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(54) **Air-conditioning and recuperating device, preferably a ceiling air distributor**

(57) An air-conditioning and recuperating device, preferably a ceiling air-distributor with a housing (1) in the form of parallelepiped and a main pipe connector (6) with attached plate (5) and a plate (2) with pipe connectors, which comprises at least three pipe connectors (3), which are aligned along a line or several lines, wherein each pipe connector (3) is furnished with two notches, which are adapted for inserting of a protector (8), is furnished with a bottom separator (7), which is placed within said housing (1) and protrudes from the bottom portion thereof, as well as a top separator (8), which protrudes from the top portion thereof, wherein said separators are

conceived as integral parts of the uniform corrugated shell of said housing (1) and arranged along the width thereof. The walls of said separators (7, 8) are inclined and on the top semi-circularly interconnected, wherein the width and the height of each separator (7, 8) correspond to approximately a half of the height of the housing (1). A protector (4) is conceived as an interrupted elastic ring having two plates, which are semi-circularly shaped in the middle and furnished with an edge, which is on the one side sharp and on the other side slightly rounded, and moreover consists of a thermoplastic material with good elasticity.

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## Description

**[0001]** The invention refers to a recuperating air-conditioning device, preferably a surface ceiling distributor, which is used in distribution air-cooling, heating or ventilating systems, in particular of accommodation rooms.

**[0002]** Distribution system means a connection with an air-valve within each accommodation room, into which the air is blown, or the air is collected, in separate systems. The recuperating device is by means of a pipe connected with a surface ceiling distributor. The surface ceiling air-distributor is via pipes connected to air-valve chambers. Air-valve chambers, into which air-valves are insertable, are arranged on the ceiling or on walls or on the floor of each accommodation rooms.

**[0003]** The purpose of the invention is to improve a housing of a surface ceiling distributor in order to reduce vibrations and noise, to assure uniform air-flow on all outputs, as well as to minimize the risk of bacterial infections of the air. A further task of the invention is to improve protection against withdrawal of the pipe from the surface ceiling air-distributor. A known ceiling surface air-distributor is furnished with a housing in the form of a parallelepiped with one main pipe connector and at least three pipe connectors aligned in one line or several lines. Pipe connectors are arranged on separate plates, so that each plate can be mounted onto said housing in such manner that the central axis of the main pipe connector and the central axis of each smaller pipe connectors extend either perpendicular or parallel with respect to each other. A full plate is attached to the opening. The ceiling surface air distributor is made of zinc-plated metal sheet. The shell of the housing consists of several parts, which are interconnected by means of screws or rivets. Pipe connectors and the main pipe connector are attached to the housing by means of screws or rivets. The interior of the housing is covered with materials which are used for reduction of noise.

**[0004]** Prevention of withdrawal of each corrugated pipe from the pipe connector is achieved by means of a protector shaped in the form of letter U. When the corrugated pipe is inserted into a pipe connector, said protector is inserted into a slot of the pipe connector and surrounds the corrugated pipe in the area of its smaller diameter.

**[0005]** As a conclusion of development and research activities, it has been found that by intensive air-flow such solution always generates essential vibrations and noise. Measuring of air in particular pipe connectors shows quite different values.

**[0006]** In a similar solution, two plate-like separators were inserted into the housing at the distance apart from each other, one of them from the top side and the other from the bottom side. Also in this solution, by intensive air-flow, generation of noise and vibrations is still very high. Measuring of air in particular pipe connectors shows different values, although deviations are smaller.

**[0007]** Such assembled construction of the housing is an essential deficiency, since its own frequency of vibra-

tions by intensive air-flow enhances vibrations and noise. Housing in the shape of parallelepiped leads to turbulence of air and huge air-flow resistance. Folded contacts of such assembled construction and noise-reducing claddings within the housing are highly risky in view of generating various potentially dangerous biologic materials. The metallic construction is due to air-air flow energized by static electricity, which attracts the particles in the air with the opposite polarization.

**[0008]** A further deficiency of such solution is a protector in the shape of the letter U. When the pipe connectors are available in three lines, such protector cannot be inserted in two lines, when it is located closely to the ceiling or the wall.

**[0009]** A surface ceiling air-distributor according to the invention comprises a housing in the form of parallelepiped, a main pipe connector as well as two separators, which are located apart from each other and are integrated within said housing, wherein the first one extends from the top of the housing and the second one extends from the bottom of said housing. A shell of the housing is corrugated and furnished with rounded transitions between each sidewall and each adjacent one.

**[0010]** Besides, the height of at least one of said separators varies along the width of the casing. The housing, a plate and a plate with pipe connectors are all made of an antistatic and anti-bacteriologic thermoplastic material, preferably of polyethylene.

**[0011]** In accordance with the invention, a protector is conceived as an interrupted elastic ring having two plates, which in the middle form a semi-circle, and the edge is in the one side sharp and on the other side rounded. The used material is a thermoplastic material with good elasticity.

**[0012]** Such surface ceiling air-distributor with its shape in the form of parallelepiped, with separators and a corrugated shell represents a compact construction, which is capable to essentially reduce vibrations and noise even by intensive air-flow. By adjusting inclination of the walls of said separator, the air-flow resistance is essentially reduced. With additional measures in the sense of adjusting of the height of the separator and adding a smaller separator, measuring of the air-flow in particular pipe connectors shows that the air-flow is uniform with only small deviations. Additional claddings for reducing of noise are not necessary. The used material prevents the formation of various biologic organisms, which might jeopardize the health. Also the particles, which are generated by static electricity, are not present.

**[0013]** The protector according to the invention is placed onto each pipe connector prior to mounting the surface ceiling distributor in such manner that the sharp edge is faced towards the housing. A notch on the pipe connector enables the plate of the protector to be moved into the pipe connector, so that the semi-circular portion of the plate protrudes over the inner diameter of the pipe connectors, while the residual portion of the plate is placed inside of the interrupted pipe connector. As soon

as the surface ceiling air distributor is mounted, corrugated pipes are inserted. Displacement of the tube towards the housing is due to said rounded edge followed by displacing the semi-circular area of the plate, which enables the elastic ring to move outwardly. The sharp edge on the semi-circular area of the plate prevents the elastic ring from being displaced outwardly, when the pipe is withdrawn. If the withdrawal of the pipe is desired, said elastic ring can be moved apart, e.g. by means of a screwdriver.

**[0014]** The invention will be described on the basis of an embodiment and by means of drawings, wherein

Fig. 1 shows a surface ceiling air-distributor;

Fig. 2 is a cross-section through the surface ceiling air-distributor along the line I - I;

Fig. 3 is a cross-section through the surface ceiling air-distributor along the line II - II;

Fig. 4 shows a protector;

Fig. 5 is a cross-section through the protector along the line III - III.

**[0015]** A surface ceiling air-distributor is shown in Fig. 1 and comprises a housing 1 in the form of a parallelepiped, a main pipe connector 6 with an attached plate 5 and a plate 2 with pipe connectors with at least three lines of pipe connectors 3 aligned along a line or several lines. Protectors are placed on said pipe connectors. The shell of said casing 1 is corrugated and furnished with rounded transitions from each sidewall into each adjacent one.

**[0016]** In Fig. 2, said surface ceiling air-distributor is shown in a cross-section along the line I-I. A bottom separator 7 is placed within said housing 1 and protrudes from the bottom area thereof, wherein the top separator 8 is located at a distance apart from it regarding the width of the housing 1 and protrudes from the top area of the housing, and wherein said separators are integral parts of the housing 1. The walls of said separators 7, 8 are inclined and on the top semi-circularly interconnected. The width and the height of the separators 7, 8 and the distance between them are determined in dependency of each desired air-flow. The width and the height of the separators 7, 8 correspond to approximately a half of the height of the housing 1. In several lines of pipe connectors 3, a small separator 9 can be placed in the front portion of the housing 1, namely in front of the plate 2 with pipe connectors. Said housing 1, said plate 5 and the plate 2 with pipe connectors all consist of an anti-static and anti-bacteriologic thermoplastic material, preferably of polyethylene.

**[0017]** In Fig. 3, said surface ceiling air-distributor is shown in cross-section along the line II-II. The height of the upper separator 8 is adjacent to the housing walls marked as  $H_{\min}$ , and in the middle as  $H_{\max}$ , wherein the difference between them may be up to 30%.

**[0018]** The protector 4 is shown in Fig. 4 and 5, and is conceived as an interrupted elastic ring with two plates,

which are in the middle semi-circularly shaped, wherein the edge is on the one side sharp and on the other side slightly rounded. The used material is a thermoplastic material with good elasticity.

## Claims

1. Air-conditioning and recuperating device, preferably a ceiling air-distributor, comprising a housing (1) in the form of parallelepiped and a main pipe connector (6) with attached plate (5) and a plate (2) with pipe connectors, which comprises at least three pipe connectors (3), which are aligned along a line or several lines, wherein each pipe connector (3) is furnished with two notches, which are adapted for inserting of a protector (8), **characterized in that** a bottom separator (7) is placed within said housing (1) and protrudes from the bottom portion thereof, as well as a top separator (8), which protrudes from the top portion thereof, wherein said separators are conceived as integral parts of the uniform corrugated shell of said housing (1) and arranged along the width thereof, and that it further comprises a protector (4), which is conceived as an interrupted elastic ring.
2. Air-conditioning and recuperating device, preferably a ceiling air-distributor, according to Claim 1, **characterized in that** the walls of said separators (7, 8) are inclined and on the top semi-circularly interconnected, wherein the width and the height of each separator (7, 8) correspond to approximately a half of the height of the housing (1).
3. Air-conditioning and recuperating device, preferably a ceiling air-distributor, according to Claims 1 and 2, **characterized in that** the height of at least one separator (7, 8) in the lateral area of the housing (1) is  $H_{\max}$ , and in the middle of the housing  $H_{\min}$ , wherein the distance between them is up to 30%.
4. Air-conditioning and recuperating device, preferably a ceiling air-distributor, according to Claim 1, **characterized in that** a small separator (9) is arranged in several lines of pipe connectors (3) in the bottom portion of the housing (1), namely in front of the plate (2) with the pipe connectors.
5. Air-conditioning and recuperating device, preferably a ceiling air-distributor, according to Claim 1, **characterized in that** said housing (1), said plate (5) and the plate (2) with pipe connectors are made of an anti-static and anti-bacteriologic material, preferably of polyethylene.
6. Air-conditioning and recuperating device, preferably a ceiling air-distributor, according to Claim 1, **characterized in that** said protector (4) is conceived as

an interrupted elastic ring having two plates, which are semi-circularly shaped in the middle and furnished with an edge, which is on the one side sharp and on the other side slightly rounded, and moreover consists of a thermoplastic material with good elasticity.

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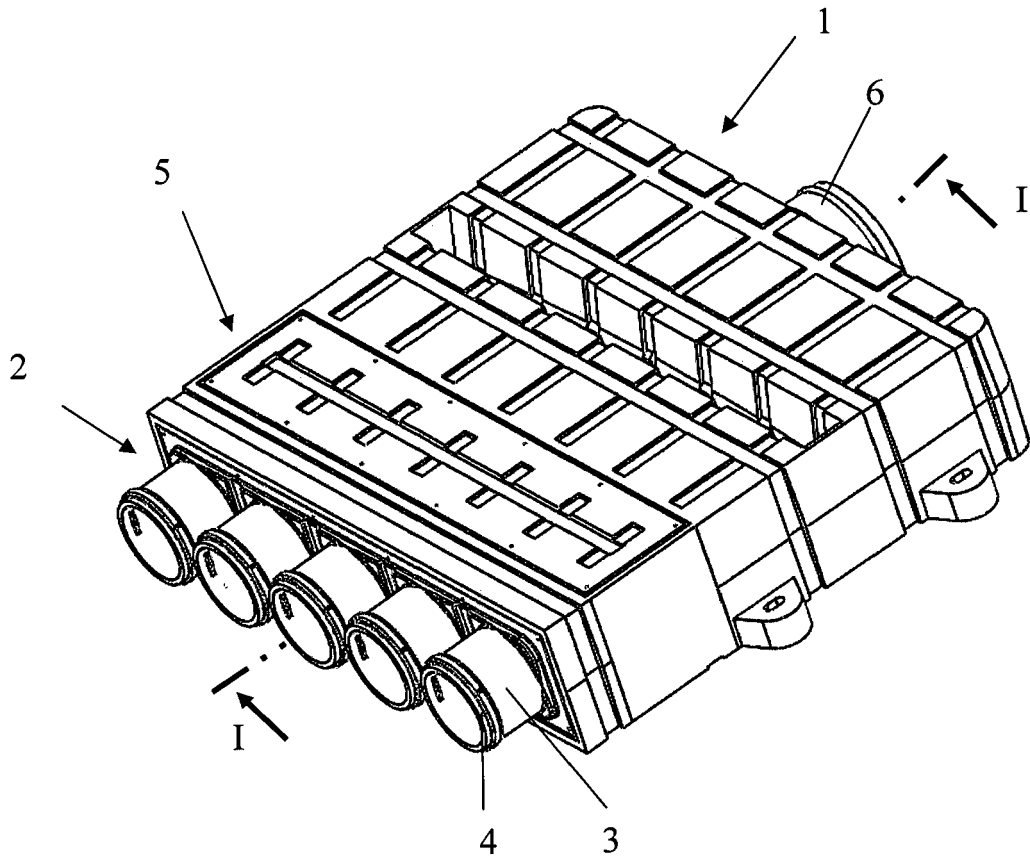
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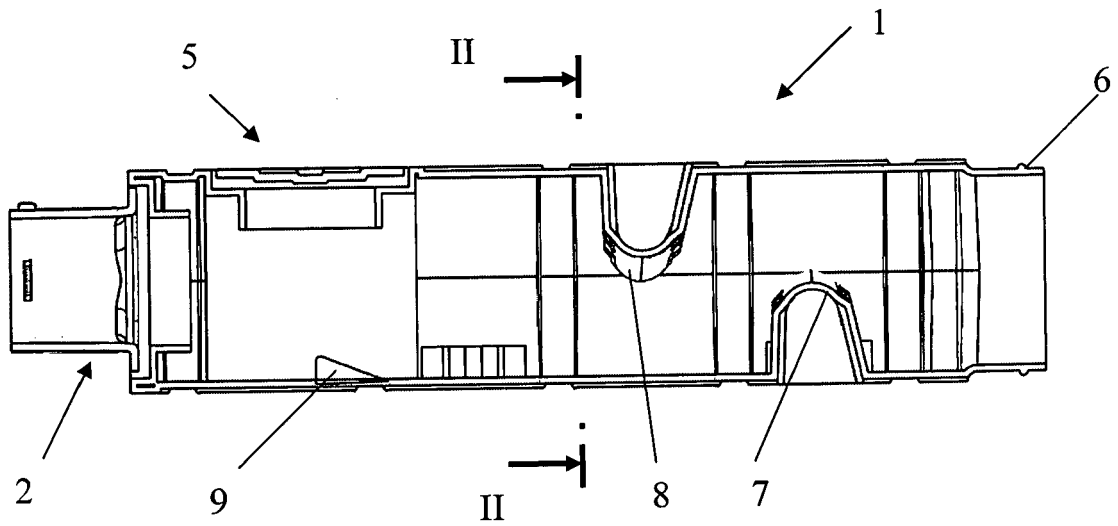
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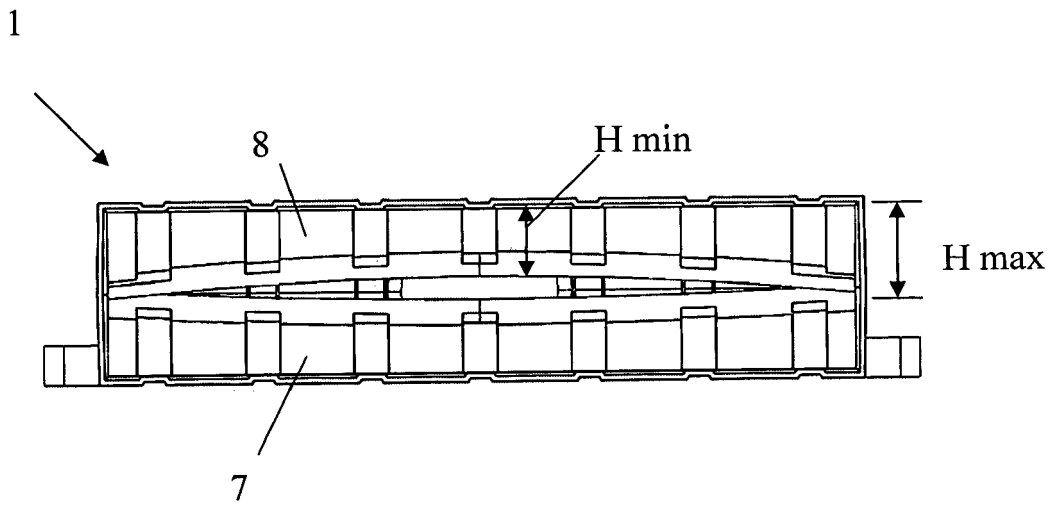
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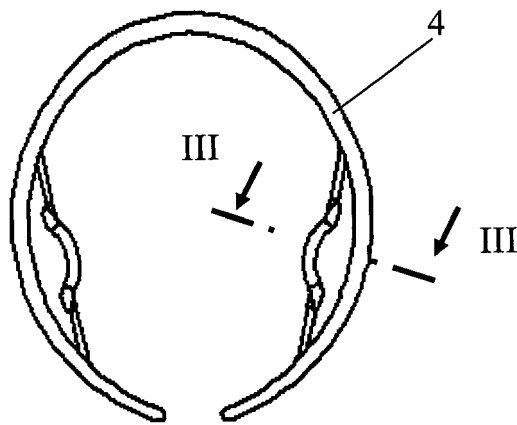
**Fig. 1**



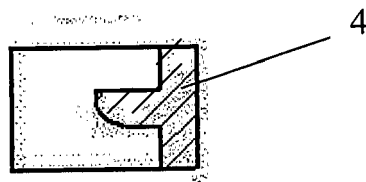
**Fig. 2**



**Fig. 3**



**Fig. 4**



**Fig. 5**



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Application Number  
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Place of search Munich		Date of completion of the search 15 May 2014	Examiner Riesen, Jörg
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