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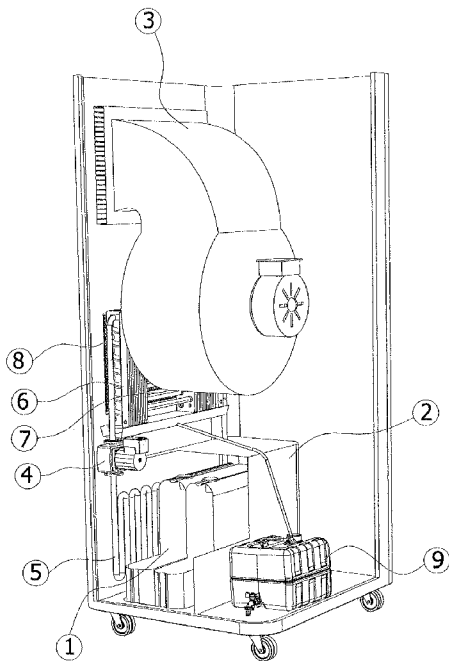


Fig. (1)

(57) Abstract: An air conditioning for home, office and open spaces, which works based on a closed path of Metal tube having high thermal conductivity, filled with fluid having certain physical properties. The system consists of several basic parts as follows: a pack of cooling or heating filled with fluid (such as blue Gel) or (PCM Phase-change material) (1) and placed in thermal insulated box (2), fan (3) pump (4), connected to a Metal tube having high thermal conductivity, filled with fluid having certain physical properties -antifreeze- (5) and connected to the Heat exchanger -Optional- (6), and the pump also connected to thermostat (7), filters (8), and finally condensation collection tank (9). What makes this invention unique is that the air conditioning system does not fully depends on compressor or heating coil, rather it depends on (thermal energy storage) placed in a thermal insulated box for cooling or heating the closed path of Metal pipes filled with fluid having special specifications, with suitable pump for cooling or heating the entire system delivering cold or hot air, which achieves the objective of the invention, in addition to the possibility of using (thermoelectric cooling/ heating) see Figure 1 and Figure 3

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Air Conditioning with a closed path system

Specifications

Background of the Invention:

The invention relates to the disclosure of air conditioning -and Heater- for home, office and open spaces. The system incorporates a thermally isolated box that contains part of closed path of Metal tube having high thermal conductivity that is filled with fluid having certain physical properties (antifreeze). And that part of metal tubing is placed in contact with a medium which has been pre cooled or heated using for example ordinary household appliances such as a refrigerator, an ice maker (or dry ice when there are appropriate conditions) or home boiler or any available means of heating. The system can be further enhanced by using thermoelectric cooling/ heating to prolong the medium's thermal energy storage.

Technical condition of the existing air conditioners that depend on CFCs - Freon "R-12" which is the most commonly used in the field of home and office air conditioning

Saudi Electricity Company showed that the wall conditioners using Freon consume different capacity (12000-24000 BTU) electric power ranging from 2000 to 4000 watts / hour (2-4 kW / h)

Given the health warnings of Freon or R-12 issued by environmental and health organizations, gas particles when leaked or secreted from the air-conditioner can cause damage to on the ozone layer and cause chronic health issues on human life causing allergic reactions, shortness of breath and even strokes. Moreover, the tubes in the air-conditioning unit carrying Freon are prone to leak especially if beyond three years of use.

The major oil consuming countries in the world are actively making significant efforts to secure stable sources of energy, and activate the Tokyo Protocol, which deals with the reduction in the discharge of greenhouse gas in order to minimize global warming. It is expected that the international pressure regarding the specific use of the energies will further increase in order to achieve global energy efficiency.

In Saudi Arabia, for example, month of August 2014 recorded unprecedented hike in electricity consumption in Saudi Arabia, a new historic record, where consumption jumped to 56,500 megawatts, an increase of 7.7% for loads peak recorded during the summer of 2013.

Specialists in energy say: this great figure in the growing electricity consumption in KSA is an indication of the growing domestic consumption of energy, which runs at very high rates compared to many countries in the world. They noted that the official statistics indicate that Saudi Arabia leads the world in the size of the domestic consumption of energy, where the average per capita consumption is twice the global average, with an average annual growth rate of more than 5% per annum. Despite the significant growth in demand for energy due in part to rapid economic growth, urban development and increase in population in the Kingdom, a large part of it is due to the waste and inefficiency in consumption, which results in an enormous burden on the electricity power plants to meet ever increasing energy demands that can cost up to hundreds of billions of Riyals.

According to the latest statistics, the residential home/building sector in the KSA is consumes more than 80% of the total electricity produced where air conditioning contributes about 70% of the total usage. With an annual expected growth rate of up to 12%, about 70% of the buildings in Saudi are not thermally insulated. It is estimated that the average per capita consumption in the Saudi is twice the average global consumption, while Saudi Arabia depends on converting over four million barrels of oil to electricity which is one of the highest levels of consumer in the world.

From the above, it shows that if the goal is to reduce the amount of conventional fuel that is burned for the purpose of producing electricity, and to reduce the environmental risks posed by the use of Freon, it is incumbent on us to look for new products that are more energy efficient and rely not on current technology that is energy thirsty and rely on fossil fuel and poses a wider threat to the planet and its inhabitants.

Add to all, the current air conditioners are very heavy, fixed, bulky, and not movable, makes a lot of noise and vibration, and cannot be used outdoors where it causes pressure on the compressor which may cause system damage.

General description of the invention:

This invention's goal in the light of the above is to provide an air conditioning system (cooling / heating), that uses less energy, and does not use conventional cooling gases CFC runs quietly, does not cause noise, has a lighter weight, very mobile, less expensive, and can be used outdoors.

According to one of invention models, the above goals are achieved by having an air conditioning system for home use, office, and in open areas, based on a closed path of Metal tube having high thermal conductivity, filled with fluid having certain physical properties - antifreeze – using a medium that is cooled or heated in advance using for example ordinary household refrigerator or ice maker (or dry ice when there are appropriate

conditions) or by merging a compressor with the isolated box or any other means of cooling, and for heating for example using water heated by solar heater or normal household heater. It can be enhanced by using thermoelectric cooling/ heating.

It consists of several basic parts as follows: a pack of cooling or heating filled with fluid (such as blue Gel) or (PCM Phase-change material) (1) and placed in the thermal insulated box (2), fan (3) pump (4) connected to a Metal tube having high thermal conductivity , filled with fluid having certain physical properties -antifreeze- (5) and connected to the Heat exchanger -Optional- (6), and the pump also connected to thermostat (7), filters (8), and finally condensation collection tank (9).

1. **Advantages of the invention:**

This invention is an air conditioning - and heating - system does not fully depend on the compressor or heating coil, which consume a lot of power, while most of compressor depend on cooling process Freon Gas which is harmful to the environment and public health, Dispensed as possible from using the compressor, means getting rid of the CFCs Gas, noise and vibration

- The use of the closed path brings us several advantages, including:

First: Possibility of using a special material with physical characteristics compatible with the target of the system low freezing point and higher boiling point, to be used inside the metal pipe

2. Second: No direct contact with the users and the materials used above, which achieves the highest safety rate

Third: The closed system provides greater protection for the system from damage and better reliability such as transport and movement from one place to another.

3. Fourth: possibility of using thermal energy storage with advantage of (latent heat storage)

Fifth: The direct contact for prior (cooling or heating medium) with metal in thermal insulated box, which achieves rapid heat transfer as required.

Sixth: Ease of use and maintenance

Seventh: Light weight for transport and movement from one place to another

4. Eighth: The possibility of using regular thermal insulated box or thermoelectric cooling/ heating

- The advantages of using the prior means of (cooling and heating) kept inside the thermal insulated box:

First: The use of materials such as blue gel, phase changing materials they are non-toxic, and provides a constant temperature for the system which supports the maximum

- temperature, as the ability of phase changing materials in energy storage up from +100 to -20 ° C.

Second: Those materials having physical properties characterized by a low rate of melting and loss of heat, which achieves higher effectiveness for number of charging / changing prior prepared means by day

- 1. Third: The possibility of using dry ice in case of availability of appropriate conditions and health standards

Fourth: Those means can be replaced by ordinary ice have been purchased or prepared in advance at home or by ice maker which available at most of restaurants, cafes and some of the houses.

- 1.◦ Fifth: Can get hot water for heating, through the solar heater system, or hot water underlying from remainder of the heater is used at homes, offices, hospitals or any other means of heating means etc.

Sixth: Uses of good type of thermal insulated box provides maximum efficiency of the system and reduce number of changing or charging of prior prepared means by day

- 2. Seventh: The possibility of operating the system by battery or connecting it to power source - car – 12/24 volts constant DC, because it can work without having to compressor or coil heating.

Eighth: The use of the new cooling system achieves savings in the use of electric energy, not relying on the use of Freon and the associated disadvantages mentioned earlier.

- 2.◦ Ninth: The possibility of using thermal insulated box that works with thermoelectric cooling / heating, which provides greater efficiency and less cost of operating, with or without prior preparation means.

Brief explanation of the drawings:

This invention requires a drawings helps in clarifying the idea and the implementation of the steps, and the work of this invention are as follows:

- 3.◦

Figure 1: Perspective for one way of applying the invention Air Conditioning using closed path system, which depends on the means of cooling or heating prepared in advance.

Figure 2: A partial perspective of one of the ways to implement the closed path

Figure 3: A perspective of one of ways to implement the invention without heat exchanger

- Figure 4: A partial perspective of one of ways to implement the invention, replacing the inside pipes in the thermal insulated box with a Metal Tank with a high heat transfer coefficient.

Detailed description:

- 1. And now described in detail Air conditioning system which uses a closed path, and it depends on the means of cooling/ heating have been prepared in advance, according to the drawings attached as an example of the application of the invention see Figures 1, 3 and 4:

- the system consists of several basic parts as follows: a pack of cooling or heating Filled with fluid (such as blue Gel) or (PCM Phase-change material) (1) and placed in thermal insulated box (2), fan (3) pump (4) connected to a Metal tube having high thermal conductivity , filled with fluid having certain physical properties -antifreeze- (5) and connected to the Heat exchanger -Optional- (6), and the pump also connected to thermostat (7), filters (8), and finally condensation collection tank (9).

- Given the attached drawings, at system startup first we put a previously prepared means - cooling or heating - 1 in the thermal insulated box 2, and fan starts to work 3, and pump also 4 fluid in the pipe metal 5 begins to rotate in a closed path as shown in Figure 1, and the heat exchanger 6 exchange the air with the atmosphere of a room or office (the place to be conditioned) we get a goal from the system cooling or heating

- If using the system in a closed area such as room or office, upon reaching the desired room temperature, the pump will stop working by thermostat 7, cooling or heating stops until the change in ambient temperature is detected as the fluid in the pipe / tank located in the thermal insulated box has gained more heat or cold during time the pump turned off. The pump will then re-work effectively to reach the desired temperature.

The air to be cooled or heated passes through the filters 8 that purifies, refreshes and cleans the air, before passing through the heat exchanger.

- Furthermore, there will be condensation as a result of hot and humid air passing through the heat exchanger, which will be collected and discharged into the condensation collection tank 9 or directly through the hose to the outside.

To specify the volumes and size of the main parts of the system are estimated by Knowing the cooling /heating load by British units - for example - and the difference with temperature desired to be achieved, and that by determine water flow rate within those pipes so that we can determine the appropriate diameters and appropriate speed

- Then we specify ton of cooling capacity to determine the flow rate inside the pipe that achieves when it passed within the heat exchanger cooling air equivalent to one ton of cooling so that we can know the number of units of air circulation for different areas if we have identified all of them by ton of cooling capacity

- Although it has been detected the favorite models of the present invention for the purposes of demonstration, the experts in this field will realize that you can make adjustments and additions and multiple substitutions, without moving away from the field of the invention and it essence, as are disclosed in the accompanying elements of protection.

Claims

- 1 1. conditioning system - and heating - used to adapt the homes, offices and in open
 2 areas, and it does not fully depend on compressor or heating coil, but depends on
 3 a closed path of Metal tube having high thermal conductivity, filled with fluid
 4 having certain physical properties - antifreeze - and using means of prior thermal
 5 energy storage, in the thermal insulated box with a portion of the metal tube path
 6 to see the Claims 1,4,5,6.
- 7 2. conditioning system - heating - used to adapt the homes and offices and in open
 8 areas, and does not fully depend on its work on compressor or heating coil and it
 9 consists of:
- 10 - Means cooling or heating (1) prepared in advance
 - 11 - Thermal insulated box (2) normal/thermoelectric (cold / hot) to put the means
 12 of refrigeration on it, to ensure the longest retention period.
 - 13 - Fan (3) to pull air from the surrounding environment to be adapted and pass
 14 thru heat exchanger and then bring it back into The surrounding environment
 - 15 - Pump (4) to Circle the fluid inside the heat exchanger tubes of the closed path
 - 16 - Metal tube (5) High heat transfer coefficient is filled with fluid having
 17 physical properties of anti-freeze /boiling-point elevation
 - 18 - - Heat exchanger (6) the air passes through it that is being withdrawn by the
 19 fan to be conditioned "cold or hot"
 - 20 - - Thermostat (7) controls the pump to stop and re-work according to the
 21 required degree
 - 22 - - Filters (8) when the suction air by the fan , first pass through filters to purify
 23 the air before it passes to the heat exchanger
 - 24 - - condensation collection tank (9) to collect condensate water as a result of
 25 warm and humid air passing through the heat exchanger
- 26 3- According to claims No. 1: in the means storage of thermal energy (heating or
 27 cooling) can be used blue gels or phase changing materials or dry ice in case of
 28 availability of appropriate conditions for use.
- 29 4- According to claims No. 1: You can use fluid cooled or heated in advance using
 30 ordinary household refrigerator or ice maker or any means cooling again, and heating
 31 using water heated by solar heater or normal household heater or no means of home
 32 heating ways.

1 5- According to claims No. 1: possibility using thermoelectric cooling / heating
2 (thermal insulated box) in order to maintain the thermal energy of the underlying means
3 that have been processed in advance, and the possibility of operating the system by
4 battery or connect the source of the power by car 12/24 volts constant DC, for not having
5 to compressor or coil heating.

1 6- According to claims No. 1: It is possible to use a (thermal insulated box) supported
2 with compressor cooling system, to operate as freezer to freeze the means stored with a
3 portion of the metal tube, and also it will work to maintain the thermal energy of the
4 underlying means that have been processed in advance inside the thermal insulated box.

1 7- According to the claims No. 1: Use a utility for measuring of temperature to
2 determine the temperature of the means stored in the thermal insulated box and determine
3 the appropriate time to charge / replace it with another ready means.

1 8- According to the claims No. 1: Using utility for measuring of temperature in order
2 to know the heat transfer fluid temperature.

1 9- According to the claims No. 1: the use of antifreeze in the pipes for example:
2 ethylene glycol / propylene glycol / glycerol / and non-glycol.

1 10 - According to the claims No. 5: the system could function independently in the event
2 of unavailability means prepared in advance in the event that the system work is going on
3 attached compressor / thermoelectric (thermal insulated box - cooling / heating).

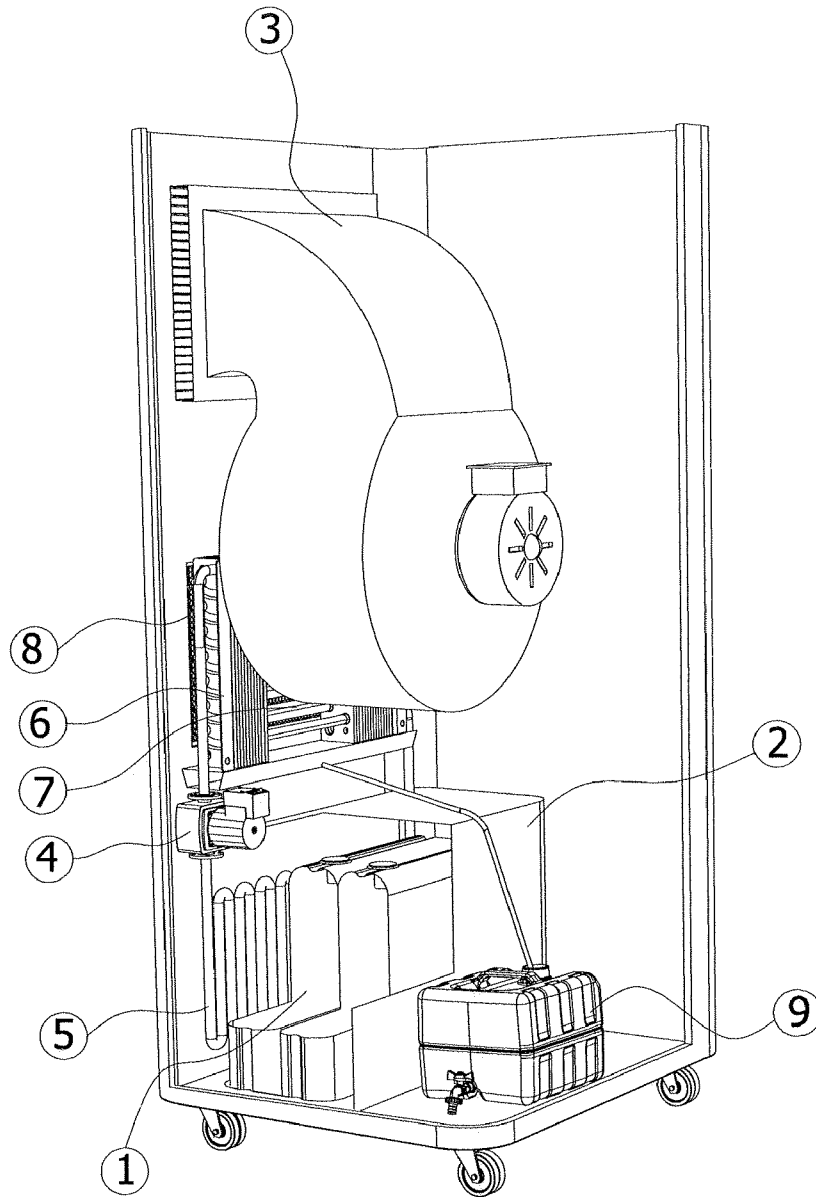


Fig. (1)

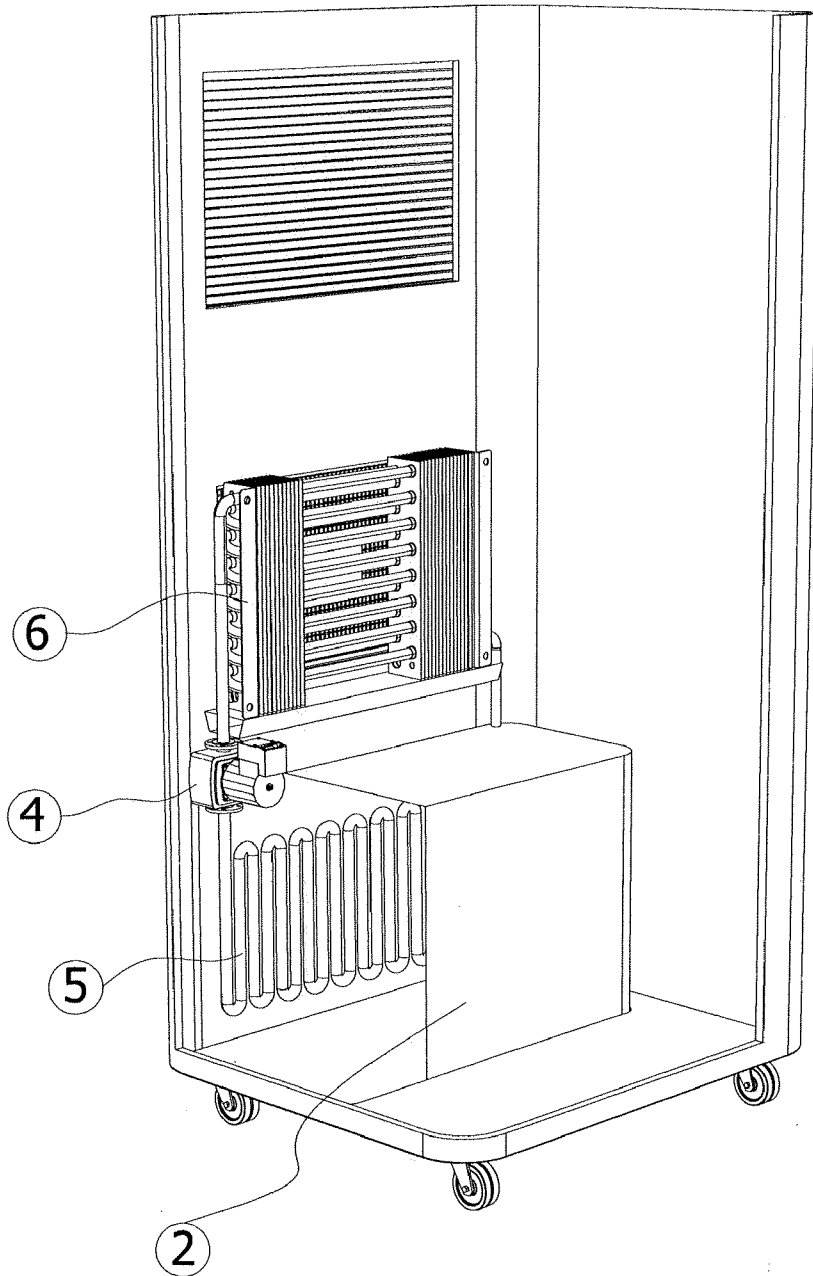


Fig. (2)

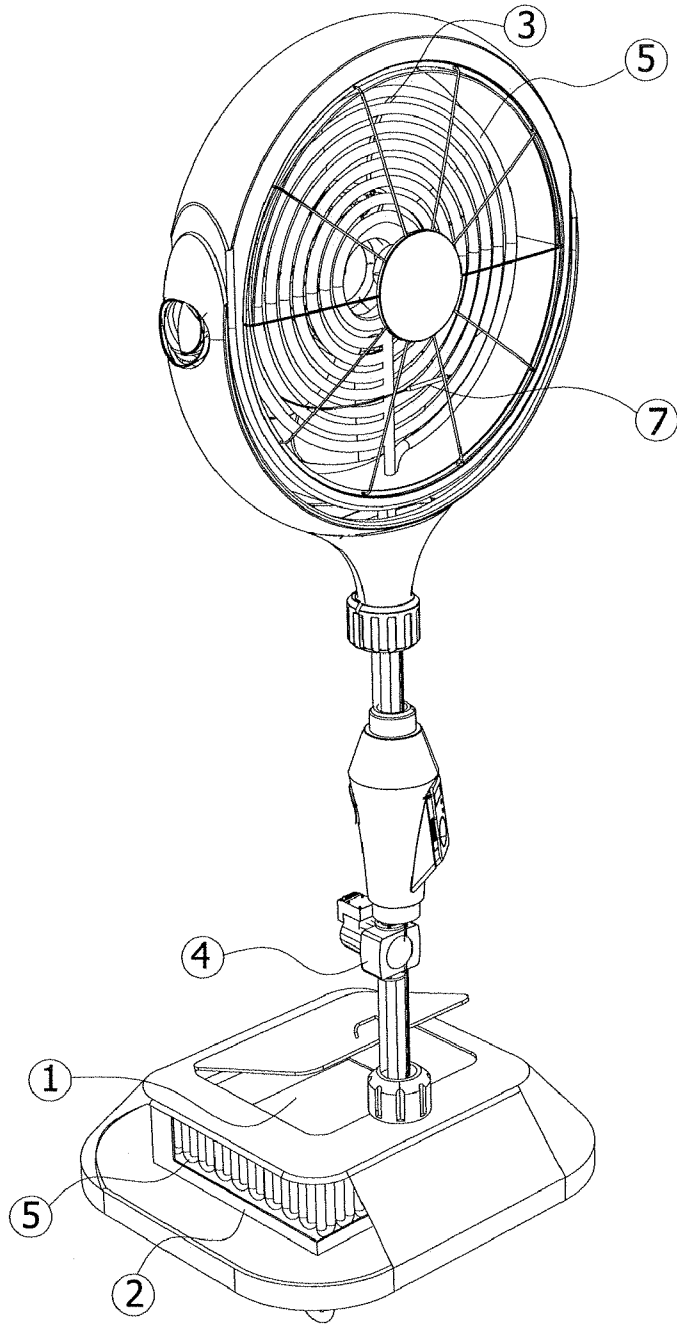


Fig. (3)

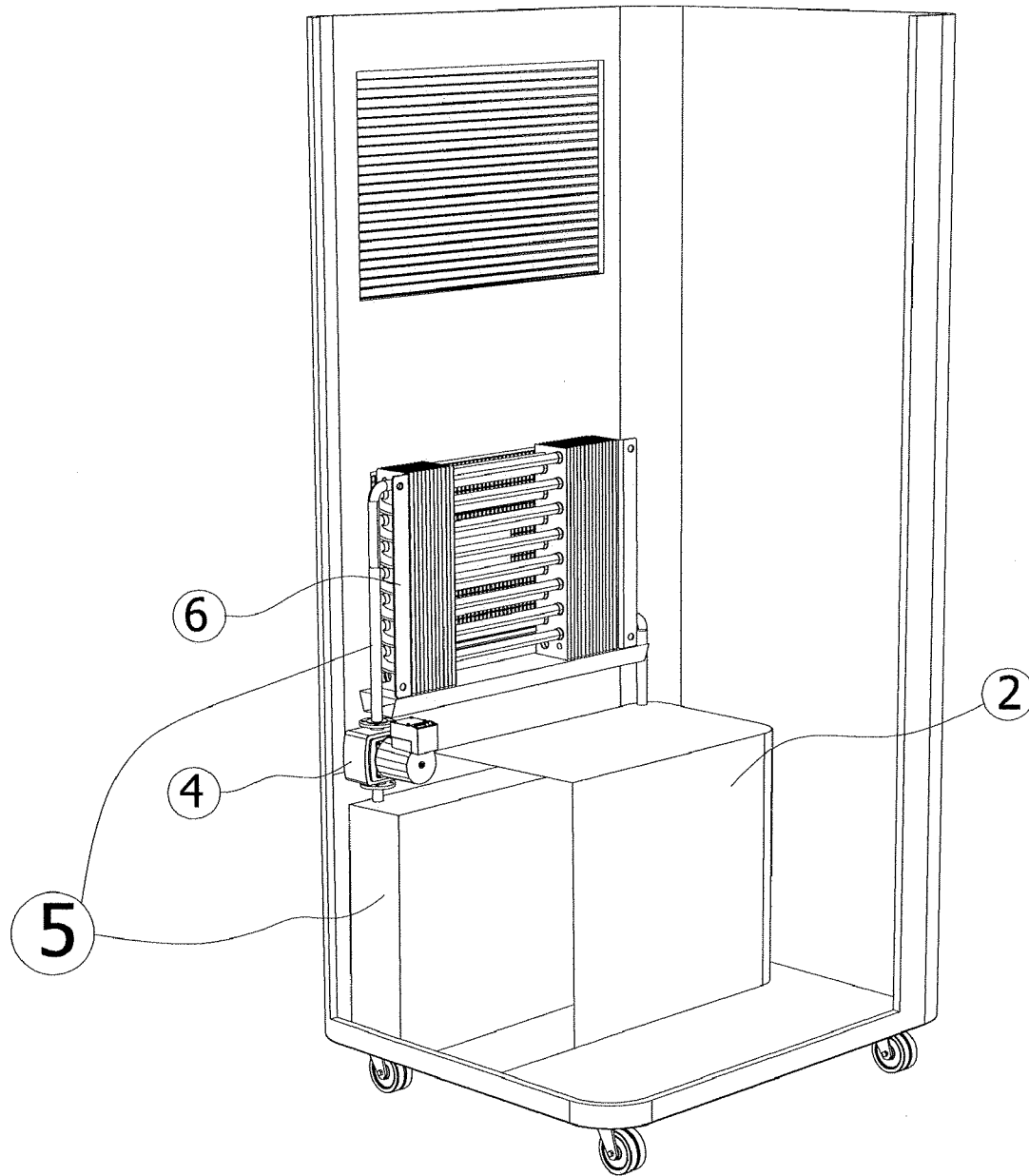


Fig. (4)