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(54) **MULTI-CONNECTED AIR CONDITIONER UNIT AND METHOD OF OPERATING THE SAME**

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(57) **ABSTRACT**

A multi-connected air conditioner unit and method of operating the same, wherein, when an air-side heat exchanger is put into operation, and a water-side heat exchanger is not put into operation, a four-way valve is used to control a refrigerant to pass through said air-side heat exchanger, in realizing the refrigerating or heating operation of said unit; when said air-side heat exchanger is not put into operation, and said water-side heat exchanger is put into operation, said four-way valve is used to control said refrigerant to pass through said water-side heat exchanger to heat water, in achieving full recovery of heat; when both said compressors are put into operations concurrently, a dispenser is used to transport refrigerant oil separated by a second oil separator to an oil inlet pipe, then it is input to said compressor via an air suction pipe; and when a portion of compressor is put into operation, and another portion of compressor is not put into operation, since said air suction pipe is installed upright, said refrigerant oil getting into said compressor not in operation will return to said dispenser under action of gravitational force, then it will move into said compressor in operation, hereby ensuring safety of compressor operations.

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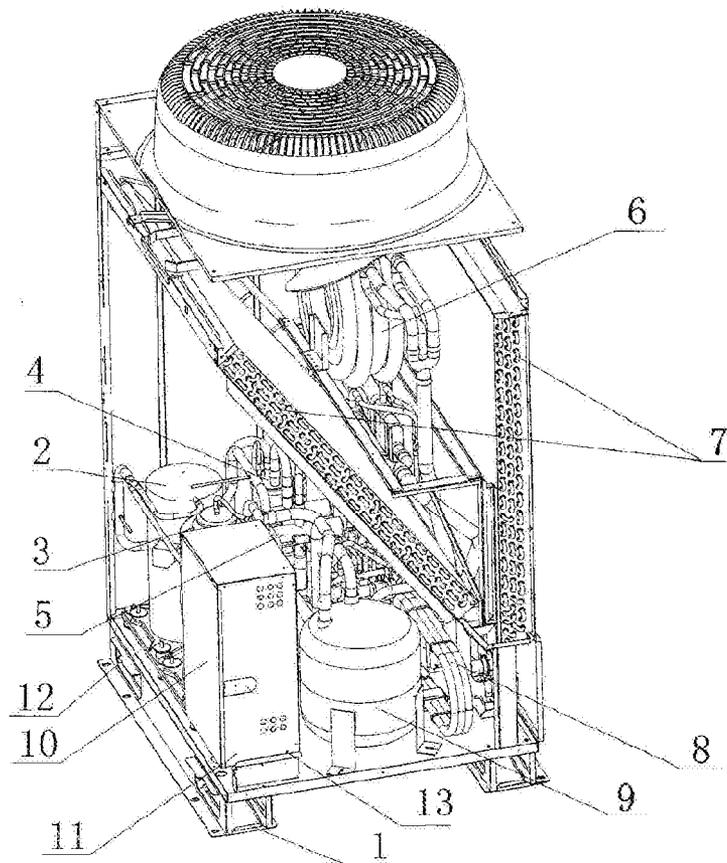
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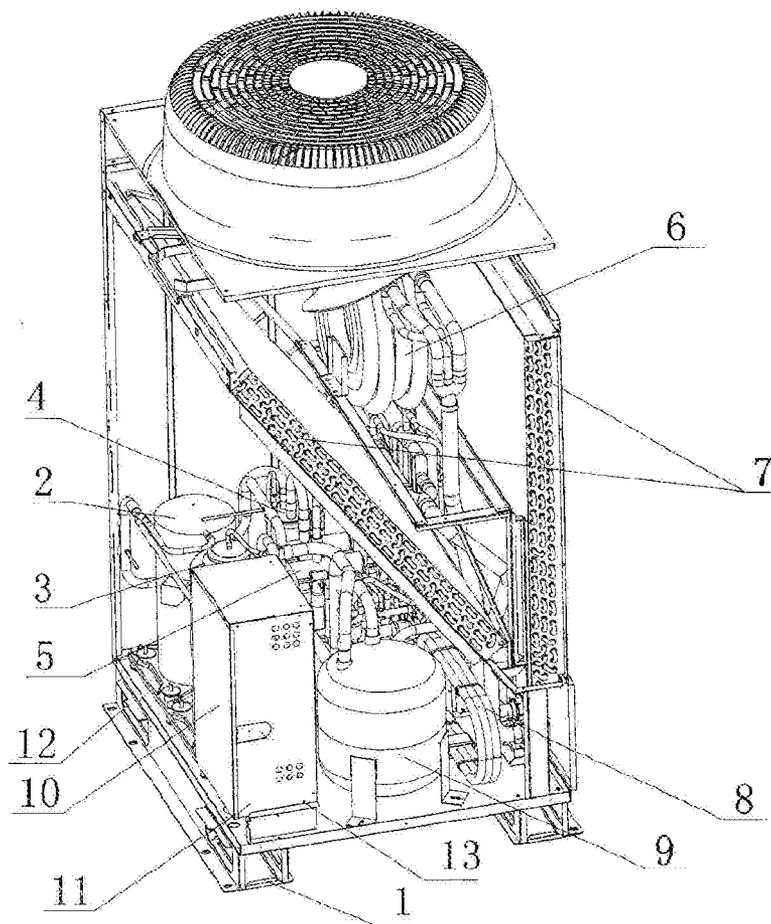


FIG. 1

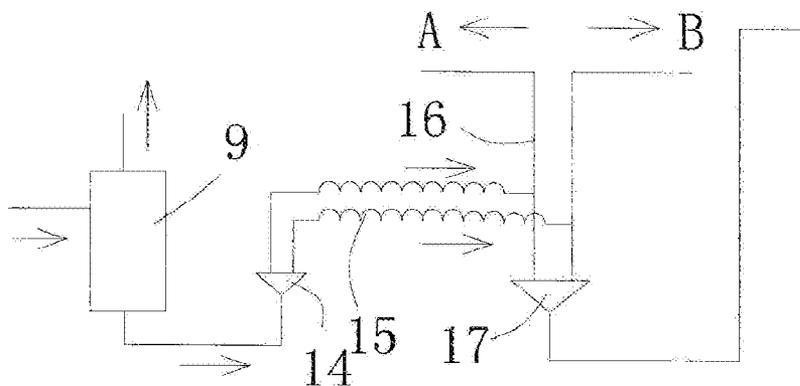


FIG. 2

**MULTI-CONNECTED AIR CONDITIONER UNIT AND METHOD OF OPERATING THE SAME**

**BACKGROUND OF THE INVENTION**

**[0001]** 1. Field of the Invention

**[0002]** The present invention relates to a multi-connected air conditioner unit, and in particular to a multi-connected air conditioner unit and method of operating the same.

**[0003]** 2. Background of the Invention

**[0004]** In general, a multi-connected air conditioner unit includes: a chassis, and a fixed speed compressor, a digital compressor, a first oil separator, a four-way valve, a water-side heat exchanger, an air-side heat exchanger, a super-cooling circuit, a second oil separator, a control box, a refrigeration system component, and connection pipe lines disposed thereon. However, the existing multi-connected air conditioner unit has quite a lot of problems and shortcomings concerning its functions, applications, and performance, so it can no longer fulfill the requirements of the users. Therefore, there is an urgent need for a multi-connected air conditioner unit, that is able to meet the various demands of users.

**SUMMARY OF THE INVENTION**

**[0005]** In view of the problems and shortcomings of the prior art, the present invention provides a multi-connected air conditioner unit, so as to overcome the problems and shortcomings of the prior art.

**[0006]** A major objective of the present invention is to provide a multi-connected air conditioner unit and method of operating the same, the air conditioner unit includes: a chassis, and a fixed speed compressor, a digital compressor, a first oil separator, a four-way valve, a water-side heat exchanger, an air-side heat exchanger, a super-cooling circuit, a second oil separator, a control box, a dispenser, an oil inlet pipe, an air suction pipe, a refrigeration system component, and connection pipe lines disposed thereon, wherein, a set of heat recovery devices are additionally provided in a cavity of the water-side heat exchanger. Said method comprising the following steps: when the air-side heat exchanger is put into operation, and the water-side heat exchanger is not put into operation, the four-way valve is used to control the refrigerant to pass through the air-side heat exchanger, in realizing the refrigerating or heating operation of the unit; when the air-side heat exchanger is not put into operation, and the water-side heat exchanger is put into operation, the four-way valve is used to control the refrigerant to pass through the water-side heat exchanger to heat water, in achieving full recovery of heat; when both the compressors are put into operations concurrently, the dispenser is used to transport the refrigerant oil separated by the second oil separator to the oil inlet pipe, then it is input to the compressor via the air suction pipe; and when a portion of compressor is put into operation, and another portion of compressor is not put into operation, since the air suction pipe is installed upright, the refrigerant oil getting into the compressor not in operation will return to the dispenser under the action of gravitational force, then it will move into the compressor in operation, hereby ensuring the safety of compressor operations.

**[0007]** Preferably, an outer shell is provided for the control box, and a partition plate is disposed inside the outer shell, such that they form an upper receiving space and a lower receiving space. Preferably, the rim of chassis through hole is

provided with a fastening portion to fasten a suspension rope. Preferably, the compressors are wrapped around with muffling devices. Preferably, the bottom plate and side plate of the control box are provided with holes for electric wires to pass through. Preferably, the heat recovery device is provided with water inlet holes and water outlet holes.

**[0008]** In the present invention, the multi-connected air conditioner unit is made of components capable of realizing multiple functions, thus it achieves great improvements over the prior art in functions, applications, and performance, as such fulfilling the requirements of user.

**[0009]** Further scope of the applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the present invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the present invention will become apparent to those skilled in the art from this detailed description.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**[0010]** The related drawings in connection with the detailed description of the present invention to be made later are described briefly as follows, in which:

**[0011]** FIG. 1 is a perspective view of a multi-connected air conditioner unit according to the present invention; and

**[0012]** FIG. 2 is a circuit diagram of a multi-connected air conditioner unit according to the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

**[0013]** The purpose, construction, features, functions and advantages of the present invention can be appreciated and understood more thoroughly through the following detailed description with reference to the attached drawings.

**[0014]** In view of the problems and shortcomings of the prior art, the present invention provides a multi-connected air conditioner unit and method of operating the same. Refer to FIGS. 1 and 2 for a perspective view of a multi-connected air conditioner unit according to the present invention, and a circuit diagram of a multi-connected air conditioner unit according to the present invention respectively. As shown in FIG. 1, the multi-connected air conditioner unit comprising: a chassis 1, and a fixed speed compressor 2, a digital compressor 3, a first oil separator 4, a four-way valve 5, a water-side heat exchanger 6, an air-side heat exchanger 7, a super-cooling circuit 8, a second oil separator 9, a control box 10, a dispenser 14, an oil inlet pipe 15, an air suction pipe 16, a refrigeration system components, and connection pipe lines disposed thereon. Wherein, the control box 10 includes an outer shell 11, and a partition plate (not shown) inside the outer shell 11, such that they form an upper receiving space and a lower receiving space, so the electronic components that are not used frequently are put in the lower receiving space, and the electronic components that are used frequently are put in the upper receiving space to save space and provide convenience in usage. A fastening portion 12 for fastening suspension rope is provided around the rim of the through hole of chassis 1, so that when the suspension rope passes the through hole in suspension, the fastening portion 12 will fasten the suspension rope, to prevent it from slipping to achieve stable suspension. Muffling devices are wrapped

around the compressors, that are made of following materials in preference sequence of sponge, lead plate, sponge and recycled plastic, such that the frequency range of noise absorption is sufficiently wide, ranging from high frequency to low frequency, to achieve effective noise reduction. In the cavity of the water-side heat exchanger 6 is provided with a set of heat recovery devices, that are disposed with water inlet holes and water outlet holes, to heat water and provide water of high temperature for daily usage, so as to save energy consumption. The bottom plate and side plate of the control box 10 is provided with holes 13 for the electric wires to pass through properly, in saving the electric wires utilized and facilitating installation.

[0015] The present invention also provides a method of operating the multi-connected air conditioner unit, comprising the following steps: when the air-side heat exchanger 7 is put into operation, and the water-side heat exchanger 6 is not put into operation, the four-way valve 5 is used to control the refrigerant to pass through the air-side heat exchanger 7, in realizing the refrigerating or heating operation of the unit; when the air-side heat exchanger 7 is not put into operation, and the water-side heat exchanger 6 is put into operation, the four-way valve 5 is used to control the refrigerant to pass through the water-side heat exchanger 6 to heat the water, in achieving full recovery of heat and providing water of high temperature for daily usage, thus saving energy; when both the compressors are put into operations concurrently, the dispenser 14 is used to transport the refrigerant oil separated by the second oil separator 9 to an oil inlet pipe 15, then it is input to the compressor via the air suction pipe 16; and when a portion of compressor is put into operation, and another portion of compressor is not put into operation, since the air suction pipe 16 is installed upright, the refrigerant oil getting into the compressor not in operation will return to the dispenser 17 under the action of gravitational force, then it will move into the compressor in operation, hereby ensuring the safety of compressor operations.

[0016] In the present invention, the multi-connected air conditioner unit is made of components capable of realizing multiple functions, thus it achieves great improvements over the prior art in functions, applications, and performance, as such fulfilling the requirements of user.

[0017] The above detailed description of the preferred embodiment is intended to describe more clearly the characteristics and spirit of the present invention. However, the preferred embodiments disclosed above are not intended to be any restrictions to the scope of the present invention. Conversely, its purpose is to include the various changes and equivalent arrangements which are within the scope of the appended claims.

What is claimed is:

1. A multi-connected air conditioner unit and method of operating the same, said air conditioner unit includes: a chassis, and a fixed speed compressor, a digital compressor, a first oil separator, a four-way valve, a water-side heat exchanger,

an air-side heat exchanger, a super-cooling circuit, a second oil separator, a control box, a dispenser, an oil inlet pipe, an air suction pipe, a refrigeration system component, and connection pipe lines disposed thereon, wherein, a set of heat recovery devices are additionally provided in a cavity of said water-side heat exchanger, and it is characterized in that,

said method comprising following steps: when said air-side heat exchanger is put into operation, and said water-side heat exchanger is not put into operation, said four-way valve is used to control refrigerant to pass through said air-side heat exchanger, in realizing the refrigerating or heating operation of said unit; when said air-side heat exchanger is not put into operation, and said water-side heat exchanger is put into operation, said four-way valve is used to control said refrigerant to pass through said water-side heat exchanger to heat water, in achieving full recovery of heat; when both said compressors are put into operations concurrently, said dispenser is used to transport refrigerant oil separated by said second oil separator to an oil inlet pipe, then it is input to said compressor via said air suction pipe; and when a portion of compressor is put into operation, and another portion of compressor is not put into operation, since said air suction pipe is installed upright, said refrigerant oil getting into said compressor not in operation will return to said dispenser under action of gravitational force, then it will move into said compressor in operation, hereby ensuring safety of compressor operations.

2. The multi-connected air conditioner unit and method of operating the same as claimed in claim 1, and it is characterized in that:

said control box includes an outer shell, and a partition plate inside said outer shell, to form a lower portion receiving space and an upper portion receiving space.

3. The multi-connected air conditioner unit and method of operating the same as claimed in claim 1, and it is characterized in that:

rim of a through hole of said chassis is provided with a fastening portion to fasten a suspension rope.

4. The multi-connected air conditioner unit and method of operating the same as claimed in claim 1, and it is characterized in that:

said compressors are wrapped around with muffling devices.

5. The multi-connected air conditioner unit and method of operating the same as claimed in claim 1, and it is characterized in that:

a bottom plate and side plates of said control box are provided with holes for electric wires to pass through.

6. The multi-connected air conditioner unit and method of operating the same as claimed in claim 1, and it is characterized in that:

said heat recovery device is provided with water inlet holes and water outlet holes.

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