A cooling/heating fan apparatus includes a protective shade, a fan motor having a propeller shaft extended into the protective shade, an impeller mounted on a distal end of the propeller shaft, at least one porous ceramic carrier mounted on the propeller shaft and located between the fan motor and the impeller, wherein the porous ceramic carrier has a plurality of through holes each having a surface provided with an electro-thermal plating film layer. Thus, the air from the ambient environment is heated by the electro-thermal plating film layer quickly, thereby enhancing the heating efficiency of the fan apparatus.
COOLING/HEATING FAN APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a fan apparatus, and more particularly to a cooling/heating fan apparatus.

2. Description of the Related Art

A conventional heater comprises a quartz tube that functions as a heat source to produce a hot air so as to provide a warming effect. However, the quartz tube burns the oxygen in the air, so that the conventional heater is not suitable for a closed space in the room. Another conventional heater comprises a heating element made of PTC ceramic material. However, the PTC ceramic material is expensive, thereby greatly increasing costs of fabrication. Another conventional heater comprises a halogen lamp that functions as a heating element. However, the halogen lamp is directly projected onto the human body, so that the human body is easily burned by the high temperature produced by the halogen lamp, thereby causing danger to the user.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a cooling/heating fan apparatus.

Another objective of the present invention is to provide a fan apparatus, wherein the air from the ambient environment is heated by the electro-thermal plating film layer quickly, so that the electro-thermal plating film layer has an accelerated thermal cycle, thereby enhancing the heating efficiency of the fan apparatus.

A further objective of the present invention is to provide a fan apparatus, wherein the air from the ambient environment is heated by the electro-thermal plating film layer evenly and safely without needing to burn the oxygen, thereby protecting the user when using the fan apparatus.

A further objective of the present invention is to provide a fan apparatus, wherein the intersecting separation walls have cylindrical connections so that each of the through holes of the porous ceramic carrier has a plurality of arc-shaped corners to reduce the stress applied on the connections of the intersecting separation walls, thereby preventing the connections of the intersecting separation walls from being worn or broken due to a stress concentration.

Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side plan view of a fan apparatus in accordance with the preferred embodiment of the present invention;

FIG. 2 is a plan cross-sectional view of a porous ceramic carrier of the fan apparatus as shown in FIG. 1;

FIG. 3 is a locally enlarged view of the porous ceramic carrier of the fan apparatus as shown in FIG. 2;

FIG. 4 is a front plan view of a fan apparatus in accordance with another preferred embodiment of the present invention;

FIG. 5 is a plan cross-sectional view of a porous ceramic carrier of a fan apparatus in accordance with another preferred embodiment of the present invention;

FIG. 6 is a plan cross-sectional view of a conventional porous ceramic carrier in accordance with the prior art.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and initially to FIG. 1, a fan apparatus in accordance with the preferred embodiment of the present invention comprises a protective shade 2, a fan motor 1 mounted on the protective shade 2 and having a propeller shaft 10 extended into the protective shade 2, an impeller 3 mounted on a distal end of the propeller shaft 10 of the fan motor 1, at least one porous ceramic carrier 4 mounted on the propeller shaft 10 of the fan motor 1 and located between the fan motor 1 and the impeller 3, a fixing sent 20 mounted in the protective shade 2 for fixing the porous ceramic carrier 4, and an auxiliary fan 11 mounted on a rear end of the fan motor 1 to introduce an ambient air into the fan motor 1 so as to cool the fan motor 1.

Referring to FIGS. 2 and 3, the porous ceramic carrier 4 is formed integrally by an extrusion process and has a plurality of through holes 40. In the preferred embodiment of the present, the porous ceramic carrier 4 has a circular shape. Each of the through holes 40 of the porous ceramic carrier 4 has a surface provided with an electro-thermal plating film layer 41 formed by a thermal chemical reaction method, such as a high temperature atomized growth method. The electro-thermal plating film layer 41 is made of a resistance material, such as tin, nickel chromium alloy, copper nickel alloy, copper nickel manganese alloy and the like.

In practice, the air from the ambient environment is heated by the electro-thermal plating film layer 41 of each of the through holes 40 of the porous ceramic carrier 4 and to produce a hot air which is carried outward by the impeller 3 to provide a warming effect. Thus, the air from the ambient environment is heated by the electro-thermal plating film layer 41 quickly, evenly and safely without needing to burn the oxygen, thereby protecting the user when using the fan apparatus. In addition, the electro-thermal plating film layer 41 has an accelerated thermal cycle, thereby enhancing the heating efficiency of the fan apparatus.

The through holes 40 of the porous ceramic carrier 4 are formed by a plurality of intersecting separation walls 43 which are arranged in a staggered perpendicular manner. The intersecting separation walls 43 have cylindrical connections 44 so that each of the through holes 40 of the porous ceramic carrier 4 has a plurality of arc-shaped corners 400 to reduce the stress applied on the connections 44 of the intersecting separation walls 43, thereby preventing the connections 44 of the intersecting separation walls 43 from being worn or broken due to a stress concentration.

Referring to FIG. 4, the fan apparatus comprises a plurality of (preferably five) porous ceramic carriers 4 surrounding the propeller shaft 10 of the fan motor 1 and
arranged in an annular manner. Thus, the propeller shaft 10 of the fan motor 1 is located at a center of the porous ceramic carriers 4 and is extended through a gap “A” defined between the porous ceramic carriers 4.

[0021] Referring to FIG. 5, the porous ceramic carrier 4 has a central portion formed with a mounting hole 42 mounted on the propeller shaft 10 of the fan motor 1.

[0022] In comparison, referring to FIG. 6, a conventional porous ceramic carrier 5 in accordance with the prior art has a plurality of through holes 50 formed by a plurality of intersecting separation walls 51 having sharp connections 52. Thus, when a fluid passes through the through holes 50 of the porous ceramic carrier 5, the stress is applied on the sharp connections 52 of the intersecting separation walls 51, so that the sharp connections 52 of the intersecting separation walls 51 are easily worn or broken due to a stress concentration.

[0023] Accordingly, the air from the ambient environment is heated by the electro-thermal plating film layer 41 quickly, so that the electro-thermal plating film layer 41 has an accelerated thermal cycle, thereby enhancing the heating efficiency of the fan apparatus. In addition, the air from the ambient environment is heated by the electro-thermal plating film layer 41 evenly and safely without needing to burn the oxygen, thereby protecting the user when using the fan apparatus. Further, the intersecting separation walls 43 have cylindrical connections 44 so that each of the through holes 40 of the porous ceramic carrier 4 has a plurality of arc-shaped corners 400 to reduce the stress applied on the connections 44 of the intersecting separation walls 43, thereby preventing the connections 44 of the intersecting separation walls 43 from being worn or broken due to a stress concentration.

[0024] Although the invention has been explained in relation to its preferred embodiment(s) as mentioned above, it is to be understood that many other possible modifications and variations can be made without departing from the scope of the present invention. It is, therefore, contemplated that the appended claim or claims will cover such modifications and variations that fall within the true scope of the invention.

What is claimed is:

1. A fan apparatus, comprising:
   a protective shade;
   a fan motor mounted on the protective shade and having a propeller shaft extended into the protective shade;
   an impeller mounted on a distal end of the propeller shaft of the fan motor;
   at least one porous ceramic carrier mounted on the propeller shaft of the fan motor and located between the fan motor and the impeller;
   wherein, the porous ceramic carrier has a plurality of through holes each having a surface provided with an electro-thermal plating film layer.

2. The fan apparatus in accordance with claim 1, wherein the porous ceramic carrier is formed integrally.

3. The fan apparatus in accordance with claim 2, wherein the porous ceramic carrier is formed integrally by an extrusion process.

4. The fan apparatus in accordance with claim 1, wherein the porous ceramic carrier has a circular shape.

5. The fan apparatus in accordance with claim 1, wherein an air from the ambient environment is heated by the electro-thermal plating film layer of each of the through holes of the porous ceramic carrier and to produce a hot air which is carried outward by the impeller to provide a warning effect.

6. The fan apparatus in accordance with claim 1, further comprising a fixing seat mounted in the protective shade for fixing the porous ceramic carrier.

7. The fan apparatus in accordance with claim 1, further comprising an auxiliary fan mounted on a rear end of the fan motor to introduce an ambient air into the fan motor so as to cool the fan motor.

8. The fan apparatus in accordance with claim 1, wherein the through holes of the porous ceramic carrier are formed by a plurality of intersecting separation walls having cylindrical connections.

9. The fan apparatus in accordance with claim 8, wherein each of the through holes of the porous ceramic carrier has a plurality of arc-shaped corners.

10. The fan apparatus in accordance with claim 8, wherein the intersecting separation walls are arranged in a staggered perpendicular manner.

11. The fan apparatus in accordance with claim 1, wherein the fan apparatus comprises a plurality of porous ceramic carriers surrounding the propeller shaft of the fan motor.

12. The fan apparatus in accordance with claim 11, wherein the porous ceramic carriers are arranged in an annular manner.

13. The fan apparatus in accordance with claim 11, wherein the propeller shaft of the fan motor is located at a center of the porous ceramic carriers and is extended through a gap defined between the porous ceramic carriers.

14. The fan apparatus in accordance with claim 1, wherein the porous ceramic carrier has a central portion formed with a mounting hole mounted on the propeller shaft of the fan motor.

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