

(19)



(11)

EP 2 518 327 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

14.08.2019 Bulletin 2019/33

(51) Int Cl.:

F04D 29/66 ^(2006.01)

(21) Application number: **10838529.5**

(86) International application number:

PCT/CN2010/070710

(22) Date of filing: **23.02.2010**

(87) International publication number:

WO 2011/075963 (30.06.2011 Gazette 2011/26)

(54) **HEAT RADIATION FAN**

HITZESTRAHLUNGSLÜFTER

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(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK SM TR**

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(30) Priority: **21.12.2009 CN 200920278237 U**

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Rechtsanwälte

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(43) Date of publication of application:
31.10.2012 Bulletin 2012/44

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Description

Technical Field

[0001] The present invention relates to a cooling device, in particular to a cooling fan used for a cooling element such as a set of cooling fins of a CPU or a cooling hole-plate of a computer mainframe.

Background Art

[0002] With rapid development of the information industry, the operating speed of electronic components is increasing; as a result, waste heat generated during the running of computer systems also increases substantially. If not spread, the waste heat generated during the running of computer systems will undermine the performance of computer systems or even cause damages to computer systems. Therefore, a cooling device is needed to dissipate the waste heat generated during the operation of the computer system. Usually, a cooling device used for computer systems is a fan. In order to achieve greater cooling efficiency, the rotating speed of the cooling fan is getting faster and faster. However, the vibration frequency brought by the high-speed operating fan will also increase. Vibrations of the high-speed operating fan, which is installed on a CPU cooler or in a computer mainframe, will be transmitted via the cooler to the CPU and its surrounding devices, such as a harddisk. Thus, the performance of the surrounding devices of the CPU is affected or even the surrounding devices may be easily damaged. If the cooling fan is installed in the computer mainframe, loud noise will be generated by the operation of the cooling fan due to loose contact between the cooling fan and the inner wall of the computer mainframe. Therefore, how to reduce the influence to the surrounding devices of a computer mainframe generated by the operation of the cooling fan has become an important subject. Due to excessive running speed and vibration of the cooling fan of the prior arts, the service life of the computer is affected.

[0003] DE 20 2009 003 887 U1 discloses a fan assembly having a frame being provided as a separate piece and being made of a damping material, which can be screw-mounted onto a fan housing.

[0004] CN 2492876 Y discloses a fan assembly with a rubber plate that is screw-mounted between cooling fins and a fan housing.

[0005] US 2006/0056966 A1 discloses a fan housing having engaging parts being located at four upper corners of the fan frame, wherein the engaging parts are made of rubber.

[0006] It is the object of the present invention to provide a cooling fan that enables reducing noise and vibration impact when being mounted to a cooling element, and which can be produced at low manufacturing costs.

[0007] This object can be solved by a cooling fan according to claim 1. Improved embodiments of the inven-

tion are given in the dependent claims.

Summary of the Invention

[0008] To overcome the above defects of the prior arts, the present invention provides rubber layers made by secondary injection molding to the outer surface of the fan body and the upper and lower edges of the fan frame, so that flexible contact between the cooling fan and the cooling fins can be achieved, thereby effectively offsetting the longitudinal, transverse impact and vibration and reducing noise.

[0009] The cooling fan of the present invention, which is installed at the corresponding position of a cooling element, includes a fan body, a fan frame and a fan impeller, wherein the fan frame is circular in shape, the fan body is arranged along the outer circumference of the fan frame, and the fan impeller is installed in the fan frame, wherein a rubber layer, which is formed by secondary injection molding, is arranged at the outer surface of the fan body and the place that touches the cooling element at

upper and lower edges of the fan frame, respectively.

[0010] The cooling element is a set of cooling fins for a CPU in a computer mainframe or a cooling hole-plate of a computer mainframe.

[0011] Preferably, through holes are provided at the upper and lower parts of four end corners of the fan body, respectively, and rubber layers are also provided at the inner walls of the through holes, so that after secondary injection molding, the outer edges of the through holes are made level with the corresponding upper and lower edges of the fan frame.

[0012] When the cooling fan is installed on the set of cooling fins, the cooling fan is preferably fastened by a steel wire button to the corresponding positions of the set of cooling fins, wherein the contact places between the cooling fan and the cooling fins are rubber layers that are formed by secondary injection molding.

[0013] When the cooling fan is installed on the set of cooling fins, the four frames of the fan body are in the shape of a three-dimensional X; the upper and lower parts of the end corners are parallel with each other; through holes are provided within the planes of the upper and lower parts of the end corners, respectively; and supporting portions are provided between the upper and lower parts of the end corners, the supporting portions being integrally formed with the fan body.

[0014] When the cooling fan is installed on the set of cooling fins, the four frames of the fan body are in the shape of a three-dimensional double U, wherein the U-shaped openings face the end corners of the fan body and the U-shaped openings of adjacent frames converge and are connected as one piece; the upper and lower parts of the end corners are parallel with each other; through holes are provided within the planes of the upper and lower parts of the end corners, respectively; and supporting portions are provided between the upper and low-

er parts of the end corners, the supporting portions being integrally formed with the fan body.

[0015] When the cooling fan is installed on the cooling hole-plate of a computer mainframe, the assembled cooling fan is fastened by vibration absorbing screws to the cooling hole-plate of the computer mainframe, wherein through holes of the computer mainframe are provided on the cooling hole-plate and are co-axial with the corresponding through holes of the fan body; the vibration absorbing screws are provided with a conical portion and a clipping position; when fixing the assembled cooling fan, the conical portion sequentially passes the mainframe through holes, lower through holes of the end corner of the fan body, the cooling hole-plate of the computer mainframe and the lower part of the end corner, and is clipped within the clipping position; and wherein the vibration absorbing screw is made of rubber.

[0016] When the cooling fan is installed on the cooling hole-plate of a computer mainframe, the fan body are four end corners disposed on the outer circumference of the fan frame at uniform intervals, wherein the upper and lower parts of the end corners being parallel with each other; through holes of the fan body are provided within the planes of the upper and lower parts of the end corners, respectively; and wherein supporting portions are provided between the upper and lower parts of the end corners, the supporting portions being integrally formed with the fan body.

[0017] Compared with the prior arts, the present invention provides rubber layers made by secondary injection molding to the upper and lower edges of the fan frame and the fan body. The upper edges of the through holes keep level with the upper and lower edges of the fan frame, so that the contact areas between the cooling fan and the set of cooling fins for a CPU in a computer mainframe or the cooling hole-plate of a computer mainframe are rubber layers. Thus, flexible contact between the cooling fan and the cooling fins or the cooling hole-plate of a computer mainframe can be achieved, thereby effectively offsetting the longitudinal, transverse impact and vibration, reducing noise and extending the service life of the cooling fan.

Explanation of the Drawings

[0018] The drawings are provided to facilitate the understanding of the present invention and form a part of the description. The drawings are intended to illustrate the present invention together with the embodiments of the present invention and are not intended to limit the present invention. Among the drawings,

Figure 1 is a schematic view of an assembled cooling fan of Embodiment 1 of the present invention (before the rubber layers are molded by secondary injection);

Figure 2 is a schematic view of the rubber layers of

the cooling fan of Embodiment 1 of the present invention after the rubber layers are molded by secondary injection;

Figure 3 is a perspective view of an assembled cooling fan of Embodiment 1 of the present invention;

Figure 4 is a schematic view of an assembled cooling fan of Embodiment 2 of the present invention (before the rubber layers are molded by secondary injection);

Figure 5 is a schematic view of the rubber layers of the cooling fan of Embodiment 2 of the present invention after the rubber layers are molded by secondary injection;

Figure 6 is a perspective view of an assembled cooling fan of Embodiment 2 of the present invention;

Figure 7 is a schematic view of a cooling fan of the present invention assembled with a set of cooling fins (take the cooling fan of Embodiment 1 as an example);

Figure 8 is a schematic view of a cooling fan of the present invention assembled with a set of cooling fins of figure 7 (i.e., an application state view);

Figure 9 is a schematic view showing the assembling process of a cooling fan of Embodiment 3 of the present invention (before the rubber layers are molded by secondary injection);

Figure 10 is a schematic view of the rubber layers of the cooling fan of Embodiment 3 of the present invention after the rubber layers are molded by secondary injection;

Figure 11 is a perspective view of an assembled cooling fan of Embodiment 3 of the present invention; and

Figure 12 is a schematic view showing the assembling process of a cooling fan of the present invention with a cooling hole-plate of a computer mainframe (take the cooling fan of Embodiment 3 as an example).

[0019] The following reference signs are provided with reference to the above drawings:

1-fan impeller, 2-fan frame, 3-fan body, 4-rubber layer, 5-set of cooling fins for a CPU, 6-steel wire button, 7-cooling hole-plate of a computer mainframe, 8-vibration absorbing screw, 31-through hole, 32-upper part of end corner, 33-lower part of end corner, 34-supporting portion, 3A-fan body, 31A-through hole, 32A-upper part of end corner, 33A-lower part of end corner, 34A-supporting portion, 4A-rubber layer, 3B-fan body, 31B-through hole,

32B-upper part of end corner, 33B-lower part of end corner, 34B-supporting portion, 4B-rubber layer, 71-through hole of computer mainframe, 81-conical portion, 82-clipping position.

Embodiment

[0020] The followings will specifically describe several embodiments of this invention with reference to the drawings. However, it should be understood that the protection scope of this invention shall not be restricted by the specific embodiments. It should be noted that the cooling fan of this invention can be installed on the element that needs cooling. The followings will specifically describe an example in which the cooling fan is installed on a set of cooling fins of a CPU or a cooling hole-plate of a computer mainframe.

Embodiment 1

[0021] As shown in Figures 1-3, the cooling fan of this invention, which is installed at the corresponding position of a set of cooling fins 5 of a CPU (i.e., the outer surface thereof, see Figures 7-8), includes a fan body 3, a fan frame 2 and a fan impeller 1, wherein the fan impeller 1 is installed in the fan frame 2, the fan frame 2 is circular in shape, and the fan body 3 is arranged along the outer circumference of the fan frame. The frame of the fan body 3 is in a square shape, wherein the four sides of the square are in a three-dimensional X shape. The end corners of the X-shaped structure are divided into upper parts 32 (there are four upper parts in total) and lower parts 33 (there are four lower parts in total). The upper and lower parts of the end corners are parallel with each other. Supporting portions 34 are provided between the upper and lower parts of the end corners, the supporting portions being integrally formed with the fan body. Through holes 31 (there are 8 through holes in total) are provided in the planes of the upper and lower parts of the end corners, respectively. A rubber layer 4, which is formed by secondary injection molding, is arranged at the outer surface of the fan body 3 and the contact parts between the set of cooling fins and the upper and lower edges of the fan frame, respectively. After secondary injection molding, the upper edges of the through holes 31 of the fan body are made level with the corresponding upper and lower edges of the fan frame 2. The circular inner wall of the fan frame 2 is made of a rubber material that is formed by primary injection molding (i.e., secondary injection molding is not performed here).

Embodiment 2

[0022] As shown in Figures 4-6, the cooling fan of this invention, which is installed at the corresponding position of a set of cooling fins 5 of a CPU (i.e., the outer surface), includes a fan body 3A, a fan frame 2 and a fan impeller 1, wherein the fan impeller 1 is installed in the fan frame

2, the fan frame 2 is circular in shape, and the fan body 3A is arranged along the outer circumference of the fan frame. The frame of the fan body 3A is in a square shape, wherein the four sides of the square are in a three-dimensional double U shape. The U-shaped openings face the end corners of the fan body and the U-shaped openings of adjacent frames converge and are connected as one piece. The end corners of the U-shaped structure are divided into upper parts 32A (there are four upper parts in total) and lower parts 33A (there are four lower parts in total). The upper and lower parts of the end corners are parallel with each other. Supporting portions 34A are provided between the upper and lower parts of the end corners, the supporting portions being integrally formed with the fan body. Through holes 31A (there are 8 through holes in total) are provided in the planes of the upper and lower parts of the end corners, respectively. A rubber layer 4A, which is formed by secondary injection molding, is arranged at the outer surface of the fan body 3A and the contact parts between the set of cooling fins and the upper and lower edges of the fan frame, respectively. After secondary injection molding, the upper edges of the through holes 31A of the fan body are made level with the corresponding upper and lower edges of the fan frame 2. The circular inner wall of the fan frame 2 is made of a rubber material that is formed by primary injection molding (i.e., secondary injection molding is not performed here).

[0023] An assembled cooling fan of the above two embodiments can be applied to a set of cooling fins of a CPU or used for cooling a computer mainframe or used for other cooling elements. The followings describe the installation process of the cooling fan of Embodiment 1 when the cooling fan is applied to a set of cooling fins of a CPU, for example. As shown in Figures 7-8, when the cooling fan is to be installed, the hook structures at both ends of a steel wire button pass the through holes of the lower parts of the end corners of the fan body and are clipped therein, wherein a middle portion of the steel wire button is clipped at the corresponding position of the set of cooling fins. The assembled cooling fan is clipped by the steel wire button 6 to the corresponding position of the set of cooling fins of a CPU, so that the contact parts between the cooling fan and the cooling fins are the above rubber layers made by secondary injection molding.

Embodiment 3

[0024] As shown in Figures 9-11, the cooling fan of this invention, which is installed at the corresponding position of a cooling hole-plate 7 of a computer mainframe, includes a fan body 3B, a fan frame 2 and a fan impeller 1, wherein the fan impeller 1 is installed in the fan frame 2, the fan frame 2 is circular in shape, and the fan body 3B is arranged along the outer circumference of the fan frame. The body 3B consists of four end corners disposed on the outer circumference of the fan frame at uniform

intervals. The end corners are divided into upper parts 32B (there are four upper parts in total) and lower parts 33B (there are four lower parts in total). The upper and lower parts of the end corners are parallel with each other. Supporting portions 34B are provided between the upper and lower parts of the end corners, the supporting portions being integrally formed with the fan body. Through holes 31B (there are 8 through holes in total) are provided in the planes of the upper and lower parts of the end corners, respectively. A rubber layer 4B, which is formed by secondary injection molding, is arranged at the outer surface of the fan body 3B and the contact parts between the cooling hole-plate 7 and the upper and lower edges of the fan frame, respectively. After secondary injection molding, the upper edges of the through holes 31B of the fan body are made level with the corresponding upper and lower edges of the fan frame 2. The circular inner wall of the fan frame 2 is made of a rubber material that is formed by primary injection molding (i.e., secondary injection molding is not performed here).

[0025] An assembled cooling fan of Embodiment 3 is fixed by vibration absorbing screws to a cooling hole-plate of a computer mainframe. The cooling hole-plate is provided with through holes 71 (there are four such through holes in total) of the computer mainframe, which are co-axial with the corresponding through holes of the fan body. The vibration absorbing screw is provided with a conical portion 81 and a clipping position 82. When fixing the assembled cooling fan, the conical portion 81 sequentially passes the through holes 71 of the computer mainframe, the lower through holes of the end corner of the fan body, the cooling hole-plate 7 of the computer mainframe and the lower part of the end corner, and is clipped within the clipping position 82. The vibration absorbing screws are also made of rubber so as to absorb vibration after the cooling fan is fixed to the computer mainframe. Of course, except for cooling a computer mainframe, the cooling fan of Embodiment 3 can also be applied to a set of cooling fins of a CPU or other cooling elements.

[0026] Since the upper and lower edges of the fan frame of the cooling fan of the present invention and the fan body, which have been processed by primary injection molding, use rubber layers formed by secondary injection molding, and the upper edges of the through holes are made level with the corresponding upper and lower edges of the fan frame, the contact parts between the cooling fan and the set of cooling fins of a CPU or a computer mainframe are rubber layers. Thus, flexible contact between the cooling fan and the cooling fins or the cooling hole-plate of a computer mainframe can be achieved, thereby effectively offsetting the longitudinal, transverse impact and vibration, reducing noise and extending the service life of the cooling fan.

[0027] The above disclosure only covers several specific embodiments of the present invention, but the present invention is not limited thereto. Any variations of the present invention that a person skilled in the art can

conceive of shall fall into the protection scope of this invention.

5 Claims

1. A cooling fan, which is installable at a corresponding position of a cooling element, comprising a fan body (3, 3A, 3B), a fan frame (2) and a fan impeller (1), wherein the fan frame (2) is circular in shape, the fan body (3, 3A, 3B) is arranged along an outer circumference of the fan frame (2), and the fan impeller (1) is installed in the fan frame (2), the cooling fan being **characterized in that** a rubber layer (4), which is formed by secondary injection molding, is arranged at an outer surface of the fan body (3, 3A, 3B) and at the upper and lower edges of the fan frame (2), respectively, at a place where the cooling fan contacts the cooling element when the cooling fan is installed at the corresponding position of the cooling element.
2. The cooling fan according to claim 1, **characterized in that** the cooling element is a set of cooling fins (5) for a CPU in a computer mainframe.
3. The cooling fan according to claim 1, **characterized in that** the cooling element is a cooling hole-plate (7) of a computer mainframe.
4. The cooling fan according to any one of claims 1 to 3, **characterized in that** through holes (31, 31A, 31B) are provided at upper and lower parts (32, 33, 32A, 33A, 32B, 33B) of four end corners of the fan body (3, 3A, 3B), respectively, and rubber layers are also provided at the inner walls of the through holes (31, 31A, 31B), so that after secondary injection molding, the outer edges of the through holes (31, 31A, 31B) are made level with the corresponding upper and lower edges of the fan frame (2).
5. The cooling fan according to claim 2, **characterized in that** an assembled cooling fan is fastenable by a steel wire button (6) to corresponding positions of the set of cooling fins (5), wherein the rubber layer that is formed by secondary injection molding provides contact parts between the cooling fan and the cooling fins (5).
6. The cooling fan according to claim 5, **characterized in that** four frames of the fan body (3) are in the shape of a three-dimensional X, wherein upper and lower parts (32, 33) of the end corners are parallel with each other; through holes (31) are provided within the planes of the upper and lower parts (32, 33) of the end corners, respectively; and wherein supporting portions (34) are provided between the upper and lower parts (32A, 33A) of the end corners,

the supporting portions (34A) being integrally formed with the fan body (3A).

7. The cooling fan according to claim 5, **characterized in that** four frames of the fan body (3A) are in the shape of a three-dimensional double U, wherein U-shaped openings face the end corners of the fan body (3A) and the U-shaped openings of adjacent frames converge and are connected as one piece; upper and lower parts (32A, 32B) of the end corners are parallel with each other; through holes (31A) are provided within the planes of the upper and lower parts (32A, 33A) of the end corners, respectively; and wherein supporting portions (34A) are provided between the upper and lower parts (32A, 33A) of the end corners, the supporting portions (34A) being integrally formed with the fan body (3A).
8. The cooling fan according to claim 3, **characterized in that** an assembled cooling fan is fastenable by vibration absorbing screws (8) to the cooling hole-plate (7) of the computer mainframe, wherein through holes (71) of the computer mainframe are provided on the cooling hole-plate (7) and are coaxial with corresponding through holes (31B) of the fan body (3B); the vibration absorbing screws (8) are provided with a conical portion (81) and a clipping position (82); and wherein when fixing the assembled cooling fan, the conical portion (81) sequentially passes the mainframe through holes (71), the lower through holes (31B) of the end corner of the fan body (3B), the cooling hole-plate (7) of the computer mainframe and a lower part (33B) of the end corner, and is clipped within the clipping position (82).
9. The cooling fan according to claim 8, **characterized in that** the vibration absorbing screw (8) is made of rubber.
10. The cooling fan according to claim 8 or 9, **characterized in that** the fan body (3B) consists of four end corners disposed on the outer circumference of the fan frame (2) at uniform intervals, wherein the upper and lower parts (31B, 33B) of the end corners are parallel with each other; the through holes (31B) of the fan body (3B) are provided within the planes of the upper and lower parts (32B, 33B) of the end corners, respectively; and wherein supporting portions (34B) are provided between the upper and lower parts (32B, 33B) of the end corners, the supporting portions (34B) being integrally formed with the fan body (3B).

Patentansprüche

1. Kühlgebläse, das an einer entsprechender Position eines Kühlelements montierbar ist, mit einem Ge-

bläsekörper (3, 3A, 3B), einem Gebläserahmen (2) und einem Gebläseimpeller (1), wobei der Gebläserahmen (2) eine runde Form hat, der Gebläsekörper (3, 3A, 3B) entlang eines Außenumfangs des Gebläserahmens (2) angeordnet ist und der Gebläseimpeller (1) in dem Gebläserahmen (2) montiert ist, wobei das Kühlgebläse **dadurch gekennzeichnet ist, dass**

eine Gummischicht (4), die durch ein sekundäres Spritzgießen hergestellt ist, auf einer Außenfläche des Gebläsekörpers (3, 3A, 3B) und an der oberen und der unteren Kante des Gebläserahmens (2) an einer Stelle angeordnet ist, an der das Kühlgebläse mit dem Kühlelement in Kontrakt ist, wenn das Kühlgebläse an der entsprechenden Position des Kühlelements montiert ist.

2. Kühlgebläse nach Anspruch 1, **dadurch gekennzeichnet, dass** das Kühlelement eine Gruppe aus Kühlrippen (5) für eine CPU in einem Computergestell ist.
3. Kühlgebläse nach Anspruch 1, **dadurch gekennzeichnet, dass** das Kühlelement eine kühlende Lochplatte (7) eines Computergestells ist.
4. Kühlgebläse nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** Durchgangslöcher (31, 31A, 31B) an einem oberen und einem unteren Teil (32, 33, 32A, 33A, 32B, 33B) von vier Endecken des Gebläsekörpers (3, 3A, 3B) entsprechend vorgesehen sind, und dass Gummischichten ebenfalls an den Innenwänden der Durchgangslöcher (31, 31A, 31B) vorgesehen sind, so dass nach dem sekundären Spritzgießen die Außenkanten der Durchgangslöcher (31, 31A, 31B) plan sind zu der entsprechenden oberen und unteren Kante des Gebläserahmens (2).
5. Kühlgebläse nach Anspruch 2, **dadurch gekennzeichnet, dass** ein zusammengebautes Kühlgebläse an entsprechenden Positionen der Gruppe aus Kühlrippen (5) durch einen Stahldrahtknopf (6) befestigbar ist, wobei die Gummischicht, die durch das sekundäre Spritzgießen gebildet ist, Kontaktteile zwischen dem Kühlgebläse und den Kühlrippen (5) bereitstellt.
6. Kühlgebläse nach Anspruch 5, **dadurch gekennzeichnet, dass** vier Rahmen des Gebläsekörpers (3) in Form eines dreidimensionalen X vorliegen, wobei ein oberer und ein unterer Teil (32, 33) der Endecken parallel zueinander sind; Durchgangslöcher (31) in den Ebenen des oberen und des unteren Teils (32, 33) der Endecken entsprechend vorgesehen sind; und wobei Haltebereiche (34) zwischen dem oberen und dem unteren Teil (32A, 33A) der Endecken vorgesehen sind und die Haltebereiche (34A)

zusammen mit dem Gebläsekörper (3A) als Einheit ausgebildet sind.

7. Kühlgebläse nach Anspruch 5, **dadurch gekennzeichnet, dass** vier Rahmen des Gebläsekörpers (3A) in Form eines dreidimensionalen Doppel-U vorliegen, wobei U-förmige Öffnungen den Endecken des Gebläsekörpers (3A) zugewandt sind und die U-förmigen Öffnungen benachbarter Rahmen zusammenlaufen und als ein einzelnes Stück verbunden sind; ein oberer und ein unterer Teil (32A, 32B) der Endecken parallel zueinander sind; Durchgangslöcher (31A) in den Ebenen des oberen und des unteren Teils (32A, 33A) der Endecken entsprechend vorgesehen sind; und wobei Haltebereiche (34A) zwischen dem oberen und dem unteren Teil (32A, 33A) der Endecken vorgesehen sind und die Haltebereiche (34A) zusammen mit dem Gebläsekörper (3A) als Einheit ausgebildet sind. 5 10 15 20
8. Kühlgebläse nach Anspruch 3, **dadurch gekennzeichnet, dass** ein zusammengebautes Kühlgebläse durch vibrationsdämpfende Schrauben (8) an der kühlenden Lochplatte (7) des Computergestells befestigbar ist, wobei Durchgangslöcher (71) des Computergestells auf der kühlenden Lochplatte (7) vorgesehen sind und koaxial zu entsprechenden Durchgangslöchern (31B) des Gebläsekörpers (3B) sind; die vibrationsdämpfenden Schrauben (8) mit einem konischen Bereich (81) und einer Abschnideposition (82) versehen sind; und wobei beim Befestigen des zusammengebautes Kühlgebläses der konische Bereich (81) der Reihe nach die Gestelldurchgangslöcher (71), die unteren Durchgangslöcher (31B) der Endecke des Gebläsekörpers (3B), die kühlende Lochplatte (7) des Computergestells und einen unteren Teil (33B) der Endecke durchläuft und in der Abschnideposition (82) abgeschnitten wird. 25 30 35
9. Kühlgebläse nach Anspruch 8, **dadurch gekennzeichnet, dass** die vibrationsdämpfende Schraube (8) aus Gummi hergestellt ist. 40
10. Kühlgebläse nach Anspruch 8 oder 9, **dadurch gekennzeichnet, dass** der Gebläsekörper (3B) aus vier Endecken besteht, die auf dem Außenumfang des Gebläserahmens (2) unter gleichem Abstand angeordnet sind, wobei der obere und der untere Teil (31B, 33B) der Endecken parallel zueinander sind; die Durchgangslöcher (31B) des Gebläsekörpers (3B) in den Ebenen des oberen und des unteren Teils (32B, 33B) der Endecken entsprechend vorgesehen sind; und wobei Haltebereiche (34B) zwischen dem oberen und dem unteren Teil (32B, 33B) der Endecken vorgesehen sind und die Haltebereiche (34B) zusammen mit dem Gebläsekörper (3B) als Einheit ausgebildet sind. 45 50 55

Revendications

1. Ventilateur de refroidissement, qui peut être installé à la position correspondante d'un élément de refroidissement, comprenant un corps de ventilateur (3, 3A, 3B), un cadre de ventilateur (2) et une turbine de ventilateur (1), dans lequel le cadre de ventilateur (2) est de forme circulaire, le corps de ventilateur (3, 3A, 3B) est disposé le long d'une circonférence extérieure du cadre de ventilateur (2), et la turbine de ventilateur (1) est installée dans le cadre de ventilateur (2), le ventilateur de refroidissement étant **caractérisé en ce qu'une** couche de caoutchouc (4), qui est formée par moulage par injection secondaire, est disposée sur une surface extérieure du corps de ventilateur (3, 3A, 3B) et au niveau des bords supérieur et inférieur du cadre de ventilateur (2), respectivement, à un emplacement où le ventilateur de refroidissement est en contact avec l'élément de refroidissement lorsque le ventilateur de refroidissement est installé à la position correspondante de l'élément de refroidissement. 5 10 15 20
2. Ventilateur de refroidissement selon la revendication 1, **caractérisé en ce que** l'élément de refroidissement est un ensemble d'ailettes de refroidissement (5) pour une CPU dans un ordinateur central. 25
3. Ventilateur de refroidissement selon la revendication 1, **caractérisé en ce que** l'élément de refroidissement est une plaque perforée de refroidissement (7) d'un ordinateur central. 30
4. Ventilateur de refroidissement selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** des trous traversants (31, 31A, 31B) sont agencés au niveau de parties supérieures et inférieures (32, 33, 32A, 33A, 32B, 33B) de quatre coins d'extrémité du corps de ventilateur (3, 3A, 3B), respectivement, et des couches de caoutchouc sont également agencées au niveau des parois intérieures des trous traversants (31, 31A, 31B), de sorte qu'après moulage par injection secondaire, les bords extérieurs des trous traversants (31, 31A, 31B) sont mis au même niveau que les bords supérieur et inférieur correspondants du cadre de ventilateur (2). 35 40 45
5. Ventilateur de refroidissement selon la revendication 2, **caractérisé en ce qu'un** ventilateur de refroidissement assemblé peut être fixé à l'aide d'un bouton en fil métallique (6) à des positions correspondantes de l'ensemble d'ailettes de refroidissement (5), dans lequel la couche de caoutchouc qui est formée par moulage par injection secondaire fournit des parties de contact entre le ventilateur de refroidissement et les ailettes de refroidissement (5). 50 55
6. Ventilateur de refroidissement selon la revendication

- 5, **caractérisé en ce que** quatre cadres du corps de ventilateur (3) ont la forme d'un X en trois dimensions, dans lequel des parties supérieure et inférieure (32, 33) des coins d'extrémité sont parallèles l'une à l'autre ; des trous traversants (31) sont agencés dans les plans des parties supérieure et inférieure (32, 33) des coins d'extrémité, respectivement ; et dans lequel des parties de support (34) sont agencées entre les parties supérieure et inférieure (32A, 33A) des coins d'extrémité, les parties de support (34A) étant formées d'un seul tenant avec le corps de ventilateur (3A).
7. Ventilateur de refroidissement selon la revendication 5, **caractérisé en ce que** quatre cadres du corps de ventilateur (3A) ont la forme d'un double U en trois dimensions, dans lequel des ouvertures en forme de U font face aux coins d'extrémité du corps de ventilateur (3A) et les ouvertures en forme de U de cadres adjacents convergent et sont connectées sous forme d'une seule pièce ; des parties supérieure et inférieure (32A, 32B) des coins d'extrémité sont parallèles l'une à l'autre ; des trous traversants (31A) sont agencés dans les plans des parties supérieure et inférieure (32A, 33A) des coins d'extrémité, respectivement ; et dans lequel des parties de support (34A) sont agencées entre les parties supérieure et inférieure (32A, 33A) des coins d'extrémité, les parties de support (34A) étant formées d'un seul tenant avec le corps de ventilateur (3A).
8. Ventilateur de refroidissement selon la revendication 3, **caractérisé en ce qu'un** ventilateur de refroidissement assemblé peut être fixé par des vis à absorption de vibrations (8) à la plaque perforée de refroidissement (7) de l'ordinateur central, dans lequel des trous traversants (71) de l'ordinateur central sont agencés sur la plaque perforée de refroidissement (7) et sont coaxiaux avec des trous traversants correspondants (31B) du corps de ventilateur (3B) ; les vis à absorption de vibrations (8) sont munies d'une partie conique (81) et d'une position de clipsage (82) ; et dans lequel, lors de la fixation du ventilateur de refroidissement assemblé, la partie conique (81) passe séquentiellement par les trous traversants d'ordinateur central (71), les trous traversants inférieurs (316) du coin d'extrémité du corps de ventilateur (3B), la plaque perforée de refroidissement (7) de l'ordinateur central et une partie inférieure (33B) du coin d'extrémité, et est clipsée dans la position de clipsage (82).
9. Ventilateur de refroidissement selon la revendication 8, **caractérisé en ce que** la vis à absorption de vibrations (8) est constituée de caoutchouc.
10. Ventilateur de refroidissement selon la revendication 8 ou 9, **caractérisé en ce que** le corps de ventilateur

(3B) est constitué de quatre coins d'extrémité disposés sur la circonférence extérieure du cadre de ventilateur (2) à des intervalles uniformes, dans lequel les parties supérieure et inférieure (31B, 33B) des coins d'extrémité sont parallèles l'une à l'autre ; les trous traversants (31B) du corps de ventilateur (3B) sont agencés dans les plans des parties supérieure et inférieure (32B, 33B) des coins d'extrémité, respectivement ; et dans lequel des parties de support (34B) sont agencées entre les parties supérieure et inférieure (32B, 33B) des coins d'extrémité, les parties de support (34B) étant formées d'un seul tenant avec le corps de ventilateur (3B).

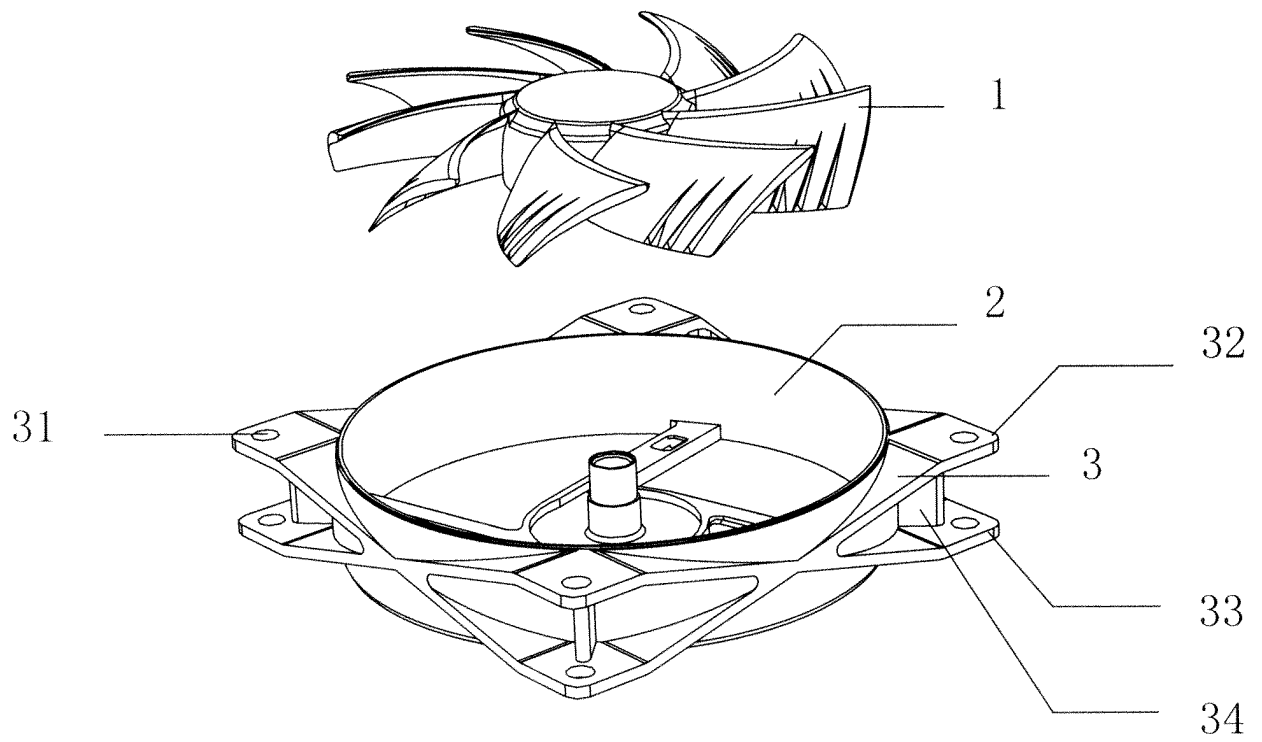


Figure 1

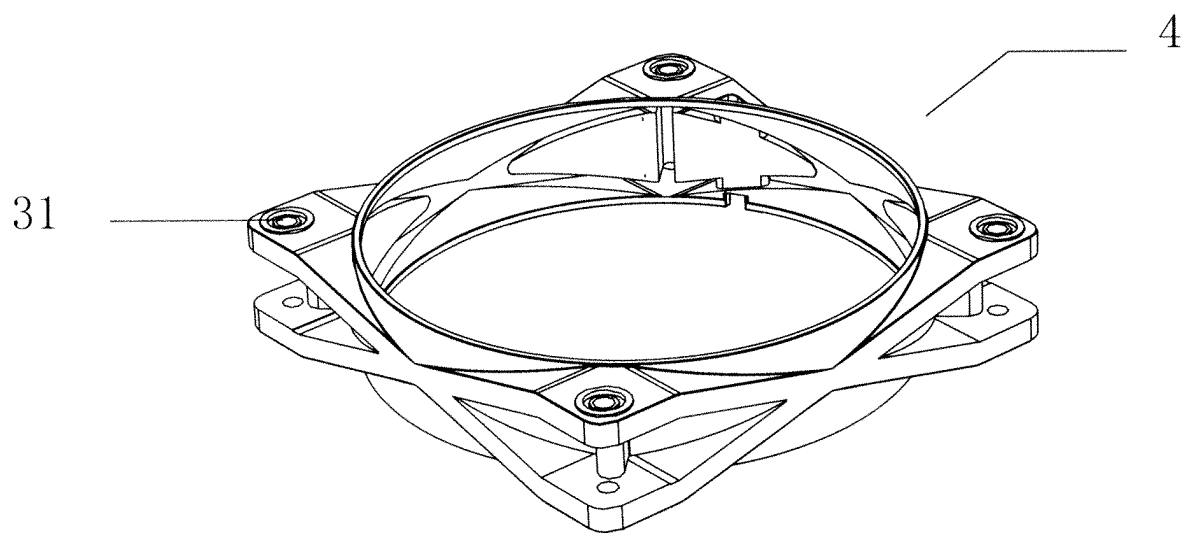


Figure 2

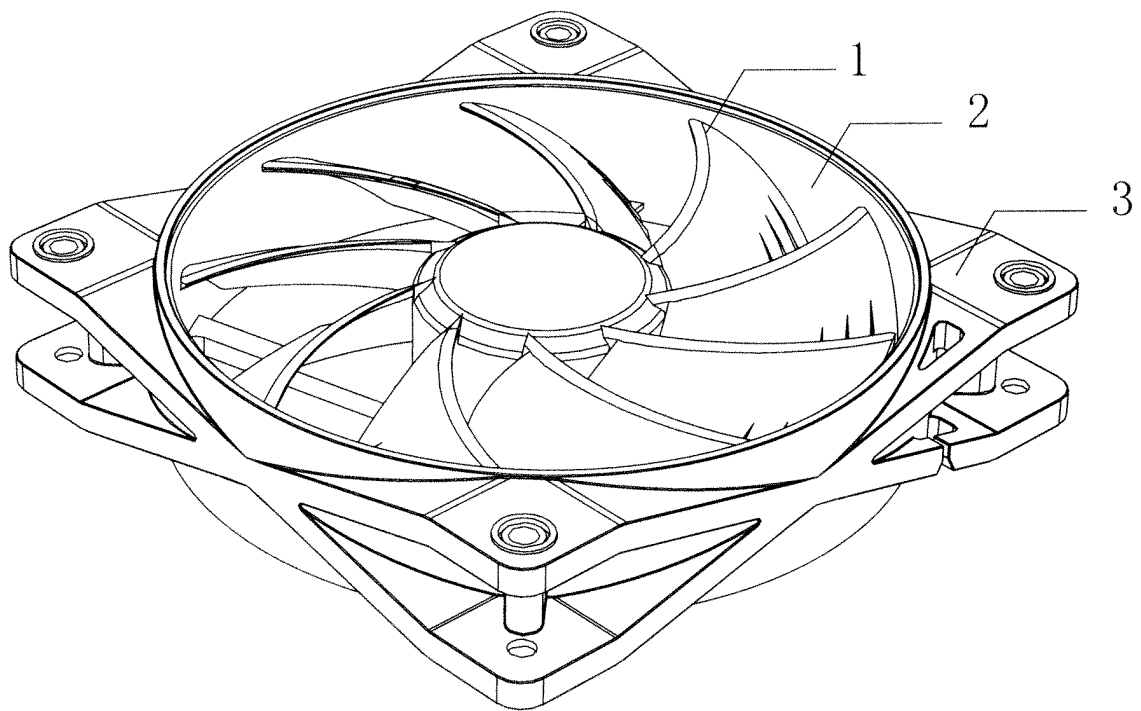


Figure 3

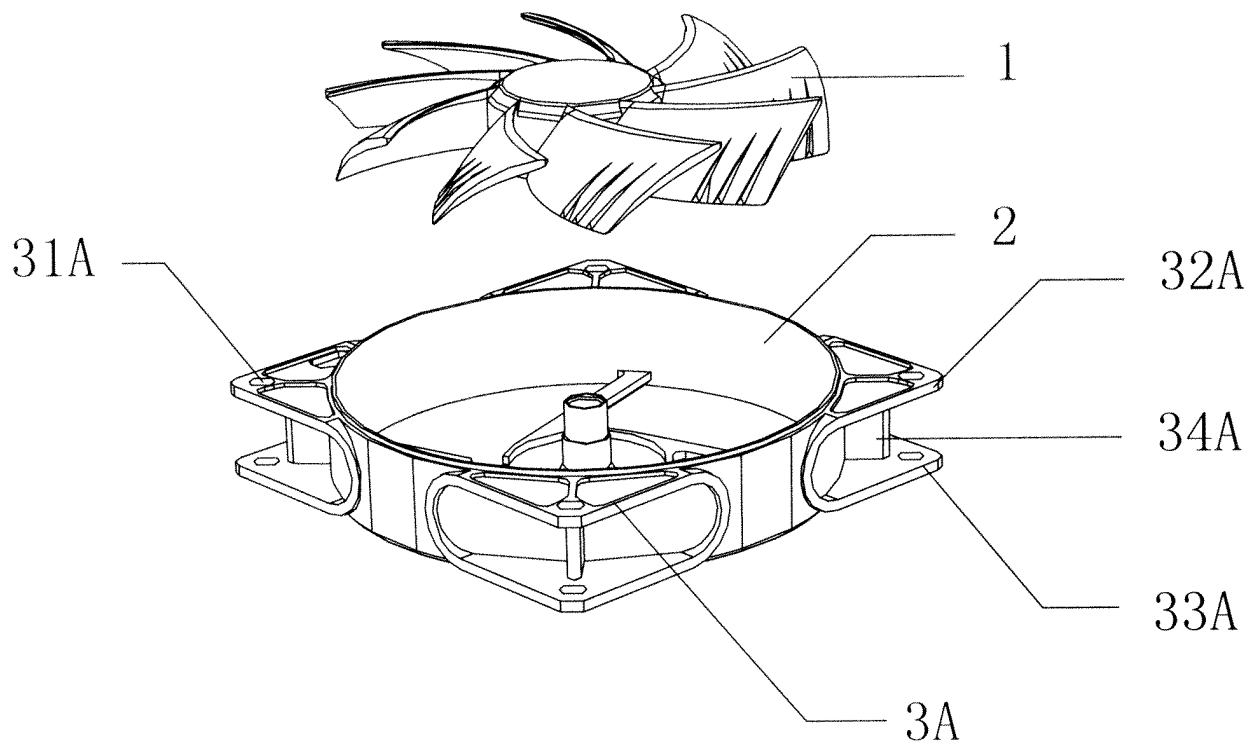


Figure 4

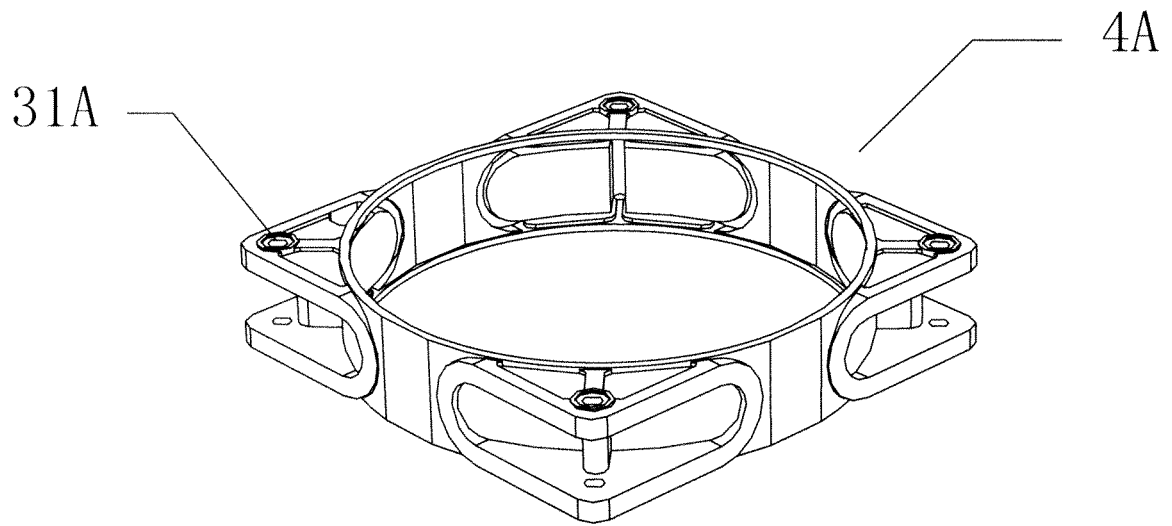


Figure 5

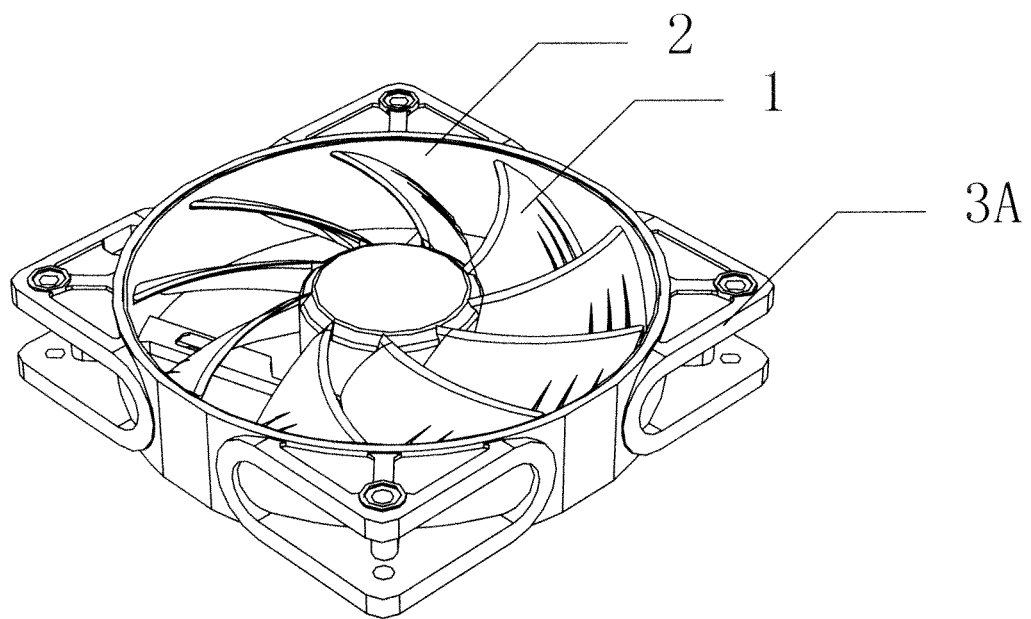


Figure 6

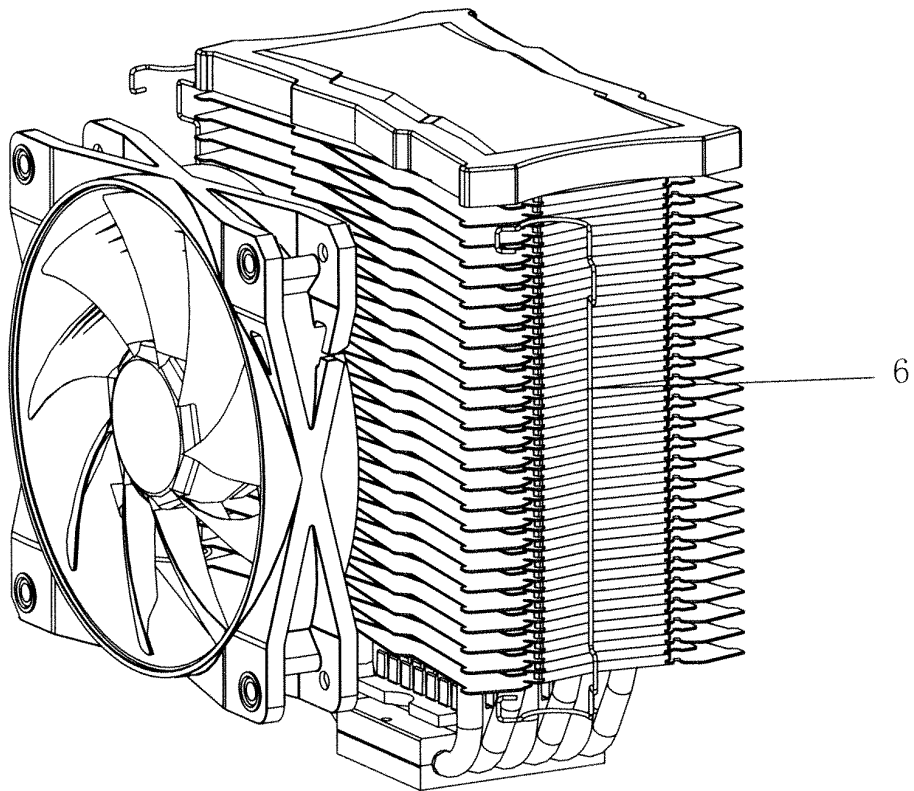


Figure 7

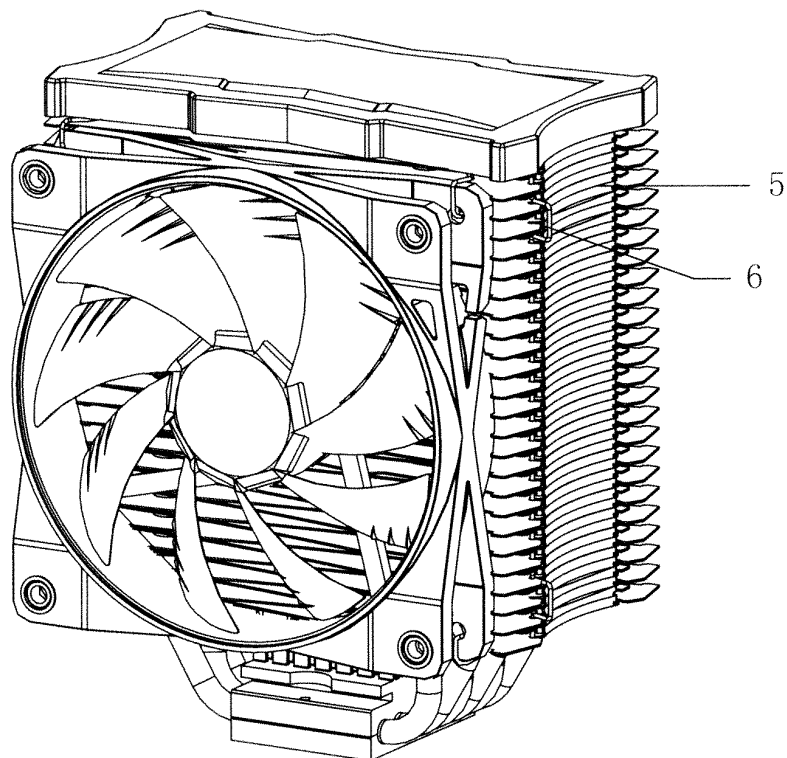


Figure 8

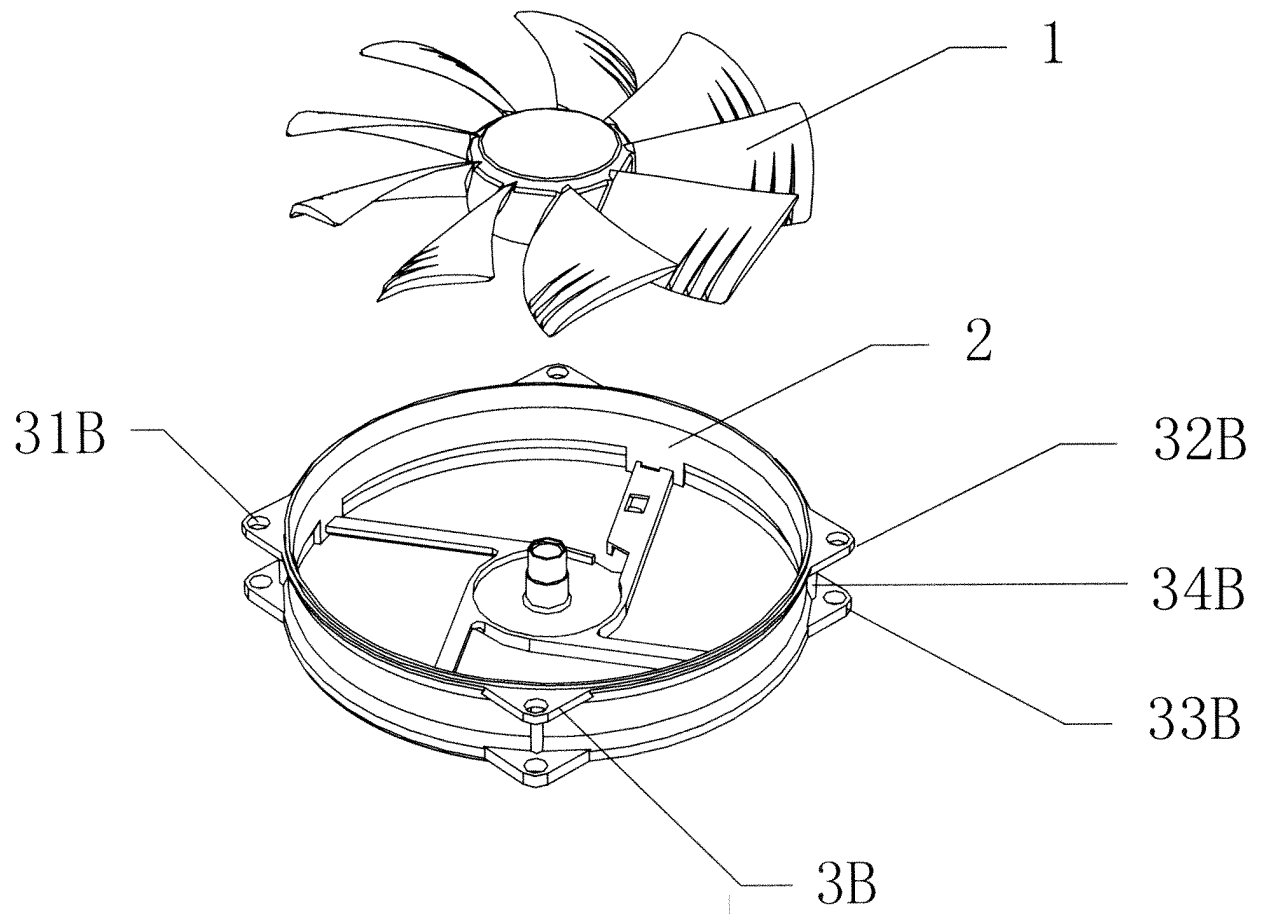


Figure 9

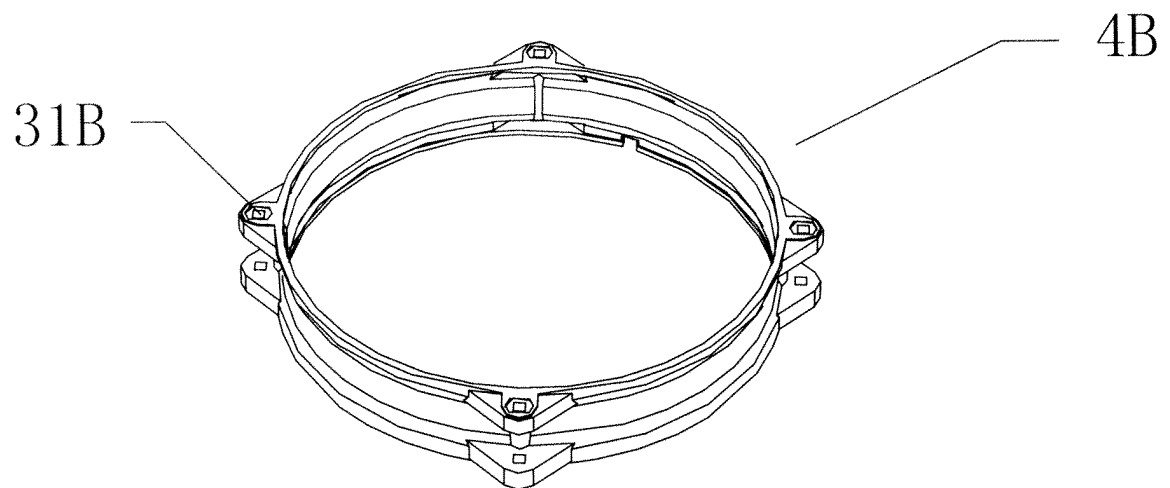


Figure 10

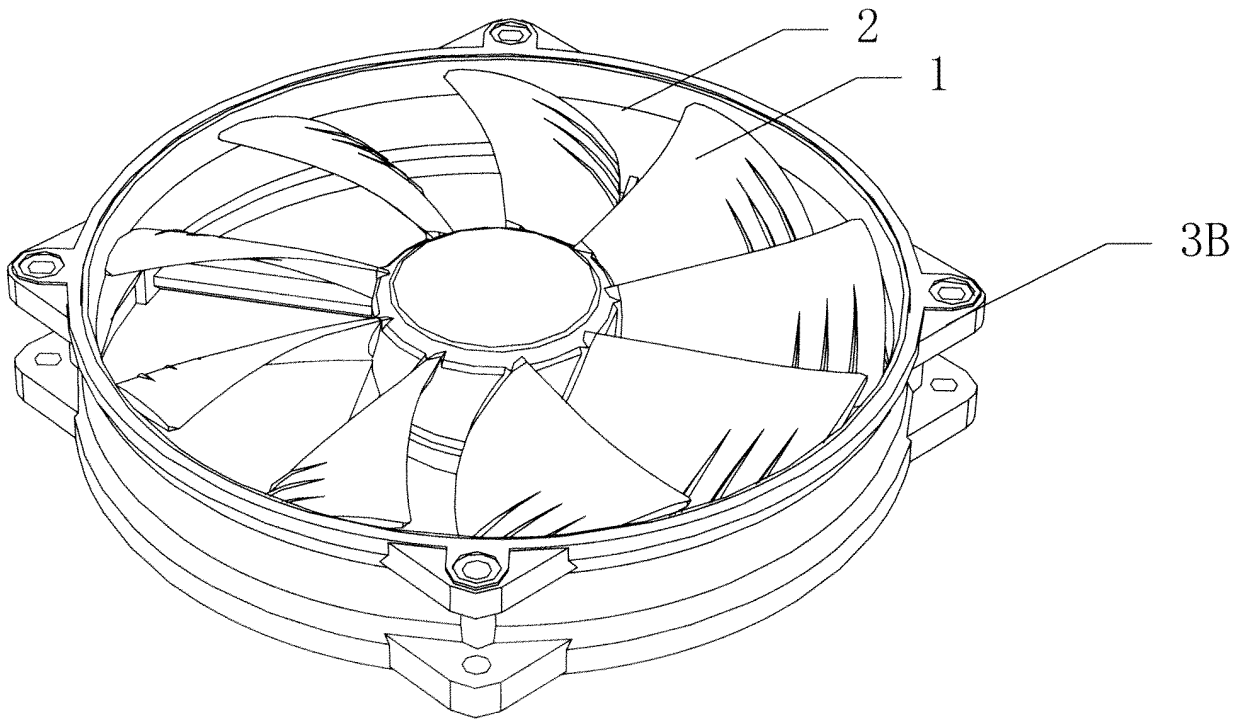


Figure 11

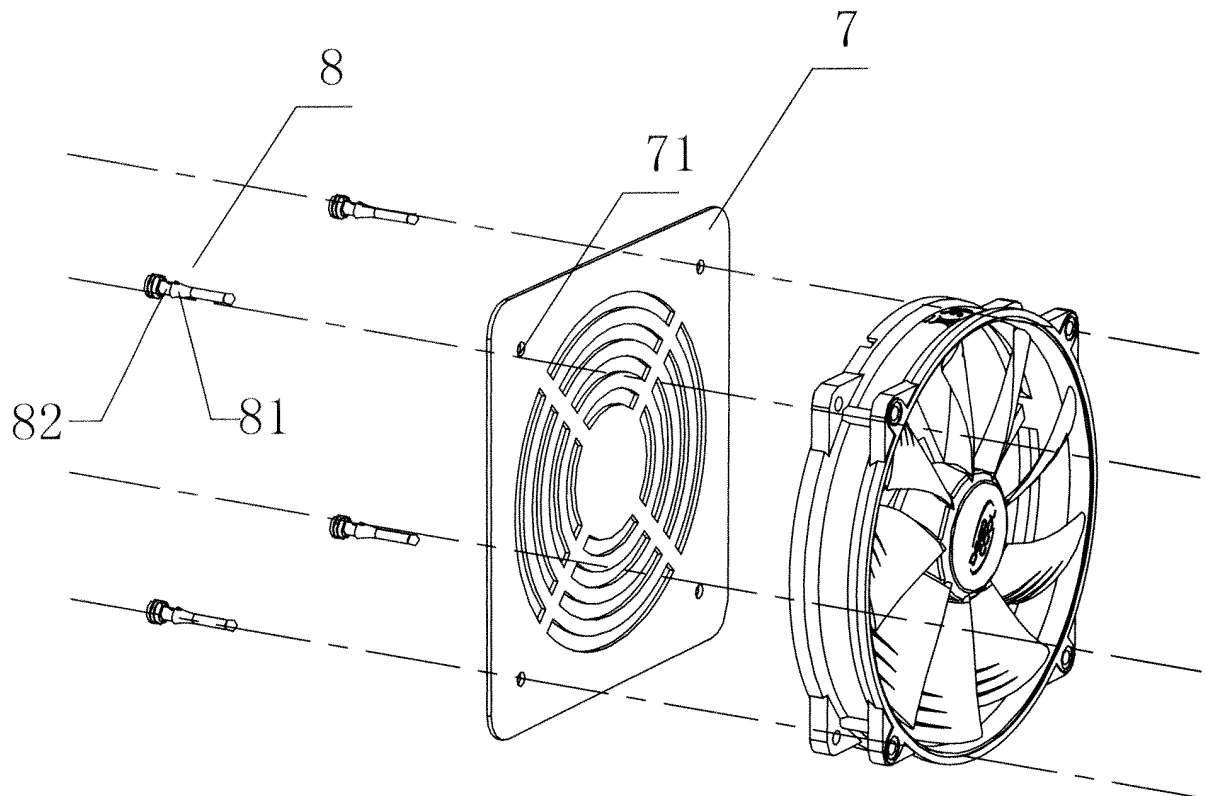


Figure 12

REFERENCES CITED IN THE DESCRIPTION

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