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(54) **Fan combined with an electrical ceramical heater**

(57) A cooling/heating fan apparatus includes a protective shade (2), a fan motor (1) having a propeller shaft (10) extended into the protective shade, an impeller (3) mounted on a distal end of the propeller shaft, at least one porous ceramic carrier (4) mounted on the propeller shaft and located between the fan motor and the impeller. The porous ceramic carrier has a plurality of through holes (40) each having a surface provided with an electro-thermal plating film layer (41). 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.

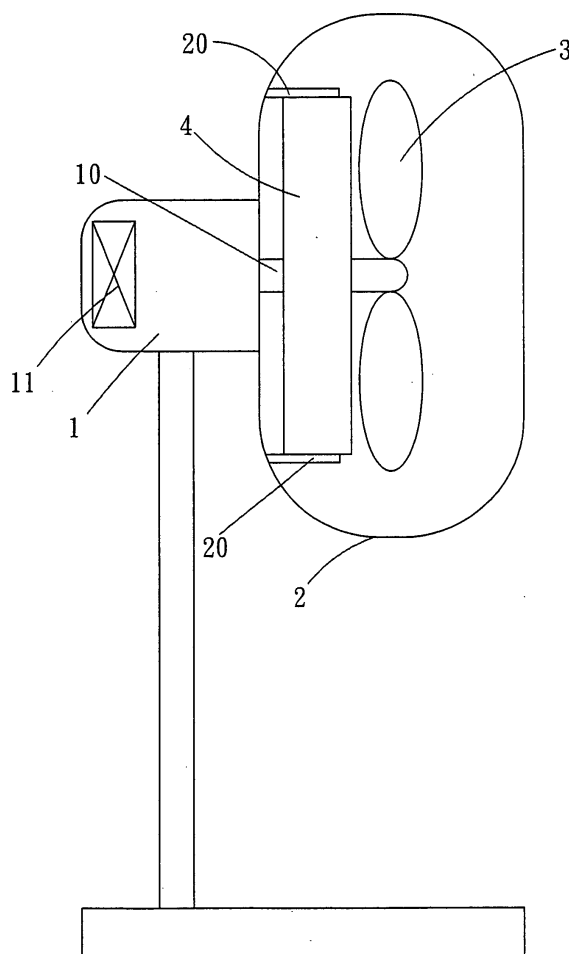


FIG. 1

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Description

[0001] The present invention relates to a fan apparatus, and more particularly to a cooling/heating fan apparatus.

[0002] 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.

[0003] The primary objective of the present invention is to provide a cooling/heating fan apparatus.

[0004] 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.

[0005] 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.

[0006] 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.

[0007] 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.

[0008] In 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; and

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

[0009] 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 seat 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.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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.

[0016] 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.

Claims

1. A fan apparatus, comprising:

a protective shade (2);
a fan motor (1) mounted on the protective shade (2) and having a propeller shaft (10) extended onto 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);

wherein, the porous ceramic carrier (4) has a plurality of through holes (40) each having a surface provided with an electro-thermal plating film layer (41).

2. The fan apparatus in accordance with claim 1,

wherein the porous ceramic carrier (4) is formed integrally.

3. The fan apparatus in accordance with claim 1 or claim 2, wherein the porous ceramic carrier (4) has a circular shape.

4. The fan apparatus in accordance with one of the preceding claims, further comprising a fixing seat (20) mounted in the protective shade (2) for fixing the porous ceramic carrier (4).

5. The fan apparatus in accordance with one of the preceding claims, further comprising 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).

6. The fan apparatus in accordance with one of the preceding claims, wherein the through holes (40) of the porous ceramic carrier (4) are formed by a plurality of intersecting separation walls (43) having cylindrical connections (44).

7. The fan apparatus in accordance with claim 6, wherein each of the through holes (40) of the porous ceramic carrier (4) has a plurality of arc-shaped corners (400).

8. The fan apparatus in accordance with one of the preceding claims, wherein the fan apparatus comprises a plurality of porous ceramic carriers (4) surrounding the propeller shaft (10) of the fan motor (1).

9. The fan apparatus in accordance with claim 8, wherein 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).

10. The fan apparatus in accordance with one of the preceding claims, wherein 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).

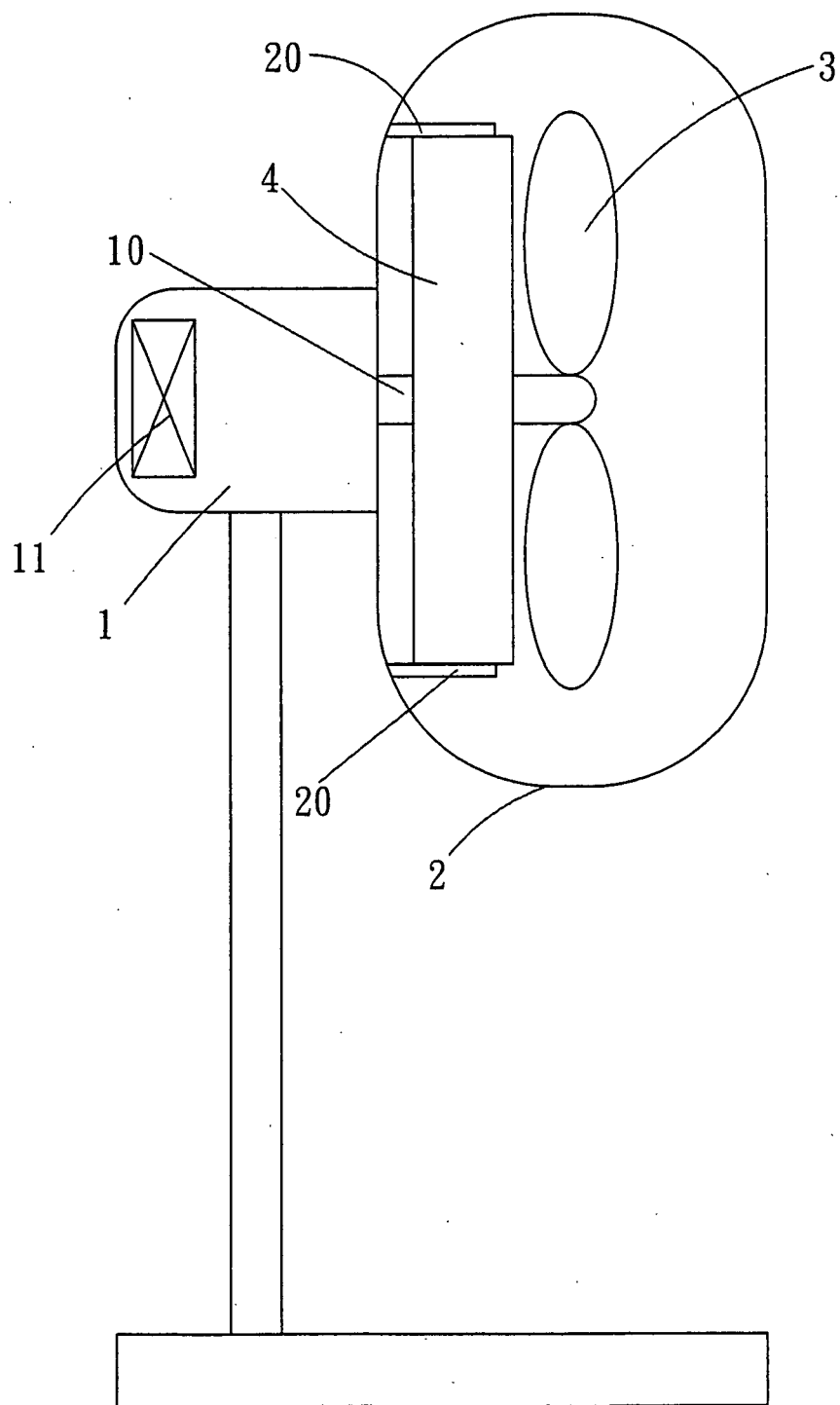


FIG. 1

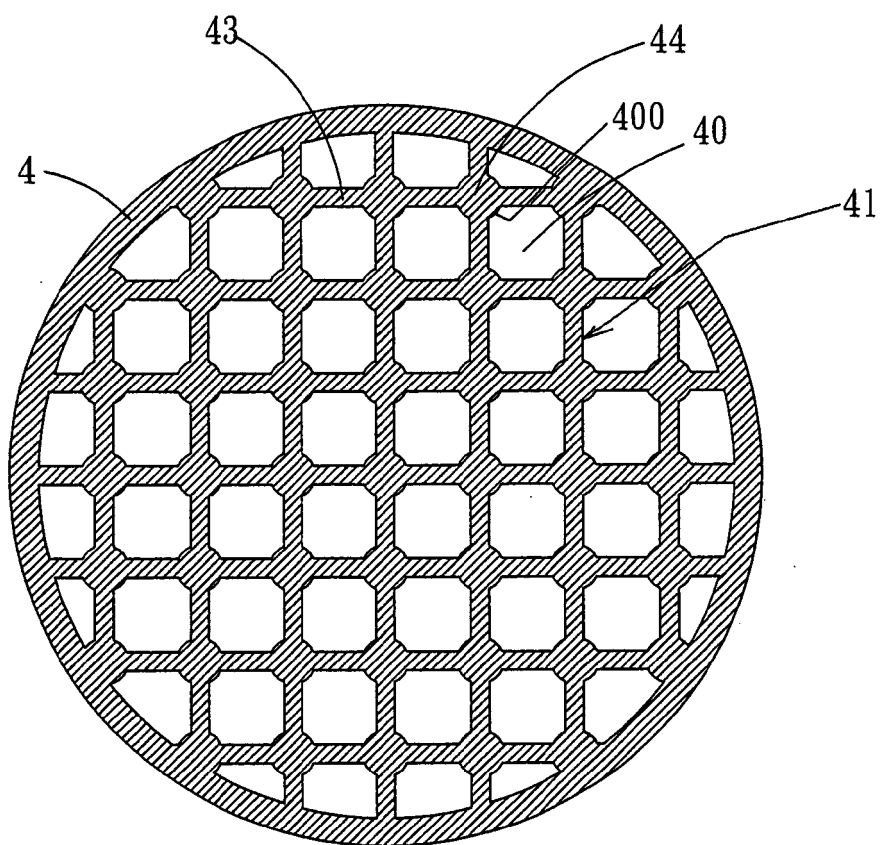


FIG. 2

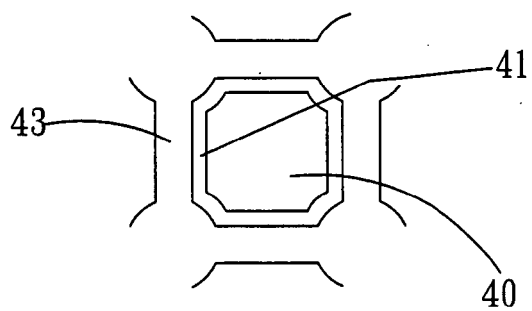


FIG. 3

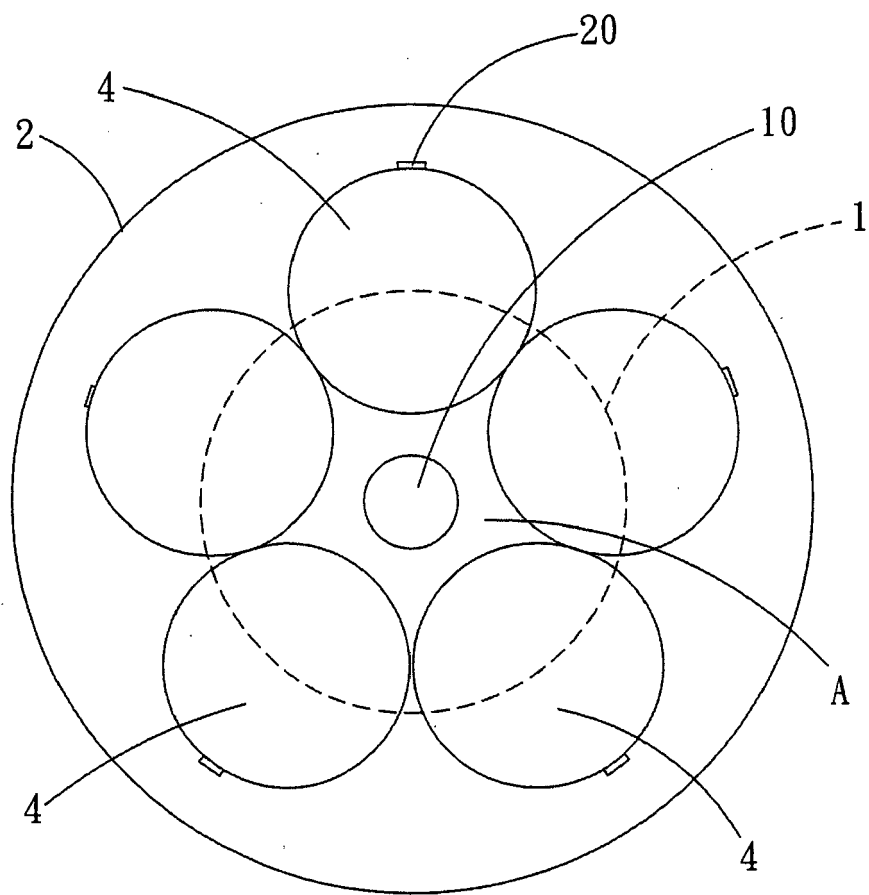


FIG. 4

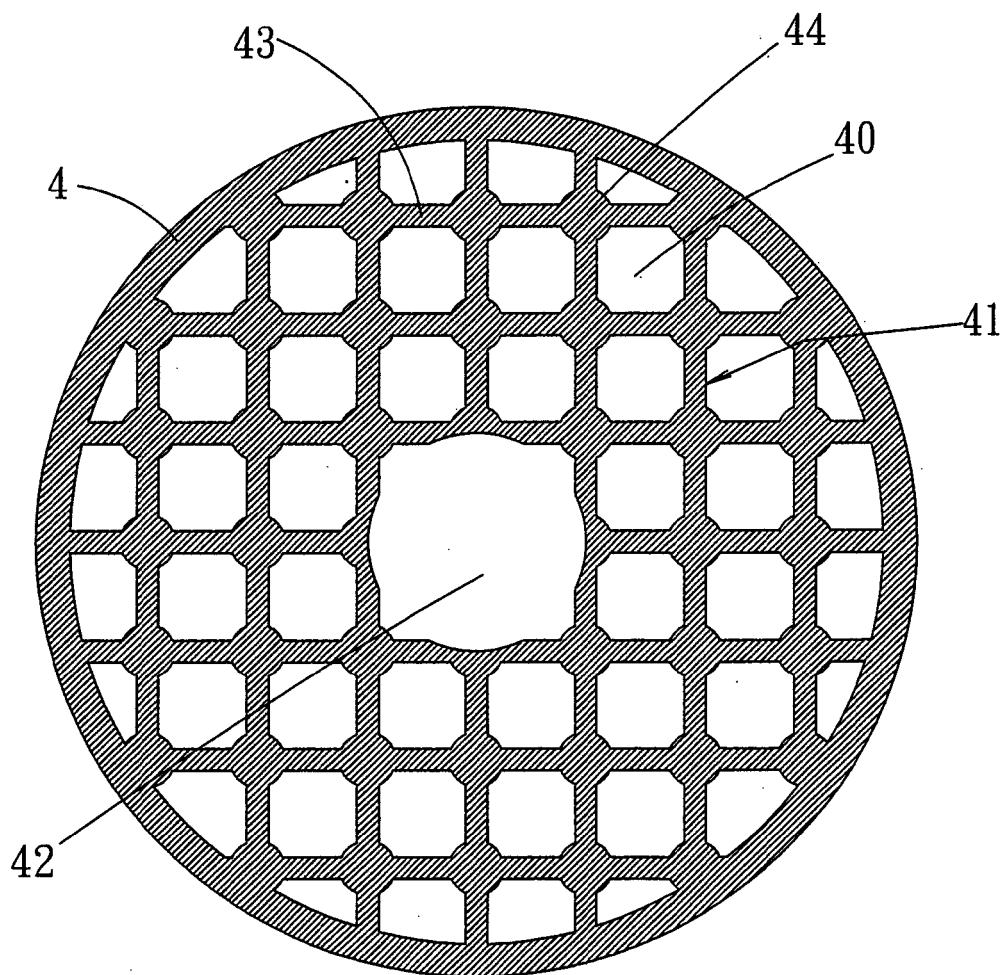


FIG. 5

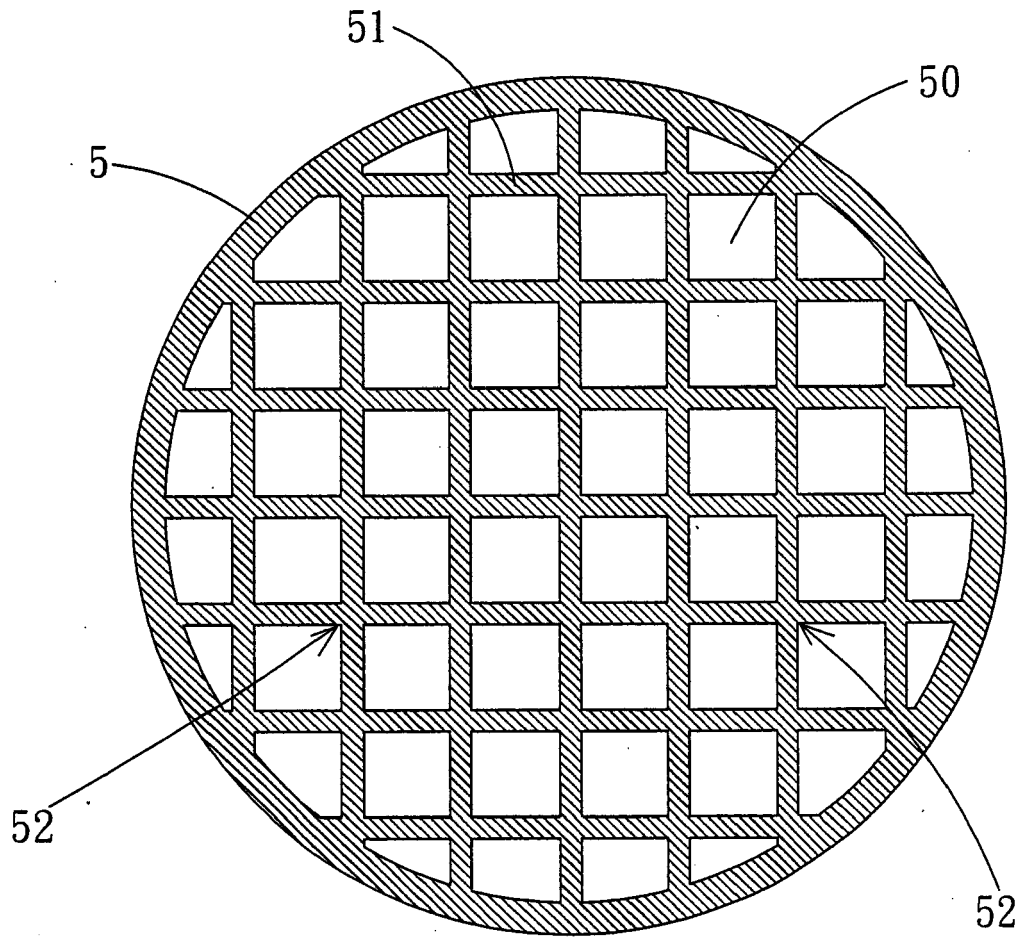


FIG. 6
PRIOR ART



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EUROPEAN SEARCH REPORT

Application Number
EP 05 01 1568

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| Place of search Munich | | Date of completion of the search 8 November 2005 | Examiner Valenza, D |
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EPO FORM 1503 03.82 (P04C01)

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EP 05 01 1568

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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