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(54) **Air diffuser**

(57) The invention relates to an air diffuser comprising a flat sheet (1), which comprises at least one deflecting fin (2) formed with respect to the flat sheet (1) itself; wherein said at least one deflecting fin (2) is inclined with respect to the larger surface of said flat sheet (1); and wherein a gap (3), defined between said at least one diffusing fin (2) and the larger surface of the flat sheet (1), defines a space for the passage of air through said

gap (3); reducing the manufacturing and forming cost of said diffuser, in addition to requiring a reduced amount of raw material to be used, which directly results in an additional saving in the overall cost of the product to be obtained; and all this without negatively affecting the aerodynamic behavior of the air circulating through said diffuser object of the invention.

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Description

Technical Field of the Invention

[0001] The present invention relates to an air diffuser configured to allow the passage of air therethrough, and diffuse said air in multiple directions towards a certain space; and in which said air diffuser is applicable in the sector of ventilation and air conditioning of building installations.

[0002] The purpose of the air diffuser object of the invention is the correct diffusion of the air circulating there-through, such that it diffuses the air towards multiple directions and a correct renewal and ventilation of the air in a certain space is achieved, and the main advantage of which is a low manufacturing and forming cost, in addition to requiring a reduced amount of raw material to be used, which directly results in an additional saving in the overall cost of the product to be obtained; and all this without negatively affecting the aerodynamic behavior of the air circulating through said diffuser object of the invention.

Background of the Invention

[0003] By way of introduction, the use of air diffusers in dwelling or office spaces is known, which air diffusers are normally coupled to the flat surface of the ceiling, and in which the ventilation conduits are concealed as a result of the coupling therein of said air diffusers.

[0004] In relation to the main functions of the diffusion of the air in certain premises, these functions are:

- Introduction of the air in the premises.
- Homogenization of the air in the premises.
- Preventing temperature stratifications of the air in the premises.
- Compensation of heat loads.

[0005] These features must be achieved independently of the type of diffuser to be used, and in which, in relation to the types of diffusers that are currently known, they vary in terms of the type of air propelling mouth, there being for example multiple-cone circular air diffusers, adjustable-cone air diffusers, square geometry air diffusers, linear air diffusers with blades and linear air diffusers with rollers.

[0006] But all these diffusers, and preferably the square geometry diffuser, have the main drawback that the air-deflecting fins, through which the air circulates and traverses towards the premises, have sheet metal sections coupled to said fins, such that they direct the air towards the deflecting fins and improve the dynamic behavior of the air to be circulated through said diffuser, but such that such sections compromise the forming time of the diffuser, increase the overall cost of the product since a large amount of material is required and, additionally, increase the weight of the diffuser, hindering its handling

and giving overload stresses to the bearing surface for said diffuser, normally the ceiling.

[0007] Therefore, in view of the aforementioned drawbacks, it is necessary for a new air diffuser to appear which allows simplifying the forming process thereof without negatively affecting the aerodynamic behavior of the air to be diffused, in addition to not incurring an additional expense of material which affects both the cost and the excess weight of the device object of the invention.

Description of the Invention

[0008] The present invention relates to an air diffuser for ventilation and air conditioning installations; which comprises a flat sheet; and in which said flat sheet comprises at least one deflecting fin having the following features:

- It is formed with respect to the flat sheet itself, i.e., it forms part of the flat sheet and is formed through a perforation or cut of part of the flat sheet, therefore it is not an additional element mechanically coupled or welded to the flat sheet;
- it is inclined with respect to the larger surface of said flat sheet, in which said inclination can be convergent or divergent and directs the air flow towards a certain direction; and
- the gap defined between said at least one diffusing fin and the larger surface of the flat sheet defines a space for the passage of air through said gap, again aided by the inclination of said at least one diffusing fin.

[0009] This series of technical features provides a manufacturing and forming simplicity unknown up until now, since the generation of a gap or cavity for the passage of air and directed towards the direction defined by the inclination of each deflecting fin is achieved with only said at least one deflecting fin formed in the flat sheet itself.

[0010] In this sense, the forming process is reduced to obtaining a flat sheet and making a series of cuts, according to the number and positioning of deflecting fins, therein in order to subsequently bend them; without needing to perform more steps or weld or couple additional elements which might increase the cost of the process due to the longer forming time and due to the greater use of material used in the manufacture thereof.

[0011] Said at least one deflecting fin preferably does not have additional elements coupled thereto; i.e., as has been described above, there are no sections coupled to the deflecting fins and therefore there are no additional steps referred to the welding, or mechanical coupling, of said sections to each of the deflecting fins, this technical feature differs from the state of the art in which the air diffusers have complex sections configured to direct the air to be circulated in specific directions; and in which the absence of said sections does not affect the aerodynamic

behavior of the air to be circulated due to the fact that the latter is directed by the inclination of said at least one deflecting fin and, therefore, performs the same function of steering the air without needing to use elements additional to the flat sheet.

[0012] The possibility is contemplated that the flat sheet comprises a square geometry, and in which the gap defined by said at least one deflecting fin is parallel to one of the sides of said flat sheet; thus, in the case of multiple deflecting fins, the latter will occupy part of the surface of the flat sheet, the gaps being parallel or transverse to the sides of said flat sheet; and in which preferably, the possibility is contemplated that the number of gaps, defined by the respective deflecting fins of said flat sheet, is comprised between one and four gaps, depending on the air flow to be circulated therethrough and the size of the air diffuser to be installed.

[0013] In relation to the coupling of the air diffuser and to the inclination of the deflecting fins, the possibility is contemplated that the diffuser is coupled to a flat surface, preferably a ceiling, which comprises a cavity suitable for allowing the passage of air therethrough; and in which said at least one deflecting fin is inclined towards the inside of said cavity; such that the air circulating through the cavity comes with contact with said at least one deflecting fin and the latter directs and steers it towards the outside following a specific exit direction, in which each deflecting fin preferably forms an angle of 35° with respect to the larger surface of the flat sheet; there still being the possibility of carrying out different inclinations and even automating the opening and closing of said at least one deflecting fin depending on the air flow to be diffused.

[0014] Finally, the possibility is contemplated that the air diffuser object of the invention comprises a perimetric bend perpendicular to the larger surface of said flat sheet, such that said bend has a dual function:

- It allows the possibility of coupling part of the air diffuser to the flat surface comprising the cavity through which the air circulates; and
- it prevents air from escaping through the perimeter of the air diffuser object of the invention, forcing the air to circulate through said at least one deflecting fin and exit through the gap corresponding to said deflecting fin.

[0015] Thus, according to the invention described, the air diffuser for ventilation and air conditioning installations described is an important novelty in currently used air diffusers and reduces the manufacturing and forming cost thereof, in addition to requiring a reduced amount of raw material to be used, which directly results in an additional saving in the overall cost of the product to be obtained; and all this without negatively affecting the aerodynamic behavior of the air circulating through said diffuser object of the invention.

Description of the Drawings

[0016] To complement the description which is being made, and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a series of drawings is attached as an integral part of said description, in which the following has been depicted with an illustrative and non-limiting character:

Figure 1 shows a three-dimensional schematic view of the air diffuser object of the invention with respect to a face to be coupled to the cavity through which the air to be diffused circulates.

Figure 2 shows a three-dimensional schematic view similar to Figure 1, but with respect to a face visible from the enclosure in which the air is to be diffused. Figure 3 shows a schematic view of a detail of the plurality of deflecting fins inclined with respect to the larger surface of the flat sheet of the air diffuser object of the invention.

Figure 4 shows schematic detailed view of the plurality of deflecting fins of the air diffuser object of the invention.

Preferred Embodiment of the Invention

[0017] In view of Figures 1 to 4, it can be observed how one of the possible embodiments of the air diffuser for air conditioning and ventilation installations proposed by the invention comprises a flat sheet (1), and in which said flat sheet (1) comprises a plurality of deflecting fins (2) having the following features:

- They are formed with respect to the flat sheet (1) itself without additional elements welded thereto;
- they are inclined with respect to the larger surface of said flat sheet (1); and
- the gap (3) defined between each diffusing fin (2) and the larger surface of the flat sheet (1) defines a space for the passage of air through said gap (3).

[0018] It is observed, in Figures 1 and 2, that the flat sheet (1) comprises a square geometry and in which each of the gaps (3) defined by each deflecting fin (2) is parallel to each of the sides of said flat sheet (1), in which the number of gaps (3) parallel to each of the sides of the flat sheet (1) is preferably four, giving a total of sixteen gaps (3) for each flat sheet (1).

[0019] In relation to the inclination of each deflecting fin (1), they are inclined towards the inside of a cavity suitable for allowing the passage of air therethrough, in which such cavity is located in a flat surface in which the air diffuser object of the invention is coupled.

[0020] Finally, and in view of Figures 3 and 4, it is observed that the air diffuser has a perimetric bend (4) perpendicular to the larger surface of said flat sheet (1), in which said perimetric bend (4) is configured to prevent

air from escaping through the side of the flat sheet (1), to provide rigidity, and to direct the air towards the deflecting fins (2) and, therefore, to the gaps (3) of the flat sheet (1).

[0021] In view of this description and set of figures, the person skilled in the art will understand that the embodiments of the invention which have been described can be combined in many ways within the object of the invention. The invention has been described according to several preferred embodiments thereof, but for the person skilled in the art it will be evident that multiple variations can be introduced in said preferred embodiments without exceeding the object of the claimed invention.

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Claims

1. Air diffuser comprising a flat sheet (1), **characterized in that** said flat sheet (1) comprises at least one deflecting fin (2) formed with respect to the flat sheet (1) itself; wherein said at least one deflecting fin (2) is inclined with respect to the larger surface of said flat sheet (1); and wherein a gap (3), defined between said at least one diffusing fin (2) and the larger surface of the flat sheet (1), defines a space for the passage of air through said gap (3). 20
2. Air diffuser comprising a flat sheet (1) according to claim 1, **characterized in that** said at least one deflecting fin (2) does not have additional elements coupled thereto. 30
3. Air diffuser comprising a flat sheet (1) according to any of the previous claims, **characterized in that** the flat sheet (1) comprises a square geometry and wherein the gap (3) defined by said at least one deflecting fin (2) is parallel to one of the sides of said flat sheet (1). 35
4. Air diffuser comprising a flat sheet (1) according to claim 3, **characterized in that** the number of gaps (3), defined by the respective deflecting fins (2) and parallel to one of the sides of said flat sheet (1), is comprised between one and four gaps (3). 40
5. Air diffuser comprising a flat sheet (1) according to any of the previous claims, **characterized in that** the diffuser is coupled to a flat surface comprising a cavity suitable for allowing the passage of air there-through; and wherein said at least one deflecting fin (2) is inclined towards the inside of said cavity. 45
6. Air diffuser comprising a flat sheet (1) according to any of the previous claims, **characterized in that** it comprises a perimetric bend perpendicular to the larger surface of said flat sheet (1). 50

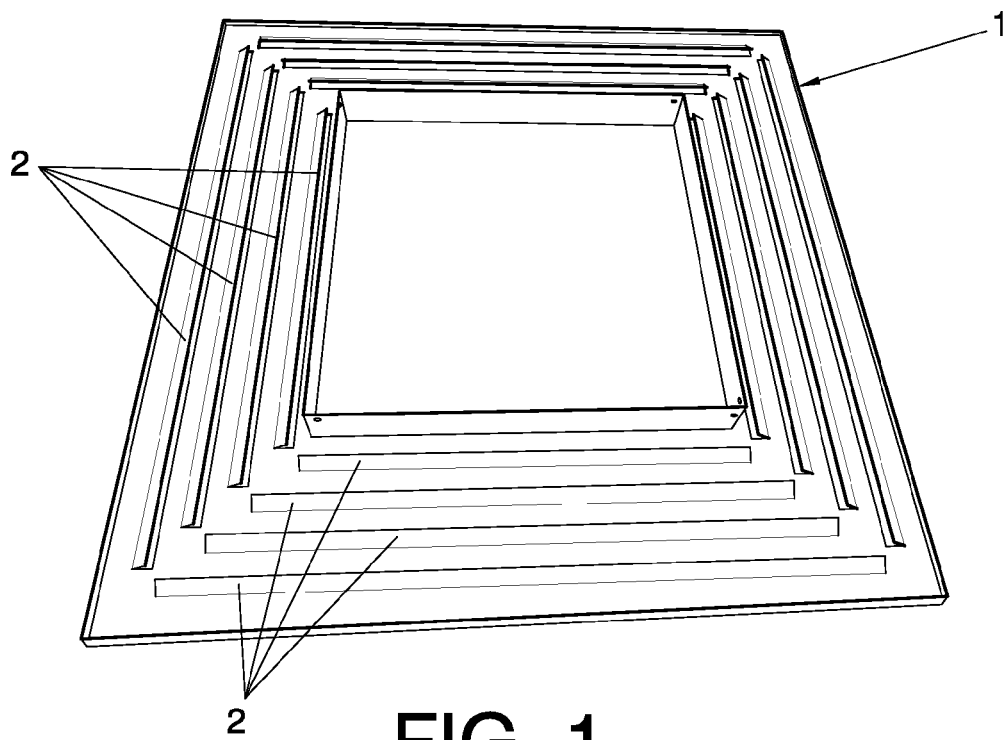


FIG. 1

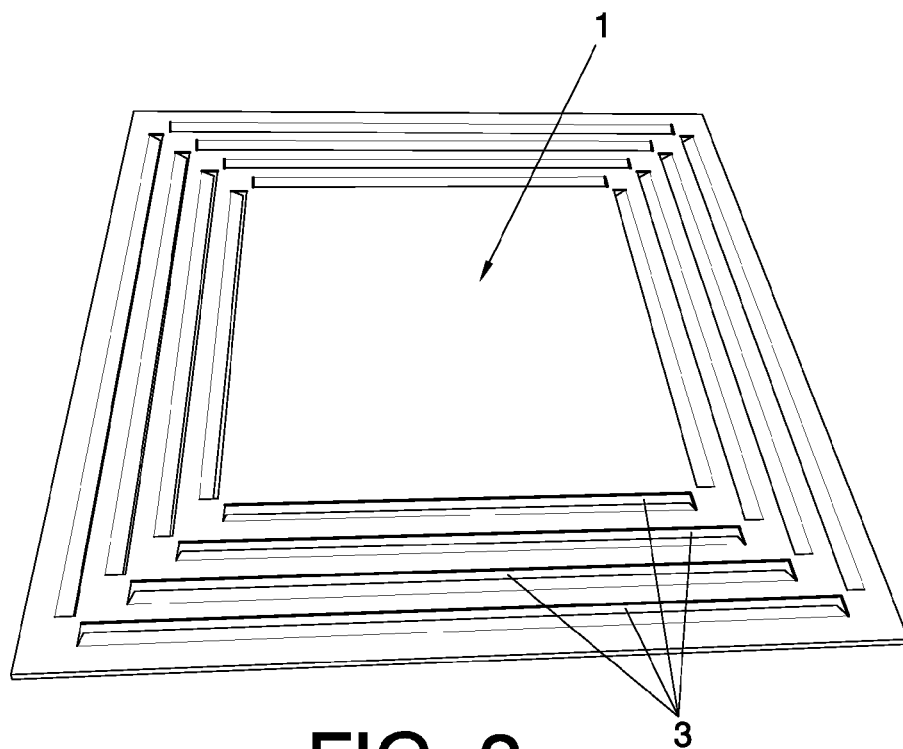


FIG. 2

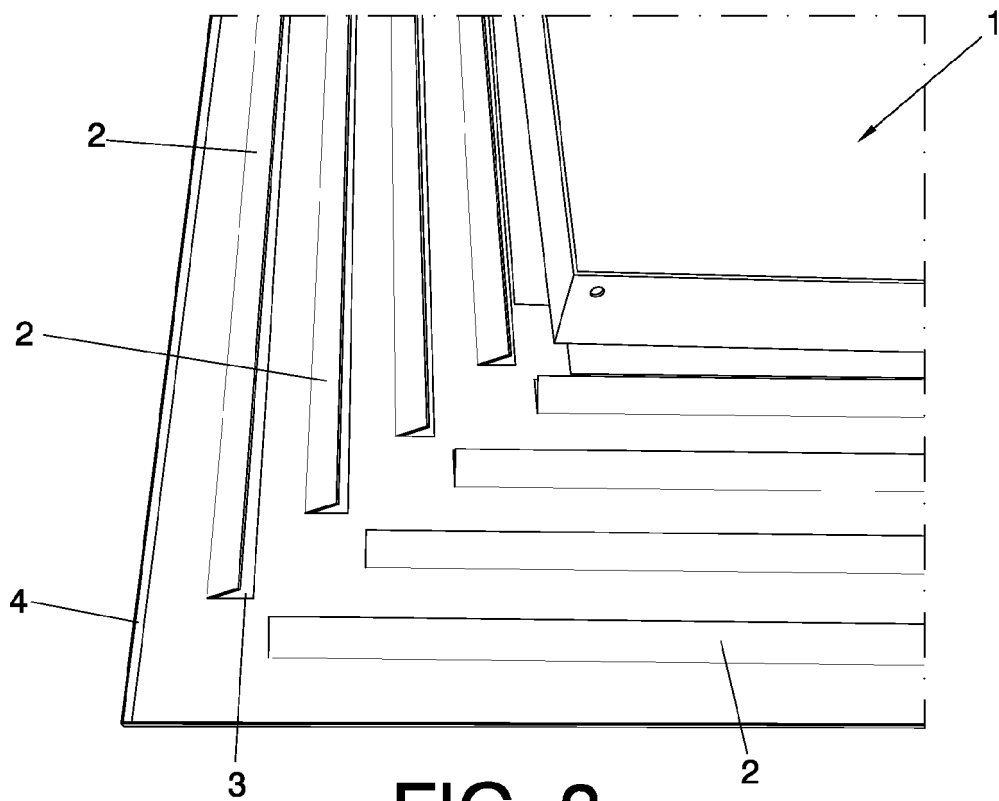


FIG. 3

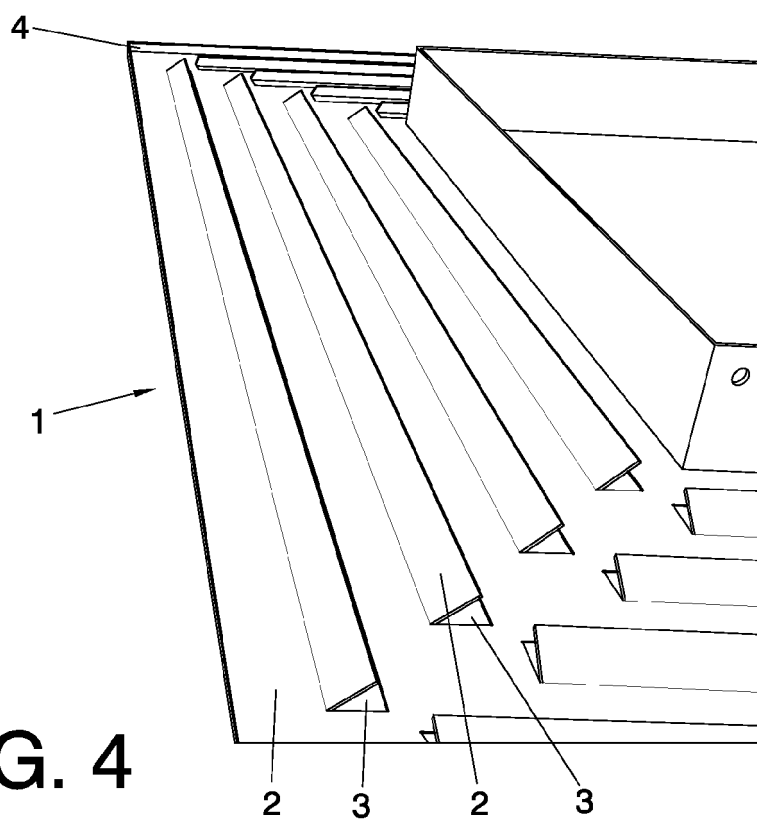


FIG. 4



EUROPEAN SEARCH REPORT

Application Number
EP 11 38 2175

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 November 2011	Examiner Vuc, Arianda
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 38 2175

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The members are as contained in the European Patent Office EDP file on
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02-11-2011

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