US 20040035556A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2004/0035556 A1**

(43) **Pub. Date: Feb. 26, 2004**

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(54) **HEAT-DISSIPATING DEVICE WITH DISSIPATING FINS DRIVABLE TO MOVE WITHIN AND AMBIENT FLUID**

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(21) Appl. No.: **10/614,241**

(22) Filed: **Jul. 8, 2003**

(30) **Foreign Application Priority Data**

Jul. 9, 2002 (TW)..... 091115210

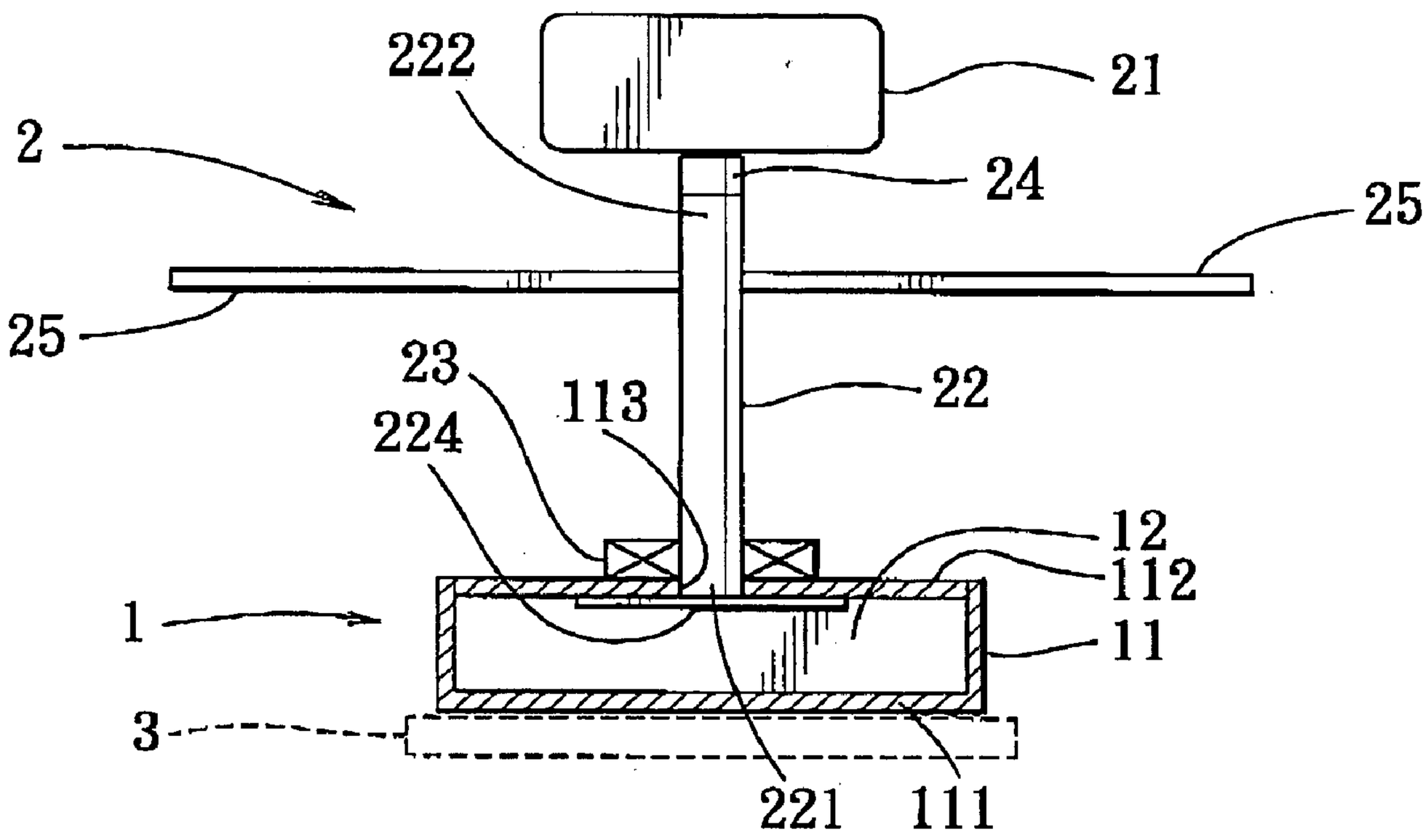
Publication Classification

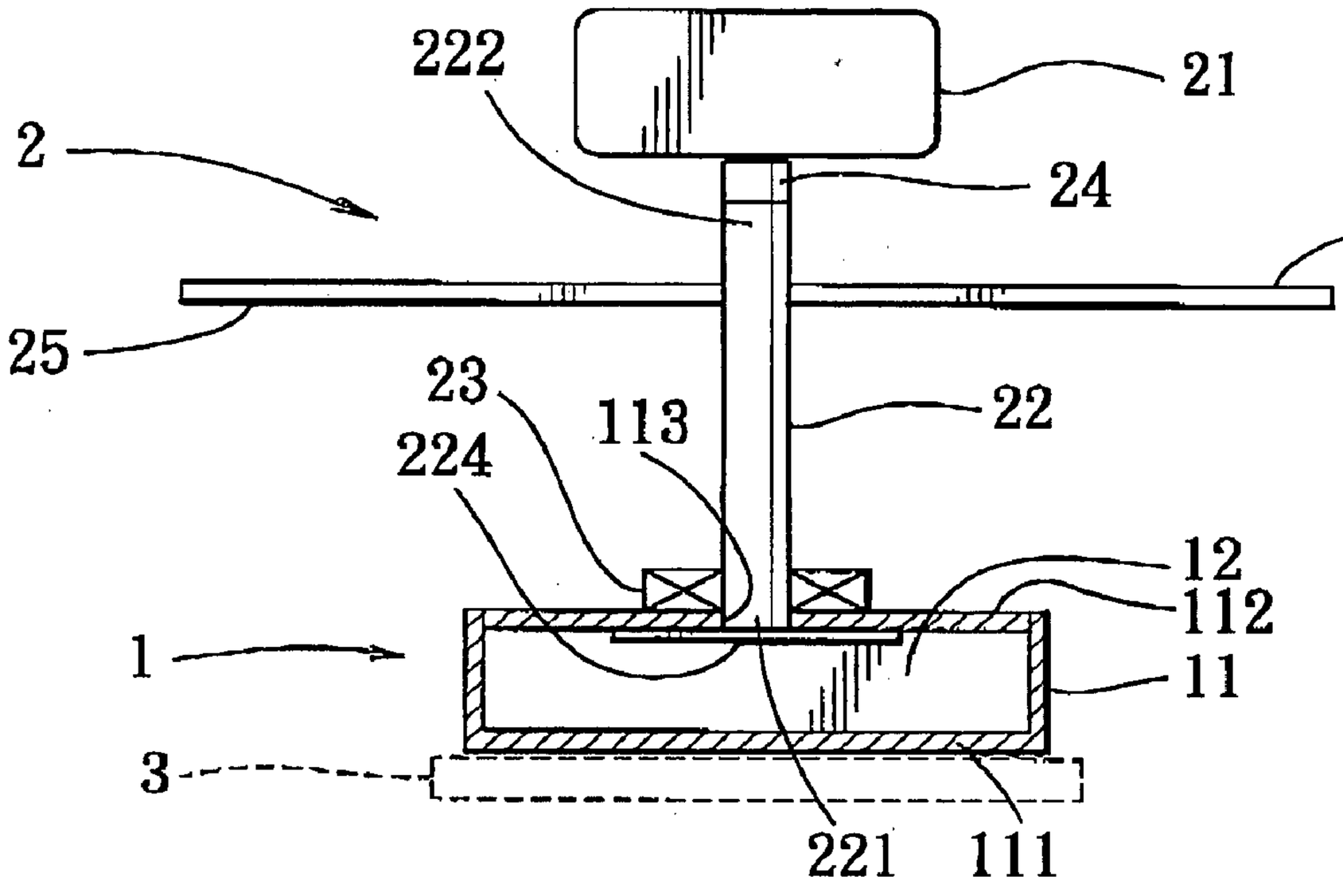
(51) **Int. Cl.**[7] **F28F 5/00**; F28D 11/00; F28F 1/00; F24H 3/06; F28F 13/12

(52) **U.S. Cl.** **165/86**; 165/92; 165/122

(57) **ABSTRACT**

A heat-dissipating device includes a hollow housing adapted to contact a heat source and for receiving a heat-conducting fluid therein, a heat-conducting member contacting the heat-conducting fluid, and a heat-dissipating fin unit driven to move within an ambient fluid so as to dissipate heat from the fin unit to the ambient fluid.

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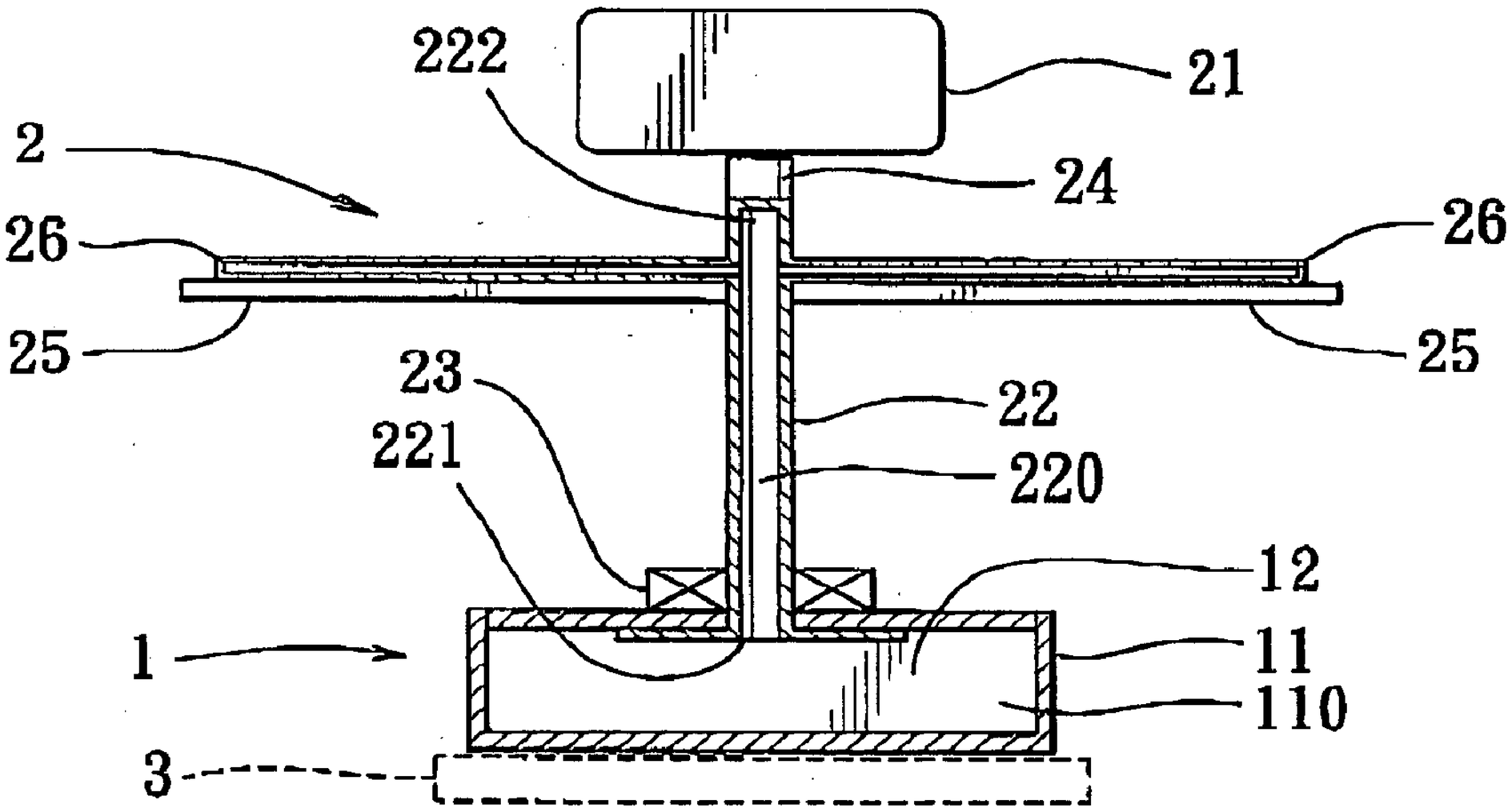
24
25
25
23
113
22
224
12
112
1
11
3
221
111

FIG. 1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11
110
3

FIG. 2

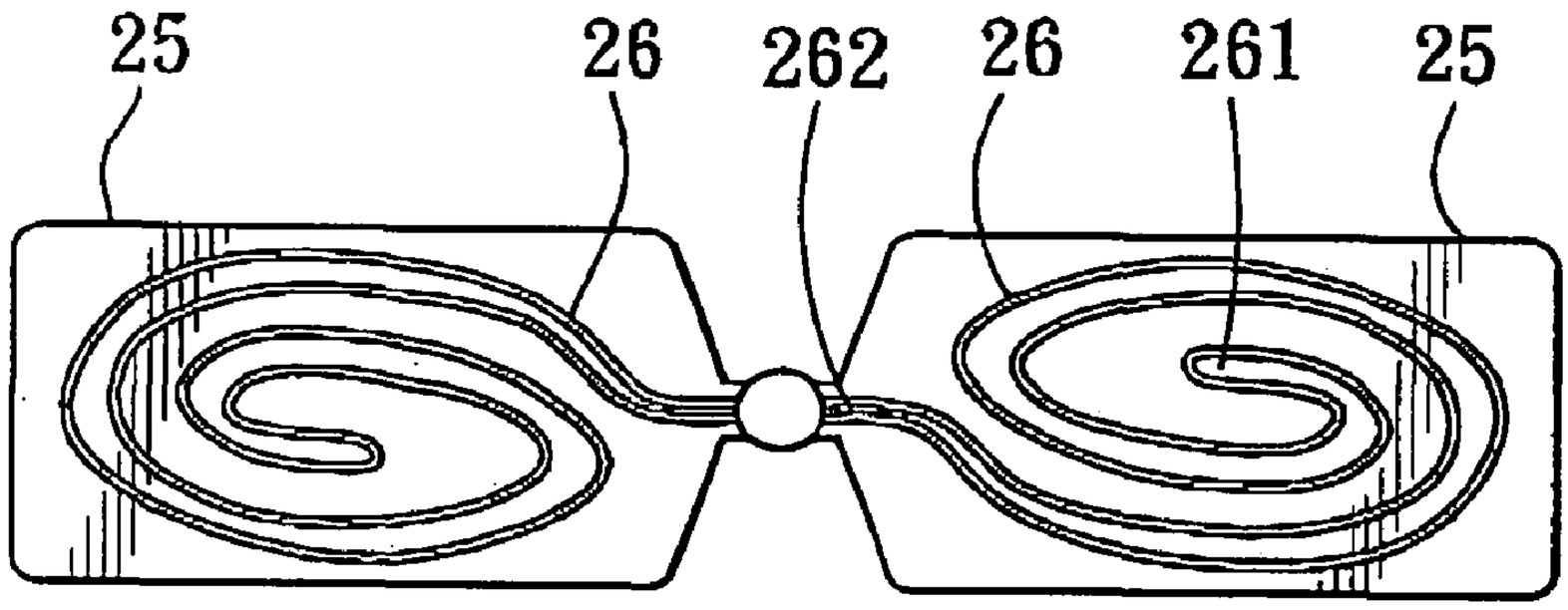
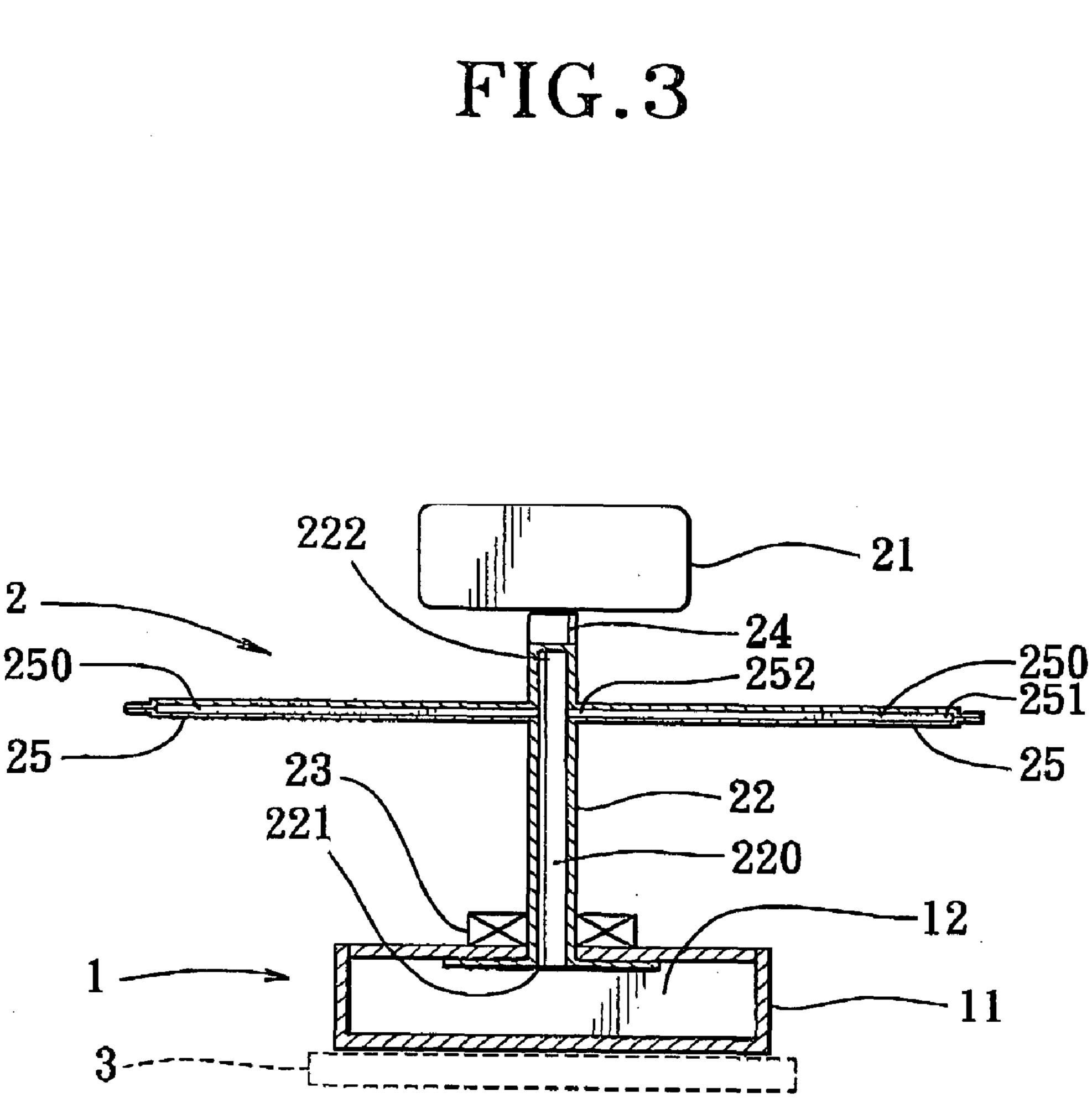

25
26
262
26
261
25

FIG.3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250
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251
25
25
23
22
221
220
12
1
11
3

FIG.4

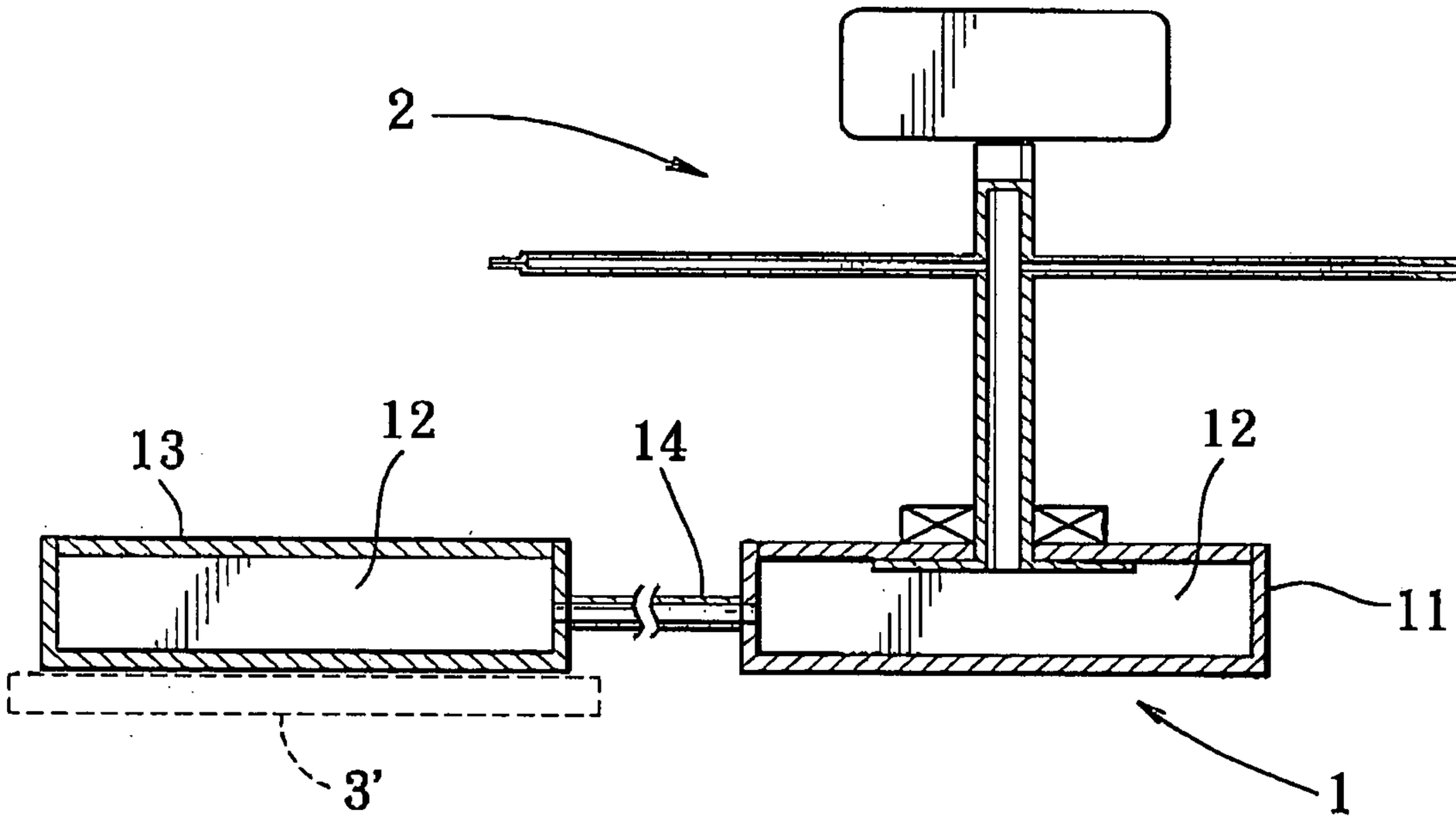

FIG.5

HEAT-DISSIPATING DEVICE WITH DISSIPATING FINS DRIVABLE TO MOVE WITHIN AND AMBIENT FLUID

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority of Taiwanese Application No. 91115210, filed on Jul. 9, 2002.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] This invention relates to a heat-dissipating device, and more particularly to a heat-dissipating device that includes heat-dissipating fins which can be driven to move within an ambient fluid so as to promote the heat dissipation efficiency of the device.

[0004] 2. Description of the Related Art

[0005] A conventional heat-dissipating device normally includes a heat-conducting member contacting a heat source, a plurality of heat-dissipating fins fixed on the heat-conducting member so as to dissipate heat from the heat-conducting member to an ambient fluid, such as air, and a fan for blowing air toward the fins. According to the wind chill effect, when the speed of air current flowing from the fan onto the fins increases by 100 meters per second, the surface temperature of the fins will reduce by only about 1° C. in view of a limited relative speed between air and the fins. As such, when the heat source has a comparatively high temperature, there is a need for a fan of a larger size to create a faster air current, thereby increasing the volume and manufacturing costs of the conventional heat dissipating device.

SUMMARY OF THE INVENTION

[0006] The object of this invention is to provide a heat-dissipating device that includes a plurality of heat-dissipating fins, which can be driven to move within an ambient fluid so as to increase significantly the relative speed between the ambient fluid and the fins, thereby promoting the heat dissipation efficiency of the device.

[0007] According to this invention, a heat-dissipating device includes a hollow housing adapted to contact a heat source and for receiving a heat-conducting fluid therein, a heat-conducting member contacting the heat-conducting fluid, and a heat-dissipating fin unit driven to move within an ambient fluid, such as air, so as to dissipate heat from the fin unit to the ambient fluid. As such, a relatively high relative speed between the ambient fluid and the heat-dissipating fin unit can be obtained so as to enhance the wind chill effect, thereby increasing the heat dissipation efficiency significantly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] These and other features and advantages of this invention will become apparent in the following detailed description of the preferred embodiments of this invention, with reference to the accompanying drawings, in which:

[0009] **FIG. 1** is a schematic sectional view of the first preferred embodiment of a heat-dissipating device according to this invention;

[0010] **FIG. 2** is a schematic sectional view of the second preferred embodiment of a heat-dissipating device according to this invention;

[0011] **FIG. 3** is a schematic top view of two heat-dissipating fins of the second preferred embodiment;

[0012] **FIG. 4** is a schematic sectional view of the third preferred embodiment of a heat-dissipating device according to this invention; and

[0013] **FIG. 5** is a schematic view of the fourth preferred embodiment of a heat-dissipating device according to this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014] Before the present invention is described in greater detail in connection with the preferred embodiments, it should be noted that similar elements and structures are designated by like reference numerals throughout the entire disclosure.

[0015] Referring to **FIG. 1**, the first preferred embodiment of a heat-dissipating device according to this invention is shown to include a heat-absorbing mechanism **1** and a heat-dissipating mechanism **2**.

[0016] The heat-absorbing mechanism **1** includes a hollow primary housing **11** that is made of a heat-conducting material and that is adapted to contact a first heat source **3**, such as a CPU chip, so as to permit heat transfer from the first heat source **3** to the primary housing **11**, and a heat-conducting fluid **12** that is received within the primary housing **11** so as to permit heat transfer from the primary housing **11** to the heat-conducting fluid **12**. The primary housing **11** has a contacting wall **111** that contacts the first heat source **3**, and a mounting wall **112** that is parallel to the contacting wall **111** and that is formed with a circular hole **112** therethrough. The heat-conducting fluid **12** may be gas, liquid, or a coolant.

[0017] The heat-dissipating mechanism **2** includes a driving unit **21**, a heat-conducting member **22**, a bearing unit **23**, a connector **24**, and a heat-dissipating fin unit consisting of two heat-dissipating fins **25**. The driving unit **21** is configured as an electrical motor. The heat-conducting member **22** is configured as a motor shaft that is rotated by the driving unit **21** and that has a first end **221** and a second end **222**. The first end **221** is journalled on the primary housing **11** by means of the bearing unit **23**, and extends into the primary housing **11** through the circular hole **113** in the mounting wall **112** of the primary housing **11**. The second end **222** is connected to the driving unit **21** by means of the connector **24**. The fins **25** are connected fixedly to and extend radially and outwardly from the second end **222** of the heat-conducting member **22**. An outward flange **224** is formed on the first end **221** of the heat-conducting member **22**, is disposed in the primary housing **11** so as to contact the heat-conducting fluid **12**, thereby permitting heat transfer from the heat-conducting fluid **12** to the heat-conducting member **22**, and has a diameter that is larger than that of the circular hole **113** in the primary housing **11** so as to prevent removal of the heat-conducting member **22** from the primary housing **11**. The fins **25** are exposed within an ambient fluid, i.e. air. As such, when the driving unit **21** runs, the fins **25** rotate about the heat-conducting member **22** at a relatively high speed

relative to the ambient fluid so as to enhance the wind chill effect, thereby permitting rapid heat transfer from the fins **25** to the ambient fluid. Alternatively, the fins **25** can be driven to perform reciprocating linear movement, swinging movement, or any other similar motion relative to the first heat source **3**.

[**0018**] **FIGS. 2 and 3** show the second preferred embodiment of a heat-dissipating device according to this invention, which is similar to the first preferred embodiment in construction. Unlike the first preferred embodiment, the heat-conducting member **22** is hollow, and is formed with a central bore **220**, and the heat-dissipating mechanism **2** further includes two tubes **26** that are connected respectively and fixedly to the fins **25**. The central bore **220** has an open end **221** in fluid communication with an interior chamber **110** in the primary housing **11**, and a closed end **222** proximate to the driving unit **21**. Each of the tubes **26** extends along a spiral path on the corresponding fin **25**, and has a closed outer end **261**, and an open inner end **262** in fluid communication with the central bore **220** in the heat-conducting member **22**.

[**0019**] **FIG. 4** shows the third preferred embodiment of a heat-dissipating device according to this invention, which is similar to the second preferred embodiment in construction. Unlike the second preferred embodiment, no tubes **26** are provided, and each of the fins **25** is hollow, and is formed with an interior space **250** that has a closed radial outer end **251** and an open radial inner end **252** that is in fluid communication with the central bore **220** in the heat-conducting member **22**.

[**0020**] **FIG. 5** shows the fourth preferred embodiment of a heat-dissipating device according to this invention, which is similar to the third preferred embodiment in construction. Unlike the third preferred embodiment, the heat-absorbing mechanism **1** further includes a hollow secondary housing **13** that is adapted to contact a second heat source **3'** so as to permit heat transfer from the second heat source **3'** to the secondary housing **13**, and a conduit **14** that is connected removably to and that is in fluid communication with the primary and secondary housings **11, 13**. The first and second heat sources **3, 3'** constitute a heat source unit.

[**0021**] With this invention thus explained, it is apparent that numerous modifications and variations can be made without departing from the scope and spirit of this invention. It is therefore intended that this invention be limited only as indicated by the appended claims.

I claim:

1. A heat-dissipating device for dissipating heat from a heat source unit to an ambient fluid, said heat-dissipating device comprising:

a heat-absorbing mechanism including a hollow primary housing that is made of a heat-conducting material and that is adapted to contact the heat source unit so as to permit heat transfer from the heat source unit to said primary housing, and a heat-conducting fluid that is received within said primary housing so as to permit heat transfer from said primary housing to said heat-conducting fluid; and

a heat-dissipating mechanism including

a heat-conducting member that contacts said heat-conducting fluid so as to permit heat transfer from said heat-conducting fluid to said heat-conducting member,

a heat-dissipating fin unit that is mounted to said heat-conducting member so as to permit heat transfer from said heat-conducting member to said heat-dissipating fin unit and that is adapted to be exposed within the ambient fluid so as to permit heat transfer from said dissipating fin unit to the ambient fluid, and

a driving unit connected to said heat-dissipating fin unit so as to drive said heat-dissipating fin unit to move within the ambient fluid.

2. The heat-dissipating device as claimed in claim 1, wherein said driving unit is configured as an electrical motor, said conducting member being configured as a motor shaft that is rotated by said electrical motor, said heat-dissipating fin unit including a plurality of fins that are connected fixedly to and that extend radially and outwardly from said motor shaft so that said electrical motor can rotate said fins about said motor shaft.

3. The heat-dissipating device as claimed in claim 2, wherein said primary housing has an interior chamber for receiving said heat-conducting fluid therein, said motor shaft being hollow and being formed with a central bore that has a closed end proximate to said electrical motor, and an open end in fluid communication with said interior chamber in said primary housing.

4. The heat-dissipating device as claimed in claim 3, wherein said heat-dissipating mechanism further includes a plurality of tubes that are connected respectively and fixedly to said fins, each of said tubes having a closed outer end, and an open inner end in fluid communication with said central bore in said motor shaft.

5. The heat-dissipating device as claimed in claim 4, wherein each of said tubes extends along a spiral path on a respective one of said fins.

6. The heat-dissipating device as claimed in claim 3, wherein each of said fins is hollow, and is formed with an interior space that has a closed radial outer end and an open radial inner end, which is in fluid communication with said central bore in said motor shaft.

7. The heat-dissipating device as claimed in claim 6, wherein said heat-absorbing mechanism further includes a hollow secondary housing that is adapted to contact the heat source unit so as to permit heat transfer from the heat source unit to said secondary housing, and a conduit that is connected removably to and that is in fluid communication with said primary and secondary housings.

8. The heat-dissipating device as claimed in claim 2, wherein said heat-dissipating mechanism further includes a bearing unit, said motor shaft being journalled on said primary housing by means of said bearing unit, said primary housing having a contacting wall that is adapted to contact the heat source unit, and a mounting wall that is parallel to said contacting wall and that is formed with a circular hole therethrough, said motor shaft extending into said primary housing through said circular hole and being formed with an outward flange that is disposed in said primary housing and that has a diameter which is larger than that of said circular hole in said primary housing so as to prevent removal of said motor shaft from said primary housing.

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