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(54) **GAS BURNER UNIT FOR A HEAT EXCHANGER**

GASBRENNEREINHEIT FÜR EINEN WÄRMETAUSCHER

ENSEMBLE DE BRÛLEUR À GAZ POUR UN ÉCHANGEUR DE CHALEUR

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(56) References cited:
WO-A1-2009/059933 DE-A1- 4 219 443
US-B1- 6 461 150

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Description

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

[0002] 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.

[0003] Document WO 2009/059933 A1 discloses a burner, specifically for gas fuels with premixing, comprising a burner body designed to be housed in a combustion chamber of a heating apparatus. The burner body being provided with a burner head on which an air and gas mixture supplied to the combustion chamber is burnt, in which the burner head has a surface profile in the form of a dome-shaped spherical segment, the height of the dome being less than half of the diameter of the sphere to which the segment belongs.

[0004] Document DE 42 19 443 A1, on which the two-part-form of claim 1 is based, discloses a radiation burner for central heating boiler. The burner wind mesh face has a curved section dished in the outlet flow direction. The curved section has a continuous axial cross section, in seamless and rotation symmetrical. It is fitted over an aperture of a support. Its inlet aperture corresponds to that in the support. Its height corresponds at least to the radius of the curved section.

[0005] Known from patent document US 6 461 150 B1 is a very low pressure gas-fired overhead radiant heater with atmospheric primary air supply by means of a venturi which comprises a geometrical structure comprising at least one first, second, third and fourth concentric enclosure, a substantially horizontal upper plate below which the said at least first, second, third, fourth enclosures are fixed concentrically to said plate, fitting the one inside the other, a central opening leading the air-gas flow perpendicularly to said plate, into the interior space created by the first enclosure.

[0006] 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.

[0007] The invention is set out in the appended set of claims.

[0008] 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.

[0009] 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 (the cone shape of the side wall of the baffle is not part of the present invention) 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 pyramid with round holes, in axonometric view; Fig. 3 presents the baffle as in Fig. 2, in side view; Fig. 4 shows 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 pyramid with round holes, fitted with a smaller base also featuring holes, in axonometric view;

Fig. 6 depicts the baffle as in Fig. 5, in side view; Fig. 7 presents the baffle as in Fig. 5, in bird's eye view;

Fig. 8 shows the air and fuel mix deflector in the conical shape, in axonometric view;

Fig. 9 depicts the deflector as in Fig. 8, in side view; Fig. 10 shows the deflector as in Fig. 8, in bird's eye view.

[0010] 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 pyramid hollow inside with its apex pointing towards the perforated burner wall 1 (Fig. 2 to Fig. 4), or the shape of the side wall of a truncated pyramid with the smaller base oriented towards the perforated burner wall 1 (Fig. 5 to Fig. 7). The baffle 3 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.

[0011] The baffle 3 features round or square holes 4 through which the air and fuel mix is supplied to the perforated wall 1 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, Fig. 8 to Fig. 10), 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.

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

[0013] The baffle 3 in the shape of the side wall of a pyramid hollow inside or in the shape of the side wall of a truncated pyramid with the smaller base is welded to the burner plate 6.

[0014] Preferably, 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.

[0015] 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, 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), the air and fuel mix deflector (7) is conical in shape with its apex pointing towards the perforated burner wall (1) and 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), **characterised in that** the baffle (3) is given the shape of the side wall of a pyramid, or the shape of the side wall of a truncated pyramid with the smaller base.
2. The unit according to Claim 1, **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).

Patentansprüche

1. Gasbrennereinheit für einen Wärmetauscher, die aus einer perforierten Brennerwand und aus einem Luft-Brennstoff-Tunnel besteht, und im Luft-Brennstoff-Tunnel (2) über der perforierten Wand (1) des Brenners eine querverlaufende Trennwand (3) mit Öffnungen (4) angeordnet ist, die den Luft-Brennstoff-Tunnel (2) in zwei Teile, vor und hinter der vorgenannten Trennwand teilt, wobei die Trennwand so ausgebildet ist, dass der Querschnitt eines Teils des Luft-Brennstoff-Tunnels (2), der zwischen der Trennwand (3) und der perforierten Wand (1) des Brenners angeordnet ist, sich entlang der Höhe der Trennwand (3) in Richtung der perforierten Wand (1) des Brenners vergrößert und der Querschnitt eines Teils des Luft-Brennstoff-Tunnels (2) innerhalb der Trennwand (3) sich in Richtung der perforierten Wand (1) des Brenners verkleinert, wobei ein Lenker (7) des Luft-Brennstoffgemisches an die Wand des Luft-Brennstoff-Tunnels (2) über der Trennwand (3) montiert und so ausgebildet ist, dass ihr Querschnitt sich in Richtung der perforierten Wand (1) des Brenners verkleinert, wobei der Lenker (7) des Luft-Brennstoffgemisches eine konische Form aufweist mit einer Spitze, die zur perforierten Wand (1) des Brenners hin ausgerichtet ist und der Neigungswinkel der seitlichen Fläche des Lenkers (7) für das Luft-Brennstoffgemisch zur perforierten Wand (1) des Brenners dem Neigungswinkel der seitlichen Trennwand (3) zur perforierten Wand (1) des Brenners entspricht, **dadurch gekennzeichnet, dass** die Trennwand (3) als Mantelfläche einer Pyramide oder als Mantelfläche einer abgeschnittenen Pyramiden mit einer kleineren Grundfläche ausgebildet ist.
2. Einheit gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die gesamte Fläche der Öffnungen (4) in der Trennwand (3) im Bereich zwischen 0,3 bis 1,2 der Öffnungsfläche des Ventilators liegt, durch die das Luft-Brennstoffgemisch dem Luft-Brennstoff-Tunnel (2) zugeführt wird.

Revendications

1. Ensemble de brûleur à gaz pour un échangeur de chaleur, contenant une paroi de brûleur perforée et un tunnel air-carburant, dans le tunnel air-carburant (2), au dessus de la paroi perforée (1) du brûleur, se trouve une cloison transversale (3) équipée de trous (4), qui divise le tunnel air-carburant (2) en deux parties, avant et après ladite cloison, la cloison étant conformée de telle sorte que la section de la partie du tunnel air-carburant (2) située entre la cloison (3) et la paroi perforée (1) du brûleur augmente avec la hauteur de la cloison (3) vers la paroi perforée (1) du brûleur, et la section de la partie du tunnel air-

carburant (2) située dans la zone intérieure de la cloison (3) diminue vers la paroi perforée (1) du brûleur, le guide (7) de mélange air-carburant étant monté sur la paroi du tunnel air-carburant (2) au-dessus de la cloison (3), conformément de telle manière que sa section transversale diminue vers la paroi perforée (1) du brûleur, le guide (7) de mélange air-carburant a une forme conique avec son sommet dirigé vers la paroi perforée (1) du brûleur et l'angle d'inclinaison de la surface latérale du guide (7) de mélange air-carburant par rapport à la paroi perforée (1) du brûleur correspond à l'angle d'inclinaison de la surface latérale de la cloison (3) par rapport à la paroi perforée (1) du brûleur, **caractérisé en ce que** la cloison (3) présente la forme de la surface latérale d'une pyramide ou la forme de la surface latérale d'une pyramide tronquée à base plus petite.

2. Ensemble selon la revendication 1, **caractérisé en ce que** la surface totale des trous (4) de la cloison (3) est de 0,3 à 1,2 de la surface du trou du ventilateur à travers lequel le mélange air-carburant est amené au tunnel air-carburant (2).

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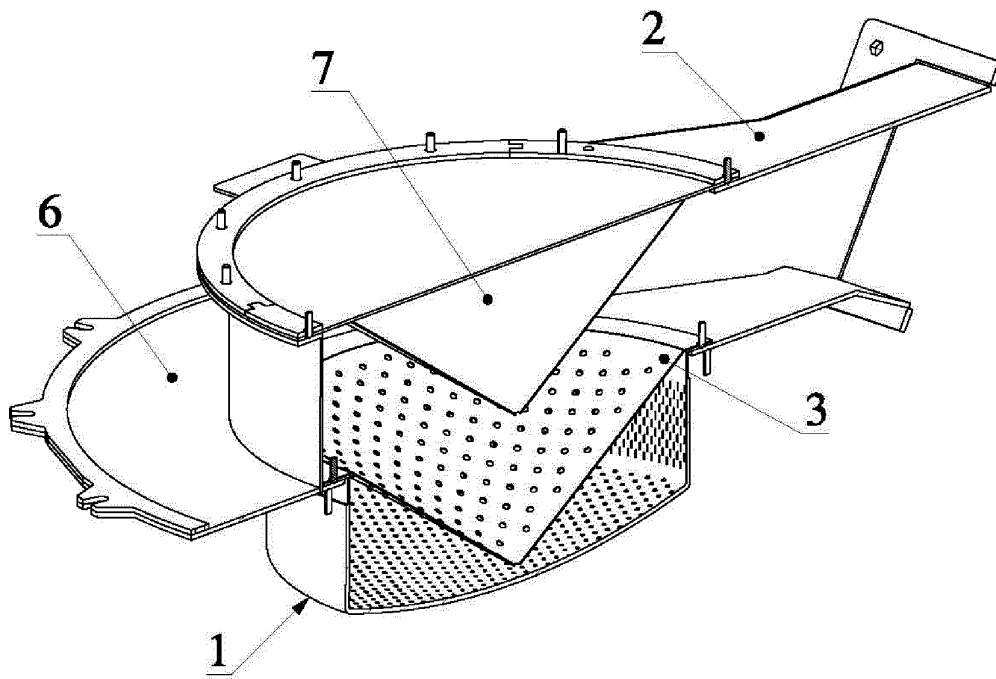


Fig. 1

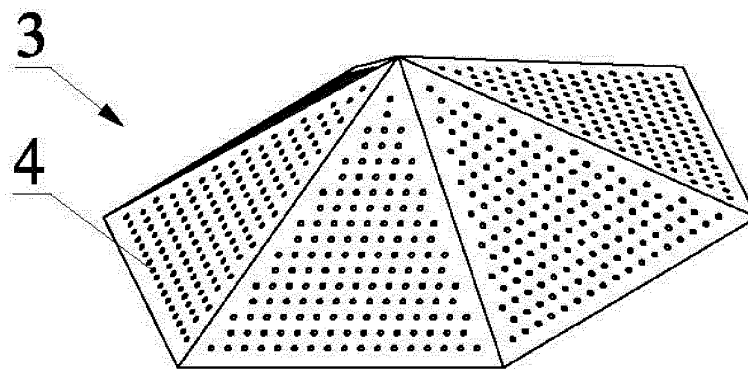


Fig. 2

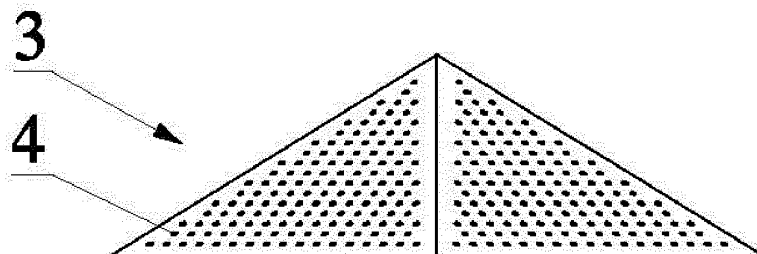


Fig. 3

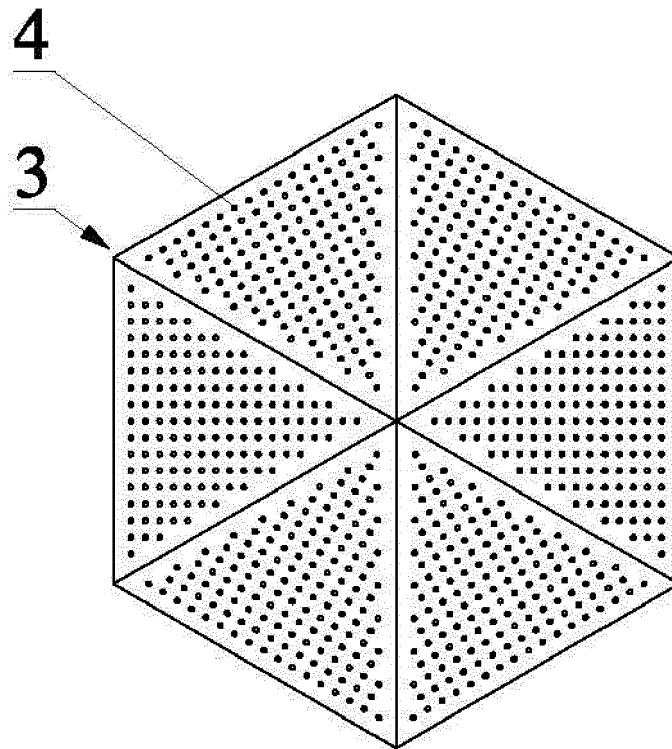


Fig. 4

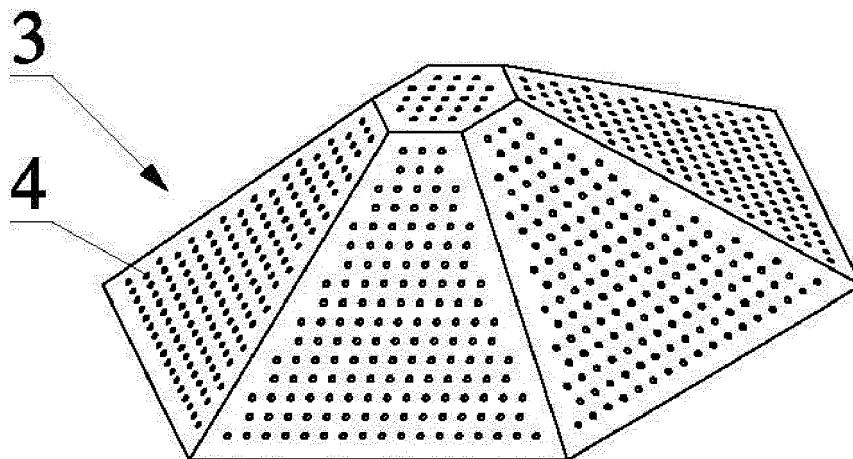


Fig. 5

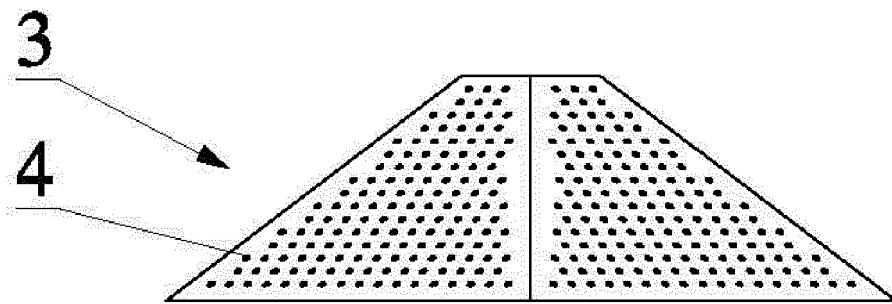


Fig. 6

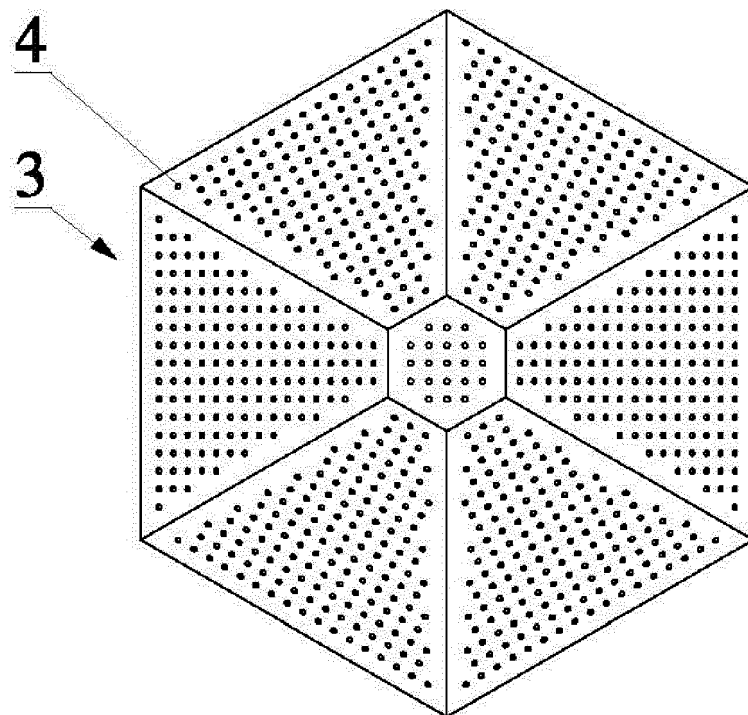


Fig. 7

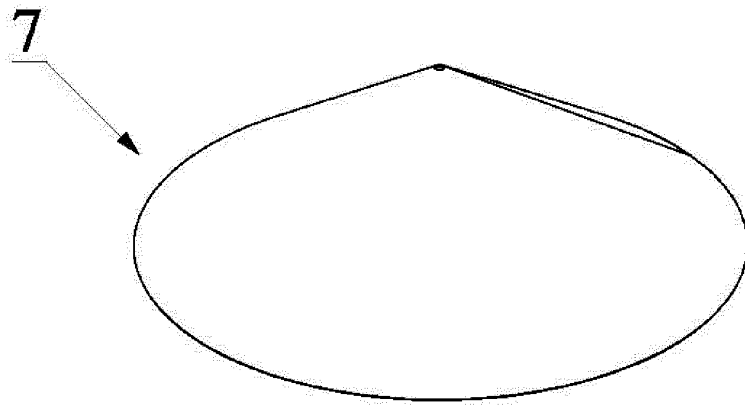


Fig. 8

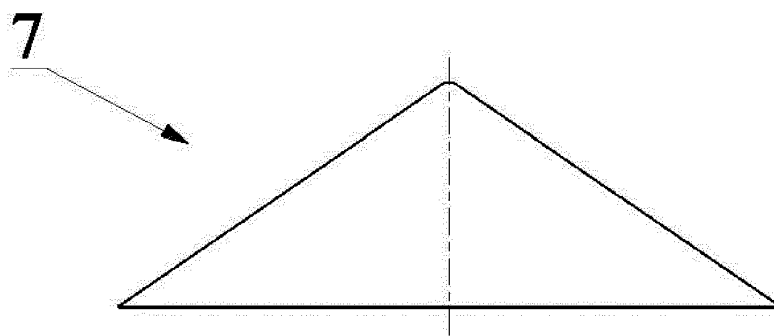


Fig. 9

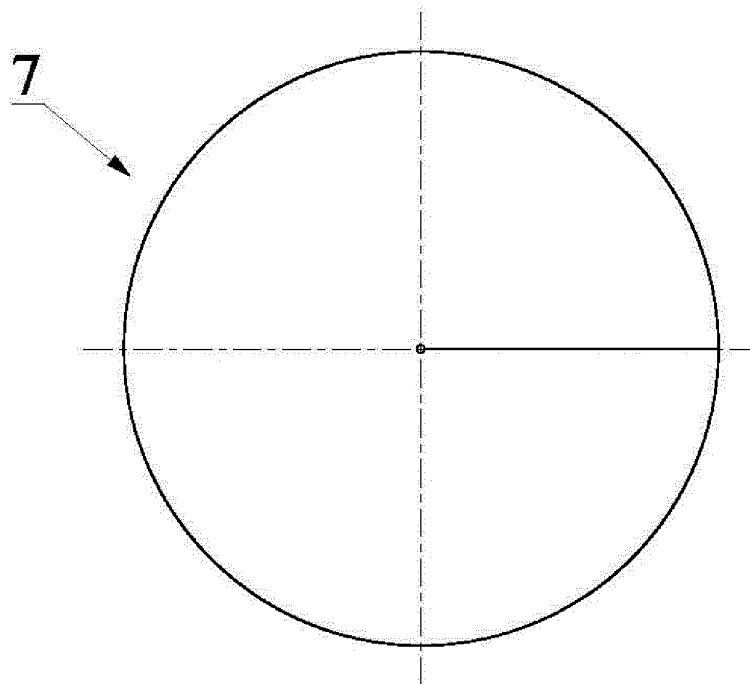


Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP H0264306 A **[0002]**
- WO 2009059933 A1 **[0003]**
- DE 4219443 A1 **[0004]**
- US 6461150 B1 **[0005]**