking food, is essentially composed of an external parallelepiped covering (1) and a cooking chamber (2), the inside of which is accessed by a traditional oven door which, in this case, is located at the front of the oven (A). At the back of the said oven (A), being a part of the cooking chamber (2), there is an intercommunicating ventilation antechamber, inside which there is a fan (3) surrounded by a mass of bands of pipes (4) which, comprising the heat exchanger, rise from the base (5) of the cooking chamber (2) until at the top of the oven they are carried to a waste device. Beneath the base (5) of the oven (A) and in correspondence with the said ventilation antechamber, there is a traditionally connected burner (6), which in this case comprises two transverse pipes (6', 6"), each having groups of distribution nozzels (12) above and along their length to direct the flame upwards in correspondence with the openings (4') of the bands of pipes (4). In this way, the base (5), particularly in the area between the openings (4') of the groups of pipe bands (4), is not directly in contact with the flame, as the nozzles are arranged approximately opposite the ends of the burners (6) in correspondence, as stated above, with the openings (4') of the groups of pipe bands (4). These are welded to a first plate (5) which is also the base of the cooking chamber(2). Immediately below this first base plate (5) and covering at least the entire area of the combustion chamber (7), there is a layer of insulating material, in this case made of armaflex (8), which is supported by a second plate (9) which, together with a third (9'), suitably separated, allows a second space to be obtained (10). A manifold pipe (11) is fitted so as to be dissociated and coaxial to the opening (4') of each pipe (4) in the band, and extends several centimetres into the pipe. The lower part of the manifold pipe has a round flange (11') which extends generously into the space (10). In this way, particularly the ends of the bands of pipes (4') are conveniently protected by the coaxial pipe (11) which can efficiently absorb both its own deformations independently of the remaining structure and expansion of the plates without causing breaking points.

Claims

1. IMPROVEMENT OF THE COMBUSTION CHAMBER, PARTICULARLY IN FORCED CONVECTION FOOD OVENS, of the type essentially comprising: a control panel and the relative electrical and electronic components, an external parallelepiped containment structure with at least one cooking chamber, to which access is possible by an oven door, and a heating unit with a fan surrounded by bands of heat exchange piping located in an intercommunicating ventilation antechamber which is part of the cooking chamber, while below the oven in correspondence to the pipe bands there is a gas burner housed inside a combustion chamber; characterised by the fact that the said combustion chamber has two spaces in correspondence with at least a part of the base of the cooking chamber, the first of which contains insulating material and the second the end(s) of at least one manifold pipe which is dissociated and coaxial with respect to each pipe in the bands of pipes, and is partly inserted in correspondence with the opening.

2. Improvement, according to claim 1., characterised by the fact that at least part of the base (5) of the oven's (A) cooking chamber (2), corresponding to the area concerning the said ventilation antechamber, will contain a layer of insulating material (8) located below the first base plate (5) and extending over at least the entire area of the combustion chamber (7), supported by a second plate (9) which, together with a third (9') suitably spaced forms a second space (10).

3. Improvement, according to claim 1., characterised by the fact that above the burner (6) in the oven's (A) combustion chamber (7) there is a plate (5) and a layer of insulating material (8) which is supported by a second plate (9) which, together with a third (9') suitably spaced forms a second space (10).

4. Improvement, according to the previous claims, characterised by the fact that a manifold pipe (11) is fitted so as to be dissociated and coaxial to the opening (4') of each pipe (4) in the band, and extends several centimetres into the pipe. The lower part of the manifold pipe has a round flange (11') which extends generously into the space (10).

5. Improvement, according to the previous claims, characterised by the fact that the burners (6) have flame distribution nozzles (12) arranged exclusively in correspondence with the area immediately below the openings (4") of the pipe bands (4).

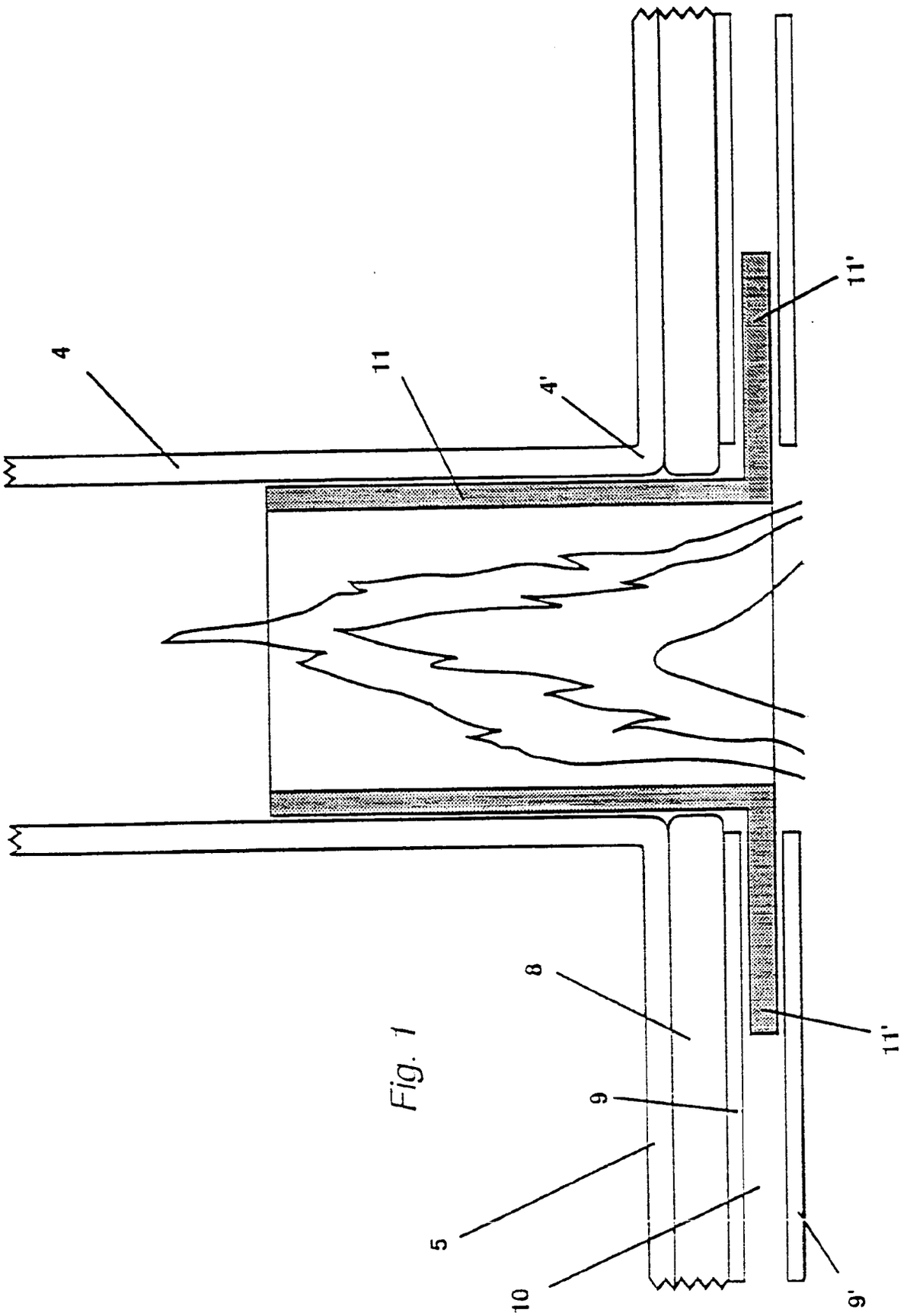

Fig. 1

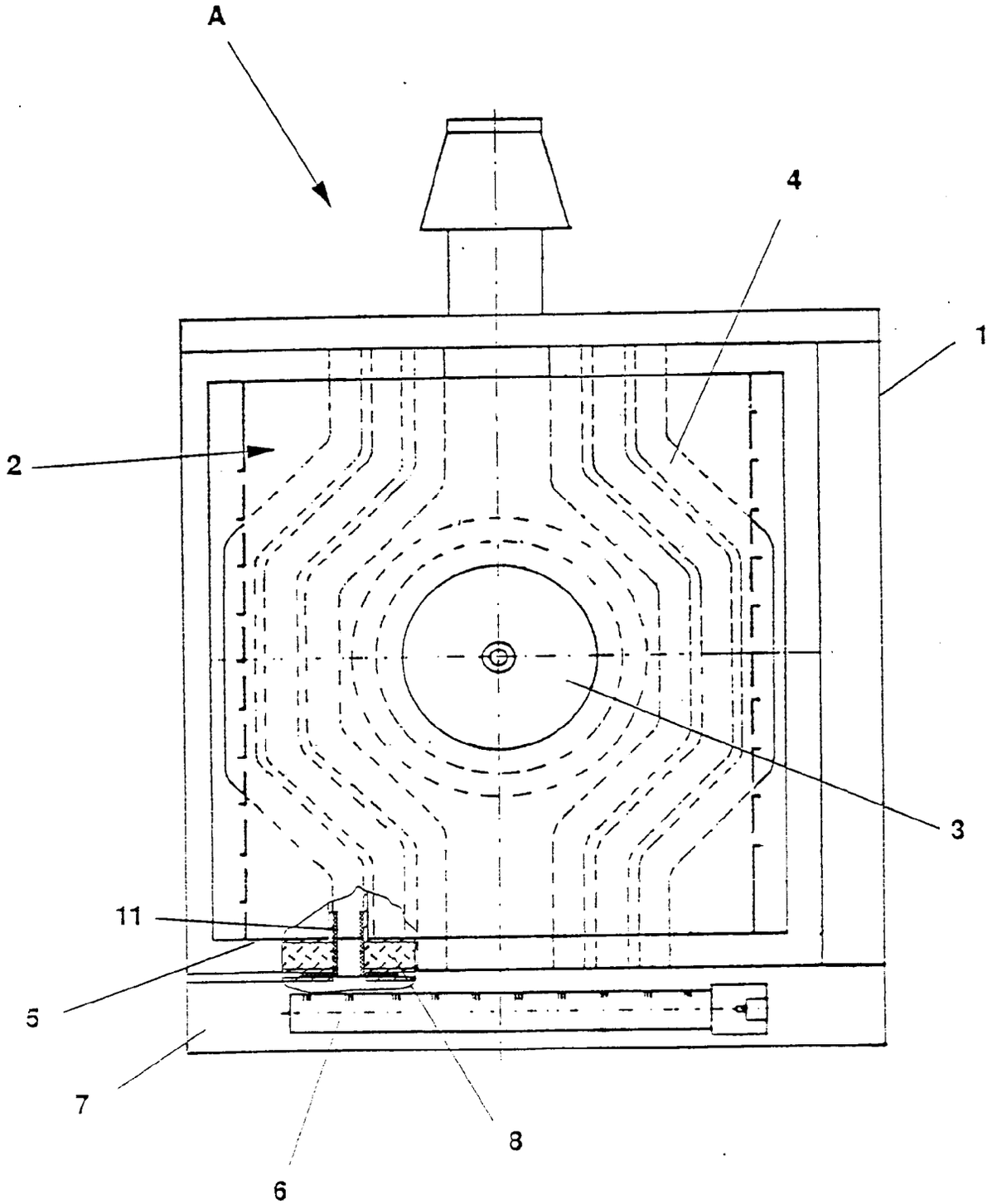

Fig. 2

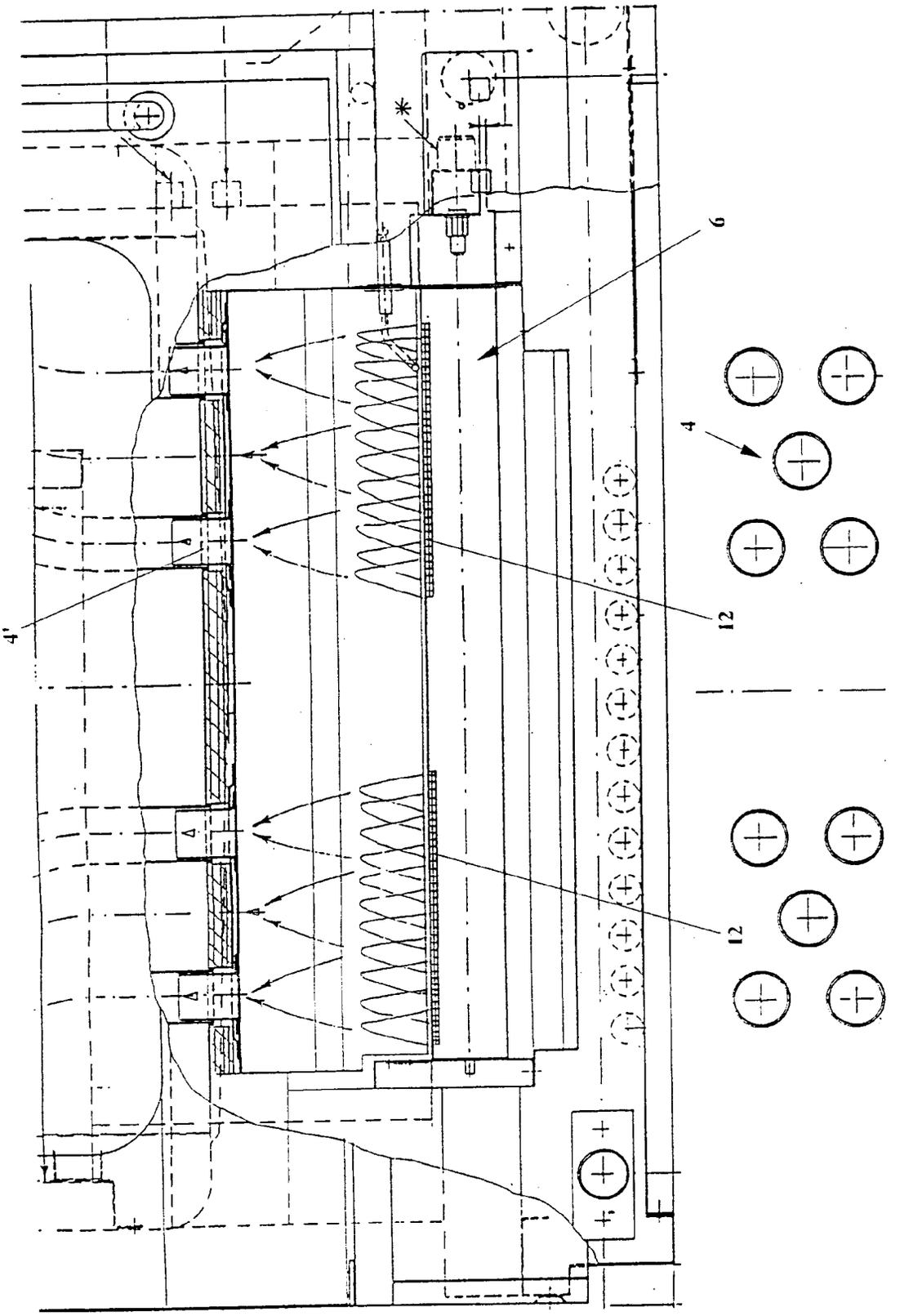

Fig. 3

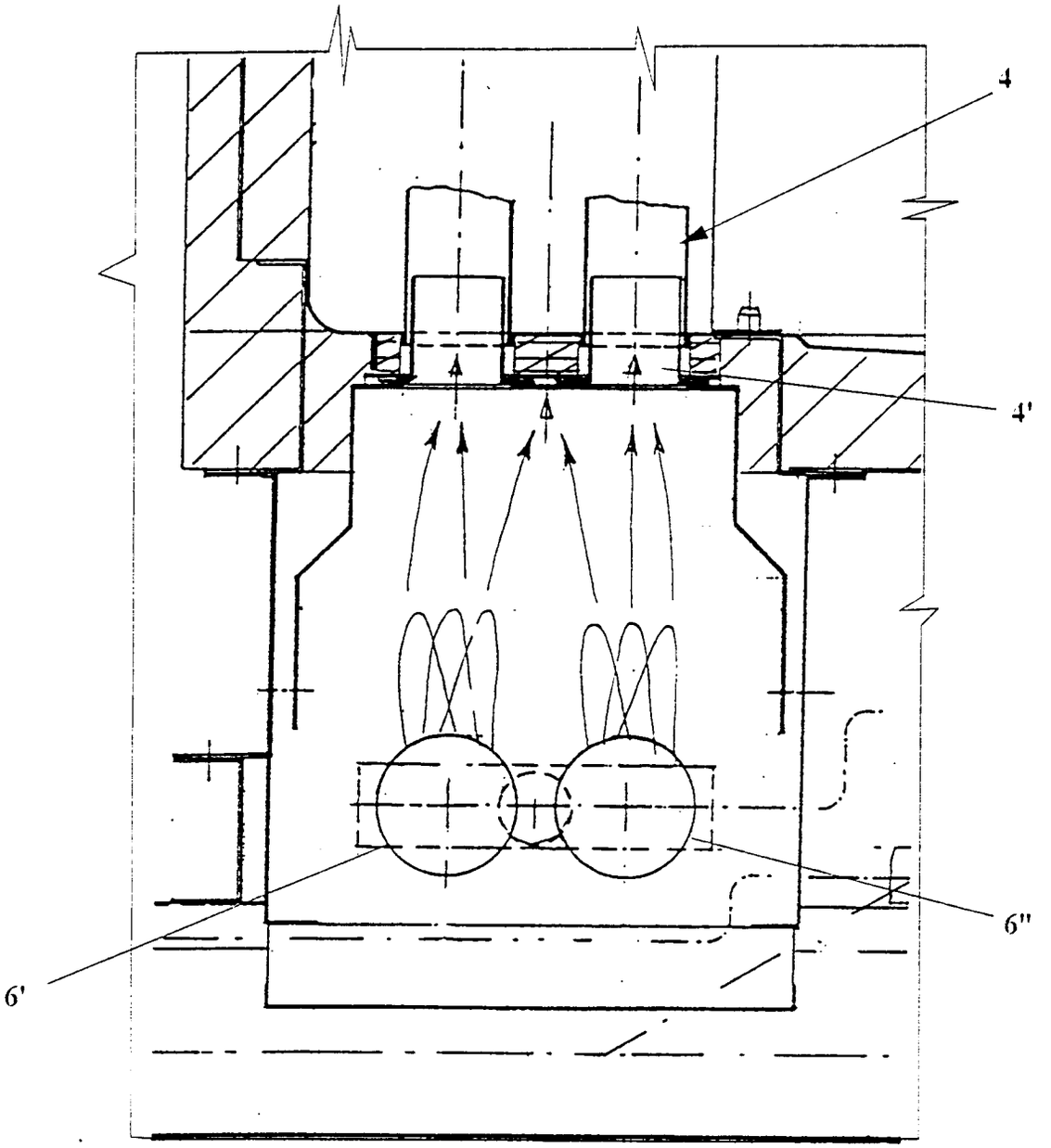

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 10 0035

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 415 035 (ZANUSSI) * column 2, line 31 - column 3, line 5; figures 1,2 * ---	1	F24C15/32
A	EP-A-0 344 743 (ZANUSSI) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F24C
A47J
A21B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 APRIL 1993	VANHEUSDEN J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)