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(56) Documents Cited:
WO 2005/064241 A1 **CN 001746578 A**
KR 007114097 A **SU 000495504 A1**

(58) Field of Search:
INT CL **F24F**
Other: **EPODOC, WPI**

(54) Title of the Invention: **Portable air conditioner**
Abstract Title: **Portable air conditioner including thermoelectric cooling**

(57) The portable air conditioner comprises a cold plate 4 arranged to cool air and a hot plate 5. Thermoelectric cooling modules 6 interconnect the hot and cold plate. A system of spraying nozzles 7 is arranged to spray water supplied from a first water tank 11 via a first pump 15 onto the hot plate. The air conditioner may include a second water tank 9 that receives water heated by the hot plate and transfers water into the first water tank via a second pump 10 and further system of spraying nozzles 12. The first water tank may include aluminium blocks 13 having heat pumps embedded therein and fins on two opposing sides, the blocks serving to dissipate heat from the sprayed water evenly into the atmosphere via ventilation fans 14. The hot plate may comprise an aluminium block having heat pipes embedded therein and fins on one side. A fan 8 may be provided to draw air to be cooled through an air intake 17 over the cold plate. The air conditioner may be mounted on wheels.

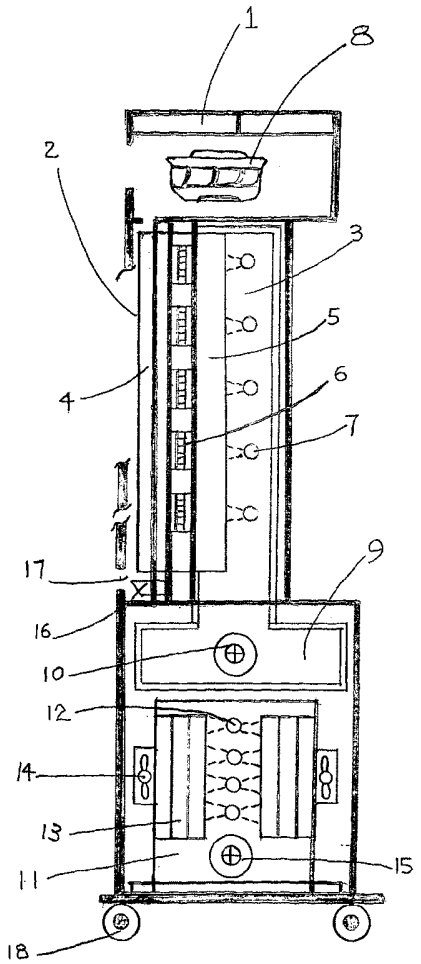

FIG 1

GB 2483936 A

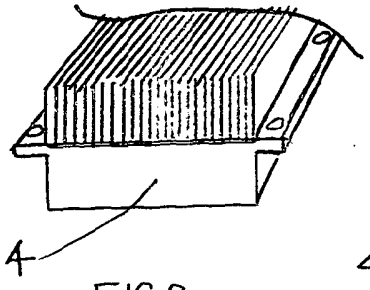

FIG2

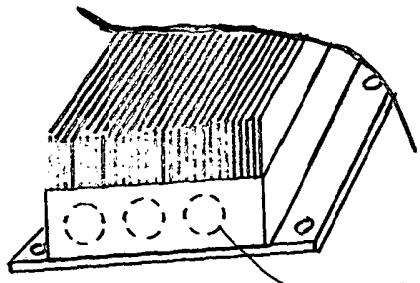

FIG 3

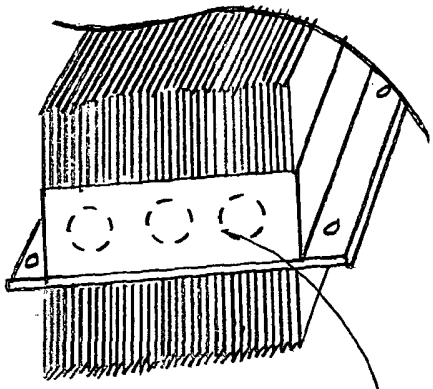

FIG 4

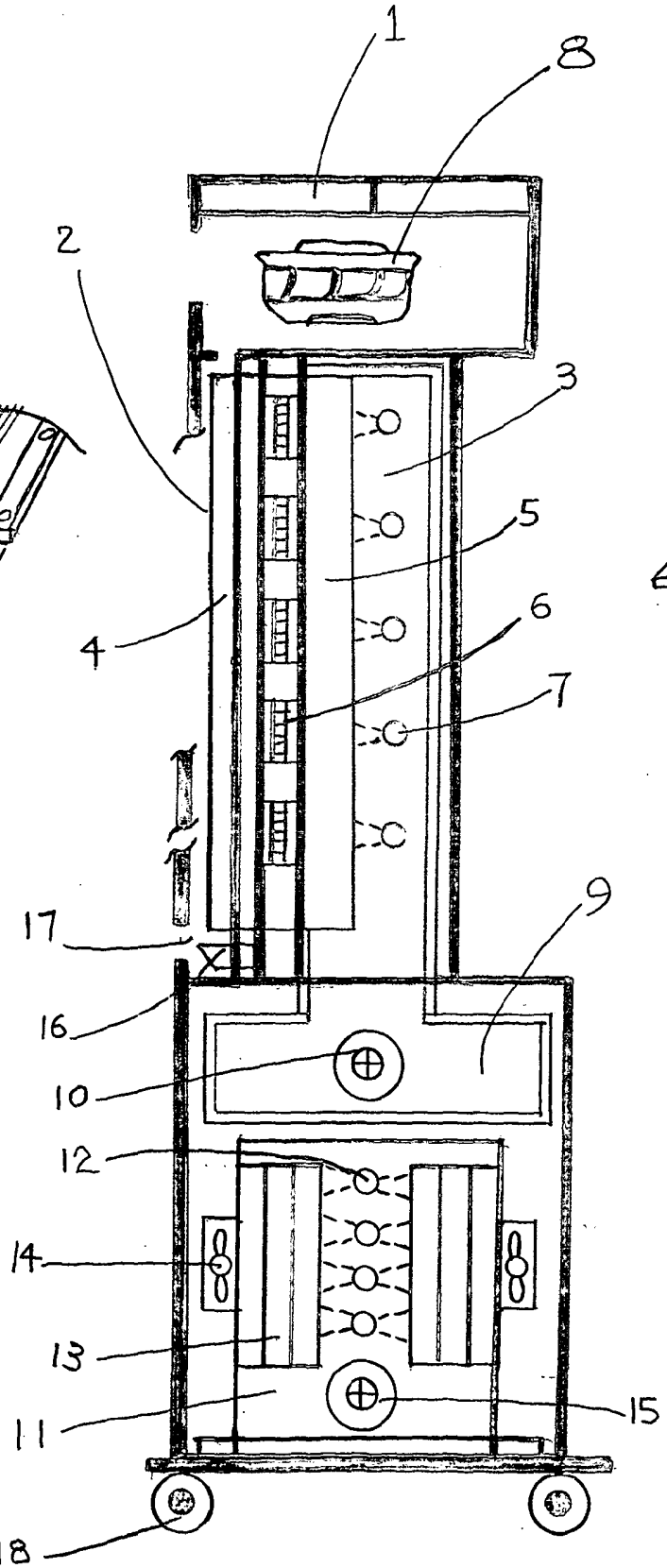

FIG 1

PORTABLE AIR CONDITIONER

This invention relates to an air conditioner character is portable and movable, working without compressor, use thermoelectric cooling modules, use atomizing spray nozzles system for cooling system, no hot air exhaust, save over 50% electric power compare with traditional air conditioner.

Conventional A/C need fix installation that easy to vent out the hot air. Let outside air temperature rising.

My invention use heat pipe, atomizing spray nozzles system, heat dissipate step down method to control and suppress the hot air, make it equilibrium to the room temperature, no hot air vent out.

Conventional A/C work with compressor, 8000~9000BTU type power consumption is around 1KW/Hour. In summer the electric power fee always double.

We use thermoelectric cooling modules (TEC) to replace the compressor. Due to we use heat pipe, atomizing spray nozzles system, heat dissipate step down method and special design of the cold plate. We get a spectacular result. When machine touch the setting temperature, we cut down 50% of the input power, it still working efficiency and normally, can keep the cold strength, temperature only rise up 1~2℃. Also, hot air generate will by proportion lower.

Description Of The Drawing

Fig 1. Is the cross-sectional view of the portable air conditioner

- No 1. Place for electrical control
- No 2. Front chamber
- No 3. Back chamber
- No 4. Cold plate (Fig 2) solid aluminium block have fins on the top side
- No 5. Hot plate (Fig 3) aluminium block, heat pipe embed inside, fins on the top side
- No 6. (TEC) thermoelectric cooling modules
- No 7. Atomizing spray nozzles system 1
- No 8. Blower
- No 9. Back chamber cover with water tank
- No 10. Submersible pump 1
- No 11. Lower water tank
- No 12. Atomizing spray nozzles system 2
- No 13. Double side fins aluminium block, heat pipe embed inside (Fig 4)
- No 14. Ventilation fan
- No 15. Submersible pump 2
- No 16. Cold plate water drops collector
- No 17. Air intake

- No 18. Wheels

Disclosure Of Invention

-- Turn on the power

-- Front chamber (No2) mounting with the cold plate vertically (No4). Retain the cold air.

-- The blower (No8) suck the air through air intake (No17). The intake air pass through the cold plate fins going up, becomes cold, and blow outside.

-- Back chamber (No3) mounting with the hot place vertically (No5) and have back chamber cover with water tank (No9). Function is to prevent hot air lose.

-- Back chamber cover inside have atomizing spray nozzles system 1 (No7). The water come from lower for tanks (No11) through submersible pump 2 (No15). Spray water mist into the fins of hot plate (No5). The heated tiny water drop going down into bottom of the water tank. (No9)

-- The Tec (No6) is mounting and contact in between cold plate (No4) and hot plate (No5) vertically like sandwich protected by some foam type insulation.

-- When the heated tiny water drop goes down to the bottom of the water tank (No9). A submersible pump 1 (No10) will pump it through another group of atomizing spray nozzles system 2 (No12). Spray it into the inner side fins of the aluminum block (No13). The embed heat pipe action with the outerside's fins and ventilation fan (No14). Release the water's heat into the atmosphere evenly.

-- The cool down water drop goes down in to the lower water tank (No11) through the submersible pump 2 (No15) start another loops of circulation.

-- The wheels (No18) let's the portable A/C can movable.

-- The collector (No16), collect the water drop from cold plate through a small rubber tube to the lower water tank (No11).

The Best Mode Of My Invention

-- Seldom people use Tec to make an air conditioner.

-- Because efficiency and cool ability not enough. Heat dissipation is difficult need a very large heat sink. High speed ventilation fans.

-- After a long long times try and error experiments, I find out the size of solid type, embedd heat pipe type, single and double side fins aluminum block. Like Fig2, Fig3, Fig4.

-- Use these kinds of aluminum block, atomizing spray nozzles system, heat dissipate step down method, can soft the above (Tec) problems.

-- First. hot plate (No5) absorb and vent out the mass heat from Tec, on the top of the fins temperature around 80℃.

-- Second. use atomizing spray nozzles system 1(No7), spray the water mist washing the hot air , the water mist absorb and carrying temperature around 40℃.

-- Third. the heated water by submersible pump (No10) spray it into the double side fins aluminum block (No13). Due to the heat pipe's action, water's heat will release evenly, temperature will equal to the room temperature again.

-- First to third procedure are working at a close circuit environment that's why without hot air vent out.

-- Heat dissipation step down method is work well. I try to find out more efficient of the cold plate. I discover we adjust the thickness of solid bottom of the aluminium block (thickness with in 25mm), can retain the cool ability and strength, co-operate with good heat dissipation method. That I can reduce the 50% input power. It still work normally.

Claims

1) A portable air conditioner unit comprising a reinforce plastic casing with wheels can movable. Front chamber install cold plate. Back chamber install hot plate. Have a back cover with water tank. Bottom of the water tank have a submersible pump. The TEC is mounting and contact in between the cold plate and hot plate vertically. Inside the back cover, a atomizing spray nozzles system mounting against to the hot plate. The lower water tank both sides (can be four sides) mounting the double side fins aluminium block. The outer side install ventilation fan. Inside the lower water tank center, have a atomizing spray nozzles system. Bottom have a submersible pump.

2) A portable air conditioner unit according to Claim 1, in which the formation of cold plate with TEC with hot plate generate diffuse the cold and heat respectively.

3) A portable air conditioner unit according to Claim 1, in which the shape and structure of the aluminium block, cold plate solid bottom with fins on top. Hot plate bottom embed heat pipe with fins on top. Double side with fin type center embed heat pipe, will affect the efficiency of the machine.

4) A portable air conditioner unit according to Claim 1, a atomizing spray nozzles system mounting inside the back cover against to the hot plate spray water mist washing the hot air . The back cover prevent the hot air lose. Get the second step of heat dissipation.

5) A portable air conditioner unit according to Claim 1, in which the lower water tank center install with a atomizing spray nozzles system spray the heated water comes from hot plate, in to the double size fins aluminium block with the action of heat pipe and ventilation fan. Release the heat. Get the third step of heat dissipation.

6) A portable air conditioner unit according to any of the preceding claims, get the machine movable, no hot air vent out, after get cool can cut down at least 50% of electric power.

Application No: GB1016376.4 **Examiner:** Colin Whitbread

Claims searched: 1 **Date of search:** 29 November 2011

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 at least	WO 2005/064241 A1 (LG ELECTRONICS INC ET AL) See figure 3 especially, noting portable air conditioner including cold plate 52, hot plate 54; system of spraying nozzles 74; and water tank 77 wherein the hot plate is interconnected with the cold plate by at least one thermoelectric module 50.
X	1 at least	KR 07114097 A (LG ELECTRONICS INC) 29.11.07 (See WPI Abstract Accession No. 2008-G00063 [38] and figure 3 especially).
X	1 at least	CN 1746578 A (LG ELECTRONICS TIANJIN) 15.03.06 (See WPI Abstract Accession No. 2006-530558 [55] and figure 3 especially).
A	-	SU 495504 A1 (POWER RES INST) 15.12.75 (See WPI Abstract Accession No. 1976-71760X [38] and figure, noting air conditioner including thermoelectric module 1 having hot 3 and cold 2 sides; system of spraying nozzles; and water tank wherein the system of nozzles spray water from the tank over the hot side).

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

F24F

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
F24F	0005/00	01/01/2006
F24F	0001/04	01/01/2011