



(51) International Patent Classification:
Not classified

(21) International Application Number:
PCT/TR2018/050559

(22) International Filing Date:
05 October 2018 (05.10.2018)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2017/17316 06 November 2017 (06.11.2017) TR

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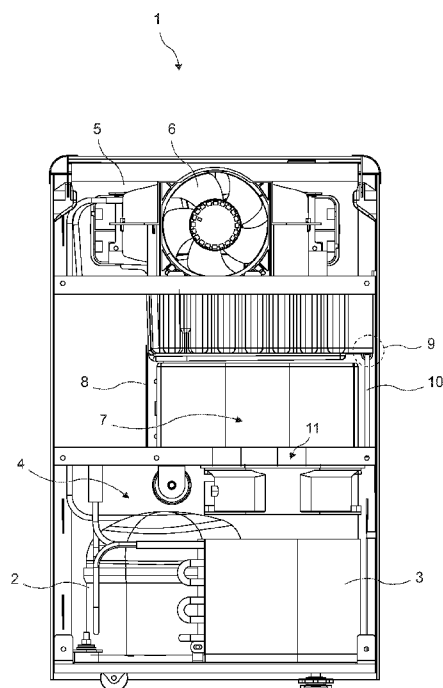
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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
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OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

(54) Title: PORTABLE AIR-CONDITIONING DEVICE

Figure 1



(57) Abstract: The present invention relates to a portable air-conditioning device (1), comprising a compressor (2) enabling the cooling cycle, a condenser (3) enabling heat to be discharged to the outer environment by condensing a refrigerant, a condenser chamber (4) in which the condenser (3) is placed, an evaporator (5) drawing heat from the ambience by evaporating the refrigerant and enabling cooling of the ambient air, an evaporator fan (6) delivering the air cooled by the evaporator (5) to the outer ambience where the user is, at least one PCM package (7) obtained by packing phase change material (PCM) with high heat storage capacity into a container, transferring and storing the heat of the condenser (3), and a heat storage chamber (8) in which the PCM packages (7) are placed.

Published:

- *without international search report and to be republished
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PORTABLE AIR-CONDITIONING DEVICE

The present invention relates to a portable air-conditioning device.

In general, air-conditioning devices comprise an internal unit and an external unit, and the heat drawn from the internal unit during cooling process is discharged to the outer environment by the external unit. In portable (transportable) air-conditioning devices, cooling process is usually performed by discharging the heat drawn from the environment to the outer environment by means of a vent extending outdoors through an aperture opened on a window or a wall. However, the vent structure that enables heat to be discharged to the outer environment, restricts transportability of the air-conditioning device. In addition, portable air-conditioning devices are not preferred by many users since an aperture to be opened on a window or a wall for the vent needs to be formed suitably, in order to obtain an efficient cooling performance by providing insulation between the ambience that requires cooling and the outer environment. This problem can be eliminated with applications in which a part of such residual heat is stored in a thermal storage member without discharging. In portable air-conditioning devices, storage of residual heat which has to be discharged to the outer environment by a condenser using PCM packages made of phase change material (PCM) with high heat storage capacity, is known. Phase change process is completed after storing a specific amount of residual heat and the PCM packages become incapable of heat storage. In this case, PCM packages require being subjected to a regeneration process by means of cooling. The PCM packages should be removed and placed in a cooler-freezer device for the regeneration process. When the PCM packages are removed, the hot air released from the condenser passes to the outer environment, decreasing the cooling performance of the portable air-conditioning device.

The patent application no. DE3938875 (A1), discloses a portable air-conditioning device in which discharging of heat is eliminated by means of storing thermal energy on the phase change material.

The patent application no. WO2017137327 (A1) relates to a transportable air-conditioning device.

The aim of the present invention is to realize a portable air-conditioning device with enhanced cooling performance, in which hot air passage to the outer environment is prevented.

The portable air-conditioning device provided to achieve the aim of the present invention is disclosed in the claims.

In the portable air-conditioning device PCM packages (phase change material packages) are used, storing residual heat discharged by the condenser. The PCM packages become

unable to store heat after being used for a certain duration, so they should be removed for the regeneration (cooling) process from the heat storage chamber in which they are disposed.

5 The portable air conditioning device of the invention comprises flaps mounted on the front side of the heat storage chamber, such that they can be opened and closed by pivoting about a horizontal or vertical axis from one edge by means of a spring hinge. Each flap opens towards into the heat storage chamber when the PCM package is being placed, and closes the front face of the heat storage chamber after the PCM package is placed and/or removed. In various embodiments of the invention, the flaps can open and close in down-up, up-down
10 direction or rightwards-leftwards.

The portable air-conditioning device realized to achieve the aim of the present invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a schematic view of the portable air-conditioning device.

Figure 2 is a perspective view of the heat storage chamber.

15 Figure 3 is a perspective view of a heat storage chamber in which a PCM package is placed.

Figure 4 is a view of the detail A of Figure 2.

Figure 5 is a schematic view of a PCM package placed in a heat storage chamber comprising a flap opening upwards.

20 Figure 6 is a schematic view of a PCM package placed in a heat storage chamber comprising a flap opening downwards.

Figure 7 is a schematic view of a heat storage chamber comprising flaps opening sideways.

Figure 8 is a schematic view of a heat storage chamber comprising symmetrical flaps.

The elements in the figures are numbered individually and the correspondence of these numbers are given hereinafter.

- 25 1. Portable air-conditioning device
2. Compressor
3. Condenser
4. Condenser chamber
5. Evaporator
- 30 6. Evaporator fan
7. PCM package

8. Heat storage chamber
9. Spring hinge
10. Flap
11. Opening

5 The portable air-conditioning device (1), comprises a compressor (2) enabling the cooling cycle, a condenser (3) enabling heat discharge to the outer environment by condensing a refrigerant, a condenser chamber (4) in which the condenser (3) is placed, an evaporator (5) drawing heat from the environment by evaporating the refrigerant and enabling cooling the ambient air, an evaporator fan (6) delivering the air cooled by the evaporator (5) to the outer
10 ambiance where the user is, at least one phase change material (PCM) package (7) (hereinafter referred to as PCM package (7)) obtained by packing phase change material (PCM) with high heat storage capacity in a container (not shown in the figures), transferring and storing the heat of the condenser (3), and a heat storage chamber (8) in which the PCM packages (7) are placed, and at least one opening (11) disposed between the condenser
15 chamber (4) and the heat storage chamber (8), enabling directing the waste heat dissipated from the condenser (3) to the PCM packages (7).

The portable air-conditioning device (1) of the invention comprises at least one flap (10),

- having a rectangular shape, mounted to the heat storage chamber (8) so as to pivotally open and close about a horizontal or a vertical axis from one side by means of a spring hinge
20 (9),
- opening into the heat storage chamber (8) by the contact of the PCM package (7) while the PCM package (7) is being placed, and covering the front face of the heat storage chamber (8) after the PCM package (7) is placed and/or removed.

The PCM packages (7) are placed into the air-conditioning device from the front side of the
25 heat storage chamber (8) facing the user. Phase change process of the PCM packages (7) end after the portable air-conditioning device (1) have operated for a certain duration, and the packages are removed from the heat storage chamber (8) by the user, in order to be cooled. When the user is placing the PCM package (7), the flap (10) opens into the heat storage chamber (8) by the contact of the PCM package (7) or by being pushed by the user,
30 and the spring hinge (9) is stressed in the meanwhile. When the user is removing the PCM package (7) from the heat storage chamber (8), the flap (10) closes the front side of the region emptied by the PCM package (7) due to being pulled back by the spring hinge (9).

In an embodiment of the invention, each flap (10) is connected to the heat storage chamber (8) from its upper edge by means of the spring hinge (9), and opens in down-up direction by pivoting about the upper horizontal axis (Figure 5).

5 In another embodiment of the invention, each flap (10) is connected to the heat storage chamber (8) from its lower edge by means of the spring hinge (9), and opens in up-down direction by pivoting about the lower horizontal axis (Figure 6).

In another embodiment of the invention, each flap (10) is connected to the heat storage chamber (8) from a side (right or left) edge by means of the spring hinge (9), and opens rightwards or leftwards by pivoting about the vertical axis (Figure 7).

10 In another embodiment of the invention, the portable air-conditioning device (1) comprises symmetrical flaps (10) shaped as saloon/bar doors, of which two is used for each PCM package (7), opening by pivoting in mutually opposite directions (one to the right and one to the left) about the vertical axis (Figure 8).

15 In the portable air-conditioning device (1) of the invention, the flaps (10) covering the front face of the heat storage chamber (8) and used individually for each PCM package (7), enable the PCM packages (7) to be placed into and removed from the heat storage chamber (8) independent of each other. For example, when only one of the PCM packages (7) is removed to be cooled, the portion emptied by the removed PCM package (7) is covered by the flap (10) moving by means of the spring hinge (9), and the heat coming through the opening (11)
20 to the heat storage chamber (8) is stored by the other PCM packages (7). The flap (10) enables sealing, prevents the heat of the condenser (4) and the compressor (3) coming through the opening (11) to the heat storage chamber (8) from escaping to the outer environment, thereby enhancing the cooling performance of the air-conditioning device (1).

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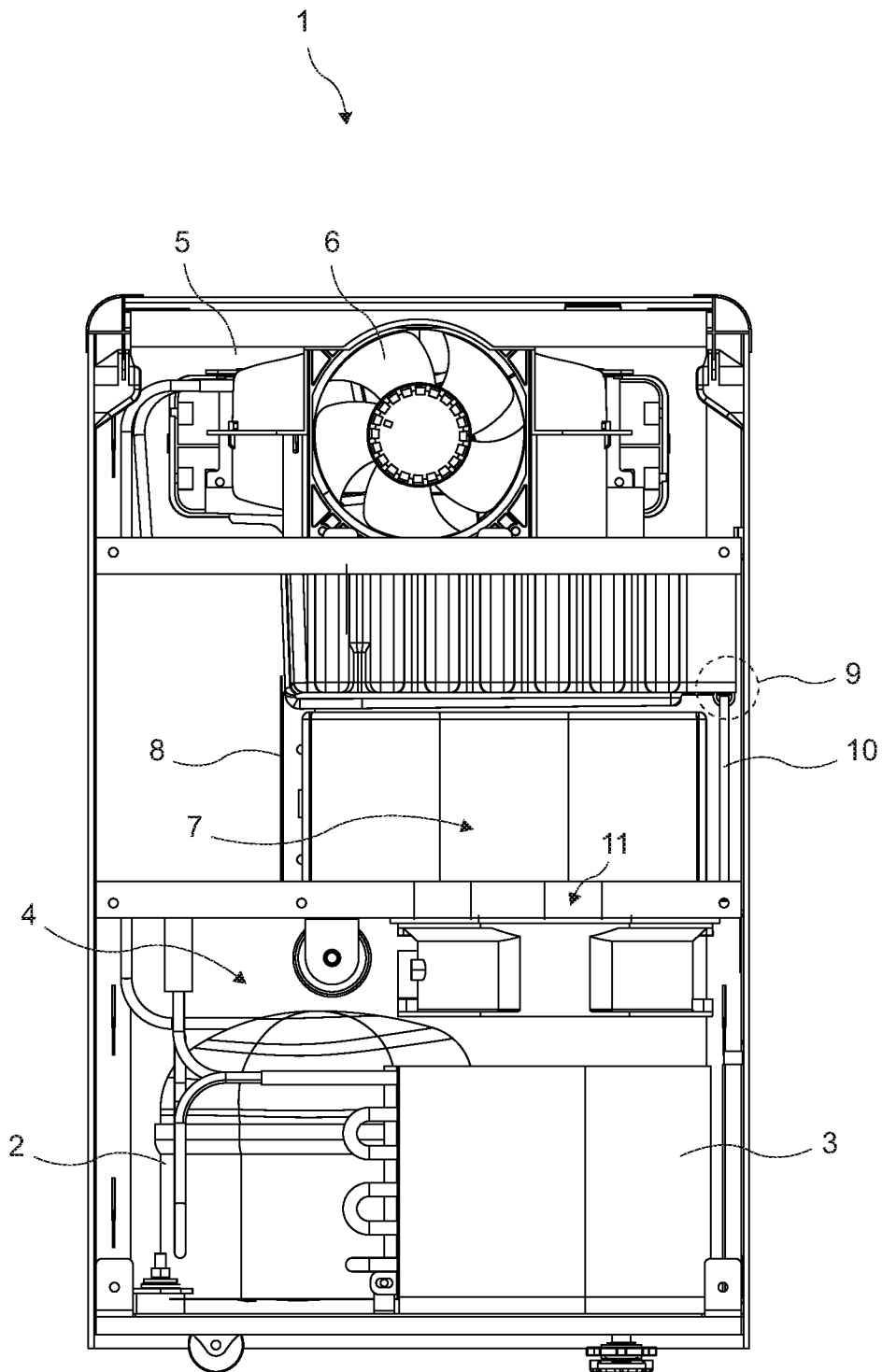
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CLAIMS

1. A portable air-conditioning device (1), **comprising** a compressor (2) enabling the cooling cycle, a condenser (3), a condenser chamber (4) in which the condenser (3) is placed, an evaporator (5) enabling cooling of the environment air, an evaporator fan (6), at least
5 one PCM package (7) transferring and storing the heat of the condenser (3), and a heat storage chamber (8) in which the PCM packages (7) are placed, **characterized by** at least one flap (10),
 - mounted to the heat storage chamber (8) from one side by means of a spring hinge (9), so as to pivotally open and close about a horizontal or a vertical axis,
 - 10 - opening into the heat storage chamber (8) while the PCM package (7) is being placed, and covering the front face of the heat storage chamber (8) after the PCM package (7) is placed and/or removed.
2. A portable air-conditioning device (1) according to claim 1, **characterized by** the flap (10) connected from its upper edge to the heat storage chamber (8) by means of the
15 spring hinge (9), opening in down-up direction by pivoting about the upper horizontal axis.
3. A portable air-conditioning device (1) according to claim 1, **characterized by** the flap (10) connected from its lower edge to the heat storage chamber (8) by means of the
20 spring hinge (9), opening in up-down direction by pivoting about the lower horizontal axis.
4. A portable air-conditioning device (1) according to claim 1, **characterized by** the flap (10) connected from its side edge to the heat storage chamber (8) by means of the spring hinge (9), opening rightwards or leftwards by pivoting about the vertical axis.
5. A portable air-conditioning device (1) according to claim 1, **characterized by** the
25 symmetrical flaps (10) shaped as saloon/bar doors, opening by pivoting in mutually opposite directions about the vertical axis.

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Figure 1



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Figure 2

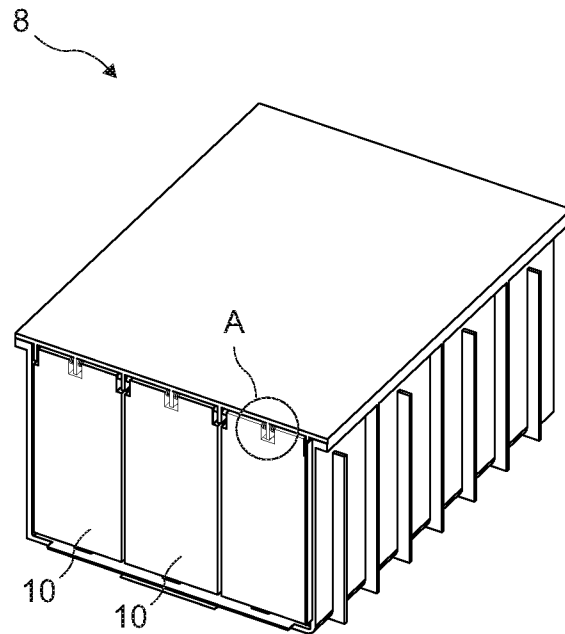


Figure 3

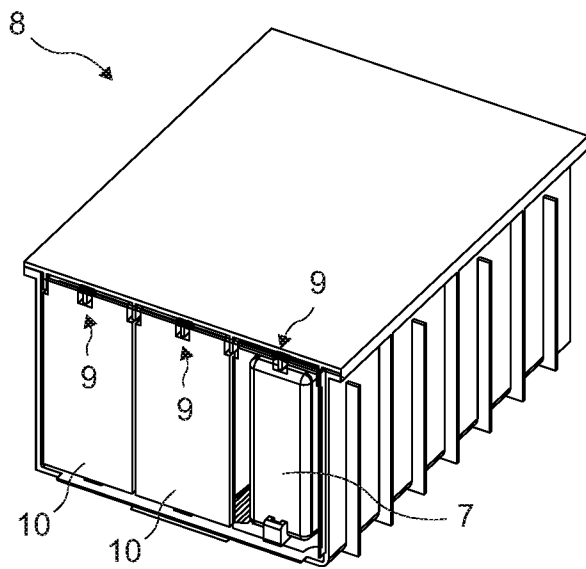
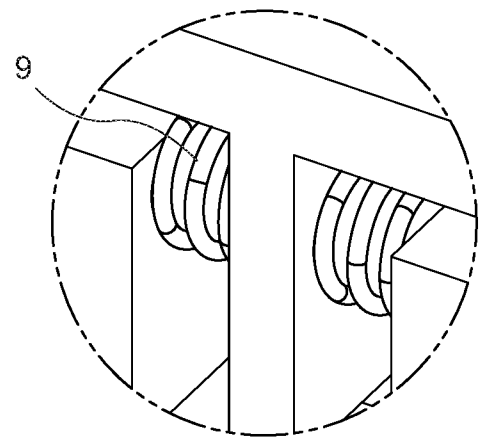


Figure 4



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Figure 5

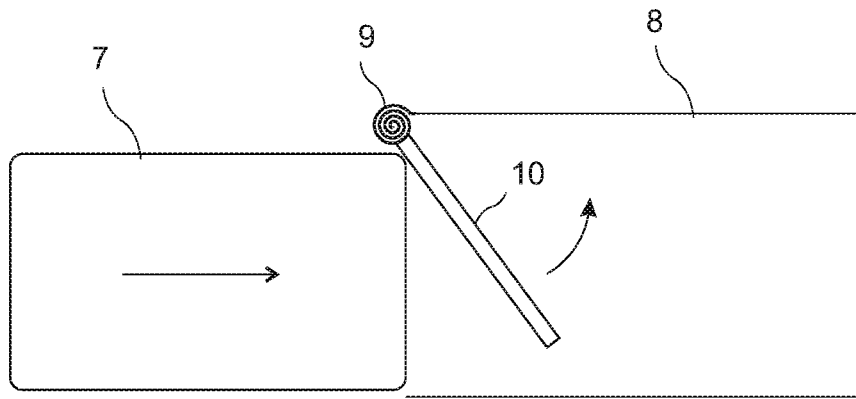


Figure 6

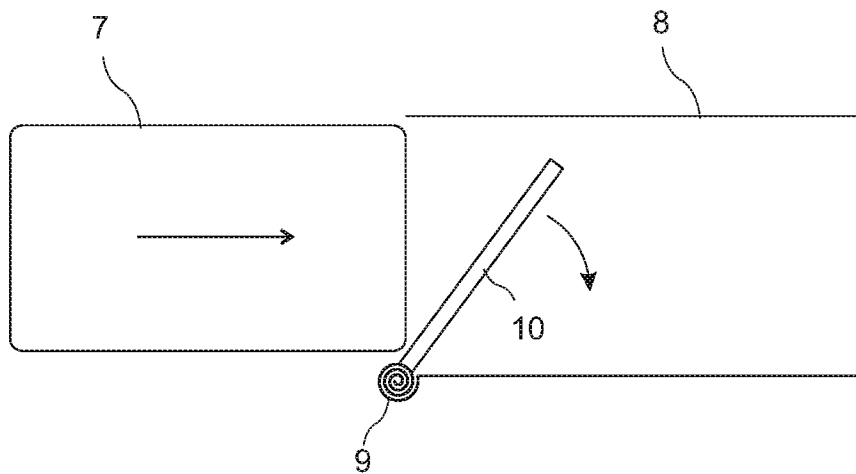


Figure 7

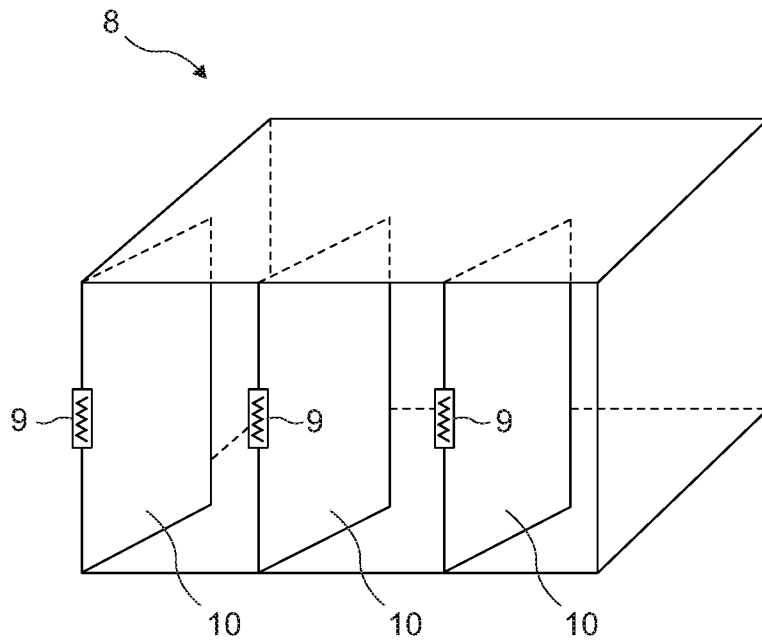


Figure 8

