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(54) **STAGE LIGHT FIXTURE WITH LIGHT HEAD HAVING EXTERNAL HEAT DISSIPATION**

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F21V 21/30 (2006.01)
F21V 29/70 (2015.01)
F21W 131/406 (2006.01)

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CPC ***F21V 29/60*** (2015.01); ***F21V 21/30*** (2013.01); ***F21V 29/70*** (2015.01); *F21W 2131/406* (2013.01)

(58) **Field of Classification Search**
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See application file for complete search history.

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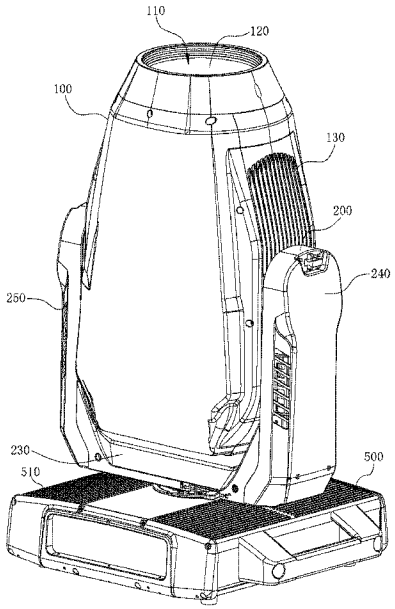
(57) **ABSTRACT**

A stage light fixture with a light head having external heat dissipation includes a light head for projecting light beams, which is formed as a cylinder with a light outlet which is covered by a light emitting lens, and a support arm for supporting the light head to rotate via a pivoting shaft. At least one first blower is provided in the support arm, which is configured to blow air around the light head to flow and thus cool the light head. According to the present invention, active heat dissipation is formed and enclosed interior of the cylinder is simultaneously ensured without damage to the existed structure of the light head. The light head thus can be effectively cooled in a way that the air around the light head is blown to flow and promptly entrain the heat on the side wall thereof via the first blower.

10 Claims, 6 Drawing Sheets



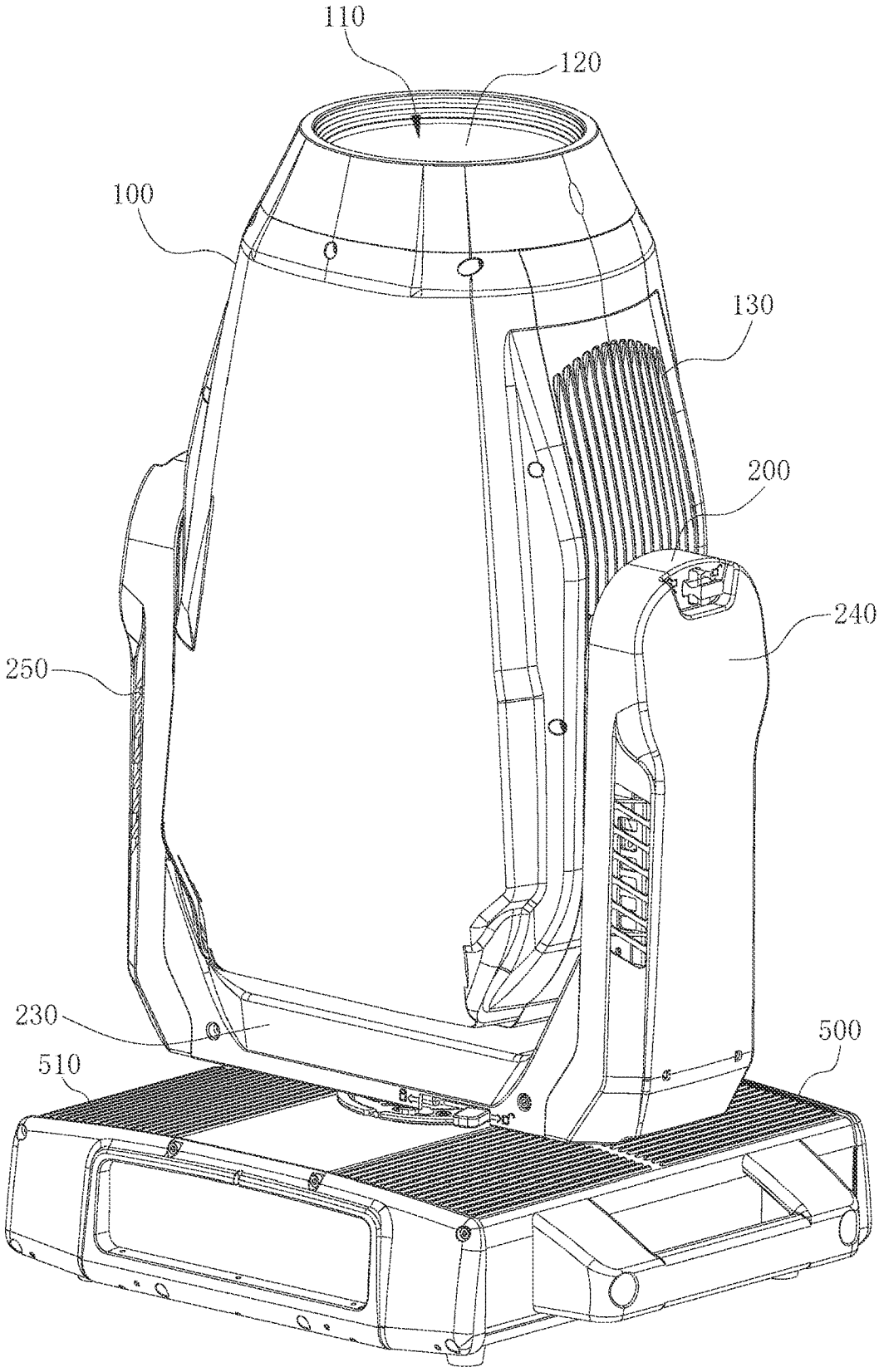


FIG. 1

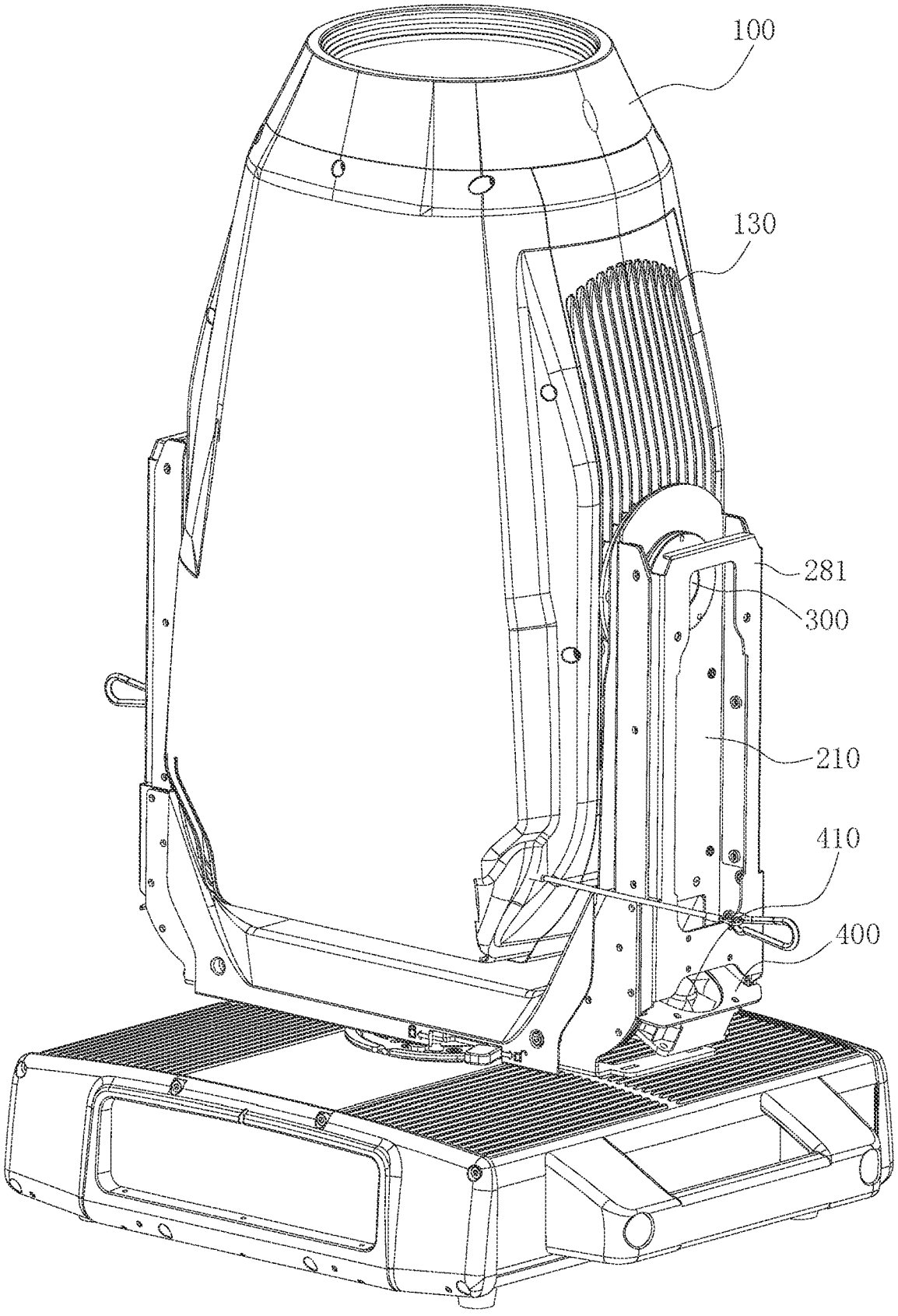


FIG. 2

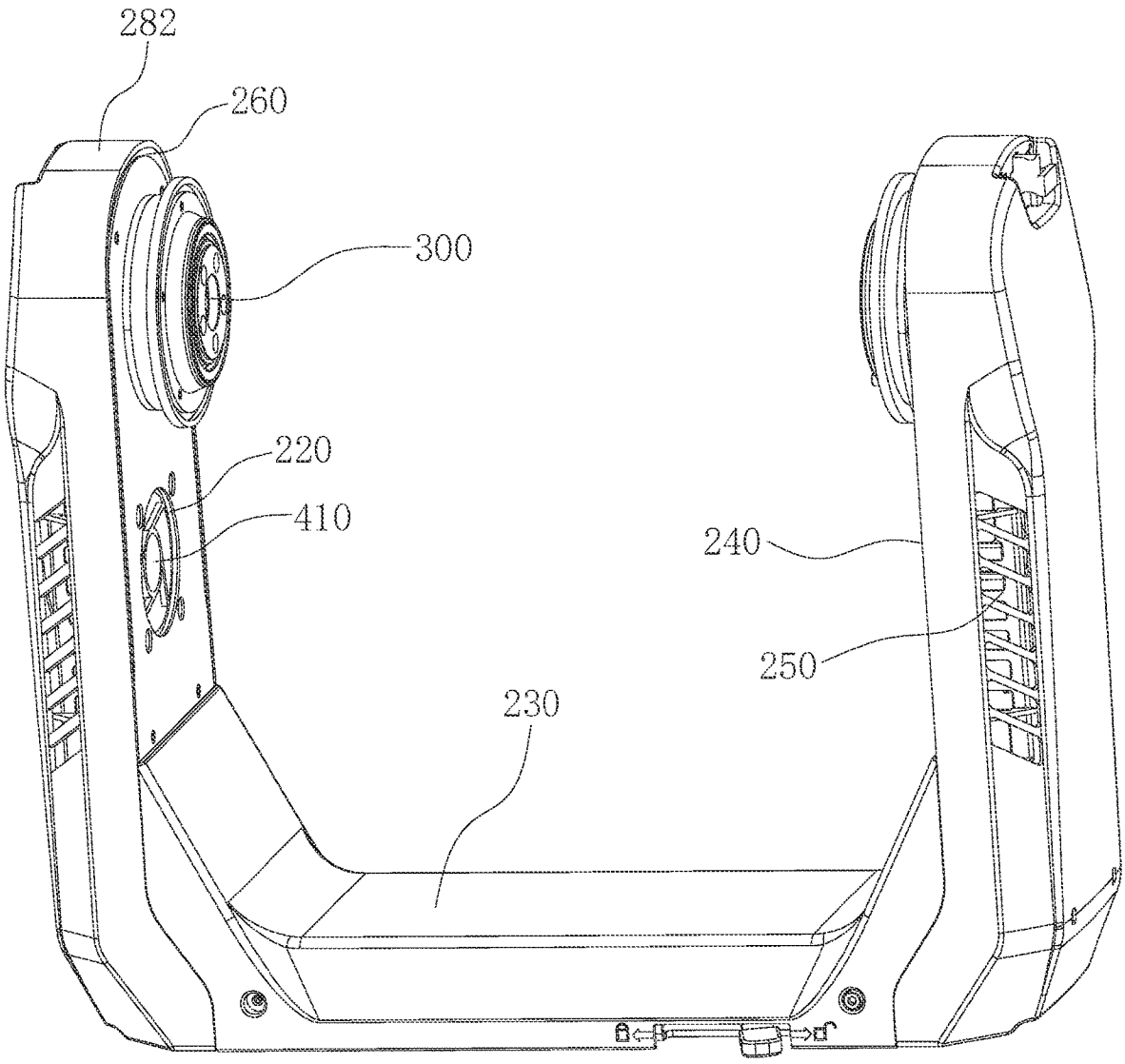


FIG. 3

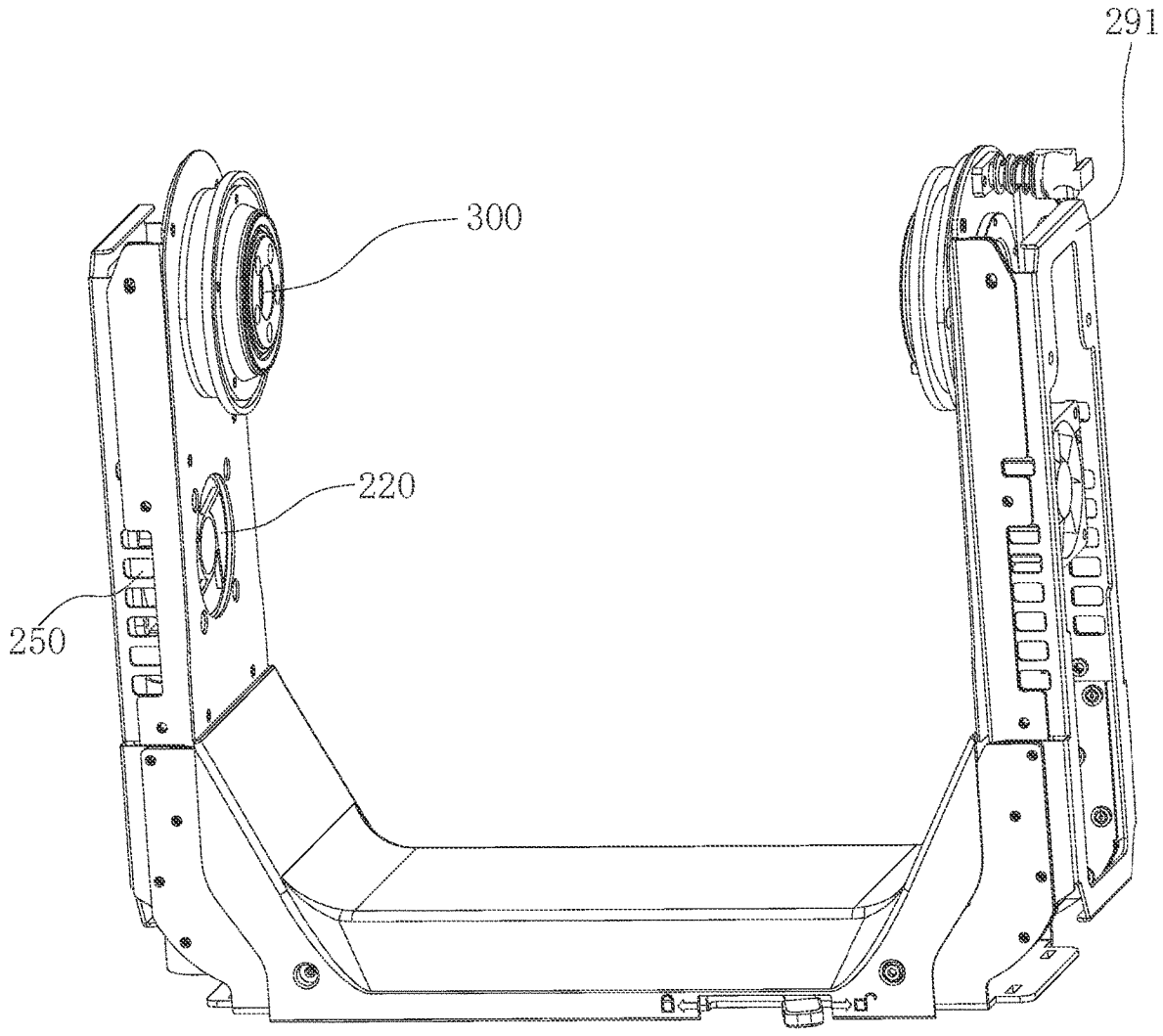


FIG. 4

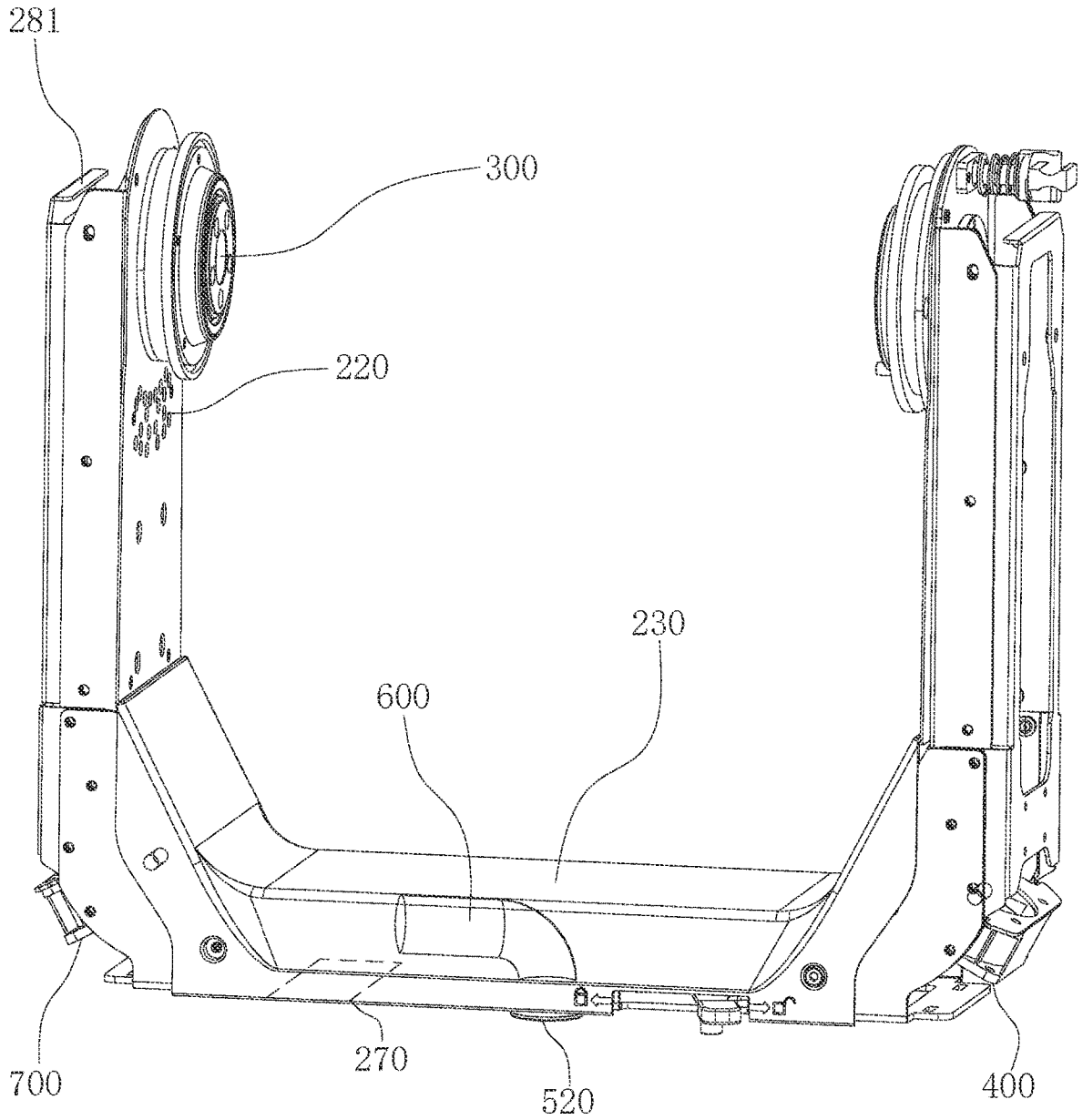


FIG. 5

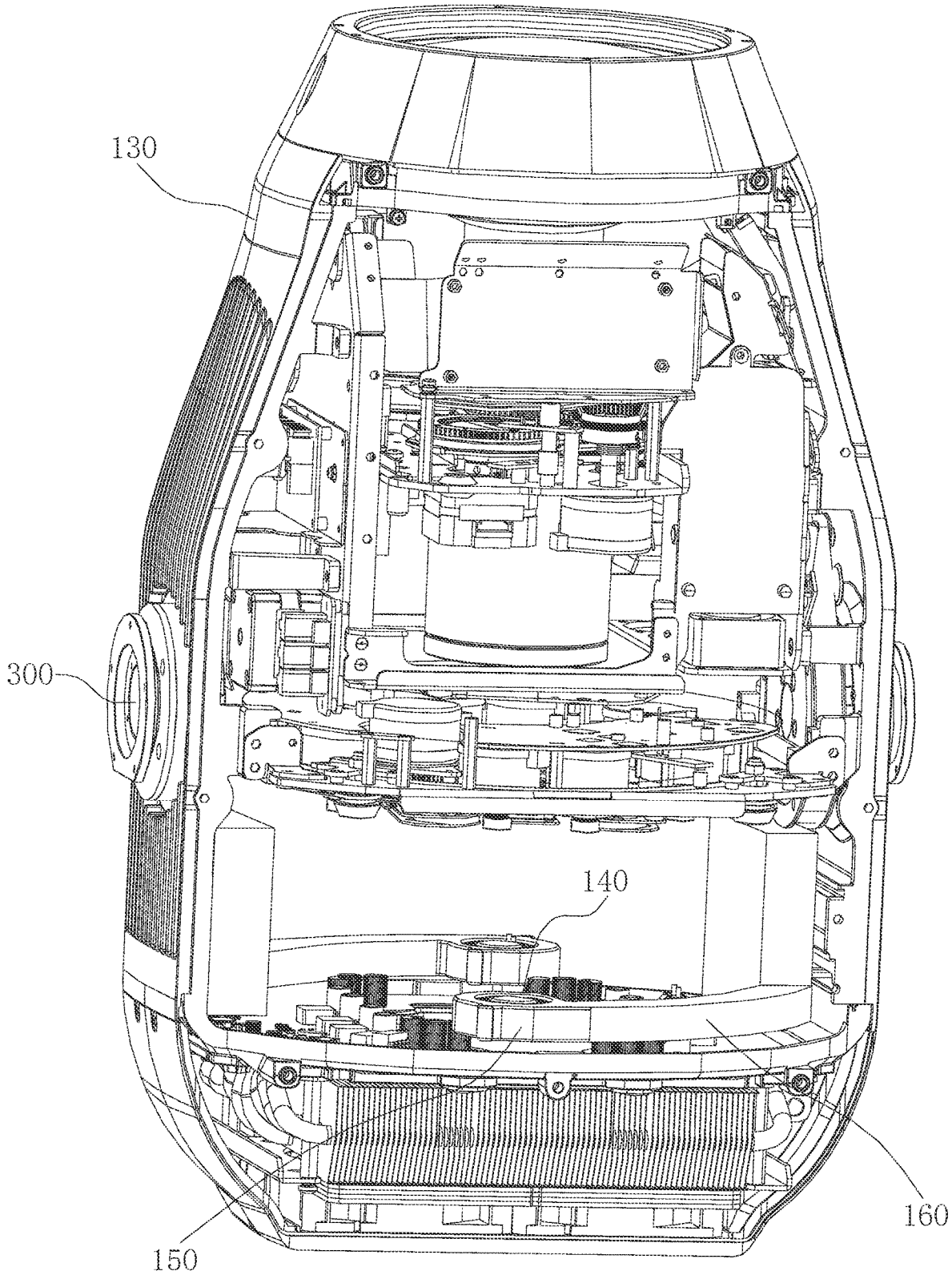


FIG. 6

STAGE LIGHT FIXTURE WITH LIGHT HEAD HAVING EXTERNAL HEAT DISSIPATION

CROSS REFERENCE TO RELATED APPLICATIONS

The present application claims priorities from Chinese Application No. CN 202322371105.5 filed on Aug. 31, 2023, all of which are hereby incorporated herein by reference.

TECHNICAL FIELD

The present invention relates to the technical field of stage light fixtures, and more particularly, relates to a stage light fixture with a light head having external heat dissipation.

BACKGROUND

The light head of the stage light fixture is usually used to generate all kinds of light effects and project light spots with specific light effects to the target object. Therefore, the interior of the light head is equipped with a light source and various effect-forming modules, which will generate a large amount of heat during operation of the stage light fixture. In addition, in order to meet the requirement of dry running environment for the inside equipment, the light head is usually tightly enclosed. Accordingly, heat dissipation is of great importance for the light head to keep the stage light fixture in normal operation. Typically, the light head is cooled via heat exchange of the side walls thereof with the outside.

However, heat in the side wall is dissipated heat by natural convection to the outside in such method, which is a passive heat-dissipation method, intrinsically having low heat-dissipating efficiency. On the other hand, during operation of the stage light fixture, the side wall close to the light source may generally accumulate massive heat, causing high temperature there, while the side wall corresponding to the space where less effect-forming modules are mounted may usually have low temperature, which thus makes distribution of heat in the whole side wall uneven. Therefore, the position in urgent need of heat dissipation would not be cooled promptly using such method. As a result, the light source and the effect-forming modules will always expose to high temperature, causing local overheating and even damaged, and thus shortening service life of the stage light fixture.

SUMMARY

It is therefore desirable to provide a stage light fixture with a light head having external heat dissipation in the present invention, which can achieve rapid heat dissipation of the outside of the light head.

According to the present invention, a stage light fixture with a light head having external heat dissipation includes a light head for projecting light beams and a support arm for supporting the light head to rotate via a pivoting shaft. The light head is preferably formed as a cylinder with a light outlet which is covered by a light emitting lens. In the present invention, at least one first blower is provided in the support arm to blow the air around the light head to flow and thus cool the outside of the light head.

In the present invention, active heat dissipation is formed and enclosed interior of the cylinder is simultaneously ensured without damage to the existed structure of the light head. Therefore, the light head in the present invention can be effectively cooled in a way that the air around the light head is blown to flow and promptly entrain the heat on the side wall thereof via the at least one blower mounted in the support arm. Meanwhile, the air is blown to continuously flow around the light head under the action of the first blower, as well as making the heat on the side wall of the light head distributed evenly, thereby avoiding heat accumulation and effectively improving heat-dissipation efficiency for the light head.

Particularly, the support arm is provided with an accommodating chamber for accommodating the first blower, and the side of the chamber close to the light head is provided with a first air outlet. With the first blower mounted in the accommodating chamber, it can achieve more compact arrangement for the components in the light head without excessive protruding from the support arm. In addition, the accommodating chamber is formed an air guiding passage together with the first air outlet, such air guiding passage is advantageous for the air to orderly blow to the outer side wall of the light head by the first blower.

The support arm preferably has one horizontal support and two vertical supports, with each end of the horizontal support connected to one end of each vertical support and the light head pivoted to the other end of each vertical support away from the horizontal support. In this situation, the accommodating chamber is arranged in the horizontal support and/or the vertical supports. With such configuration, the light head can rotate relative to the support arm around at least one dimension, and the first blower can be mounted in the horizontal support and/or the vertical supports according to actual demands, which thus can multi-directionally and intentionally blow cooler air to the light head, thereby achieving effective heat dissipation. More preferably, the accommodating chamber crosses over the horizontal support and

the vertical supports, the first blower is arranged at the joint of the horizontal support and the vertical supports, with the air-outlet surface of the first blower facing toward the side of the vertical support away from the light head. As there is sufficient room for mounting the first blower at the joint, larger fan can be used as the first blower, thus further improving the heat-dissipation efficiency for the light head.

It is advantageous to arrange the first air outlet close to the pivoting shaft of the light head relative to the support arm. In operation of the stage light fixture, the light head may rotate beyond the range limited by the support arm during rotation around the pivoting shaft. With such design the air can be blown to the light head by the first blower as much as possible, even if the light head constantly rotates, and the air flow from the first air outlet can blow the air around the light head to flow.

In order to increase heat-dissipation area of the cylinder of the light head, the side of the light head close to the support arm is provided with a plurality of first air guiding ribs which are parallel to the length direction of the light head. In addition, air passages are formed between the adjacent air guiding ribs, which can orderly guide the air blown by the first blower to the whole outside of the light head.

A base may be further included for supporting the support arm to rotate according to the present invention. In this situation, a second blower may be further provided in the support arm, which is used for blowing the air around the base to flow and thus cool the base. For most of the current stage light fixtures, the control element such as control panel is arranged in the base, that is, the rotation of the light head

and the support arm are controlled by the base. As the space inside the base is usually very limited while with many elements closely mounted, less room is provided for the blower to mount inside the base for heat dissipation. However, the second blower arranged in the support arm in the present invention can achieve heat dissipation for the base by blowing the air on the surface of the base to flow and such air promptly entrains the hot air inside the base. Therefore, according to the present invention the base can also be effectively cooled in such easy way, avoiding over temperature inside the base to damage the control element.

Similar to the light head, the side of the base close to the support arm may also be provided with a plurality of second air guiding ribs extending towards the periphery. Air passages are thus formed between the adjacent air guiding ribs, through which the air blown by the second blower can be guided orderly and flow on the surface of the base. In addition, such second air guiding ribs can increase heat-dissipation area of the base. Therefore, the heat-dissipation efficiency of the base can be effectively improved.

To produce rich and varied light effects, various effect-forming modules can be provided in the light head according to the present invention, including a light shaping component for shaping the light beams, a light filter component for changing the color of the light beams, a pattern component for forming light beams with specific pattern, and/or a lens component for changing divergence angle of the light beams.

In the present invention, the light emitting lens and the cylinder-shape light head is closely cooperated to form an enclosed chamber, in which the effect-forming modules are arranged for changing light effects of the stage light fixture. Such configuration ensures sealing of the light head to avoid water entering the light head to damage the elements therein. Meanwhile, the first blower accelerates the flow rate of the air around the light head. Therefore, the light head of the present invention can simultaneously meet the requirements of waterproof performance and heat dissipation.

In order to direct the heat inside of the light head to the outer side wall thereof, a circulating fan can be further provided in the light head, which is configured to blow the heat air inside the light head to at least one side wall of the light head close to the support arm. In such configuration, the heat inside the light head, especially at the center of the light head, can be guided to the inner side wall thereof by means of the circulating fan, then directed to the outer side wall of the light head via heat exchange, and thus finally removed by the first blower.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a stage light fixture with a light head having external heat dissipation according to an embodiment of the present invention;

FIG. **2** is another perspective view of the stage light fixture according to an embodiment of the present invention, with a housing of a support arm removed;

FIG. **3** is a perspective view of a support arm according to an embodiment, in which a first air outlet is covered by an air-outlet surface of a first blower;

FIG. **4** is another perspective view of the support arm of FIG. **3**, with a vertical support of the support arm removed;

FIG. **5** is another perspective view of the support arm according to another embodiment, showing the first air outlet composed of a plurality of air vents; and

FIG. **6** is a structure schematic view of inside of the stage light fixture, with a circulating fan inside the light head.

DETAILED DESCRIPTION

The accompanying drawings are for exemplary illustration only, and should not be construed as limitations on this invention. In order to better illustrate the present embodiment, some parts of the accompanying drawings may be omitted, enlarged or reduced, and do not represent the size of actual products. For those skilled in the art, it is understandable that certain well-known structures and descriptions thereof may be omitted in the drawings. The positional relationship described in the drawings is only for exemplary illustration, and should not be construed as a limitation on this invention.

FIGS. **1** and **2** depict a stage light fixture with a light head **100** having external heat dissipation according to an embodiment of the present invention, which includes a light head **100** for projecting light beams and a support arm **200** for supporting the light head to rotate via a pivoting shaft **300**. The light head **100** is formed as a cylinder with a light outlet **110**. A light emitting lens **120** is covered on the light outlet **110**. At least one first blower **400** is provided in the support arm **200** to blow the air around the light head **100** to flow and thus cool the outside of the light head **100**.

In the present embodiment, active heat dissipation is formed and enclosed interior of the cylinder is simultaneously ensured without damage to the structure of the light head **100**. The light head **100** can be effectively cooled in a way that the air around the light head **100** is blown to flow to promptly entrain the heat on the side wall thereof via the blower **400** mounted on the support arm **200**. Meanwhile, the air is blown to continuously flow around the light head **100** under the action of the first blower **400**, as well as making the heat on the side wall of the light head distributed evenly, thereby avoiding heat accumulation and effectively improving heat-dissipation efficiency for the light head.

Optionally, the first blower **400** can either be arranged at the outside of the support arm **200** or be arranged at the inner side of the support arm **200**.

In the illustrated embodiment, the support arm **200** is in a U shape, the light head **100** is pivoted to the inner sides of the support arm **200**, and each side of the U-shaped support arm **200** is provided with one blower **400** so that the air at both sides of the light head **100** can be blown to flow, result in enhanced flow rate of the air around the light head **100** and thus improved heat-dissipation efficiency of the light head.

With reference to FIGS. **3-5**, the support arm **200** includes at least one support plate **281** for supporting. The first blower **400** is arranged on the support plate **281** and corresponding to the pivoting shaft **300** the support plate **281** is provided with a pivoting hole. One end of the pivoting shaft **300** is fastened to the light head **100** and the other end is pivoted to the support plate **281** via the pivoting hole, so that the light head **100** can rotate around the support arm **200**.

As mental has good thermal conductivity, the outside of the light head **100** is preferably made of metal material, so that the heat inside the light head **100** can be conducted to the outside thereof.

The first blower **400** is preferably a waterproof blower, which can achieve waterproof performance of the whole light head.

In the illustrated embodiment, the support arm **200** is provided with an accommodating chamber **210** for accommodating the first blower **400**, and the side of the chamber **210** close to the light head **100** is provided with a first air

outlet **220**. It makes the support arm **200** more compact with the blower **400** mounted on the accommodating chamber **210**.

The support arm has a plurality of housings **282** which are buckled with each other and surrounded the support plate **281**. In this case, the accommodating chamber **210** is formed by the support plate **281**, and an air guiding passage is formed between the support plate **281** and the housings **282**, so that the air blown by the first blower **400** will flow to the first air outlet **220** along the air guiding passage and finally blow toward the light head **100**.

The support arm **200** further includes an air inlet **250** in air communication with the outside. During running of the first blower **400**, the air outside enters the support arm **200** via the air inlet **250**, flows through the first air outlet **220**, and is then blown to the light head **100** with the help of the first blower **400** to make the air around the light head **100** flow rapidly, meanwhile the cool air outside can effectively cool the hot side wall of the light head **100**.

The support arm **200** may be additionally provided with an air-inlet gap **260** in air communication with the outside, through which cool air can enter the support arm **200**. With the air-inlet gap **260**, it thus can reduce the area of the air inlet **250** to achieve good waterproof and dustproof performance.

Referring to FIG. **3** and FIG. **4**, according to an embodiment of the present invention, the first air outlet **220** is formed as a through hole. In such case, the first air outlet **220** is covered by the air-outlet surface **410** of the first air blower **400**.

Referring to FIG. **1**, FIG. **2**, and FIG. **5**, according to another embodiment of the present invention, the first air outlet **220** is composed of a plurality of air vents closely arranged. In this situation, the first blower **400** is arranged at the side of the support arm away from the first air outlet **220**.

In the illustrated embodiment, the support arm **200** has one horizontal support **230** and two vertical supports **240**, with each end of the horizontal support **230** connected to one end of each vertical support **240** and the light head **100** pivoted to the other end of each vertical support **240** away from the horizontal support **230**. In this embodiment, the accommodating chamber **210** is arranged in the horizontal support **230** and/or the vertical supports **240**. In such configuration, the light head **100** can rotate relative to the support arm **200** around at least one dimension, and the first blower **400** can mounted in the horizontal support **230** and/or the vertical supports **240** according to actual demands, which thus can multi-directionally and intentionally blow cooler air to the light head **100**, thereby achieving effective heat dissipation for the light head **100**.

FIG. **1** and FIG. **5** clearly shows that the accommodating chamber **210** crosses over the horizontal support **230** and the vertical support **240**, the first blower **400** is arranged at the joint of the horizontal support **230** and the vertical support **240**, with the air-outlet surface **410** of the first blower **400** facing toward the side of the vertical support **240** away from the light head **100**. As there is sufficient room for mounting the first blower **400** at the joint, larger fan can be used as the first blower **400**, thus further improving the heat-dissipation efficiency for the light head **100**.

Alternatively, the first blower **400** can also be arranged perpendicular to the horizontal support **230**, with the air-outlet surface **410** of the first blower **400** facing toward the vertical support **240**.

In the illustrated embodiment, the first air outlet **220** is arranged close to the pivoting shaft **300** of the light head **100** relative to the support arm **200**. In operation of the stage light fixture, the light head **100** may usually rotate beyond the range limited by the support arm **200** during rotation around the pivoting shaft **300**. However, with such design the air can be blown to the light head **100** by the first blower **400** as much as possible, even if the light head **100** constantly rotates, and the air flow from the first air outlet **220** can blow the air around the light head to flow.

As FIGS. **1** and **2** shown, the side of the light head **100** close to the support arm **200** is provided with a plurality of first air guiding ribs **130** which are parallel to the length direction of the light head **100**. On one hand, such air guiding ribs **130** can increase heat-dissipation area of the cylinder of the light head. On the other hand, air passages are formed between the adjacent air guiding ribs **130**, which can guide the air blown by the first blower **400**. Particular preference is given that the air guiding ribs **130** is arranged parallel to each other.

FIG. **2** and FIG. **5** clearly show that a base **500** is further included for supporting the support arm **200** to rotate. In this embodiment, a second blower **700** is provided in the support arm **200**, which is used for blowing the air around the base **500** to flow and thus cool it. For most of the current stage light fixtures, the control element such as control panel is arranged in the base **500**, that is, the rotation of the light head **100** and the support arm **200** are controlled by the base **500**. As the space inside the base **500** is usually very limited while with many elements closely mounted, less room is provided for the blower to mount inside the base **500** for heat dissipation. However, the second blower **700** arranged in the support arm in the present embodiment can achieve heat dissipation for the base **500** by blowing the air on the surface of the base to flow and such air promptly entrains the hot air inside the base **500**. Therefore, according to the present embodiment the base **500** can be effectively cooled, avoiding over temperature inside the base **500** to damage the control element.

The second flower **700** is preferably mounted in the accommodating chamber **210**, and the side of the support arm **200** close to the base **500** is provided with a second air outlet **270**.

Advantageously, the housing of the base is made of metal material of good thermal conductivity.

The support arm **200** is pivoted to the base **500** via a rotation shaft **520**, so that the light head **100** can rotate relative to the base **500** in at least two dimensions.

In the illustrated embodiment, the side of the base **500** close to the support arm **200** is provided with a plurality of second air guiding ribs **510** extending towards the periphery. Air passages are formed between the adjacent air guiding ribs **510**, through which the air blown by the second blower **700** can be guided orderly and flow on the surface of the base **500**. In addition, such second air guiding ribs **510** can increase heat-dissipation area of the base **510**. Therefore, the heat-dissipation efficiency of the base can be effectively improved.

The stage light fixture may also include a light shaping component for shaping of the light beams, a light filter component for changing the color of the light beams, a pattern component for forming light beams with specific pattern, and/or a lens component for changing divergence angle of the light beams. With such effect-forming modules, the stage light fixture thus can produce rich and varied light effects.

The light emitting lens **120** and the cylinder-shape light head **100** is closely cooperated to form an enclosed chamber, in which the effect-forming modules are arranged for changing light effects of the stage light fixture. Such configuration

ensures the sealing of the light head **100** to avoid water entering the light head **100** to damage the elements therein. Meanwhile, the first blower **400** accelerates the flow rate of the air around the light head **100**. The light head **100** of the present invention thus meets the requirements of waterproof performance and heat dissipation.

With reference to FIG. **5**, the support arm **200** is further provided with a waterproof tube **600** for receiving the electric lines of the electric elements, which can further avoid water entering the accommodating chamber **210** of the support arm **200** with the cool air to cause adverse effects on the electric lines.

With reference to FIG. **6**, a circulating fan **150** is further provided in the light head **100** according to a preferred embodiment, which blows the heat inside the light head **100** to at least one side wall of the light head **100** close to the support arm **200**. In such configuration, the heat inside the light head **100**, especially at the center of the light head **100**, can be directed to the inner side wall thereof by means of the circulating fan **150**, then conducted to the outer side wall of the light head **100** via heat exchange, and finally removed by the first blower **400**.

The circulating fan **150** is particularly in form of an exhaust fan. In this case, an air guide **160** connected to the air outlet of the circuiting fan **150** is further arranged. The circulating fan **150** is arranged close to the light source **140**, so that heat air with higher temperature accumulated around the light source **140** during operation can be extracted by the circulating fan **150**, further guided to side wall of the light head **100** close to the support arm **200** through the air guide **160** for heat exchange therewith, and finally directed to the outside of the light head **100**. On the other hand, the heat air from inside of the light head **100** is cooled into cold air after heat exchange, such cold air is in turn blown to the area close to the light source **140** or the effect assembly from the side of the light head **100** away from the light source **140** for the next heat exchange. With the cooperation of the circuiting fan **150** and the air guide **160**, a heat dissipation passage is formed inside of the light head **100** for air circulation therein.

Obviously, the above-mentioned embodiments of the present invention are only examples for clearly illustrating the present invention, rather than limiting the mode of implementation of the present invention. For those of ordinary skill in the art, changes or alterations in other different forms can also be made on the basis of the above description. It is not needed and also not possible to list all the modes of implementation here. Any modification, equivalent replacement, improvement, etc. made within the spirit and principle of the present invention shall be included within the protection scope of the claims of the present invention.

What is claimed is:

1. A stage light fixture with a light head having external heat dissipation, comprising:

a light head for projecting light beams, which is formed as a cylinder with a light outlet which is covered by a light emitting lens; and

a support arm for supporting the light head to rotate via a pivoting shaft,

wherein at least one first blower is provided in the support arm, which is configured to blow air around the light head to flow and thus cool outside of the light head, and

wherein at least one effect-forming module is further provided in the light head for changing the light beams generated by a light source inside the light head, including a light shaping component for shaping the light beams, a light filter component for changing color of the light beams, a pattern component for forming light beams with specific pattern, and/or a lens component for changing divergence angle of the light beams.

2. The stage light fixture according to claim **1**, wherein the support arm is provided with an accommodating chamber for accommodating the first blower, and a side of the chamber close to the light head is provided with a first air outlet.

3. The stage light fixture according to claim **2**, wherein the support arm has one horizontal support and two vertical supports, with each end of the horizontal support connected to one end of each vertical support and the light head pivoted to the other end of each vertical support away from the horizontal supports, and the accommodating chamber is arranged in the horizontal support and/or the vertical supports.

4. The stage light fixture according to claim **3**, wherein the accommodating chamber crosses over the horizontal support and the vertical supports, the first blower is arranged at a joint of the horizontal support and the vertical supports, with an air-outlet surface of the first blower facing toward a side of the vertical support away from the light head.

5. The stage light fixture according to claim **2**, wherein the first air outlet is arranged close to the pivoting shaft of the light head relative to the support arm.

6. The stage light fixture according to claim **1**, wherein a side of the light head close to the support arm is provided with a plurality of first air guiding ribs which are parallel to a length direction of the light head.

7. The stage light fixture according to claim **1**, wherein a base is further included for supporting the support arm to rotate, and a second blower is further provided in the support arm, which is used for blowing air around the base to flow and cool the base.

8. The stage light fixture according to claim **7**, wherein a side of the base close to the support arm is provided with a plurality of second air guiding ribs extending towards periphery thereof.

9. The stage light fixture according to claim **1**, wherein the light emitting lens and the cylinder-shape light head is closely cooperated to form an enclosed chamber, in which the at least one effect-forming module is arranged for changing light effects of the stage light fixture.

10. The stage light fixture according to claim **1**, wherein a circulating fan is further provided in the light head, which is configured to blow heat air inside the light head to at least one inner side wall of the light head close to the support arm.

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