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(54) **A PROTECTION PANEL FOR ADIABATIC PRE COOLING SYSTEM**

SCHUTZTAFEL FÜR ADIABATISCHES VORKÜHLSYSTEM

PANNEAU DE PROTECTION POUR SYSTÈME DE REFROIDISSEMENT PRÉ ADIABATIQUE

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GB-A- 2 198 053 US-A- 5 196 040
US-A- 5 689 969 US-A1- 2009 019 824**

• **None**

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DescriptionTechnical Field

5 **[0001]** The invention relates to a protection panel for an pre-cooling system.

Background Art

10 **[0002]** United States patent No. US 8,468,846 discloses a system and a method for indirect evaporative cooling and for two stage evaporating cooling having a module and a cartridge. International patent application publication No. WO2011/074005 discloses a pre-cooling system and method for pre-cooling air having adiabatic cooling means.

[0003] United states patent No. US 6,385,987 discloses heat exchanger for cooling and a pre-cooler for turbine intake air conditioning having heat exchanger plates

15 **[0004]** US 5 689 969 A discloses a protection panel for an adiabatic pre-cooling system to be installed on a cooling device, comprising: a profiled frame designed from at least four profiles and a cell panel having cells. .

[0005] In disclosed cooling systems a water is used to intensify a cooling process. In the mean time use of water reduces life of cooling system elements. Therefore, a protection system for the cooling devices or heat exchangers should be designed.

20 Summary of the Invention

[0006] Aim of the invention is reached by developing a protection panel for adiabatic pre cooling system to be installed on a heat exchanger or a cooling device. The protection panel comprises a profiled frame, flat frame, a net and a cell panel which are arranged on each other creating sandwiched protective panel.

25 **[0007]** The profiled frame is designed from at least four profiles and the profiles are connected to each other by angles forming a the profiled frame. Preferably, the profiled frame is of rectangular shape. It can be made in any other shape to be able to fit to any heat exchanger. The flat frame is designed from at least four flat bars and is configured to be attached to the profiled frame.

30 **[0008]** The net comprises holes, where a width of each hole is in the range of 4 mm to 100 mm and a height of each hole is in range of 4 mm to 16 mm. More preferably, the width of each hole is in the range of 6 mm to 20 mm and a height of each hole is in range of 6 mm to 20 mm.

[0009] The cell panel comprises cells, where a cell diameter of each cell is in the range of 1000 μm to 7000 μm , more preferably in the range of 1500 μm to 3500 μm .

35 **[0010]** The protective panel in assembled state comprises the profiled frame as a base, where the net is installed, which is followed by the cell panel and above the cell panel another net is placed forming a sandwiched panel, wherein the flat frame is attached to the sandwiched panel in order to secure the formed protective panel. After that all panels are attached together by means of attachment members. All elements of the panel are secured together by means of attachment members. The attachment members can be bolts and washers. Instead of bolts and washers, clips can be used.

40 **[0011]** The cell panel with cells has the following properties:

Property	Unit	Method of measure	Specification
net or cell density	kg/m ³	ISO 845	10-50
Compression resistance 40%	kPa	ISO 3386/1	1-9
Cell diameter	μm	Recticel / T.013.4	1000 - 7000

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Brief description of the drawings

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[0012] The following disclosure will be better understood by a person skilled in the art when read in conjunction with the figures.

55 Fig. 1 illustrates a flat frame 5 assembled by four flat bars 6.

Fig. 2 illustrates the flat bar 6 for the flat frame 5.

Fig. 3 illustrates a profiled frame 2 comprising four profiles 3 and four angles 4.

Fig. 4 illustrates a cell panel 8.

Fig. 5 illustrates a part of a net **6** having holes **7**, wherein a width **B** of each hole **7** is in the range of 4 mm to 100 mm and a height **H** of each hole is in range of 4 mm to 16 mm.

Fig. 6 illustrates two protective panels **1** in assembled state and attached to each other.

Fig. 7 illustrates the protective panel **1** in exploded view.

Fig. 8 illustrates the protective panel **1** installed on a heat exchanger.

Fig. 9 illustrates unassembled protective panel having clips **9C** as attachment members.

[0013] A protection panel **1** comprises a flat frame **5**, a profiled frame **2**, a cell panel **8** and two nets **6** (see Fig. 7). The flat frame **5** comprises four flat bars **6** (see Fig. 2), that are connected together by means of four angles **4**. The result is rectangular flat frame **5** (see Fig. 1). A profiled frame **2** is formed in a similar way. The profiled frame **2** is created by connecting together four profiles **3** by means of four angles **4**. In the result a rectangular profiled frame **2** is created (see Fig. 3). The next step includes assembling of the panel **1**. The net **6** is laid in the profiled frame **2**. The a cell panel **8** is added and then covered by another net **6** and above all the flat frame is attached. Therefore, a sandwiched protective panel **1** is created. To secure all said elements a attachment members are used. As attachments member bolts **9A** and washers **9B** are used (see Fig. 7). When the panel **1** is assembled it is installed on a cooling device **10** (see Fig. 8). Beforehand, separate panels **1** can be attached together creating one large protective panel (see Fig. 6).

[0014] In another embodiment instead of bolts **9A** and washers **9B**, clips **9C** are used.

[0015] While the inventions have been described with reference to certain embodiments, it will be understood by those skilled in the art that various changes may be made provided they are within the scope of the appended claims.

Claims

1. A protection panel (1) for an adiabatic pre-cooling system to be installed on a cooling device, comprising:

- a profiled frame (2) designed from at least four profiles (3) wherein the profiles (3) are connected to each other by angles (4) forming the profiled frame (2),
- a flat frame (5) designed from at least four flat bars (6) and configured to be attached to the profiled frame (2);
- a net (6) having holes (7), where a width (B) of each hole (7) is in the range of 4 mm to 100 mm and a height (H) of each hole (7) is in range of 4 mm to 100 mm,
- a cell panel (8) having cells, where a cell diameter of each cell is in the range of 1000 μm to 7000 μm ,

wherein the assembled protection panel (1) comprises the profiled frame (2) as a base, where the net (6) is installed, which is followed by the cell panel (8) and above the cell panel (8) another net (6) is placed forming a sandwiched panel, wherein the flat frame (5) is attached to the sandwiched panel in order to secure the protection panel (1).

2. A protection panel (1) according to claim 1, wherein all elements (2, 5, 6, 8) of the panel (1) are secured together by means of attachment members.

3. A protection panel (1) according to Claim 1 or 2, wherein the width (B) of each hole (7) of the net (6) is in the range of 6 mm to 20 mm and a height (H) of each hole (7) of the net (6) is in range of 6 mm to 20 mm.

4. A protection panel (1) according to Claim 1 or 2, wherein where a diameter of each cell in the cell panel (8) is in the range of 1500 μm to 3500 μm .

Patentansprüche

1. Schutztafel (1) für ein adiabatisches Vorkühlsystem zum Einbau an einer Kühlvorrichtung, umfassend:

- einen Profilrahmen (2), der aus mindestens vier Profilen (3) konstruiert ist, wobei die Profile (3) untereinander durch Winkel (4), die den Profilrahmen (2) bilden, verbunden sind,
- einen Flachrahmen (5), der aus mindestens vier Flachstäben (6) konstruiert ist und ausgelegt ist, um an dem Profilrahmen (2) befestigt zu werden;
- ein Netz (6), das Löcher (7) aufweist, wobei eine Breite (B) von jedem Loch (7) im Bereich von 4 mm bis 100 mm und eine Höhe (H) von jedem Loch (7) im Bereich von 4 mm bis 100 mm liegt,
- eine Zelltafel (8), die Zellen aufweist, wobei ein Zelldurchmesser von jeder Zelle im Bereich von 1000 μm bis 7000 μm liegt,

wobei die zusammengebaute Schutztafel (1) den Profilrahmen (2) als Basis umfasst, auf der das Netz (6) eingebaut ist, auf das die Zelltafel (8) folgt und über der Zelltafel (8) ein weiteres Netz (6) eingesetzt wird, das eine Sandwichtafel bildet,
wobei der Flachrahmen (5) an der Sandwichtafel befestigt wird, um die Schutztafel (1) zu sichern.

2. Schutztafel (1) nach Anspruch 1, wobei alle Elemente (2, 5, 6, 8) der Tafel (1) aneinander anhand von Befestigungselementen gesichert sind.
3. Schutztafel (1) nach Anspruch 1 oder 2, wobei die Breite (B) von jedem Loch (7) des Netzes (6) im Bereich von 6 mm bis 20 mm und eine Höhe (H) von jedem Loch (7) des Netzes (6) im Bereich von 6 mm bis 20 mm liegt.
4. Schutztafel (1) nach Anspruch 1 oder 2, wobei ein Durchmesser jeder Zelle in der Zelltafel (8) im Bereich von 1500 μm bis 3500 μm liegt.

Revendications

1. Panneau de protection (1) pour un système de pré-refroidissement adiabatique devant être installé sur un dispositif de refroidissement, comprenant :

- un cadre profilé (2) conçu à partir d'au moins quatre profilés (3) dans lequel les profilés (3) sont reliés les uns aux autres par des angles (4) formant le cadre profilé (2),
- un cadre plat (5) conçu à partir d'au moins quatre barres plates (6) et configuré pour être fixé au cadre profilé (2) ;
- un filet (6) présentant des trous (7), où une largeur (B) de chaque trou (7) est dans la plage de 4 mm à 100 mm et une hauteur (H) de chaque trou (7) est dans la plage de 4 mm à 100 mm,
- un panneau de cellules (8) présentant des cellules, dans lequel un diamètre de cellule de chaque cellule est dans la plage de 1 000 μm à 7 000 μm ,

dans lequel le panneau de protection (1) assemblé comprend le cadre profilé (2) en tant que base, dans lequel le filet (6) est installé, qui est suivi du panneau de cellules (8) et au-dessus du panneau de cellules (8) un autre filet (6) est placé formant un panneau pris en sandwich, dans lequel le cadre plat (5) est fixé au panneau pris en sandwich afin de maintenir le panneau de protection (1).

2. Panneau de protection (1) selon la revendication 1, dans lequel tous les éléments (2, 5, 6, 8) du panneau (1) sont maintenus ensemble au moyen d'éléments de fixation.
3. Panneau de protection (1) selon la revendication 1 ou 2, dans lequel la largeur (B) de chaque trou (7) du filet (6) est dans la plage de 6 mm à 20 mm et une hauteur (H) de chaque trou (7) du filet (6) est dans la plage de 6 mm à 20 mm.
4. Panneau de protection (1) selon la revendication 1 ou 2, dans lequel un diamètre de chaque cellule dans le panneau de cellules (8) est dans la plage de 1 500 μm à 3 500 μm .

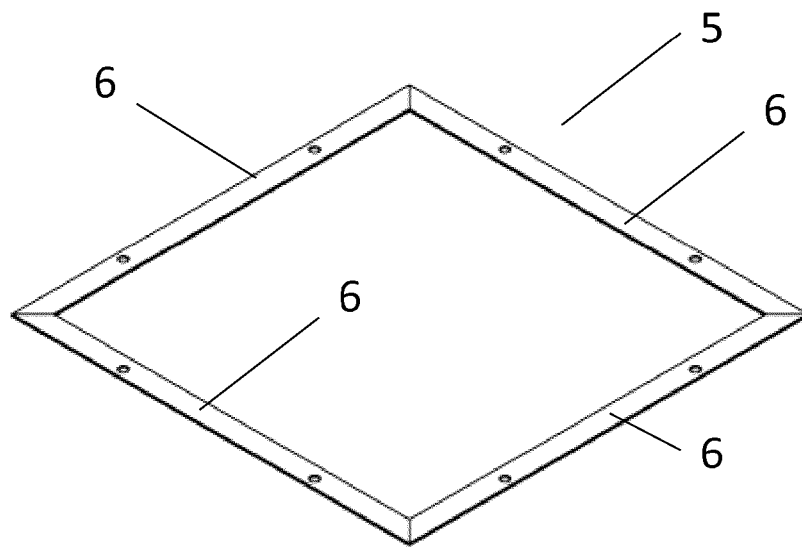


Fig. 1

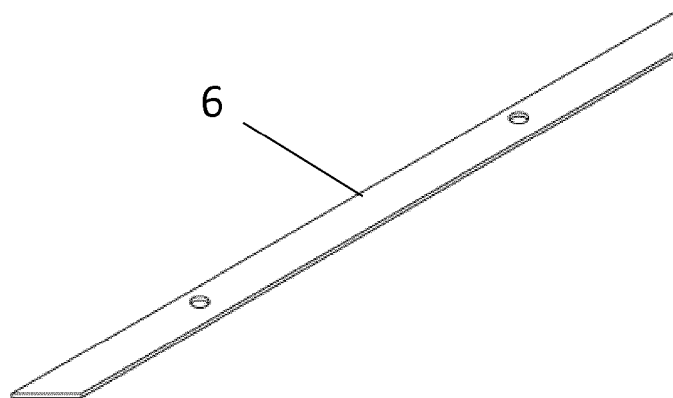


Fig. 2

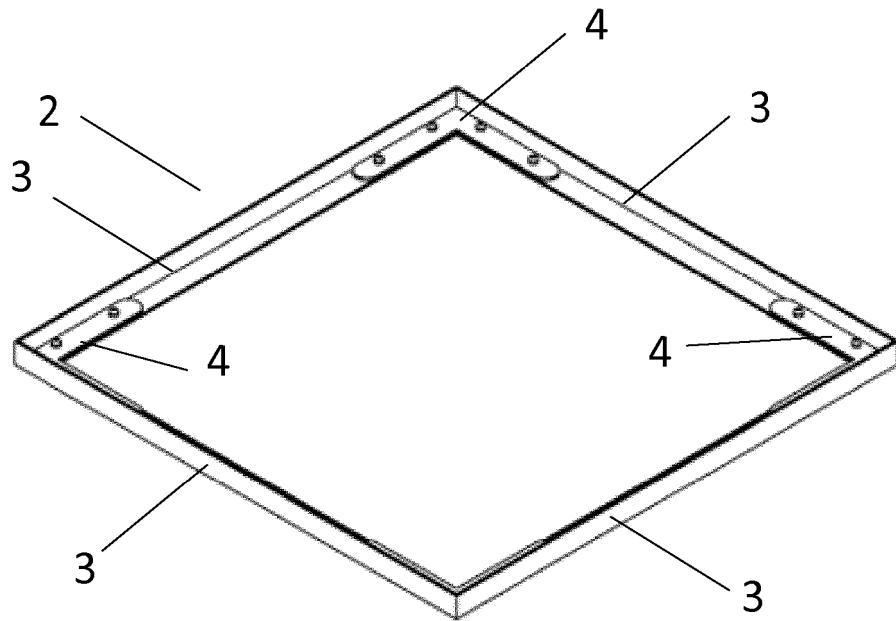


Fig. 3

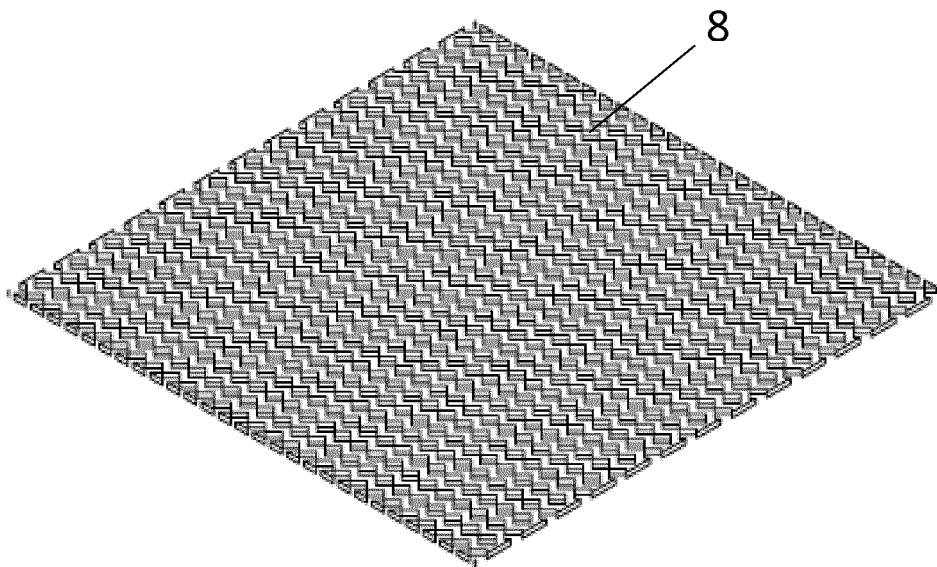


Fig. 4

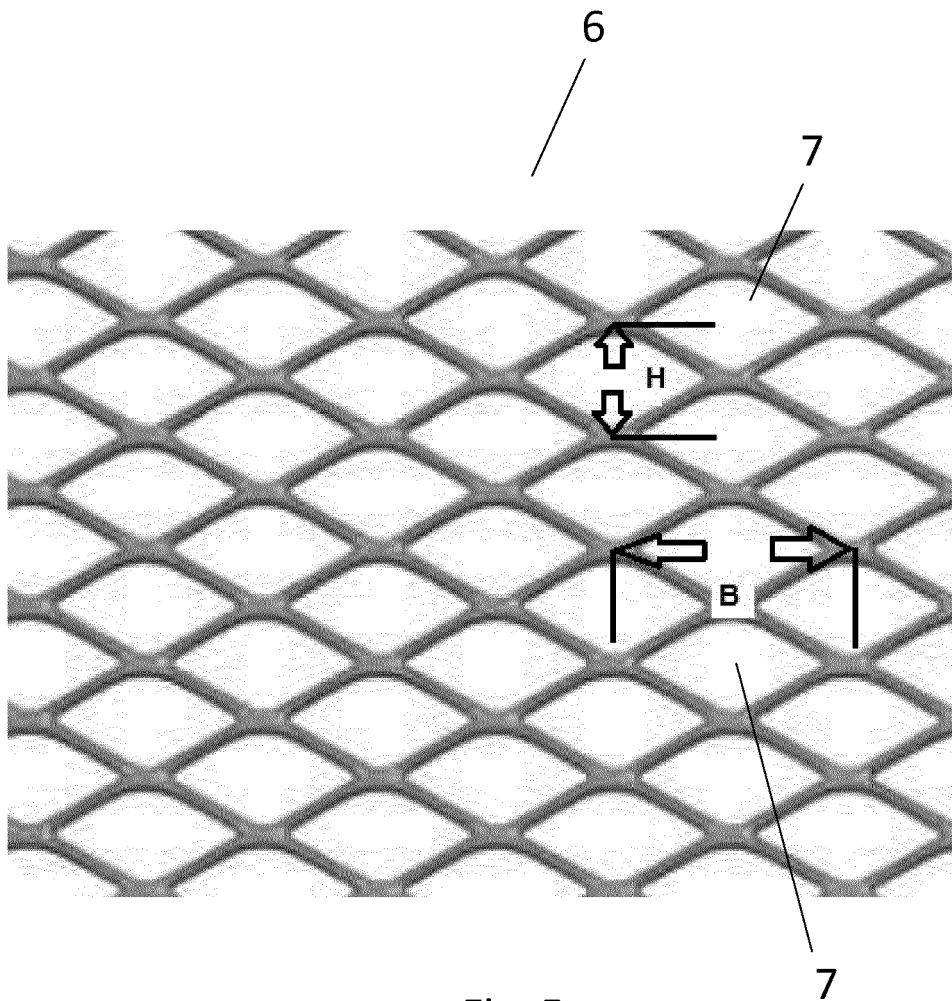


Fig. 5

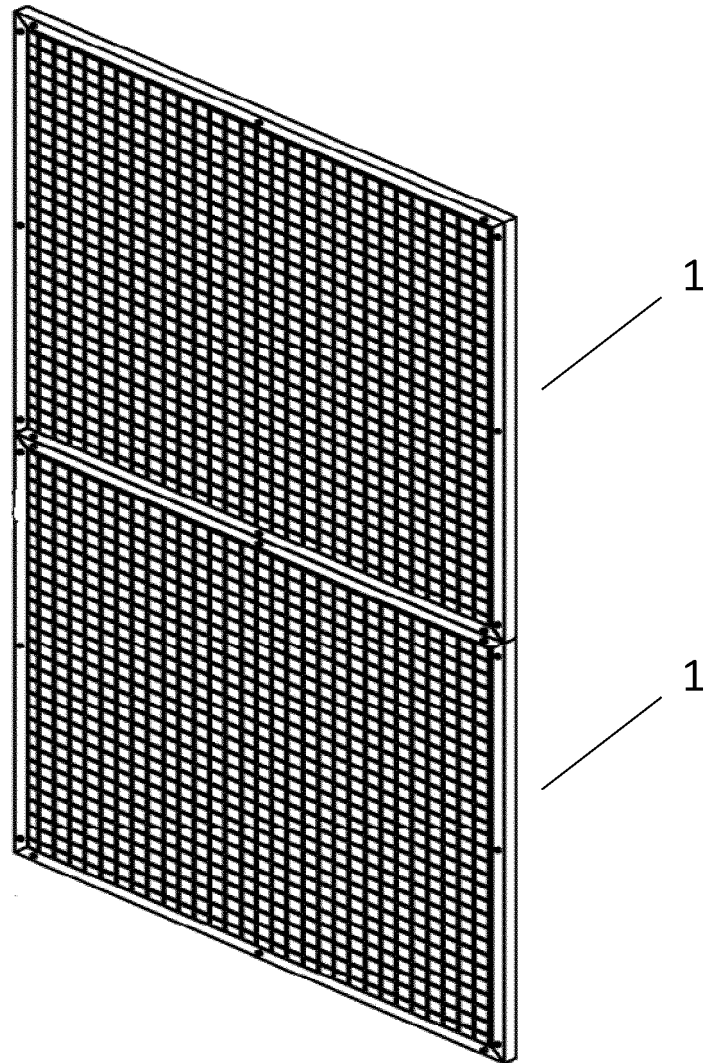


Fig. 6

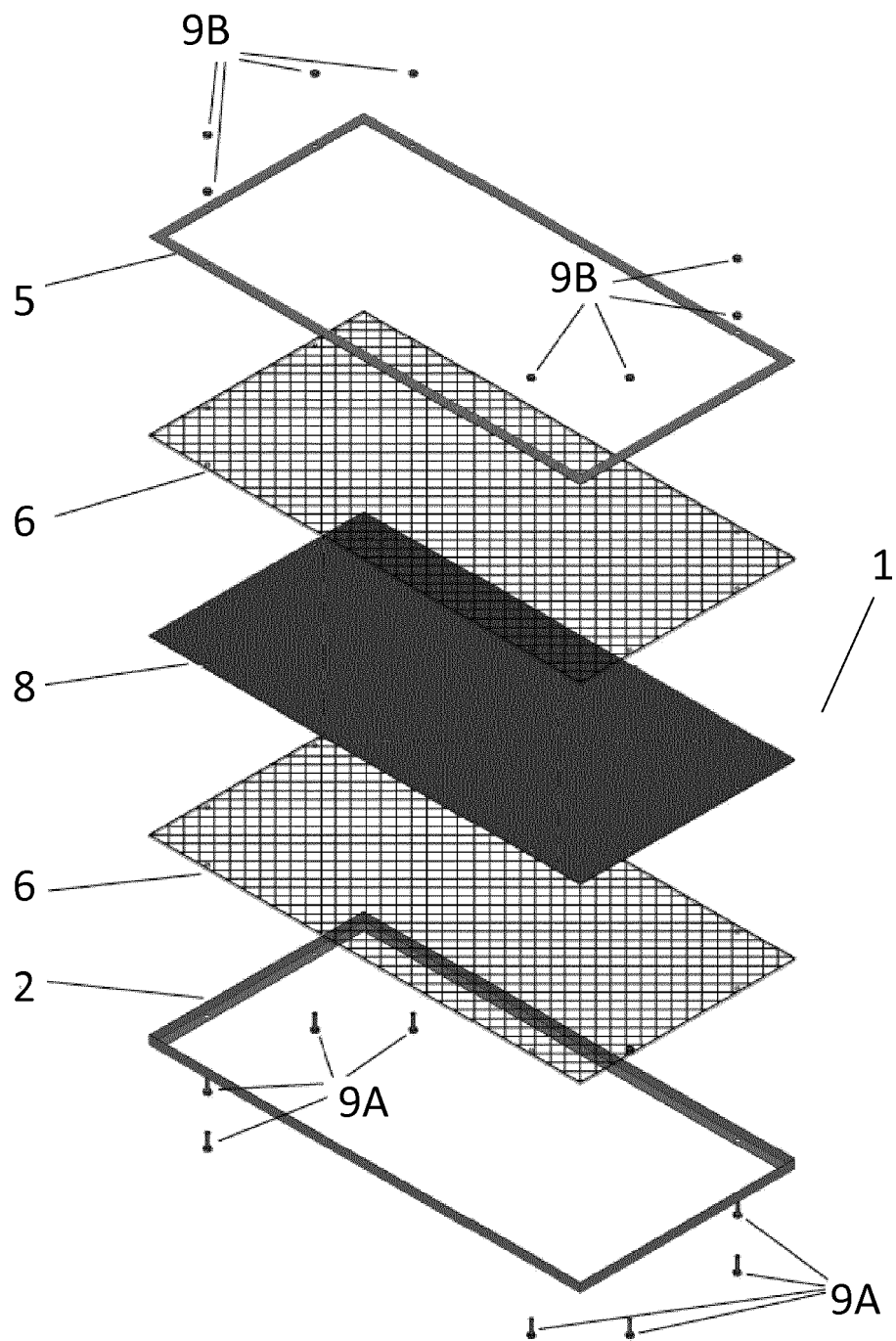


Fig. 7

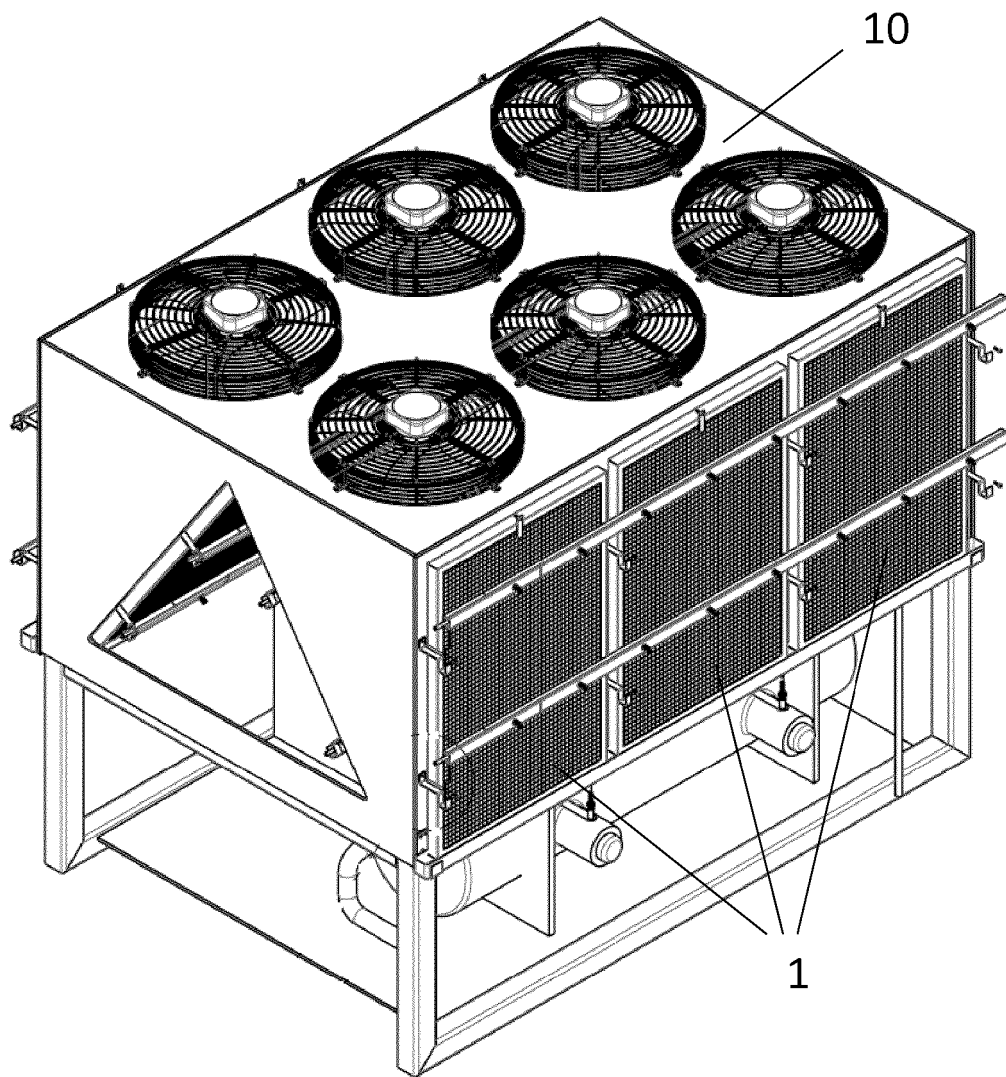


Fig. 8

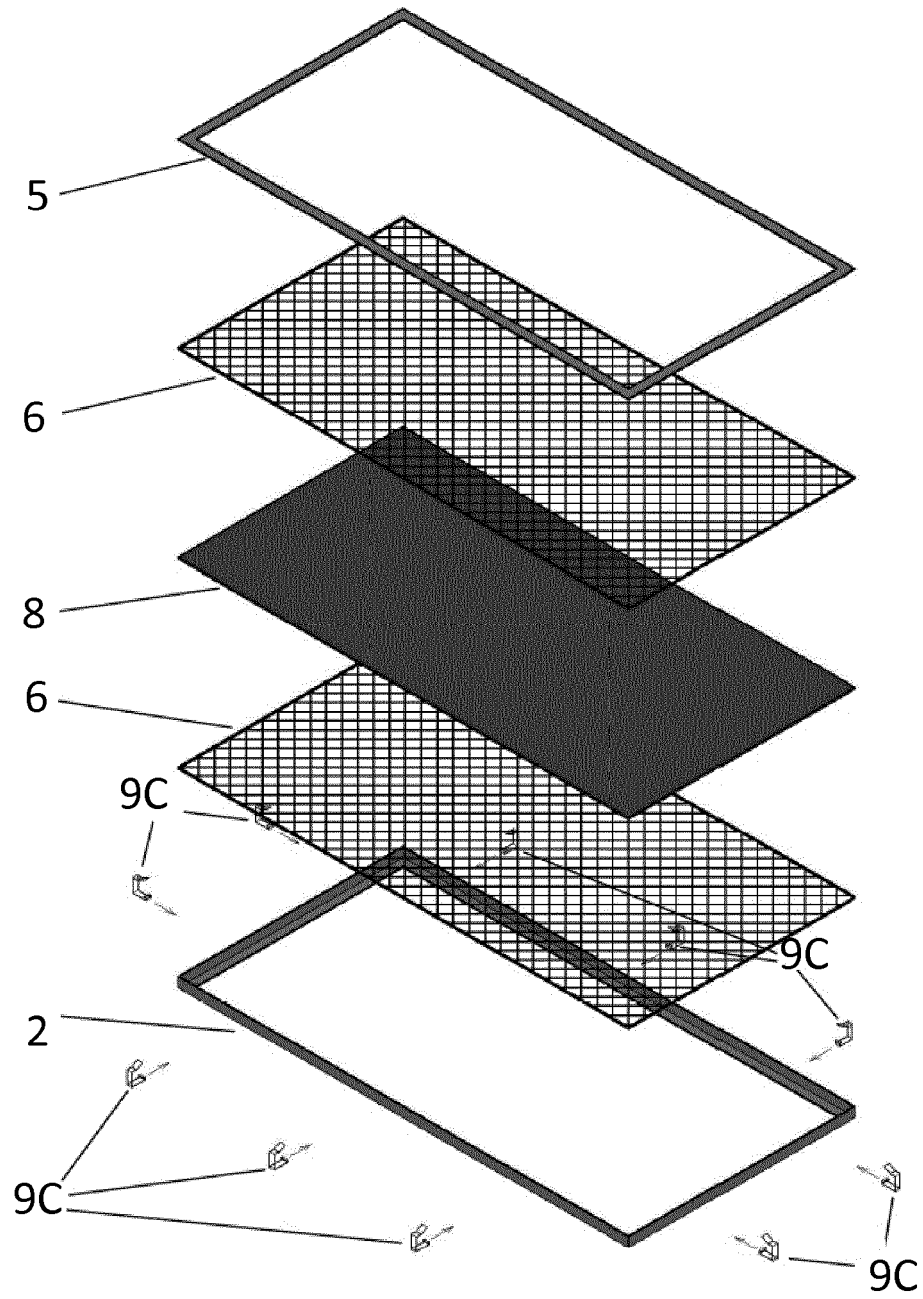


Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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