(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 September 2006 (21.09.2006)

PCT

(10) International Publication Number
WO 2006/097901 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/IB2006/050810

(22) International Filing Date: 15 March 2006 (15.03.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2005/00957 16 March 2005 (16.03.2005) TR

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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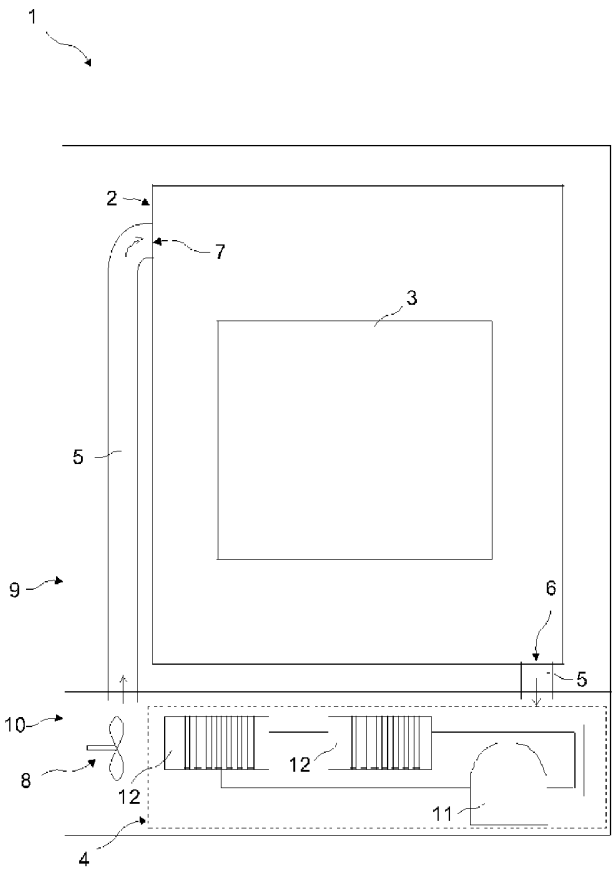
(54) Title: A WASHER/DRYER



(57) Abstract: The present invention relates to a washer/dryer (1), wherein a drying cycle is implemented via a heat pump (4) for drying the laundry, whereby the heat pump (4) components can easily be accessed for cleaning the fibers that get caught on the flow pipes (13) and the fins (14) of the heat exchangers (12) like the evaporator and/or the compressor during the drying cycle and for carrying out the maintenance.

WO 2006/097901 A2

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Description

A WASHER/DRYER

The present invention relates to a washer/dryer wherein the fibers that disengage from the laundry during the drying cycle can easily be cleaned.

In washer/dryers, the heat pump used for drying the laundry is composed of conventional components of a cooling cycle like the flow pipes through which the refrigerant fluid flows, a compressor for activating the refrigerant fluid, an evaporator, a condenser and capillary tubes, and the drying of the laundry is accomplished by means of passing the hot and dry air over the laundry. The humid air leaving the laundry, leaves its moisture as it passes over the evaporator operating as a precipitator and heats up as it passes over the condenser that operates as a heater. The air that heats up by leaving its moisture, is delivered onto the laundry during the drying cycle. As the laundry drying cycle is being operated, the drum into which the laundry is placed, moves the laundry and a considerable amount of fiber and lint comes out of the laundry as a result of the clothes rubbing against one another and against the inner surface of the drum and the hot air being passed over the laundry for drying. The most suitable places for the fibers that come out of the laundry to get caught up stopping along the way while being carried away by the hot air, are the fins and ducts of the heat exchangers situated in the evaporator and the condenser. In conventional embodiments, fiber filters on the path of the drying air and various methods of cleaning them are utilized; however, using filters only do not suffice for cleaning the fibers. When fibers are improperly cleaned, the fiber clumps that get caught up and accumulate on the fins of the heat exchanger prevent the flow of the drying air, lower the performance of the heat exchanger, increasing the amount of time necessary for drying process and thus increasing the energy consumption.

In the German Patent no. DE4212697, since the heat exchanging fins situated inside the evaporator in a dryer with a heat pump, are attachable / detachable to the evaporator, they may be taken out of the dryer for cleaning the fibers accumulated.

In the German Patent no. DE4212700, the compressor, evaporator and the condenser which form the heat pump circuit in a dryer with a heat pump and furthermore the drying air duct that carry the drying air over these components, are mounted in a box which is positioned inside the dryer housing at the lower part of the dryer, and which can be pulled out like a drawer.

The aim of the present invention is the realization of a washer/dryer wherein the fibers that accumulate on the heat exchangers during the drying cycle can easily be cleaned.

The washer/dryer realized in order to attain above mentioned aim of the present

invention is illustrated in the attached figures, where :

Figure 1 - is the schematic view of a washer/dryer.

Figure 2 - is the schematic view of a washer/dryer having a body opened by being tilted over on a chassis.

Figure 3 - is the schematic view of the present invention in Figure 2 in another embodiment of the present invention.

Figure 4 - is the schematic view of a washer/dryer having a body opened by sliding on a chassis.

Figure 5 - is the schematic view of the fins that are mounted on the flow pipes in a heat exchanger.

Figure 6 - is the schematic view of a washer/dryer having a lid that covers the chassis.

Figure 7 - is the schematic view of another embodiment of the present invention in Figure 6.

Figure 8 - is the schematic view of a washer/dryer having drying air inlets and outlets between the chassis and the body.

Elements shown in the figures are numbered as follows:

1. Washer/dryer
2. Washing tank
3. Loading lid
4. Heat pump
5. Air duct
6. Washing tank outlet
7. Washing tank inlet
8. Fan
9. Body
10. Chassis
11. Compressor
12. Heat exchanger
13. Flow pipe
14. Fin
15. Movement mechanism
16. Lid
17. Drying air inlet
18. Drying air outlet

The washer/dryer (1), preferably a dryer with a heat pump, comprises a washing tank (1) wherein the laundry to be dried is placed, a loading lid (3) allowing the laundry to be placed into and taken out of the washing tank (2), a heat pump (4)

performing the cooling cycle for drying the laundry, an air duct (5) in which the drying cycle air circulates, a washing tank outlet (6) through which the humid air is sucked out of the washing tank (2), a washing tank inlet (7) through which the dehumidified and heated air is delivered into the washing tank (2) again, a fan (8) which provides the circulation of the air in the drying cycle, a body (9) into which the washing tank (2) is positioned and a chassis (10) at the bottom of the body (9), which supports the body (9) and into which the heat pump (4) is situated.

The heat pump (4) comprises a compressor (11) that provides the sucking and pumping of the refrigerant fluid, one or more heat exchangers (12) like an evaporator and a condenser, serving as a precipitator, dehumidifying the air passed over the laundry and heating of the dehumidified drying cycle air.

The heat exchanger (12) comprises more than one flow pipes (13) through which the refrigerant fluid flows and more than one fins (14) contacting the flow pipes (13), preferably mounted on the flow pipes (13), dismounted from the flow pipes (13) if necessary, providing heat transfer to the drying cycle air.

The washer/dryer (1) also comprises a movement mechanism (15) providing for moving of the body (9) to disengage the lower surface of the body (9) from the upper surface of the chassis (10) and accessing the heat pump (4) from the opened upper surface of the chassis (10), for cleaning the fibers accumulated between the fins (14) of the heat exchangers (12).

Movers such as a pedal or a turning arm driven by the user or the ones driven by an electric motor, a hydraulic piston etc. are used as the movement mechanism (15).

In the preferred embodiment of the present invention, the movement mechanism (15) rotates the body (9), around the rotation axis, being one of the conjunct sides of the chassis (10) and the body (9), providing the body (9) to be tilted over a certain amount and the upper surface of the chassis (10) to be opened (Figures 2, 3).

In another embodiment of the present invention, the movement mechanism (15) slides the body (9) over the chassis (10) allowing for the opening of the upper surface of the chassis (Figure 4).

When the fins (14) of the heat exchanger (12) are desired to be cleaned, the lower surface of the body (9) and the upper surface of the chassis (10) are disengaged by either tipping over the body (9) or sliding the body (9), and the components of the heat pump (4) are accessed through the opened surface of the chassis (10). The fins (14) of the heat exchanger (12) where the fibers accumulate, can either be cleaned at the site or by taking out if desired, through methods like for example, blowing pressurized air.

In another embodiment of the present invention, the fins (14) are mounted onto the lower surface of the body (9), disengaging from the flow pipes (13) by moving together with the body (9) when the body (9) is lifted upwards (Figure 3). In this

embodiment, as the lower surface of the body (9) disengages from the upper surface of the chassis (10), the fins (14) move upwards together with the body (9) and are dismounted from the flow pipes (13) that they are mounted on. The fins (14), without the need of being taken out of place by the user by holding them, can be cleaned at the place where they are mounted on the lower surface of the body (9).

In another embodiment of the present invention, the washer/dryer comprises a lid (16), positioned between the chassis (10) and the body (9) that can be opened, closed over the chassis (10) covering the upper surface of the chassis (10), providing a leak-proof structure for the drying air (Figure 6). In this embodiment, when the body (9) is lifted for cleaning of the heat pump (4) group, the lid (16) is in closed position over the chassis (10), hence also the lid (16) has to be opened in order to access the heat pump (4) group.

In another embodiment of the present invention, the fins (14) of the heat exchanger (12) are attached to the lid (16) and disengage from the flow pipes (13) moving together with the lid (16), when the lid (16) is lifted upwards (Figure 7). In this embodiment, since the fins (14) are attached to the lid (16), which is comparably lighter and more flexible than the body (9), the fins (14) easily disengage from the flow pipes (13) and are mounted on the flow pipes (13) again when the lid (16) is opened and closed.

In yet another embodiment of the present invention, the washer/dryer (1) comprises a drying air inlet (17), between the chassis (10) and the body (9), preferably situated on the sides of the chassis (10) that support the body (9), wherein the end of the air duct (5) extending from the washing tank outlet (6) that extends into the chassis (10) is seated on the chassis (10) in a leak-proof way and allows the drying air to be directed to the inner volume of the chassis (10) and a drying air outlet (18), wherein the end of the air duct (5) connected to the washing tank inlet (7) extending into the chassis (10) is seated in a leak-proof way and allows the drying air to be directed from the inner volume of the chassis (10) into the washing tank (2) (Figure 8).

When the body (9) is mounted on the chassis (10), the base of the body (9) is seated on the side walls of the chassis (10) so as to cover the open upper surface of the chassis (10) and all the surfaces of the chassis (10) become closed. The air duct (5) extending from the washing tank outlet (6), extends into the inner volume of the chassis (10) by way of the drying air inlet (17) and the humid air, passing over the heat exchangers (12) situated in the inner volume of the chassis (10), by becoming dehumidified and heated, is directed into the air duct (5), one end of which extends into the inner volume of the chassis (10) and the other into the washing tank inlet (7), by way of the drying air outlet (18). The dry and hot air directed from the inner volume of the chassis (10) to the air duct (5), enters into the washing tank (2) through the washing tank inlet (7),

providing for drying the laundry.

In the washer/dryer (1), the upper surface of the chassis (10) supporting the body (9) is opened by means of the body (9) construction that can move on the chassis (10), and the heat pump (4) group situated inside the chassis (10) can easily be accessed for cleaning the fibers that pass through the fiber filters and get caught on the fins (14) of the heat exchangers (12) like the evaporator and/or the compressor during the drying cycle and for carrying out maintenance procedures. The heat exchanger (12) fins (14) can easily be cleaned of fibers, thereby enhancing drying effectiveness and reducing energy consumption.

Claims

[001] A washer/dryer (1) comprising a washing tank (1) wherein the laundry is placed, a heat pump (4) driving the cooling cycle for drying the laundry, an air duct (5) in which the drying cycle air circulates, and characterized by a movement mechanism (15) providing for moving of the body (9) from its place to disengage the lower surface of the body (9) from the upper surface of the chassis (10), on which the body (9) is supported and into which the heat pump (4) is situated, for accessing the heat pump (4) from the opened upper surface of the chassis (10).

[002] A washer/dryer (1) as in Claim 1, characterized by a movement mechanism (15) that rotates the body (9) around the rotation axis, which is one of the conjunct sides of the chassis (10) and the body (9), providing the body (9) to be tilted over a certain amount and the upper surface of the chassis (10) to be opened.

[003] A washer/dryer (1) as in Claim 1, characterized by a movement mechanism (15) that allows the upper surface of the chassis (10) to be opened by sliding the body (9) on the chassis (10).

[004] A washer/dryer (1) as in any one of the above claims, characterized by a drying air inlet (17) and a drying air outlet (18), situated between the chassis (10) and the body (9), wherein the ends of the air duct (5) extending into the chassis (10) are seated in a leak-proof way, allowing the drying air to be directed into or out of the inner volume of the chassis (10).

[005] A washer/dryer (1) as in any one of the above claims, characterized by a heat pump (4) comprising one or more heat exchangers (12) such as an evaporator providing for dehumidification of the air passed over the laundry being dried and a condenser that serves to heat the drying cycle air being passed over the evaporator.

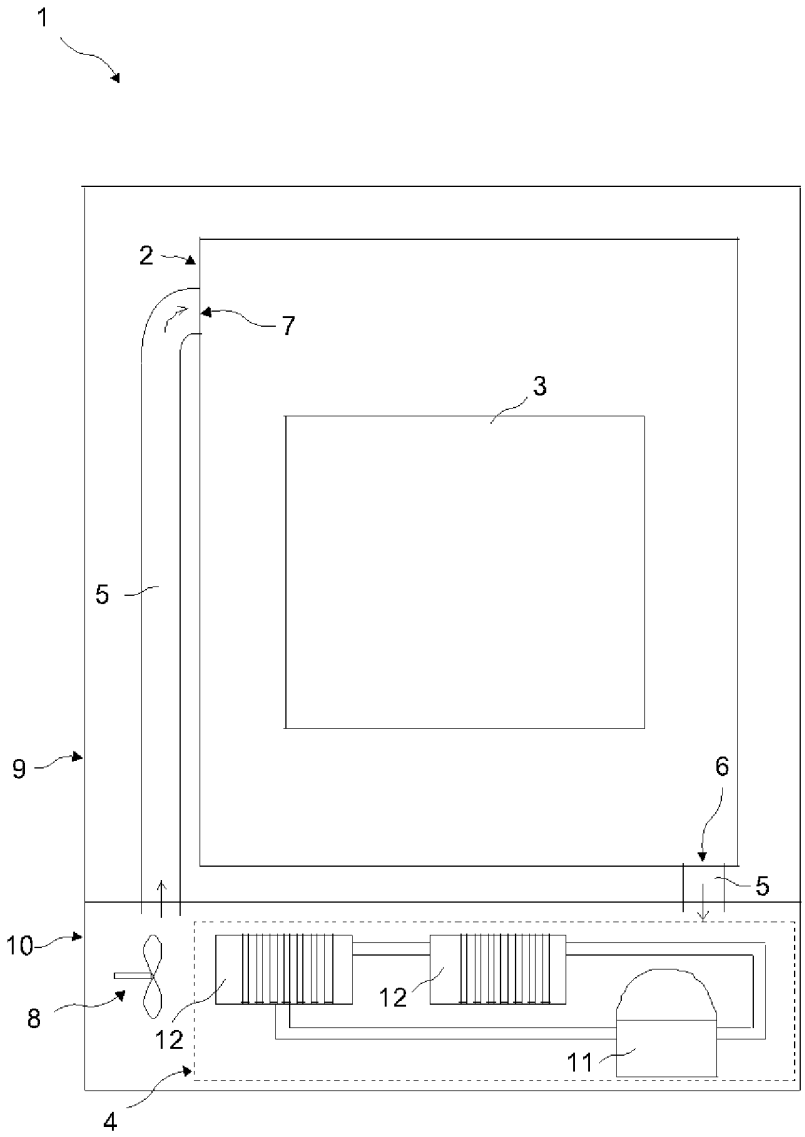
[006] A washer/dryer (1) as in Claim 5, characterized by a heat pump (4) comprising heat exchangers (12) having more than one flow pipes (13) through which the refrigerant fluid flows and more than one fins (14) contacting the flow pipes (13) and detachable from the flow pipes (13), providing heat transfer to the drying cycle air.

[007] A washer/dryer (1) as in Claim 6, characterized by a heat pump (4) comprising a heat exchanger (12) having fins (14) that are mounted onto the lower surface of the body (9), disengaging from the flow pipes (13) by moving together with the body (9) when the body (9) is lifted upwards.

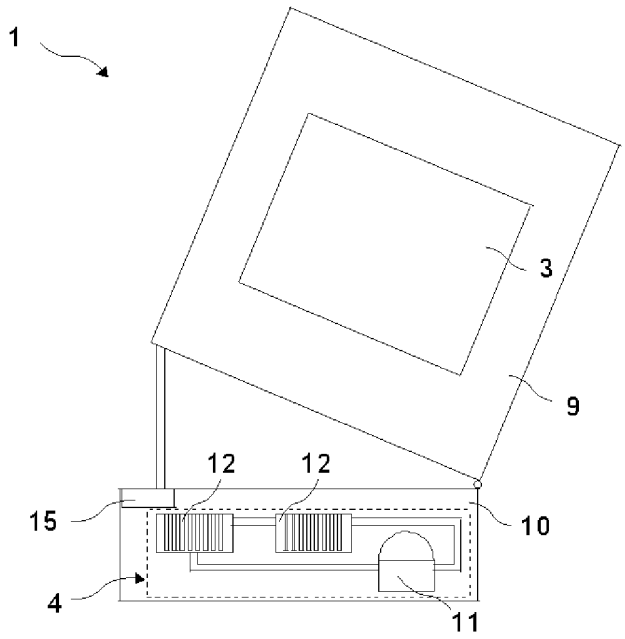
[008] A washer/dryer (1) as in any one of the claims from 1 to 4, characterized by a lid (16), situated between the chassis (10) and the body (9), that can be opened or closed on the chassis (10).

[009] A washer/dryer (1) as in any one of the claims from 6 to 8, characterized by a heat pump (4) comprising a heat exchanger (12) having fins (14) attached to the lid (16), that disengage from the flow pipes (13) by moving together with the lid (16), when the lid (16) is lifted upwards.

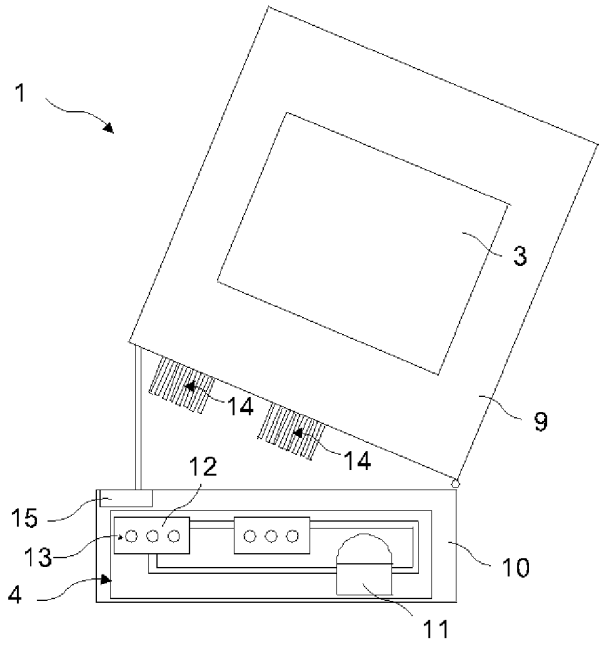
[Fig. 001]



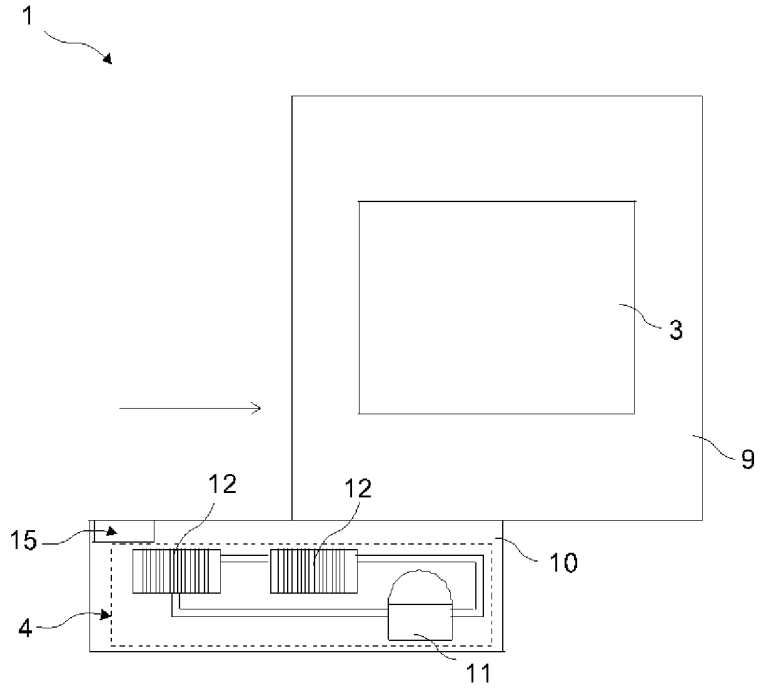
[Fig. 002]



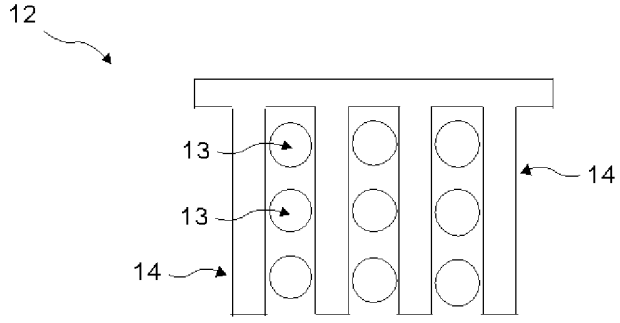
[Fig. 003]



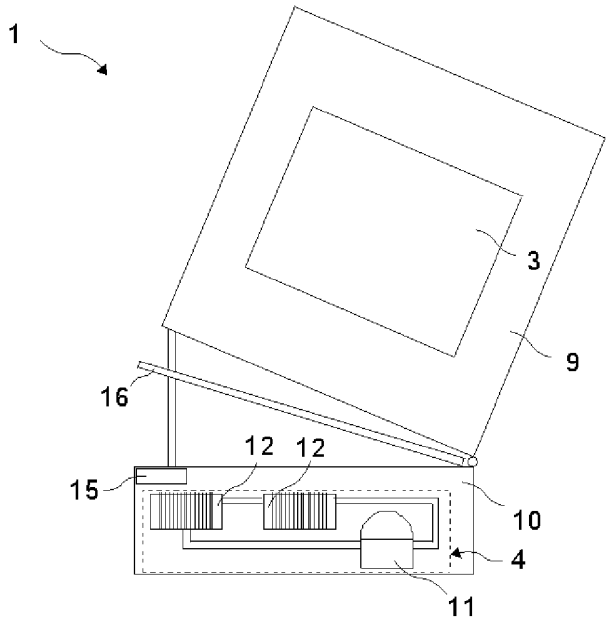
[Fig. 004]



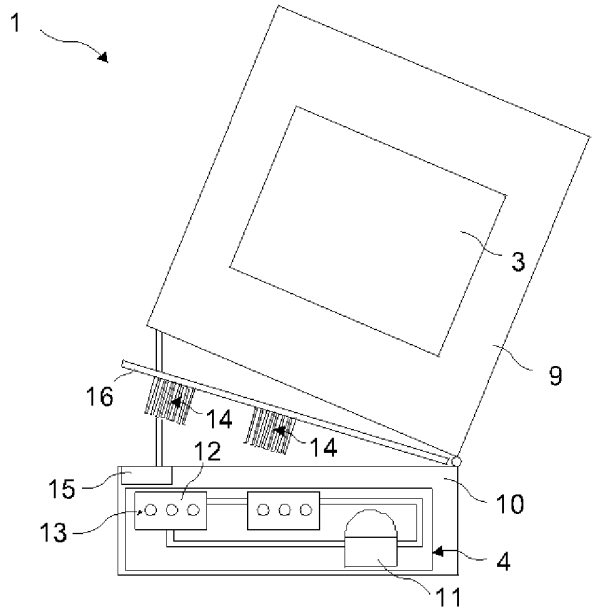
[Fig. 005]



[Fig. 006]



[Fig. 007]



[Fig. 008]