COMBINED BLADE DEVICE AND COMBINED AIR OUTLET DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

The present disclosure is based on and claims the priority to Chinese Patent Application No. 202111639861.0, filed December 29, 2021, the entirety of which is incorporated by reference herein.

TECHNICAL FIELD

The present disclosure relates to a combined blade device and a combined air outlet device.

BACKGROUND

The statements herein merely provide background information related to the present disclosure and do not necessarily constitute the prior art.

Traditional high-air-pressure and high-speed fans are generally diagonal flow fans, hubs are disposed in the middles of diagonal flow blades, and air can only enter from the outsides of the hubs, which causes the diagonal flow fans to have some invalid air inlet areas, affecting the air inlet volumes of the diagonal flow fans. Moreover, the air forms turbulence in those areas, interfering with normal air intakes of the diagonal flow fans, and affecting the air pressures and air outlet volumes of the diagonal flow fans.

SUMMARY

The present disclosure aims to solve at least one of the technical problems existing in the prior art. To this end, the present disclosure provides a combined blade device and a combined air outlet device, and the air pressure and air volume of the air outlet device may be improved by making full use of air inlet areas of blades.

According to the present disclosure, a combined blade device includes:

a hub, where a first air inlet is formed outside an edge of a first end of the hub, and a first air outlet is formed outside an edge of a second end of the hub, the hub is internally provided with a centrifugal cavity, the first end of the hub is provided with a second air inlet, the first air inlet surrounds the second air inlet, the second end of the hub is provided with a second air outlet, both the second air inlet and the second air outlet are communicated with the

centrifugal cavity, and the hub expands gradually in a direction from the second air inlet to the second air outlet;

at least one diagonal flow blade, connected to one side of the hub that is away from the centrifugal cavity; and

at least one centrifugal blade, connected to the hub and located in the centrifugal cavity, where rotating axes of the at least one diagonal flow blade and the at least one centrifugal blade coincide with each other.

The combined blade device according to the present disclosure may at least have the following beneficial effects.

In the present disclosure, an air inlet side of the hub is provided with the second air inlet, the first air inlet is formed outside the edge of the first end of the hub, thus the air inlet volume can be increased by making full use of the air inlet area at the air inlet side of the hub; undisturbed streams at the air inlet side of the hub facilitate the air entry, to improve the working efficiency of the air outlet device. Moreover, the diagonal flow blade and centrifugal blade can form two the airflows respectively, and the two airflows converge after being discharged from the respective air outlets, to effectively increase the air volume and air pressure of the air outlet device.

According to the present disclosure, the combined blade device further includes an adapter part, the at least one centrifugal blade includes a plurality of centrifugal blades, and ends of at least part of the centrifugal blades that are away from the first air outlet are connected to the adapter part.

According to the present disclosure, the part of the centrifugal blades connected to the adapter part and the part of the centrifugal blades not connected to the adapter part are spaced alternately in a circumferential direction of the hub.

According to the present disclosure, a plurality of adapter parts are provided and distributed at intervals, and in a plane perpendicular to the rotating axis of the centrifugal blades, projections of the adapter parts are located outside a projection of the first end of the hub.

According to the present disclosure, the plurality of adapter parts are evenly spaced in the circumferential direction of the hub.

According to an aspect of the present disclosure, a combined air outlet device includes:

a combined blade device including:

a hub, wherein a first air inlet is formed outside an edge of a first end of the hub, and a first air outlet is formed outside an edge of a second end of the hub, the hub is internally provided with a centrifugal cavity, the first end of the hub is provided with a second air inlet, the first air inlet surrounds the second air inlet, the second end of the hub is provided with a second air outlet, both the second air inlet and the second air outlet are communicated with the centrifugal cavity, and the hub expands gradually in a direction from the second air inlet to the second air outlet;

at least one diagonal flow blade, connected to one side of the hub that is away from the centrifugal cavity;

a plurality of centrifugal blades, connected to the hub and located in the centrifugal cavity, wherein rotating axes of the at least one diagonal flow blade and the plurality of centrifugal blades coincide with each other;

an air deflector in which at least part of the combined blade device is arranged;

a driving element connected to the combined blade device and configured to drive the combined blade device to rotate; and

a base, wherein the base is connected to one side of the plurality of centrifugal blades that are away from the second air inlet, and configured to mount the driving element,

wherein the air deflector is provided with a first air guide section and a second air guide section, the first air guide section is disposed around the hub, the second air guide section is disposed around the base and blocks the second air outlet in a radial direction of the hub, and the second air guide section is configured to guide airflows discharged from the first air outlet and the second air outlet.

The combined air outlet device according to the embodiment of the present disclosure may at least have the following beneficial effects.

In the embodiment of the present disclosure, the air deflector is disposed around the hub and forms air ducts with the hub, which can make full use of the air inlet area at the air inlet side of the air outlet device, and the airflows generated by the centrifugal blade and diagonal flow blade converge after being discharged from the first air outlet and the second air outlet, to increase the air volume and air pressure of the air outlet device.

According to some embodiments of the present disclosure, an area enclosed by the air deflector and the outside of the edge of the first end of the hub is the first air inlet, and an area enclosed by the air deflector and the outside of the edge of the second end of the hub is the first air outlet.

According to some embodiments of the present disclosure, the combined air outlet device further includes a base, connected to one side of the centrifugal blade that are away from the second air inlet, and configured to mount the driving element.

According to some embodiments of the present disclosure, an edge of the base that is away from the rotating axis is flush with the second end of the hub in a direction of the rotating axis.

According to some embodiments of the present disclosure, the air deflector is provided with a first air guide section and a second air guide section, the first air guide section is disposed around the hub, the second air guide section is disposed around the base and blocks the second air outlet in the radial direction of the hub, the second air guide section is configured to guide the airflows discharged from the first air outlet and the second air outlet, and at least part of the second air guide section is parallel to the rotating axis.

According to some embodiments of the present disclosure, an inner surface of a joint of the first air guide section and the second air guide section is a curved surface, and the curved surface gradually approaches the second air outlet in the flowing direction of the airflow.

According to some embodiments of the present disclosure, the combined air outlet device further includes a mounting seat, the mounting seat is connected to one side of the base that is away from the hub, the air deflector further includes a third air guide section connected to one end of the second air guide section that is away from the first air inlet, the third air guide section is disposed around the mounting seat, and both the third air guide section and a part of the mounting seat are parallel to the rotating axis.

CLAIMS

1. A combined air outlet device, comprising:

a combined blade device comprising:

a hub, wherein a first air inlet is formed outside an edge of a first end of the hub, and a first air outlet is formed outside an edge of a second end of the hub, the hub is internally provided with a centrifugal cavity, the first end of the hub is provided with a second air inlet, the first air inlet surrounds the second air inlet, the second end of the hub is provided with a second air outlet, both the second air inlet and the second air outlet are communicated with the centrifugal cavity, and the hub expands gradually in a direction from the second air inlet to the second air outlet;

at least one diagonal flow blade, connected to one side of the hub that is away from the centrifugal cavity;

a plurality of centrifugal blades, connected to the hub and located in the centrifugal cavity, wherein rotating axes of the at least one diagonal flow blade and the plurality of centrifugal blades coincide with each other;

an air deflector in which at least part of the combined blade device is arranged;

a driving element connected to the combined blade device and configured to drive the combined blade device to rotate; and

a base, wherein the base is connected to one side of the plurality of centrifugal blades that are away from the second air inlet, and configured to mount the driving element,

wherein the air deflector is provided with a first air guide section and a second air guide section, the first air guide section is disposed around the hub, the second air guide section is disposed around the base and blocks the second air outlet in a radial direction of the hub, and the second air guide section is configured to guide airflows discharged from the first air outlet and the second air outlet.

2. The combined air outlet device according to claim 1, wherein an area enclosed by the air deflector and the outside of the edge of the first end of the hub is the first air inlet, and an area enclosed by the air deflector and the outside of the edge of the second end of the hub is the first air outlet.

3. The combined air outlet device according to claim 1, wherein an edge of the base that is away from the rotating axis is flush with the second end of the hub in a direction of the rotating axis.

4. The combined air outlet device according to claim 1, wherein an inner surface of a joint of the first air guide section and the second air guide section is a curved surface, and the curved

surface gradually approaches the second air outlet in the flowing direction of the airflow.

5. The combined air outlet device according to claim 1, further comprising a mounting seat, wherein the mounting seat is connected to one side of the base that is away from the hub, the air deflector further comprises a third air guide section connected to one end of the second air guide section that is away from the first air inlet, the third air guide section is disposed around the mounting seat, and both the third air guide section and a part of the mounting seat are parallel to the rotating axis.

6. The combined air outlet device according to claim 5, wherein the mounting seat comprises a drainage part and a mounting part, the mounting part is connected to one side of the base that is away from the hub, the drainage part is connected to an outer edge of the mounting part that is away from the rotating axis, and the drainage part is parallel to the rotating axis and extends in a direction away from the base.

7. The combined air outlet device according to claim 5, further comprising guide vanes, wherein an air guide cavity is formed between the third air guide section and the mounting seat, and the guide vanes are accommodated in the air guide cavity and connected between the third air guide section and the mounting seat.

8. The combined air outlet device according to claim 1, wherein the combined blade device further comprises an adapter part, ends of at least part of the plurality of centrifugal blades that are away from the first air outlet are connected to the adapter part.

9. The combined air outlet device according to claim 8, wherein a part of the plurality of centrifugal blades connected to the adapter part and a part of the plurality of centrifugal blades not connected to the adapter part are spaced alternately in a circumferential direction of the hub.

10. The combined air outlet device according to claim 8, wherein a plurality of adapter parts are provided and distributed at intervals, and in a plane perpendicular to the rotating axis of the plurality of centrifugal blades, projections of the plurality of adapter parts are located outside a projection of the first end of the hub.

11. The combined air outlet device according to claim 10, wherein the plurality of adapter parts are evenly spaced in the circumferential direction of the hub.