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(54) GAS BURNER UNIT FOR A HEAT EXCHANGER

(57) A gas burner unit intended for a heat exchanger incorporates a perforated burner wall (1) and an air and fuel duct (2). In the air and fuel duct (2), over the perforated burner wall (1), there is a transverse baffle (3) featuring holes (4) and dividing the air and fuel duct (3) into two segments: before and after the said baffle, where the baffle is shaped so that the cross section of the segment of the air and fuel duct (2), located between the baffle (3) and perforated burner wall (1), increases along the baffle (3) towards the perforated burner wall (1), and cross section of the segment of the air and fuel duct (2) located within the inner space delimited by the baffle (3) decreases towards the perforated burner wall (1), and where fixed to the wall of the air and fuel duct above the baffle (3) is a deflector (7) for the air and fuel mix, shaped so that its cross section decreases towards the perforated burner wall (1).

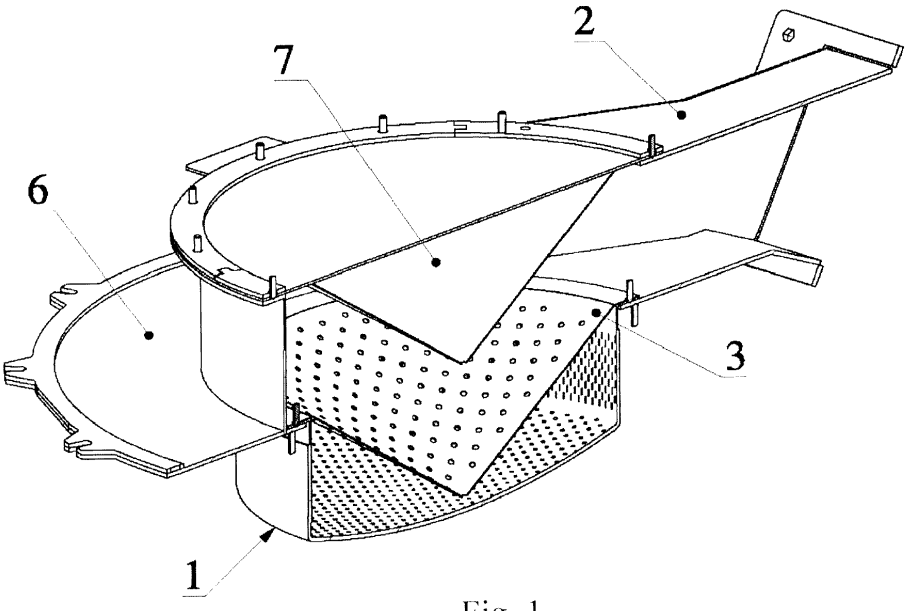

Fig. 1

EP 3 587 922 A1

Description

[0001] The invention concerns a gas burner unit intended for a heat exchanger.

[0002] In the known solutions, the heat exchanger gas burner unit incorporates a perforated burner wall and an air and fuel duct used to supply the air and fuel mix to the perforated burner wall. The operating burner unit generates substantial noise which can be a nuisance to the surrounding environment.

[0003] Known from patent document JPH 0264306 A is a heat exchanger in which the inner space of the chamber for the air and fuel mix supplied to the burner is divided with a flat baffle spreading along the chamber and featuring small holes. The baffle is intended to e.g. suppress the noise accompanying the work of a burner.

[0004] The purpose of the invention is to develop such burner unit structure which will allow to steady the flow of the fuel mix so as to achieve even flame on the burner surface, which in effect will reduce the noise generated by working exchanger.

[0005] A gas burner unit intended for a heat exchanger, having a perforated burner wall and an air and fuel duct according to the invention is characterised in that in the air and fuel duct, over the perforated burner wall, there is a transverse baffle featuring holes and dividing the air and fuel duct into two segments: before and after the said baffle, where the baffle is shaped so that the cross section of the segment of the air and fuel duct located between the baffle and the perforated burner wall increases along the baffle towards the perforated burner wall, and the cross section of the segment of the air and fuel duct located within the inner space delimited by the baffle decreases towards the perforated burner wall, and where fixed to the wall of the air and fuel duct above the baffle is a deflector for the air and fuel mix, shaped so that its cross section decreases towards the perforated burner wall.

Preferably, the baffle is given the shape of the side wall of a cone or truncated cone with its smaller base also featuring holes, or the shape of an open dome, or of the side wall of a truncated pyramid, its smaller base also featuring holes, where the shape of the baffle depends on the shape of the burner. Preferably, the baffle is fitted with a mounting flange.

Preferably, the total area of the holes in the baffle accounts for 0.3 to 1.2 of the area of the opening of the fan used to supply the air and fuel mix to the air and fuel duct.

Preferably, the angle of inclination of the side surface of the air and fuel mix deflector with respect to the perforated burner wall corresponds to the angle of inclination of the side surface of the baffle with respect to the perforated burner wall.

Preferably, the air and fuel mix deflector is given the conical shape.

[0006] Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

In the drawings:

Fig. 1 shows the cross section of the burner unit with visible baffle in the shape of the side wall of a cone featuring holes and fitted with an air and fuel mix deflector in the shape of the side wall of a cone, in axonometric view;

Fig. 2 depicts the baffle in the shape of the side wall of a cone with round holes and a mounting flange, in axonometric view;

Fig. 3 shows the baffle as in Fig. 2, in side view;

Fig. 4 depicts the baffle as in Fig. 2, in bird's eye view;

Fig. 5 shows the baffle in the shape of the side wall of a truncated cone with round holes, fitted with a smaller base also featuring holes, and fitted with a mounting flange on the side of the larger base, in axonometric view;

Fig. 6 presents the baffle as in Fig. 5, in side view;

Fig. 7 depicts the baffle as in Fig. 5, in bird's eye view;

Fig. 8 shows the baffle in the shape of an open dome with square holes, in axonometric view;

Fig. 9 depicts the baffle as in Fig. 8, in side view;

Fig. 10 presents the baffle as in Fig. 8, in bird's eye view;

Fig. 11 depicts the baffle in the shape of the side wall of a pyramid with round holes, fitted with a smaller base also featuring holes, in axonometric view;

Fig. 12 presents the baffle as in Fig. 11, in side view;

Fig. 13 -shows the baffle as in Fig. 11, in bird's eye view;

Fig. 14 shows the baffle in the shape of the side wall of a truncated pyramid with round holes, fitted with a smaller base also featuring holes, in axonometric view;

Fig. 15 depicts the baffle as in Fig. 14, in side view;

Fig. 16 presents the baffle as in Fig. 14, in bird's eye view;

Fig. 17 shows the air and fuel mix deflector in the conical shape, in axonometric view;

Fig. 18 depicts the deflector as in Fig. 17, in side view;

Fig. 19 shows the deflector as in Fig. 17, in bird's eye view.

[0007] In the first exemplary embodiment of the invention (Fig. 1 to Fig. 4), a gas burner unit intended for a heat exchanger incorporates a perforated wall 1 of the burner, air and fuel duct 2, where there is a transverse baffle 3 over the perforated wall 1 of the burner, and further includes a plate 6 of the burner. Fixed to the plate 6 of the burner is the baffle 3, air and fuel duct 2, and perforated wall 1 of the burner. The baffle 3 is given the shape of the side wall of a cone hollow inside (Fig. 2 to Fig. 4), where the apex of the cone points in the direction of the perforated wall 1 of the burner and divides the air and fuel duct 2 into two segments: the segment under the baffle 3 and the one over the baffle 3. The cross section of the segment of the air and fuel duct 2 located within

the inner space delimited by the baffle 3 decreases towards the perforated wall 1 of the burner.

The baffle 3 features round holes 4 through which the air and fuel mix is supplied to the perforated wall 1 of the burner, as well as a mounting flange 5 used to screw the baffle 3 to the plate 6 of the burner. Fixed to the wall of the air and fuel duct over the baffle 3 is the air and fuel mix deflector 7 given the conical shape (Fig. 1 plus Fig. 17 to Fig. 19), with its apex pointing towards the perforated wall 1 of the burner. The angle of inclination of the side surface of the air and fuel mix deflector 7 with respect to the perforated burner wall 1 corresponds to the angle of inclination of the side surface of the baffle 3 with respect to the perforated burner wall 1.

[0008] In the second exemplary embodiment of the invention, the burner unit described in the first example incorporates the baffle 3 in the shape of the side wall of a truncated cone hollow inside (Fig. 5 to Fig. 7), fitted with a smaller base pointing towards the perforated burner wall 1, which divides the air and fuel duct 2 into two segments: the segment under the baffle 3 and the one over the baffle 3. The cross section of the segment of the air and fuel duct 2 located within the inner space delimited by the baffle 3 decreases towards the perforated burner wall 1. The baffle 3 features round holes 4 made in its side surface and the base, and is fitted with a mounting flange 5 used to screw the baffle 3 to the burner plate 6. In the same embodiment of the invention, the air and fuel mix deflector 7 is also conical in shape (Fig. 17 to Fig. 19), with its apex pointing towards the perforated burner wall 1. The angle of inclination of the side surface of the air and fuel mix deflector 7 with respect to the perforated burner wall 1 corresponds to the angle of inclination of the side surface of the baffle 3 with respect to the perforated burner wall 1.

[0009] In the third exemplary embodiment the burner unit described in example 1 incorporates the baffle 3 in the shape of an open dome (Fig. 8 to Fig. 10), oriented in the direction opposite to the perforated wall 1 of the burner, where the baffle divides the air and fuel duct 2 into two segments: the segment under the baffle 3 and the one over the baffle 3. The cross section of the segment of the air and fuel duct 2 located within the inner space delimited by the baffle 3 decreases towards the perforated wall 1 of the burner. The baffle 3 features square holes 4, and is fitted with a mounting flange 5 used to screw the baffle 3 to the burner plate 6.

In this embodiment the air and fuel mix deflector 7 is also conical in shape (Fig. 17 to Fig. 19), with the apex pointing towards the perforated burner wall 1.

[0010] In the fourth exemplary embodiment the burner unit described in example one incorporates the baffle 3 in the shape of the side wall of a pyramid hollow inside (Fig. 11 to Fig. 13), with its apex pointing towards the perforated burner wall 1, where the baffle divides the air and fuel duct 2 into two segments: the segment under the baffle 3 and the one over the baffle 3. The cross section of the segment of the air and fuel duct 2 located within the inner space delimited by the baffle 3 decreases towards the perforated wall 1 of the burner. The baffle 3 features round holes 4. The baffle 3 is welded to the burner plate 6.

In this embodiment of the invention the air and fuel mix deflector 7 is also conical in shape (Fig. 17 to Fig. 19), with the apex pointing towards the perforated burned wall 1. The angle of inclination of the side surface of the air and fuel mix deflector 7 with respect to the perforated burner wall 1 corresponds to the angle of inclination of the side surface of the baffle 3 with respect to the perforated burner wall 1.

[0011] In the fifth embodiment of the invention the burner unit described in the first example features the baffle 3 in the shape of the side wall of a truncated pyramid (Fig. 14 to Fig. 16) with the smaller base oriented towards the perforated burner wall 1, where the baffle divides the air and fuel duct 2 into two segments: the segment under the baffle 3, and the one over the baffle 3. The cross section of the segment of the air and fuel duct 2 located within the inner space delimited by the baffle 3 decreases towards the perforated burner wall 1. The baffle 3 features round holes 4, made in its side wall and the base. The baffle 3 is welded to the burner plate 6.

In this embodiment of the invention the air and fuel mix deflector 7 is also conical in shape (Fig. 17 to Fig. 19), with the apex pointing towards the perforated burner wall 1. The angle of inclination of the side surface of the air and fuel mix deflector 7 with respect to the perforated burner wall 1 corresponds to the angle of inclination of the side surface of the baffle 3 with respect to the perforated burner wall 1.

[0012] The shape of the baffle 3 depends on the shape of the burner.

[0013] In all embodiments of the invention the total area of the holes 4 in the baffle 3 accounts for 0.3 to 1.2 of the area of the opening of the fan used to supply the air and fuel mix to the air and fuel duct 2.

[0014] The air and fuel mix is supplied via the air and fuel duct 3 fitted with a deflector 7 to the perforated wall 1 of the burner through the holes 4 in the baffle 3. The shape of the baffle 3 and the deflector 7 and their positioning towards each other in the air and fuel duct 2 according to the invention ensures substantial reduction of noise accompanying the work of the burner unit. Before the air and fuel mix gets inside the baffle 3, it comes across the deflector 7 and when it flows around it, it gets evenly directed to the baffle 3, from where, through the holes 4, it evenly gets to the perforated burner wall, thus ensuring steady burning of the mix, which reduces the noise generated by the working burner.

Claims

1. A gas burner unit intended for a heat exchanger, having a perforated burner wall and an air and fuel duct is **characterised in that** in the air and fuel duct

(2), over the perforated burner wall (1), there is a transverse baffle (3) featuring holes (4) and dividing the air and fuel duct (2) into two segments, before and after the said baffle, where the baffle is shaped so that the cross section of the segment of the air and fuel duct (2) located between the baffle (3) and perforated burner wall (1) increases along the baffle (3) towards the perforated burner wall (1), and the cross section of the segment of the air and fuel duct (2) located within the inner space delimited by the baffle (3) decreases towards the perforated burner wall (1), and where fixed to the wall of the air and fuel duct (2) above the baffle (3) is a deflector (7) for the air and fuel mix, shaped so that its cross section decreases towards the perforated burner wall (1).

2. The unit according to Claim 1, **characterised in that** the baffle (3) is given the shape of the side wall of a cone.

3. The unit according to Claim 1, **characterised in that** the baffle (3) is given the shape of the side wall of a truncated cone with the smaller base.

4. The unit according to Claim 1, **characterised in that** the baffle (3) is given the shape of an open dome.

5. The unit according to Claim 1, **characterised in that** the baffle (3) is given the shape of the side wall of a pyramid.

6. The unit according to Claim 1, **characterised in that** the baffle (3) is given the shape of the side wall of a truncated pyramid with the smaller base.

7. The unit according to Claims 1 to 6, **characterised in that** the baffle (3) is fitted with a mounting flange (5).

8. The unit according to Claims 1 to 6, **characterised in that** the total area of the holes (4) in the baffle (3) accounts for 0.3 to 1.2 of the area of the opening of the fan used to supply the air and fuel mix to the air and fuel duct (2).

9. The unit according to Claims 1 to 8, **characterised in that** the angle of inclination of the side surface of the air and fuel mix deflector (7) with respect to the perforated burner wall (1) corresponds to the angle of inclination of the side surface of the baffle (3) with respect to the perforated burner wall (1).

10. The unit according to Claims 1 or 9, **characterised in that** the air and fuel mix deflector (7) is conical in shape.

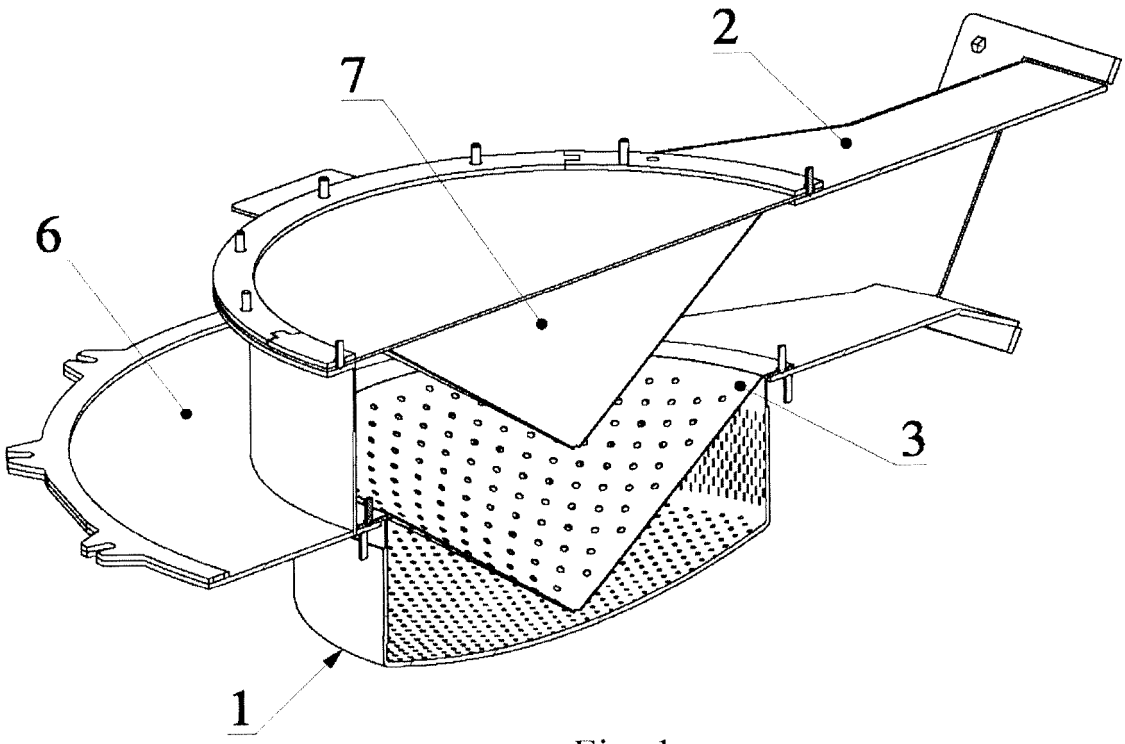

Fig. 1

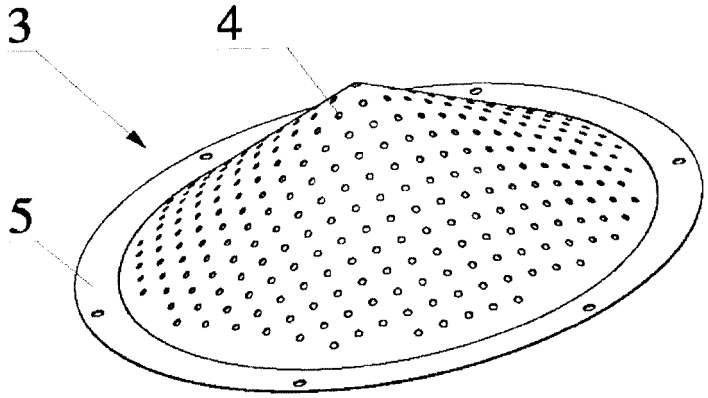

Fig. 2

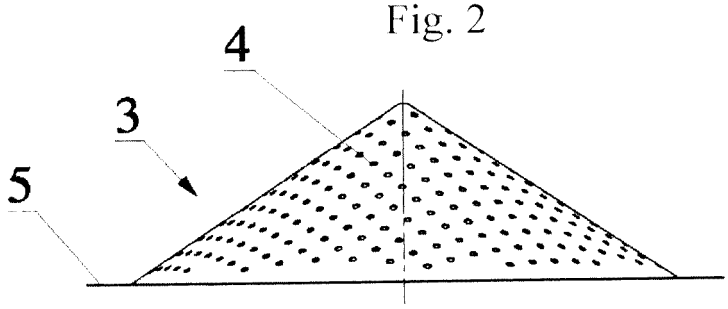

Fig. 3

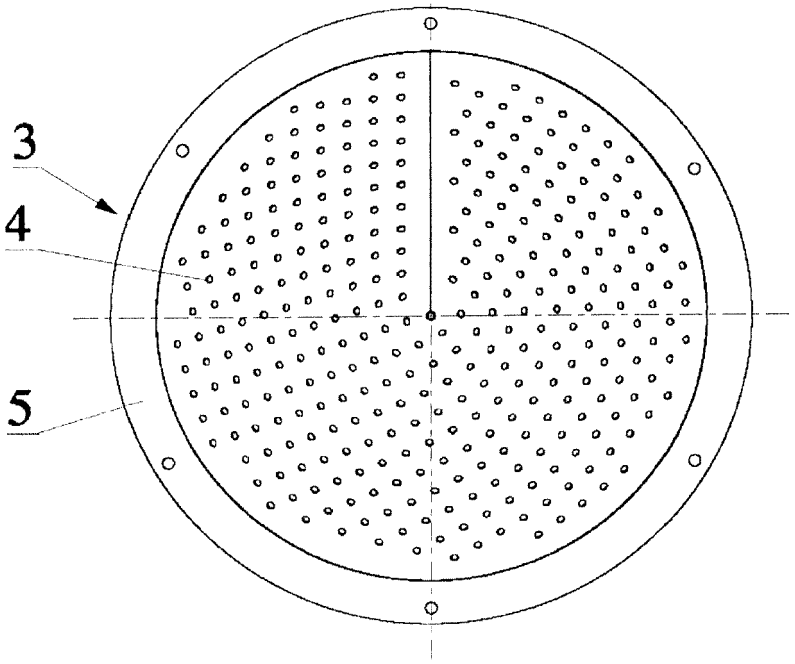

Fig. 4

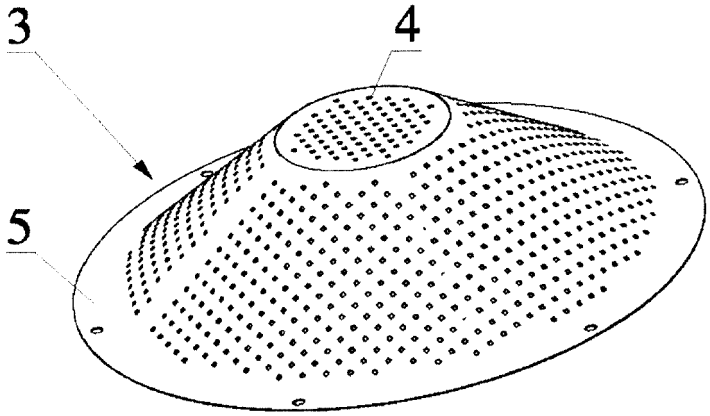

Fig. 5

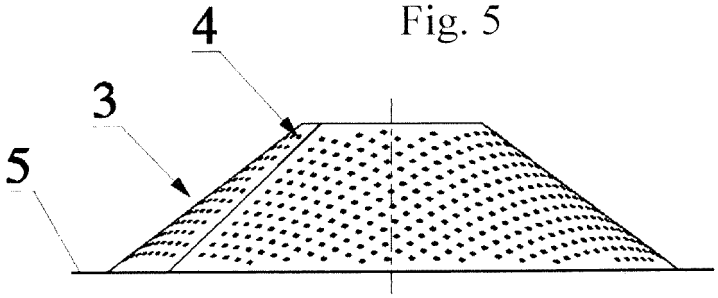

Fig. 6

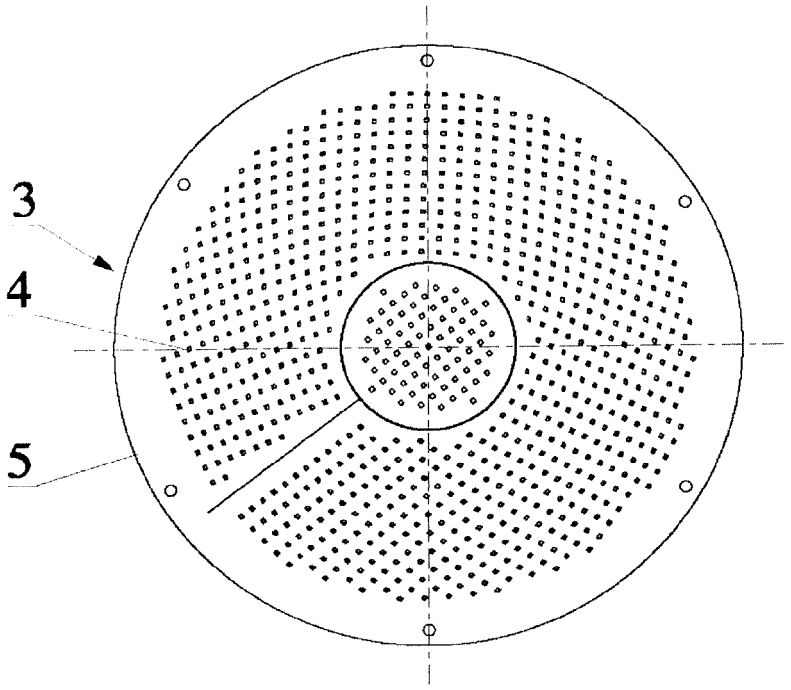

Fig. 7

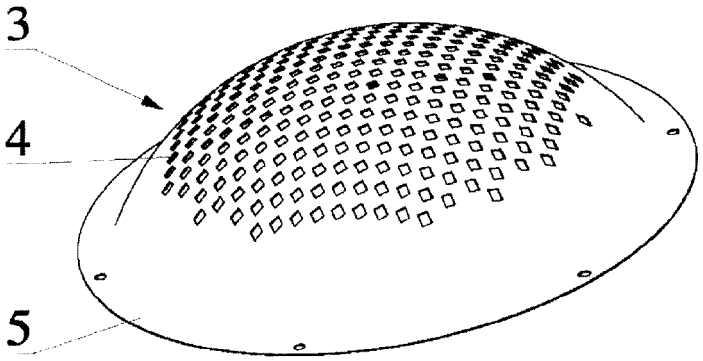

Fig. 8

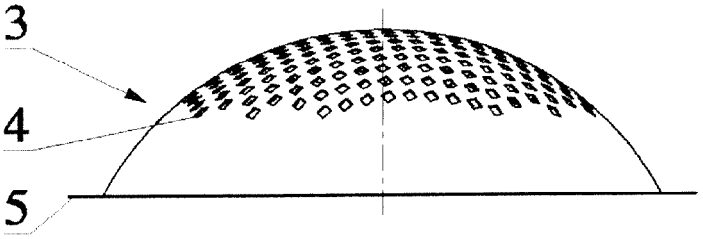

Fig. 9

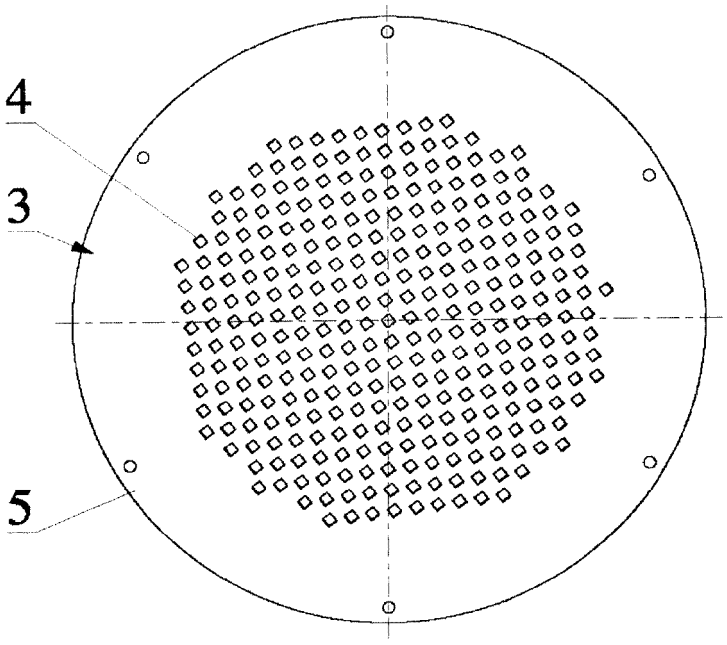

Fig. 10

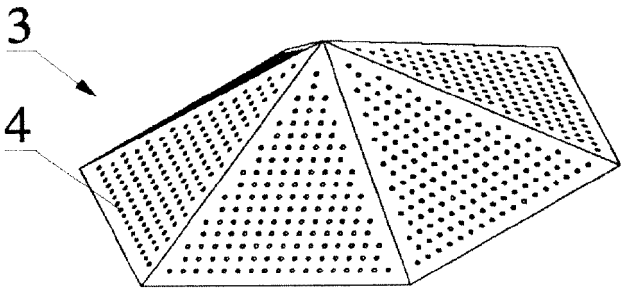

Fig. 11

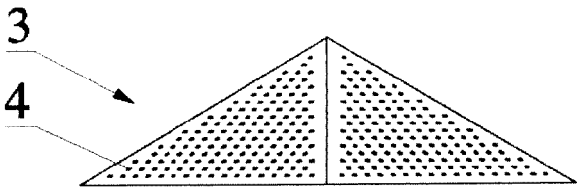

Fig. 12

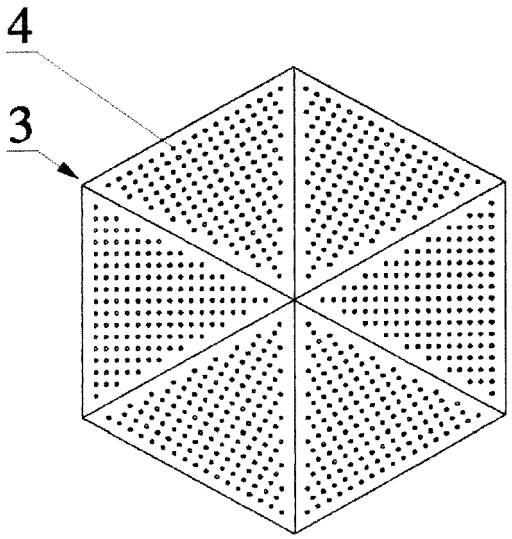

Fig. 13

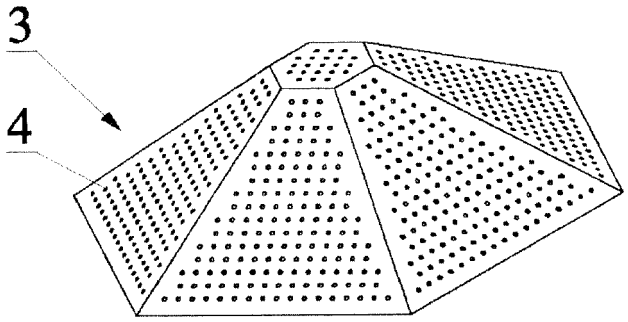

Fig. 14

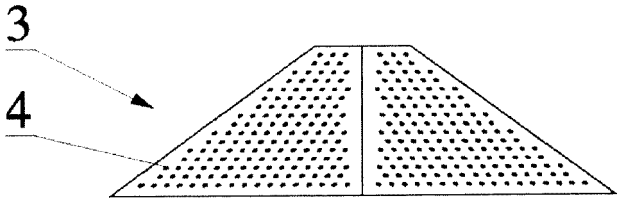

Fig. 15

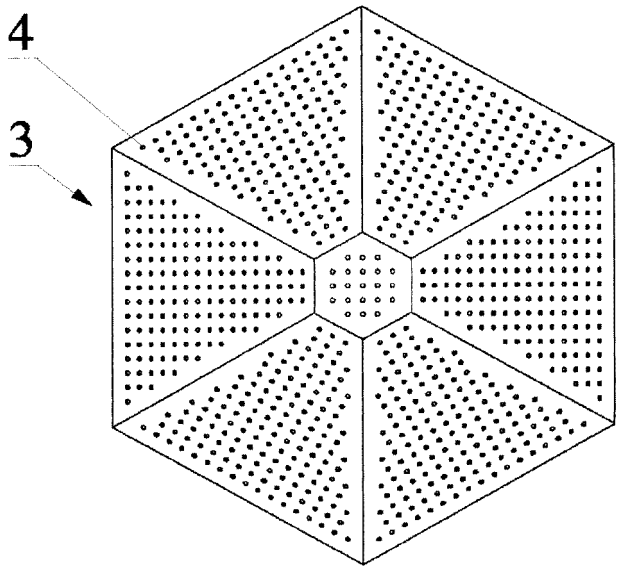

Fig. 16

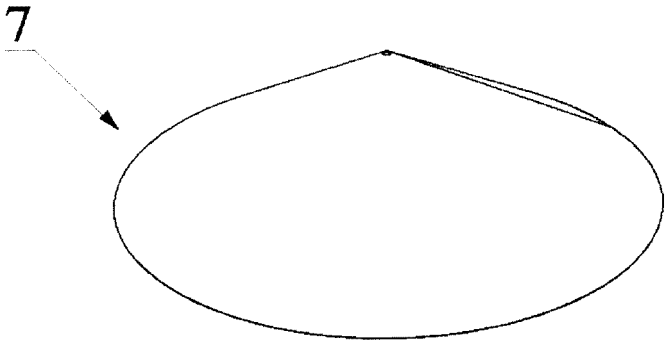

Fig. 17

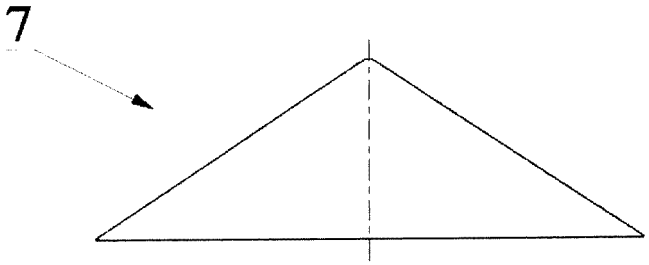

Fig. 18

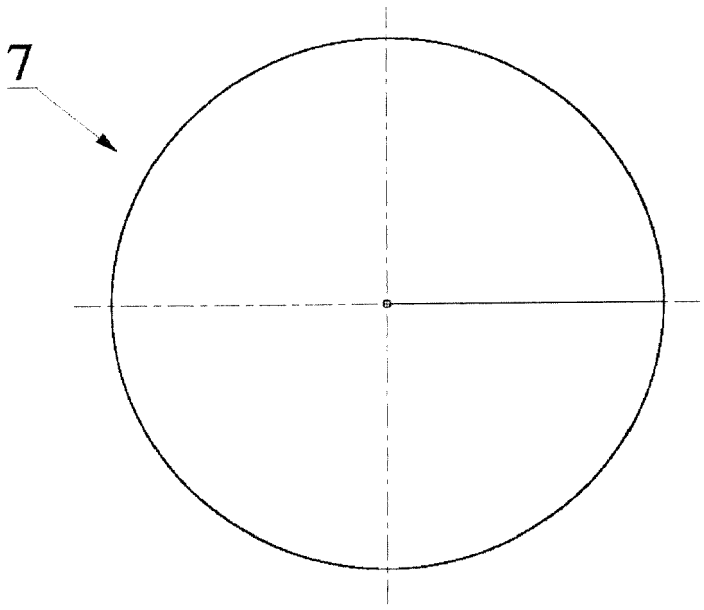

Fig. 19

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EUROPEAN SEARCH REPORT

Application Number
EP 19 46 0031

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2009/059933 A1 (SIT LA PRECISA SPA [IT]; SCRIBANO GIANFRANCO [IT] ET AL.) 14 May 2009 (2009-05-14) * figures 2, 4, 5 * * page 5, line 11 - page 6, line 13 *	1-10	INV. F23D14/02 F23D14/36 F23D14/62 F23D14/70
X	DE 42 19 443 A1 (VIESMANN HANS DR [DE]) 16 December 1993 (1993-12-16) * column 3, lines 22-26 * * column 4, lines 21-40 * * figures 1-4 *	1-10	
X	US 6 461 150 B1 (SIRAND JOSEPH [FR]) 8 October 2002 (2002-10-08) * column 10, line 28 - column 11, line 58 * * figures 3, 4 *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

F23D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 September 2019	Vogl, Paul

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 46 0031

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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05-09-2019

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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