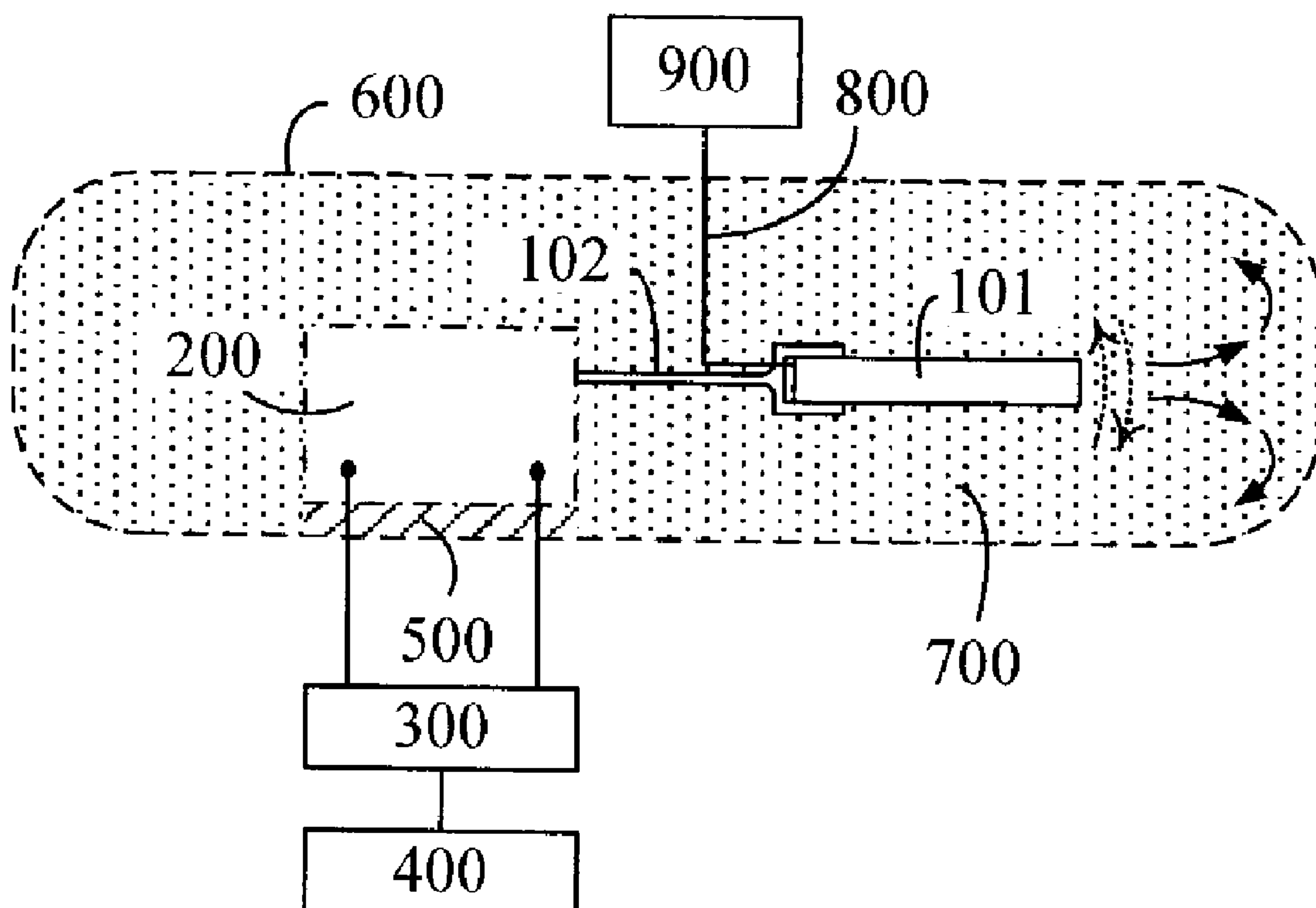




(22) Date de dépôt/Filing Date: 2013/07/03  
(41) Mise à la disp. pub./Open to Public Insp.: 2014/01/05  
(30) Priorité/Priority: 2012/07/05 (US13/541,830)

(51) Cl.Int./Int.Cl. *F28F 13/10* (2006.01)  
(71) Demandeur/Applicant:  
YANG, TAI-HER, TW  
(72) Inventeur/Inventor:  
YANG, TAI-HER, TW  
(74) Agent: GOWLING LAFLEUR HENDERSON LLP

(54) Titre : PROCEDE DE TRANSFERT THERMIQUE ET DISPOSITIF STRUCTUREL UTILISANT UN CORPS D'ENERGIE THERMIQUE EFFECTUANT UN DEPLACEMENT PAR VIBRATION DU FLUIDE  
(54) Title: THERMAL TRANSFERRING METHOD AND STRUCTURAL DEVICE UTILIZING THERMAL ENERGY BODY PERFORMING VIBRATION DISPLACEMENT TO FLUID



(57) **Abrégé/Abstract:**

The present invention provides a thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid in which a vibration actuating device is provided for performing vibration driving to a thermal energy body disposed in a fluid thereby allowing the thermal energy body to perform periodic vibration displacement to the fluid for transferring thermal energy and enabling the fluid to circulatively flow, thereby a novel thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid for the purpose of heating or cooling are provided.



**ABSTRACT**

The present invention provides a thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid in which a vibration actuating device is provided for performing vibration driving to a thermal energy body disposed in a fluid  
5 thereby allowing the thermal energy body to perform periodic vibration displacement to the fluid for transferring thermal energy and enabling the fluid to circulatively flow, thereby a novel thermal transferring method and a structural device utilizing thermal energy body performing vibration  
10 displacement to fluid for the purpose of heating or cooling are provided.

**TITLE: THERMAL TRANSFERRING METHOD AND STRUCTURAL DEVICE UTILIZING THERMAL ENERGY BODY PERFORMING VIBRATION DISPLACEMENT TO FLUID**

5 **BACKGROUND OF THE INVENTION**

(a) Field of the Invention

The present invention provides a thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid in which a vibration actuating device is provided for performing vibration driving to a thermal energy body disposed in a fluid thereby allowing the thermal energy body to perform periodic vibration displacement to the fluid for transferring thermal energy and enabling the fluid to circulatively flow, thereby a novel thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid for the purpose of heating or cooling are provided.

(b) Description of the Prior Art

A conventional thermal energy body disposed in a fluid for performing thermal transferring to the fluid for the purpose of heating or cooling often utilizes the fluid flowing through the thermal energy body for increasing the thermal transferring effect; however, a fluid pump has to be additionally provided for pumping the fluid to flow through the thermal energy body.

**SUMMARY OF THE INVENTION**

25 The present invention provides a thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid in which a vibration actuating device is provided for performing vibration driving to a thermal energy body disposed in a fluid thereby allowing the thermal energy body to perform periodic vibration displacement to the fluid for transferring thermal energy and enabling the

30

fluid to circulatively flow, thereby a novel thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid for the purpose of heating or cooling are provided.

The structural device provided by the present invention includes  
 5 utilizes an electric-driven vibration actuating device (200) which is connected to a thermal energy body (101) having relatively higher temperature and serving to perform vibration displacement to the ambient gaseous or liquid fluid having relatively lower temperature thereby forming a circulative flow and discharging the thermal energy having  
 10 higher temperature to the thermal energy transferring fluid; or an electric energy driving device (300) is provided for driving the vibration actuating device (200), and the thermal energy body (101) connected with the vibration actuating device (200) and having relatively lower temperature is served to perform vibration displacement to the ambient gaseous or  
 15 liquid fluid having relatively higher temperature thereby forming a circulative flow and absorbing the thermal energy having higher temperature of the thermal energy transferring fluid.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

20 FIG. 1 is a schematic view showing the main structure of the present invention.

FIG. 2 is a schematic structural view illustrating an electromagnetic vibration device (2001) being adopted as the vibration actuating device (200) for driving the thermal energy body (101), according to the present  
 25 invention.

FIG. 3 is a schematic structural view illustrating a solid state vibration device (2002) being adopted as the vibration actuating device (200) for driving the thermal energy body (101), according to the present invention.

### **DESCRIPTION OF MAIN COMPONENT SYMBOLS**

- 101 : Thermal energy body
- 102 : Vibration arm
- 200 : Vibration actuating device
- 201 : Magnetic conductive vibration reed
- 5 202 : Magnetic conductive iron core
- 203 : Excitation winding
- 2001 : Electromagnetic vibration device
- 2002 : Solid state vibration device
- 300 : Electric energy driving device
- 10 301 : Deformation unit driven by electric energy
- 400 : Driving electric energy source
- 500 : Fixed base
- 600 : Enclosure
- 700 : Thermal energy transferring fluid
- 15 800 : Soft electric conductive body
- 900 : Electric energy transmission interface

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

20 A conventional thermal energy body disposed in a fluid for performing thermal transferring to the fluid for the purpose of heating or cooling often utilizes the fluid flowing through the thermal energy body for increasing the thermal transferring effect; however, a fluid pump has to be additionally provided for pumping the fluid to flow through the thermal energy body.

25 The present invention provides a thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid in which a vibration actuating device is provided for performing vibration driving to a thermal energy body disposed in a fluid thereby allowing the thermal energy body to perform periodic vibration  
30 displacement to the fluid for transferring thermal energy and enabling the

fluid to circulatively flow, thereby a novel thermal transferring method and a structural device utilizing thermal energy body performing vibration displacement to fluid for the purpose of heating or cooling are provided.

The structural device provided by the present invention includes  
 5 utilizing an electric-driven vibration actuating device (200) which is connected to a thermal energy body (101) having relatively higher temperature and serving to perform vibration displacement to the ambient gaseous or liquid fluid having relatively lower temperature thereby forming a circulative flow and discharging the thermal energy having  
 10 higher temperature to the thermal energy transferring fluid; or an electric energy driving device (300) is provided for driving the vibration actuating device (200), and the thermal energy body (101) connected with the vibration actuating device (200) and having relatively lower temperature is served to perform vibration displacement to the ambient gaseous or  
 15 liquid fluid having relatively higher temperature thereby forming a circulative flow and absorbing the thermal energy having higher temperature of the thermal energy transferring fluid.

FIG. 1 is a schematic view showing the main structure of the present invention.

20 As shown in FIG. 1, it mainly consists of:  
 --thermal energy body (101): constituted by a thermal energy body having different temperature relative to the fluid, including being constituted by a thermal energy body (101) installed with an electric energy transmission interface (900) and a soft electric conductive body (800), wherein the soft  
 25 electric conductive body (800), e.g. a soft electric conductive wire or soft electric conductive plate, is served to electrically connect the electric energy transmission interface (900) and the thermal energy body (101); the thermal energy body (101) includes a thermal energy body composed of analog or digital signal processing chips capable of inputting or  
 30 outputting electric energy signals to the exterior, or semiconductor power

units, or LED chips, or thermoelectric devices capable of converting thermal energy into electric energy, or semiconductors capable of being inputted with electric energy for cooling or heating, or a thermal energy body capable of converting chemical energy into thermal energy thereby  
5 utilizing the chemical energy for the purpose of cooling or heating;  
--vibration actuating device (200): constituted by a physical structural device capable of converting electric energy to perform vibration displacement, directly driven by the electric energy from a driving electric energy source (400) or driven by the electric energy outputted by an  
10 electric energy driving device (300) for generating the required vibration frequency and the vibration magnitude, thereby enabled to directly drive the thermal energy body (101) to perform vibration displacement for transferring thermal energy to the fluid and allowing the fluid to circulatively flow, or utilizing a vibration arm (102) extended from the  
15 vibration actuating device (200) to drive the connected thermal energy body (101) to perform vibration displacement thereby transferring thermal energy to the fluid and enabling the fluid to circulatively flow;  
--electric energy driving device (300): receiving the electric energy from the driving electric energy source (400) for generating the driving electric  
20 energy having corresponding voltage and output frequency to drive the vibration actuating device (200), and the electric energy driving device (300) includes being composed of an individual device or combined with the vibration actuating device (200);  
--fixed base (500): constituted by a fixed base for the installation of a  
25 housing or seat of the vibration actuating device (200);  
--enclosure (600): constituted by an accommodating structure for being installed with the vibration actuating device (200) and/or the extended vibration arm (102) and the thermal energy body (101); the internal space is filled with the thermal energy transferring fluid (700);  
30 --thermal energy transferring fluid (700): constituted by gaseous or liquid

fluid or oil or paste fluid having viscosity, filled between the enclosure (600) and the vibration actuating device (200), the thermal energy body (101) and the vibration arm (102) for transferring thermal energy;

--soft electric conductive body (800): constituted by a soft electric  
 5 conductive wire or soft electric conductive plate installed between the thermal energy body (101) and the electric energy transmission interface (900) for transferring electric energy and/or signal electric energy;

--electric energy transmission interface (900): constituted by an electric  
 10 energy transmission interface device composed of electric conductive terminals or electric conductive wires or electric conductive plugs or sockets or connectors, served to transfer the electric energy of electric energy source and/or transfer the signal electric energy;

The mentioned thermal energy body (101), the vibration actuating  
 device (200) and the electric energy driving device (300) are driven by the  
 15 driving electric energy source (400), the driving electric energy source (400) includes AC or DC electric energy of the public electricity or an individual electric energy source for supplying the electric energy required by the thermal energy body (101), or directly supplying the electric energy required by the vibration actuating device (200) or driving  
 20 the vibration actuating device (200) through the electric energy driving device (300).

FIG. 2 is a schematic structural view illustrating an electromagnetic  
 vibration device (2001) being adopted as the vibration actuating device  
 (200) for driving the thermal energy body (101), according to the present  
 25 invention.

As shown in FIG. 2, it mainly consists of:

--thermal energy body (101): constituted by a thermal energy body having  
 different temperature relative to the fluid, including being constituted by a  
 thermal energy body (101) installed with an electric energy transmission  
 30 interface (900) and a soft electric conductive body (800), wherein the soft

electric conductive body (800), e.g. a soft electric conductive wire or soft electric conductive plate, is served to electrically connect the electric energy transmission interface (900) and the thermal energy body (101); the thermal energy body (101) includes a thermal energy body composed of analog or digital signal processing chips capable of inputting or outputting electric energy signals to the exterior, or semiconductor power units, or LED chips, or thermoelectric devices capable of converting thermal energy into electric energy, or semiconductors capable of being inputted with electric energy for cooling or heating, or a thermal energy body capable of converting chemical energy into thermal energy thereby utilizing the chemical energy for the purpose of cooling or heating;

-- electromagnetic vibration device (2001): composed of a magnetic conductive vibration reed (201), a magnetic conductive iron core (202) and an excitation winding (203), directly driven by the electric energy from a driving electric energy source (400) or driven by the electric energy outputted by an electric energy driving device (300); after being electrically charged, the generated vibration displacement can be served to directly drive the thermal energy body (101) to perform vibration displacement for transferring thermal energy to the fluid and allowing the fluid to circulatively flow, or utilizing a vibration arm (102) extended from the magnetic conductive vibration reed (201) to drive the connected thermal energy body (101) to perform vibration displacement thereby transferring thermal energy to the fluid and enabling the fluid to circulatively flow;

--electric energy driving device (300): receiving the electric energy from the driving electric energy source (400) for generating the driving electric energy having corresponding voltage and output frequency to drive the excitation winding (203) of the electromagnetic vibration device (2001), and the electric energy driving device (300) includes being composed of an individual device or combined with the electromagnetic vibration

device (2001);

--fixed base (500): constituted by a fixed base for the installation of a housing or seat of the electromagnetic vibration device (2001);

--enclosure (600): constituted by an accommodating structure for being  
5 installed with the electromagnetic vibration device (2001) and/or the extended vibration arm (102) and the thermal energy body (101); the internal space is filled with the thermal energy transferring fluid (700);

--thermal energy transferring fluid (700): constituted by gaseous or liquid  
10 fluid or oil or paste fluid having viscosity, filled between the enclosure (600) and the electromagnetic vibration device (2001), the thermal energy body (101) and the vibration arm (102) for transferring thermal energy;

--soft electric conductive body (800): constituted by a soft electric  
15 conductive wire or soft electric conductive plate installed between the thermal energy body (101) and the electric energy transmission interface (900) for transferring electric energy and/or signal electric energy;

--electric energy transmission interface (900): constituted by an electric  
20 energy transmission interface device composed of electric conductive terminals or electric conductive wires or electric conductive plugs or sockets or connectors, served to transfer the electric energy of electric energy source and/or transfer the signal electric energy;

FIG. 3 is a schematic structural view illustrating a solid state vibration device (2002) being adopted as the vibration actuating device (200) for driving the thermal energy body (101), according to the present invention.

As shown in FIG. 3, it mainly consists of:

--thermal energy body (101): constituted by a thermal energy body having  
25 different temperature relative to the fluid, including being constituted by a thermal energy body (101) installed with an electric energy transmission interface (900) and a soft electric conductive body (800), wherein the soft electric conductive body (800), e.g. a soft electric conductive wire or soft  
30 electric conductive plate, is served to electrically connect the electric

energy transmission interface (900) and the thermal energy body (101); the thermal energy body (101) includes a thermal energy body composed of analog or digital signal processing chips capable of inputting or outputting electric energy signals to the exterior, or semiconductor power units, or LED chips, or thermoelectric devices capable of converting thermal energy into electric energy, or semiconductors capable of being inputted with electric energy for cooling or heating, or a thermal energy body capable of converting chemical energy into thermal energy thereby utilizing the chemical energy for the purpose of cooling or heating;

5

10 -- solid state vibration device (2002): directly driven by the electric energy from a driving electric energy source (400) or driven by the electric energy outputted by an electric energy driving device (300), the solid state vibration device (2002) is composed by a deformation unit driven by electric energy (301) having the piezoelectric effect or hysteresis retraction effect; after being electrically charged, the generated vibration displacement can be served to directly drive the thermal energy body (101) to perform vibration displacement for transferring thermal energy to the fluid and allowing the fluid to circulatively flow, or utilizing a vibration arm (102) extended from the solid state vibration device (2002)

15

20 to drive the connected thermal energy body (101) to perform vibration displacement thereby transferring thermal energy to the fluid and enabling the fluid to circulatively flow;

--electric energy driving device (300): receiving the electric energy from the driving electric energy source (400) for generating the driving electric energy having corresponding voltage and output frequency to drive the solid state vibration device (2002), and the electric energy driving device (300) includes being composed of an individual device or combined with the solid state vibration device (2002);

25

--fixed base (500): constituted by a fixed base for the installation of a housing or seat of the solid state vibration device (2002);

30

--enclosure (600): constituted by an accommodating structure for being installed with the solid state vibration device (2002) and/or the extended vibration arm (102) and the thermal energy body (101); the internal space is filled with the thermal energy transferring fluid (700);

5 --thermal energy transferring fluid (700): constituted by gaseous or liquid fluid or oil or paste fluid having viscosity, filled between the enclosure (600) and the solid state vibration device (2002), the thermal energy body (101) and the vibration arm (102) for transferring thermal energy;

10 --soft electric conductive body (800): constituted by a soft electric conductive wire or soft electric conductive plate installed between the thermal energy body (101) and the electric energy transmission interface (900) for transferring electric energy and/or signal electric energy;

15 --electric energy transmission interface (900): constituted by an electric energy transmission interface device composed of electric conductive terminals or electric conductive wires or electric conductive plugs or sockets or connectors, served to transfer the electric energy of electric energy source and/or transfer the signal electric energy.

20 According to the thermal transferring method and the structural device utilizing thermal energy body performing vibration displacement to fluid, the vibration frequency can be selected from one or more than one of the followings, which includes:

1. Frequency below the hearing range;
2. Frequency within the hearing range;
3. Frequency above the hearing range;
- 25 4. Variable working frequency.

**CLAIMS**

1. A thermal transferring method and structural device utilizing thermal energy body performing vibration displacement to fluid, which includes utilizing an electric-driven vibration actuating device (200) which is connected to a thermal energy body (101) having relatively higher temperature and serving to perform vibration displacement to the ambient gaseous or liquid fluid having relatively lower temperature thereby forming a circulative flow and discharging the thermal energy having higher temperature to the thermal energy transferring fluid; or an electric energy driving device (300) is provided for driving the vibration actuating device (200), and the thermal energy body (101) connected with the vibration actuating device (200) and having relatively lower temperature is served to perform vibration displacement to the ambient gaseous or liquid fluid having relatively higher temperature thereby forming a circulative flow and absorbing the thermal energy having higher temperature of the thermal energy transferring fluid; and it mainly consists of:
- thermal energy body (101): constituted by a thermal energy body having different temperature relative to the fluid, including being constituted by a thermal energy body (101) installed with an electric energy transmission interface (900) and a soft electric conductive body (800), wherein the soft electric conductive body (800), e.g. a soft electric conductive wire or soft electric conductive plate, is served to electrically connect the electric energy transmission interface (900) and the thermal energy body (101); the thermal energy body (101) includes a thermal energy body composed of analog or digital signal processing chips capable of inputting or outputting electric energy signals to the exterior, or semiconductor power units, or LED chips, or thermoelectric devices capable of converting thermal energy into electric energy, or semiconductors capable of being inputted with

electric energy for cooling or heating, or a thermal energy body capable of converting chemical energy into thermal energy thereby utilizing the chemical energy for the purpose of cooling or heating;

5 --vibration actuating device (200): constituted by a physical structural device capable of converting electric energy to perform vibration displacement, directly driven by the electric energy from a driving electric energy source (400) or driven by the electric energy outputted by an electric energy driving device (300) for generating the required vibration frequency and the vibration magnitude, thereby enabled to  
10 directly drive the thermal energy body (101) to perform vibration displacement for transferring thermal energy to the fluid and allowing the fluid to circulatively flow, or utilizing a vibration arm (102) extended from the vibration actuating device (200) to drive the connected thermal energy body (101) to perform vibration  
15 displacement thereby transferring thermal energy to the fluid and enabling the fluid to circulatively flow;

--electric energy driving device (300): receiving the electric energy from the driving electric energy source (400) for generating the driving electric energy having corresponding voltage and output frequency to  
20 drive the vibration actuating device (200), and the electric energy driving device (300) includes being composed of an individual device or combined with the vibration actuating device (200);

--fixed base (500): constituted by a fixed base for the installation of a housing or seat of the vibration actuating device (200);

25 --enclosure (600): constituted by an accommodating structure for being installed with the vibration actuating device (200) and/or the extended vibration arm (102) and the thermal energy body (101); the internal space is filled with the thermal energy transferring fluid (700);

--thermal energy transferring fluid (700): constituted by gaseous or  
30 liquid fluid or oil or paste fluid having viscosity, filled between the

enclosure (600) and the vibration actuating device (200), the thermal energy body (101) and the vibration arm (102) for transferring thermal energy;

5 --soft electric conductive body (800): constituted by a soft electric conductive wire or soft electric conductive plate installed between the thermal energy body (101) and the electric energy transmission interface (900) for transferring electric energy and/or signal electric energy;

10 --electric energy transmission interface (900): constituted by an electric energy transmission interface device composed of electric conductive terminals or electric conductive wires or electric conductive plugs or sockets or connectors, served to transfer the electric energy of electric energy source and/or transfer the signal electric energy;

15 The mentioned thermal energy body (101), the vibration actuating device (200) and the electric energy driving device (300) are driven by the driving electric energy source (400), the driving electric energy source (400) includes AC or DC electric energy of the public electricity or an individual electric energy source for supplying the  
20 electric energy required by the thermal energy body (101), or directly supplying the electric energy required by the vibration actuating device (200) or driving the vibration actuating device (200) through the electric energy driving device (300).

25 2. A thermal transferring method and structural device utilizing thermal energy body performing vibration displacement to fluid as claimed in claim 1, wherein includes an electromagnetic vibration device (2001) being adopted as the vibration actuating device (200) for driving the thermal energy body (101), and it mainly consists of:

30 --thermal energy body (101): constituted by a thermal energy body having different temperature relative to the fluid, including being

constituted by a thermal energy body (101) installed with an electric energy transmission interface (900) and a soft electric conductive body (800), wherein the soft electric conductive body (800), e.g. a soft electric conductive wire or soft electric conductive plate, is served to

5 electrically connect the electric energy transmission interface (900) and the thermal energy body (101); the thermal energy body (101) includes a thermal energy body composed of analog or digital signal processing chips capable of inputting or outputting electric energy signals to the exterior, or semiconductor power units, or LED chips, or

10 thermoelectric devices capable of converting thermal energy into electric energy, or semiconductors capable of being inputted with electric energy for cooling or heating, or a thermal energy body capable of converting chemical energy into thermal energy thereby utilizing the chemical energy for the purpose of cooling or heating;

15 -- electromagnetic vibration device (2001): composed of a magnetic conductive vibration reed (201), a magnetic conductive iron core (202) and an excitation winding (203), directly driven by the electric energy from a driving electric energy source (400) or driven by the electric energy outputted by an electric energy driving device (300); after being

20 electrically charged, the generated vibration displacement can be served to directly drive the thermal energy body (101) to perform vibration displacement for transferring thermal energy to the fluid and allowing the fluid to circulatively flow, or utilizing a vibration arm (102) extended from the magnetic conductive vibration reed (201) to

25 drive the connected thermal energy body (101) to perform vibration displacement thereby transferring thermal energy to the fluid and enabling the fluid to circulatively flow;

--electric energy driving device (300): receiving the electric energy from the driving electric energy source (400) for generating the driving

30 electric energy having corresponding voltage and output frequency to

drive the excitation winding (203) of the electromagnetic vibration device (2001), and the electric energy driving device (300) includes being composed of an individual device or combined with the electromagnetic vibration device (2001);

5 --fixed base (500): constituted by a fixed base for the installation of a housing or seat of the electromagnetic vibration device (2001);

--enclosure (600): constituted by an accommodating structure for being installed with the electromagnetic vibration device (2001) and/or the extended vibration arm (102) and the thermal energy body (101); the internal space is filled with the thermal energy transferring fluid (700);

10 --thermal energy transferring fluid (700): constituted by gaseous or liquid fluid or oil or paste fluid having viscosity, filled between the enclosure (600) and the electromagnetic vibration device (2001), the thermal energy body (101) and the vibration arm (102) for transferring thermal energy;

15 --soft electric conductive body (800): constituted by a soft electric conductive wire or soft electric conductive plate installed between the thermal energy body (101) and the electric energy transmission interface (900) for transferring electric energy and/or signal electric energy;

20 --electric energy transmission interface (900): constituted by an electric energy transmission interface device composed of electric conductive terminals or electric conductive wires or electric conductive plugs or sockets or connectors, served to transfer the electric energy of electric energy source and/or transfer the signal electric energy.

25 3. A thermal transferring method and structural device utilizing thermal energy body performing vibration displacement to fluid as claimed in claim 1, wherein includes a solid state vibration device (2002) being adopted as the vibration actuating device (200) for driving the thermal

30

energy body (101), and it mainly consists of:

--thermal energy body (101): constituted by a thermal energy body having different temperature relative to the fluid, including being constituted by a thermal energy body (101) installed with an electric energy transmission interface (900) and a soft electric conductive body (800), wherein the soft electric conductive body (800), e.g. a soft electric conductive wire or soft electric conductive plate, is served to electrically connect the electric energy transmission interface (900) and the thermal energy body (101); the thermal energy body (101) includes a thermal energy body composed of analog or digital signal processing chips capable of inputting or outputting electric energy signals to the exterior, or semiconductor power units, or LED chips, or thermoelectric devices capable of converting thermal energy into electric energy, or semiconductors capable of being inputted with electric energy for cooling or heating, or a thermal energy body capable of converting chemical energy into thermal energy thereby utilizing the chemical energy for the purpose of cooling or heating;

-- solid state vibration device (2002): directly driven by the electric energy from a driving electric energy source (400) or driven by the electric energy outputted by an electric energy driving device (300), the solid state vibration device (2002) is composed by a deformation unit driven by electric energy (301) having the piezoelectric effect or hysteresis retraction effect; after being electrically charged, the generated vibration displacement can be served to directly drive the thermal energy body (101) to perform vibration displacement for transferring thermal energy to the fluid and allowing the fluid to circulatively flow, or utilizing a vibration arm (102) extended from the solid state vibration device (2002) to drive the connected thermal energy body (101) to perform vibration displacement thereby transferring thermal energy to the fluid and enabling the fluid to

circulatively flow;

5 --electric energy driving device (300): receiving the electric energy from the driving electric energy source (400) for generating the driving electric energy having corresponding voltage and output frequency to drive the solid state vibration device (2002), and the electric energy driving device (300) includes being composed of an individual device or combined with the solid state vibration device (2002);

--fixed base (500): constituted by a fixed base for the installation of a housing or seat of the solid state vibration device (2002);

10 --enclosure (600): constituted by an accommodating structure for being installed with the solid state vibration device (2002) and/or the extended vibration arm (102) and the thermal energy body (101); the internal space is filled with the thermal energy transferring fluid (700);

15 --thermal energy transferring fluid (700): constituted by gaseous or liquid fluid or oil or paste fluid having viscosity, filled between the enclosure (600) and the solid state vibration device (2002), the thermal energy body (101) and the vibration arm (102) for transferring thermal energy;

20 --soft electric conductive body (800): constituted by a soft electric conductive wire or soft electric conductive plate installed between the thermal energy body (101) and the electric energy transmission interface (900) for transferring electric energy and/or signal electric energy;

25 --electric energy transmission interface (900): constituted by an electric energy transmission interface device composed of electric conductive terminals or electric conductive wires or electric conductive plugs or sockets or connectors, served to transfer the electric energy of electric energy source and/or transfer the signal electric energy.

30 4. A thermal transferring method and structural device utilizing thermal

energy body performing vibration displacement to fluid as claimed in claims 1, 2 or 3, wherein the vibration frequency can be selected from one or more than one of the followings, including:

- 1) frequency below the hearing range;
- 5 2) frequency within the hearing range;
- 3) frequency above the hearing range;
- 4) variable working frequency.

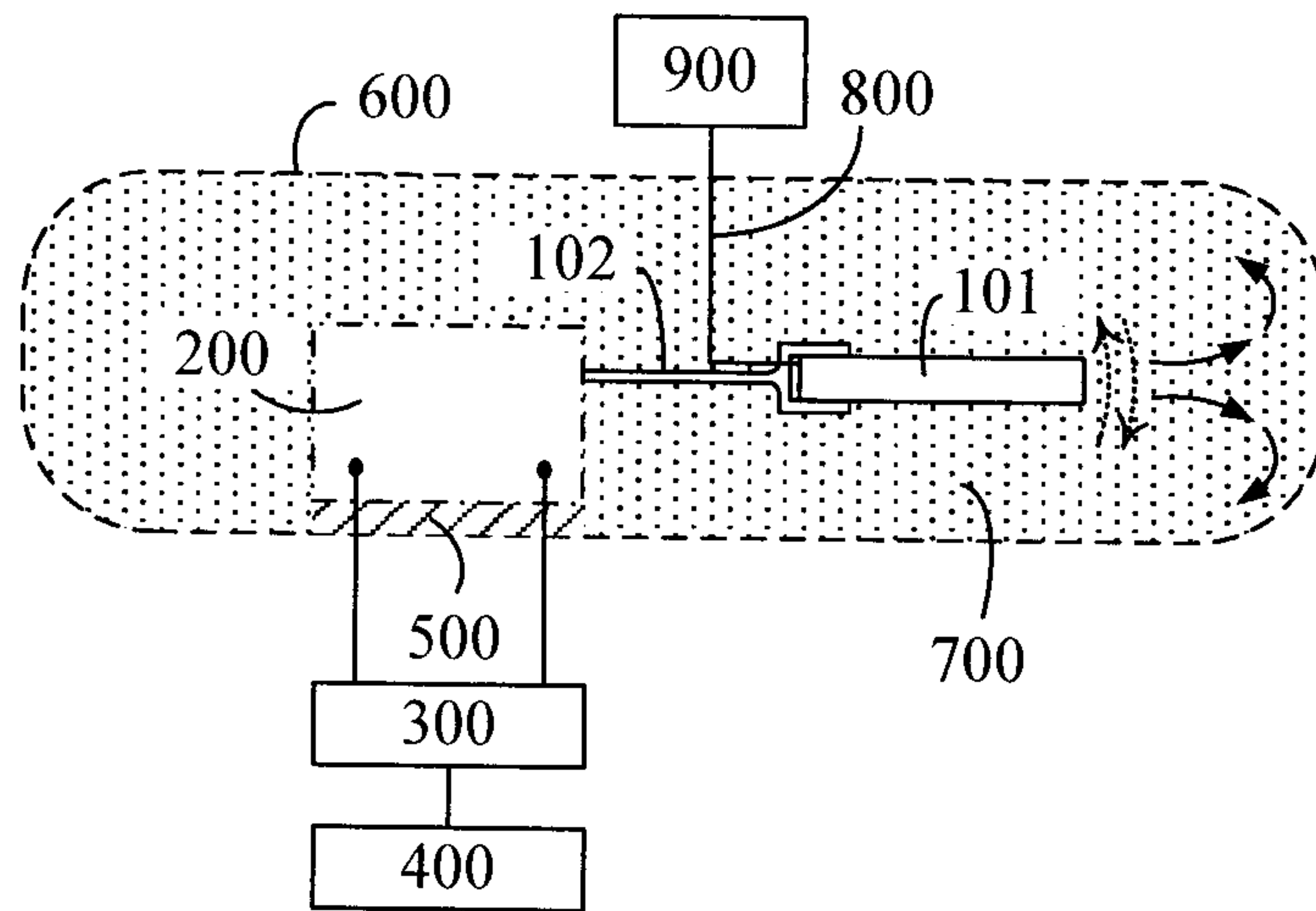


FIG. 1

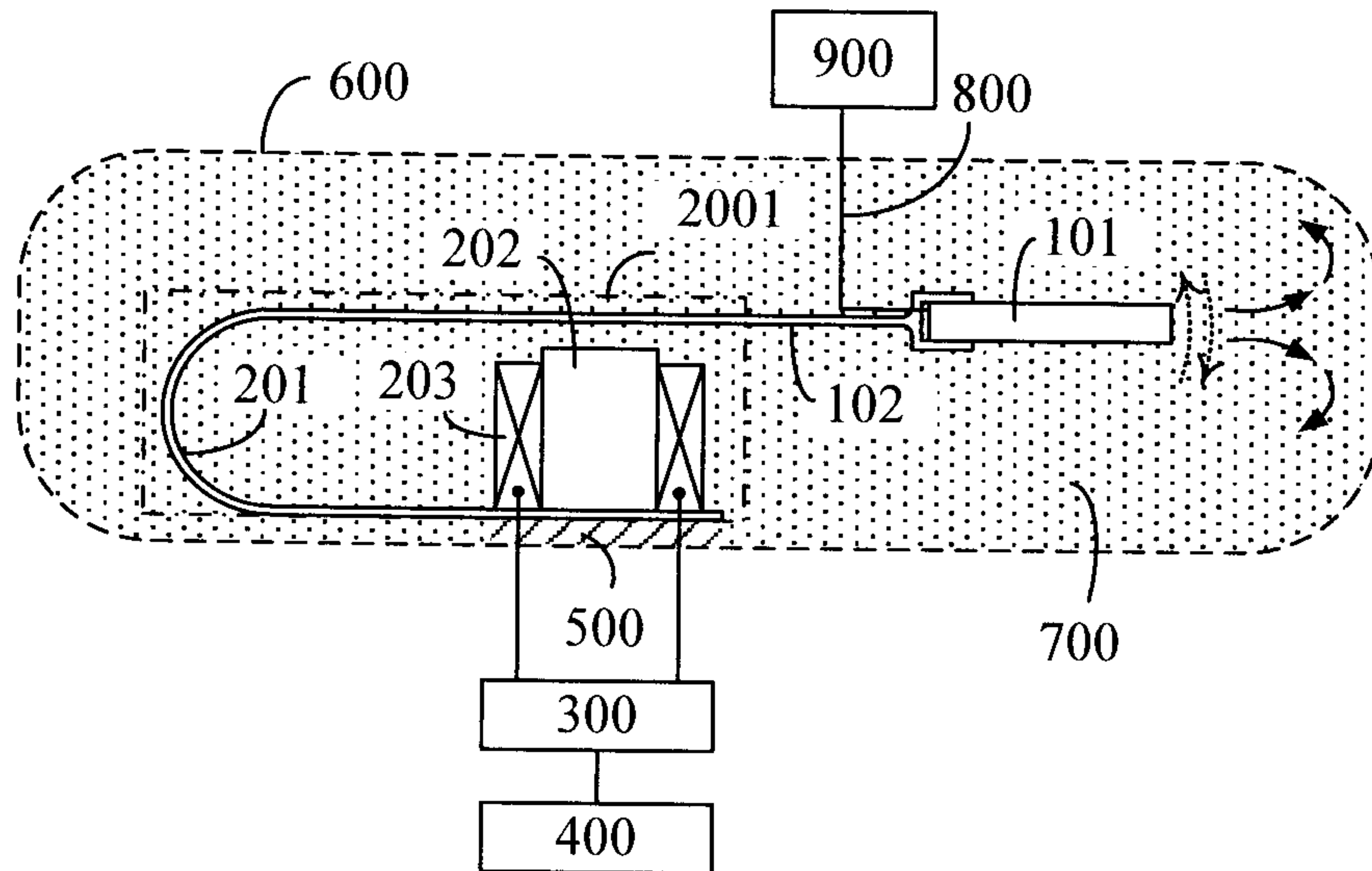


FIG. 2

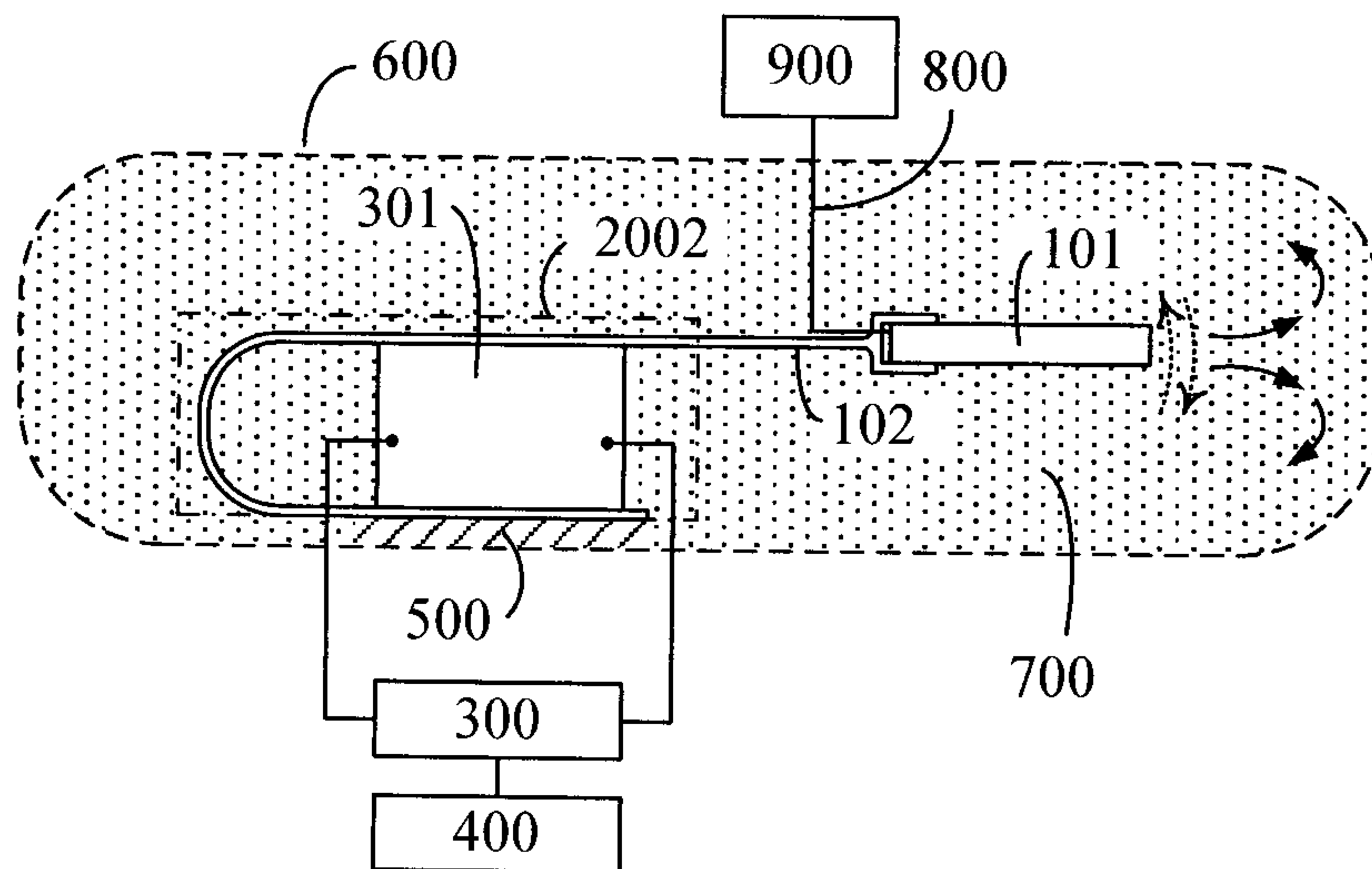


FIG. 3

