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(54) COMPRESSOR OIL STORAGE ASSEMBLY, AIR CONDITIONER, AND CONTROL METHOD THEREFOR

(57) A compressor oil storage assembly comprises a compressor (100) and an oil storage tank (200). The compressor (100) is provided with an oil discharge opening (110). The oil storage tank (200) is provided with an oil inlet (210) and an oil outlet (220). The oil discharge opening (110) communicates with the oil inlet (210) through a first pipeline (300) that is provided with a first electromagnetic valve (400). The oil outlet (220) communicates with a return air opening of the compressor (100) through a second pipeline (500) that is provided with a second electromagnetic valve (600). Also provided are an air conditioner comprising the compressor oil storage assembly, and a control method therefor. When the compressor (100) is stopped, high-concentration refrigeration oil in the compressor (100) is stored in the oil storage tank (200) in time, and when the compressor (100) is started again, the high-concentration refrigeration oil in the oil storage tank (200) is supplied to the compressor (100) in time, so that the phenomenon that the compressor (100) is in lack of oil after stopped for a long time is effectively avoided.

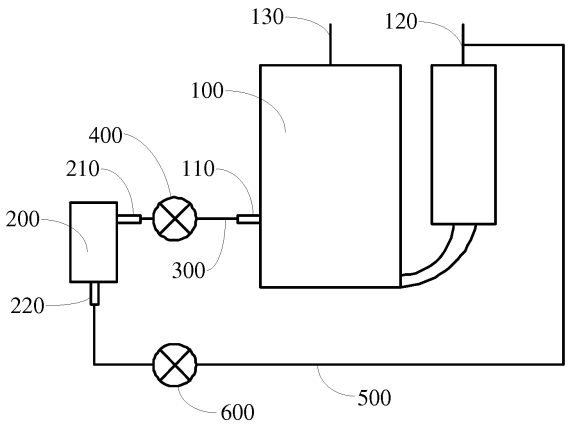

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a field of air conditioner technology, and more particularly to an oil storage assembly for a compressor, an air conditioner and a control method thereof.

BACKGROUND

[0002] When a compressor of an air conditioner is shut down, with an attracting effect of refrigeration oil inside the compressor, refrigerant moves to an inside of the compressor, and mass of the refrigerant would accumulate in the compressor. When the compressor is restarted after long-term shutdown, the mass of the refrigerant accumulated inside the compressor will carry off the refrigeration oil inside the compressor during thermal cycling, resulting in oil shortage of the compressor.

SUMMARY

[0003] A main objective of the present disclosure is to provide an oil storage assembly for a compressor, an air conditioner and a control method thereof, which may aim to solve a technical problem that the compressor is easy to be short of oil after long-term shutdown.

[0004] The oil storage assembly for the compressor provided by the present disclosure includes a compressor and an oil storage tank. The compressor is provided with an oil drain outlet. The oil storage tank is provided with an oil inlet and an oil outlet. The oil drain outlet and the oil inlet are connected with a first pipeline, and the first pipeline is provided with a first electromagnetic valve. A second pipeline is connected between the oil outlet and a return air port of the compressor, and the second pipeline is provided with a second electromagnetic valve.

[0005] Preferably, a height of the oil drain outlet relative to a bottom of the compressor is less than half a height of the compressor.

[0006] Preferably, the oil drain outlet is higher than a top of a cylinder inside the compressor.

[0007] Preferably, a diameter of the first pipeline is less than or equal to a diameter of an air outlet of the compressor.

[0008] Further, the oil storage assembly for the compressor is applied to an air conditioner, both the first electromagnetic valve and the second electromagnetic valve are connected with a controller of the air conditioner, wherein the controller is configured to control the second electromagnetic valve to turn off and control the first electromagnetic valve to turn on when receiving a stop signal, to enable the oil storage tank to store oil when the compressor is shut down; the controller is configured to control the first electromagnetic valve to turn off when the oil storage tank finishes storing oil during shutdown of the compressor; the controller is configured to control the second electromagnetic valve to turn on to enable the oil storage tank to drain oil when receiving a power-on signal.

[0009] Further, before controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on to enable the oil storage tank to store oil when the compressor is shut down, the controller is further configured to control the first electromagnetic valve to turn off and control the second electromagnetic valve to turn on for a first preset time period, which enables the oil storage tank to switch to a negative pressure state.

[0010] Further, after controlling the second electromagnetic valve to turn on when receiving the power-on signal, the controller is further configured to turn off the second electromagnetic valve when the oil storage tank finishes draining oil.

[0011] Further, when the compressor is operating, the controller is further configured to calculate a discharge superheat degree of the compressor, and to control the second electromagnetic valve to turn off and control the first electromagnetic valve to turn on when the discharge superheat degree continues to be greater than a preset threshold for a second preset time period, to enable the oil storage tank to store oil during operating process of the compressor. When the oil storage tank finishes storing oil during operating of the compressor, the controller is further configured to turn off the first electromagnetic valve.

[0012] In addition, an air conditioner further provided by the present disclosure includes an oil storage assembly for a compressor. The oil storage assembly of the compressor includes a compressor and an oil storage tank. The compressor is provided with an oil drain outlet. The oil storage tank is provided with an oil inlet and an oil outlet. The oil drain outlet and the oil inlet are connected with a first pipeline, and the first pipeline is provided with a first electromagnetic valve. A second pipeline is connected between the oil outlet and a return air port of the compressor, and the second pipeline is provided with a second electromagnetic valve.

[0013] In addition, a control method of an air conditioner further provided by the present disclosure includes:

controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on when receiving a stop signal to enable the oil storage tank to store oil when the compressor is shut down;

turning off the first electromagnetic valve when the oil storage tank finishes storing oil during shutdown of the compressor;

controlling the second electromagnetic valve to turn on to enable the oil storage tank to drain oil when receiving a power-on signal.

[0014] Preferably, before controlling the second electromagnetic valve to turn off and controlling the first elec-

tromagnetic valve to turn on, the control method further includes:
controlling the first electromagnetic valve to turn off and controlling the second electromagnetic valve to turn on for a first preset time period, to enable the oil storage tank to switch to a negative pressure state.

[0015] Preferably, after controlling the second electromagnetic valve to turn on when receiving the power-on signal, the control method further includes:
turning off the second electromagnetic valve when the oil storage tank finishes draining oil.

[0016] Preferably, the control method further includes:

when the compressor is operating, calculating a discharge superheat degree of the compressor;
when the discharge superheat degree is greater than a preset threshold for a second preset time period, controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on, to enable the oil storage tank to store oil when the compressor is operating;
when the oil storage tank finishes storing oil during operating of the compressor, turning off the first electromagnetic valve.

[0017] Preferably, before controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on to enable the oil storage tank to store oil when the compressor is operating, the control method further includes:
controlling the first electromagnetic valve to turn off and controlling the second electromagnetic valve to turn on for a third preset time period, to enable the oil storage tank to switch to a negative pressure state.

[0018] The present disclosure further provides a non-transitory computer-readable storage medium. The storage medium is stored with computer programs, in which the programs are configured to be executed by a processor to realize the control method above.

[0019] The oil storage assembly for the compressor, the air conditioner and the control method thereof provided by the present disclosure control the second electromagnetic valve to turn off and control the first electromagnetic valve to turn on when receiving the stop signal , to enable the refrigeration oil in the compressor to flow into the oil storage tank via the first pipeline, which controls the oil storage tank to store oil when the compressor is shut down; and control the first electromagnetic valve to turn off when the oil storage tank finishes storing oil during shutdown of the compressor; and control the second electromagnetic to turn on when receiving the power-on signal, to enable the refrigeration oil in the oil storage tank to flow into the compressor via the second pipeline, which controls the oil storage tank to drain oil. In this way, when the compressor is shut down, the refrigeration oil with a high concentration inside the oil storage tank may be stored in the oil storage tank in time, and when the compressor is restarted, the refrigeration oil with the high concentration inside the oil storage tank may be provided to the compressor in time, and thus an occurrence of the oil shortage of the compressor after a long-time shutdown is effectively avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Fig. 1 is a block diagram illustrating an oil storage assembly for a compressor according to the present disclosure.
Fig. 2 is a flow chart illustrating a control method of an air conditioner according to a first embodiment of the present disclosure.

[0021] Implementation of objectives, and functional features and advantages of the present disclosure will be further illustrated in combination with embodiments and with reference to drawings.

DETAILED DESCRIPTION

[0022] It is to be understood that, specific embodiments described herein are used to explain the present disclosure, and are not used to limit the present disclosure.

[0023] The present disclosure provides an oil storage assembly for a compressor, which is applied to an air conditioner. Referring to Fig.1, which is a block diagram illustrating the oil storage assembly for the compressor according to an embodiment of the present disclosure, the oil storage assembly for the compressor includes a compressor 100 and an oil storage tank 200. The compressor 100 is provided with an oil drain outlet 110. The oil storage tank 200 is provided with an oil inlet 210 and an oil outlet 220. The oil drain outlet 110 and the oil inlet 210 are connected with a first pipeline 300, and the first pipeline 300 is provided with a first electromagnetic valve 400. A second pipeline 500 is connected between the oil outlet 220 and a return air port 120 of the compressor 100, and the second pipeline 500 is provided with a second electromagnetic valve 600.

[0024] In this embodiment, the oil drain outlet 110 of the compressor 100, the first pipeline 300, the oil inlet 210 of the oil storage tank 200, the oil outlet 220 of the oil storage tank 200, the second pipeline 500 and the return air port 120 of the compressor 100 are sequentially connected, forming a circuit.

[0025] Alternatively, both the first electromagnetic valve 400 and the second electromagnetic valve 600 are connected with a controller of the air conditioner, wherein the controller is configured to control the first electromagnetic valve 400 and the second electromagnetic valve 600 to turn on and off.

[0026] Alternatively, the controller may control the second electromagnetic valve 600 to turn off and control the first electromagnetic valve 400 to turn on when receiving

a stop signal, to enable the refrigeration oil in the compressor 100 to flow into the oil storage tank 200 via the first pipeline 300, so as to control the oil storage tank 200 to store oil when the compressor 100 is shut down.

[0027] When the oil storage tank 200 finishes storing oil during shutdown of the compressor 100, the controller may turn off the first electromagnetic valve 400.

[0028] When receiving a power-on signal, the controller may control the second electromagnetic valve 600 to turn on, to enable the refrigeration oil in the oil storage tank 200 to flow into the compressor 100 via the second pipeline 500, so as to enable the oil storage tank 200 to drain oil.

[0029] In embodiments, when the controller detects that the compressor 100 is shut down, it can be considered that the controller receives the stop signal; or when the controller receives the shutdown signal sent by a user, it can be considered that the controller receives the stop signal. When the first electromagnetic valve 400 is controlled to turn on, the refrigeration oil in the compressor 100 can flow into the oil storage tank 200 via the pipeline 100 under the high pressure inside the compressor 100, such that the oil storage tank 200 can store oil when the compressor is shut down.

[0030] When the controller receives the stop signal, and controls the second electromagnetic valve 600 to turn off and controls the first electromagnetic valve 400 to turn on for a fifth preset time period, it can be considered that the oil storage tank 200 finishes storing oil when the compressor is shut down. Alternatively, an oil level detecting device may be arranged in the oil storage tank 200 for detecting an oil-storing volume of the oil storage tank 200, and when the oil level detecting device detects that the oil-storing volume of the oil storage tank 200 reaches a preset oil volume, it can be considered as finishing storing oil. The oil level detecting device may include, for example, a float provided in the oil storage tank 200 and a proximity switch provided on the top of the oil storage tank 200, and the proximity switch automatically switches on or off depending on the distance between the float and the proximity switch.

[0031] When the compressor 100 is restarted, the first electromagnetic valve 400 is in a turn-off state, and the second electromagnetic valve 600 is controlled to turn on. Under a negative pressure of the return air port 120 of the compressor 100, the refrigeration oil in the oil storage tank 200 may flow into the compressor 100 via the second pipeline500, such that the refrigeration oil in the oil storage tank 200 returns to the inside of the compressor 100 again, and thus the occurrence of the oil shortage of the compressor 100 after long-term shutdown is avoided.

[0032] In embodiments, when the compressor 100 is steadily operating, oil temperature of the refrigeration oil at the bottom of the compressor 100 is relatively high, and concentration of the refrigeration oil may be relatively high. When the compressor 100 is shut down, the refrigeration oil with the relatively high concentration in the compressor 100 can flow into the oil storage tank 200 through the oil drain outlet 110 and the first pipeline 300. When the oil storage is completed, the first electromagnetic valve 400 is controlled to turn off, such that the stored refrigeration oil is sealed in the oil storage tank 200. When the compressor 100 is shut down for a long time, the refrigeration oil at the bottom of the compressor 100 is diluted with transferred refrigerant, and the concentration of the refrigeration oil in the oil storage tank 200 is higher at this time. When the compressor 100 is restarted, the second electromagnetic valve 600 is turned on, such that the refrigeration oil with the relatively high concentration in the oil storage tank 200 returns into the compressor 100 through the oil outlet 220 and the second pipeline 500, and thus the refrigeration oil with the higher concentration is provided to the compressor 100 in time, which increases the concentration of the refrigeration oil at the bottom of the compressor 100, and effectively avoids the oil shortage in the compressor 100.

[0033] Further, a height of the oil drain outlet 110 relative to the bottom of the compressor 100 is less than half a height of the compressor100. Since the refrigeration oil of the compressor 100 usually accumulates at the bottom of the compressor 100, the height of the oil drain outlet 110 cannot be too high, otherwise the refrigeration oil will not reach the oil drain outlet 110.

[0034] Further, in order to ensure a normal operation of a cylinder inside the compressor 100, the oil drain outlet 110 is higher than a top of the cylinder inside the compressor, such that the oil level of the refrigeration oil inside the compressor 100 is always higher than the cylinder, which ensures that the refrigeration oil always exists at the periphery of the cylinder, so that the cylinder can always work normally.

[0035] Further, a diameter of the first pipeline 300 is less than or equal to a diameter of the air outlet 130 of the compressor100. Therefore, it ensures that the pressure at the air outlet 130 of the compressor 100 is not too small due to the exhaust action of the first pipeline 300, ensuring a heat exchange capacity of the air conditioner.

[0036] Further, a volume of the oil storage tank 200 is between 10% and 20% of a volume of the refrigeration oil of the air conditioner. Therefore, it not only ensures that the compressor 100 is not short of oil during the long-term shutdown, but also can ensure that the oil storage tank 200 does not affect the heat exchange capability of the compressor 100 too much after storing oil.

[0037] Further, a height of the oil inlet 210 of the oil storage tank 200 relative to the bottom of the oil storage tank 200 is greater than two-thirds of the height of the oil storage tank 200. Since the refrigeration oil flowing out through the oil drain outlet 110 of the compressor 100 may contain gaseous refrigerant, the oil inlet 210 of the oil storage tank 200 may be provided at a higher position of the oil storage tank 200, which is more advantageous for the refrigeration oil inside the compressor 100 to enter into the oil storage tank 200 via the first pipeline 300.

Preferably, the oil outlet 220 is provided at the bottom of the oil storage tank 200, which is more advantageous for the refrigeration oil in the oil storage tank 200 to flow into the compressor 100.

[0038] The present disclosure further provides an air conditioner. The air conditioner includes a controller and an oil storage assembly for a compressor. With respect to a specific structure of the oil storage assembly for the compressor, reference can be made to the above embodiments. Since the air conditioner adopts all the technical solutions of all the above embodiments of the compressor oil storage assembly, it also has all the beneficial effects brought by the technical solutions of the above embodiments, which will not be elaborated herein.

[0039] The present disclosure provides a control method for an air conditioner. With respect to a structure of the air conditioner, reference may be made to the embodiments above, which will not be elaborated here. Referring to Fig. 2, which is a flow chart illustrating a control method of an air conditioner according to a first embodiment of the present disclosure, a control method of an air conditioner provided by the present disclosure includes the following steps.

[0040] In block S10, when a stop signal is received, the second electromagnetic valve 600 is controlled to turn off, the first electromagnetic valve 400 is controlled to turn on, to enable the refrigeration oil in the compressor 100 to flow into the oil storage tank 200 via the first pipeline 300, so as to control the oil storage tank 200 to store oil when the compressor 100 is shut down.

[0041] In embodiments, when the controller detects that the compressor 100 is shut down, it can be considered that the stop signal is received; or when the controller receives the shutdown signal sent by a user, it can be considered that the stop signal is received. When the first electromagnetic valve 400 is controlled to turn on, the refrigeration oil in the compressor 100 may flow into the oil storage tank 200 via the pipeline 100 under the high pressure inside the compressor 100, such that the oil storage tank 200 can store oil when the compressor is shut down.

[0042] In block S20, when the oil storage tank 200 finishes storing oil during shutdown of the compressor 100, the first electromagnetic valve 400 is controlled to turn off.

[0043] When the controller receives the stop signal, and controls the second electromagnetic valve 600 to turn off and controls the first electromagnetic valve 400 to turn on for a fifth preset time period, it can be considered that the oil storage tank 200 finishes storing oil when the controller is shut down. Alternatively, an oil level detecting device may be arranged in the oil storage tank 200 for detecting an oil-storing volume of the oil storage tank 200, and when the oil level detecting device detects that the oil-storing volume of the oil storage tank 200 reaches a preset oil volume, it can be considered as finishing storing oil. The oil level detecting device may include, for example, a float provided in the oil storage tank 200 and a proximity switch provided on the top of the oil storage tank 200, and the proximity switch automatically switches on or off depending on the distance between the float and the proximity switch.

[0044] In block S30, when a power-on signal is received, the second electromagnetic valve 600 is controlled to turn on, such that the refrigeration oil in the oil storage tank 200 flows into the compressor 100 via the second pipeline 500, to enable the oil storage tank 200 to drain oil.

[0045] When the compressor 100 is restarted, the first electromagnetic valve 400 is in a turn-off state, and the second electromagnetic valve 600 is controlled to turn on. Under a negative pressure of the return air port 120 of the compressor 100, the refrigeration oil in the oil storage tank 200 may flow into the compressor 100 via the second pipeline 500, such that the refrigeration oil in the oil storage tank 200 returns to the inside of the compressor 100 again, and thus the occurrence of the oil shortage of the compressor 100 after long-term shutdown is avoided.

[0046] Alternatively, when the oil storage tank 200 finishes draining oil, the second electromagnetic valve 600 is controlled to turn off. In this way, the oil storage tank 200 does not always communicate with the compressor 100, and further does not affect the heat exchange capacity of the compressor 100 during the normal operating process of the compressor 100. When the power-on signal is received, and when the second electromagnetic valve 600 is controlled to turn on for a fourth preset time period, it can be considered that the oil storage tank 200 finishes draining oil.

[0047] In embodiments, when the compressor 100 is steadily operating, oil temperature of the refrigeration oil at the bottom of the compressor 100 is relatively high, and concentration of the refrigeration oil may be relatively high. When the compressor 100 is shut down, the refrigeration oil with the relatively high concentration inside the compressor 100 can flow into the oil storage tank 200 through the oil drain outlet 110 and the first pipeline 300. When the oil storage is completed, the first electromagnetic valve 400 is controlled to turn off, such that the stored refrigeration oil is sealed in the oil storage tank 200. When the compressor 100 is shut down for a long time, the refrigeration oil at the bottom of the compressor 100 is diluted with transferred refrigerant, and the concentration of the refrigeration oil in the oil storage tank 200 is higher at this time. When the compressor 100 is restarted, the second electromagnetic valve 600 is turned on, such that the refrigeration oil with the relatively high concentration in the oil storage tank 200 returns into the compressor 100 through the oil outlet 220 and the second pipeline 500, and thus the refrigeration oil with the higher concentration is provided to the compressor 100 in time, which increases the concentration of the refrigeration oil at the bottom of the compressor 100, and effectively avoids the oil shortage in the compressor 100.

[0048] With the present disclosure, when the stop signal is received, the second electromagnetic valve 200 is

controlled to turn off, and the first electromagnetic valve 400 is controlled to turn on, such that the refrigeration oil in the compressor 100 flows into the oil storage tank 200 via the first pipeline 300, which controls the oil storage tank 200 to store oil when the compressor 100 is shut down. Moreover, when the oil storage tank 200 finishes storing oil during shutdown of the compressor, the first electromagnetic valve 400 is turned off, and when the power-on signal is received, the second electromagnetic valve 600 is controlled to turn on, such that the refrigeration oil in the oil storage tank 200 flows into the compressor 100 via the second pipeline 500, which control the oil storage tank 200 to drain oil. Therefore, when the compressor 100 is shut down, the refrigeration oil with the relatively high concentration inside the compressor 100 may be stored in the oil storage tank 200 in time, and when the compressor 100 is restarted, the high-concentration refrigeration oil in the oil storage tank 200 can be provided to the compressor 100 in time, and thus the oil shortage of the compressor 100 after long-term shutdown is effectively avoided.

[0049] Further, in order to further improve the automatic oil storage capacity of the oil storage tank 200, based on the first embodiment of a control method of an air conditioner in the present disclosure, the present disclosure further provides a second embodiment of the control method of the air conditioner, which further performs following operations before controlling the second electromagnetic valve 600 to turn off and controlling the first electromagnetic valve400 to turn on to enable the oil storage tank 200 to store oil when the compressor is shut down:

controlling the first electromagnetic valve 400 to turn off and controlling the second electromagnetic valve 600 to turn on for a first preset time period, to enable the oil storage tank 200 to switch to a negative pressure state.

[0050] In embodiments, when the stop signal is received, before the second electromagnetic valve 600 is controlled to turn off and the first electromagnetic valve 400 is controlled to turn on, the first electromagnetic valve 400 is controlled to turn off and the second electromagnetic valve 600 is controlled to turn on for a first preset time period. Or, it is also possible to control the first electromagnetic valve 400 to turn off and control the second electromagnetic valve 600 to turn on for a first preset time period before receiving the stop signal, that is, during operating of the compressor 100.

[0051] The return air port 120 of the compressor 100 has a suction force during operating of the compressor 100, and the suction force of the return air port 120 keeps existing until the stop signal is received. Therefore, when the first electromagnetic valve 400 is turned off and the second electromagnetic valve 600 is turned on, a pressure in the oil storage tank 200 will gradually decrease under the suction force of the return air port 120 of the compressor 100, reaching a low pressure state, which can be referred as a negative pressure state. Therefore, when the oil storage tank 200 is controlled to store oil, the refrigeration oil in the compressor 100 is easy to flow into the oil storage tank 200 in the negative pressure state.

[0052] Further, based on the first or the second embodiment of the control method of the air conditioner in the present disclosure, the present disclosure further provides a third embodiment of the control method of the air conditioner, which further includes:

calculating a discharge superheat degree of the compressor 100 when the compressor 100 is operating;

when the discharge superheat degree is greater than a preset threshold for a second preset time period, controlling the second electromagnetic valve 600 to turn off and controlling the first electromagnetic valve 400 to turn on, to enable the refrigeration oil in the compressor 100 to flow into the oil storage tank 200 via the first pipeline300, such that the oil storage tank 200 is controlled to store oil when the compressor 100 is operating; and

when the oil storage tank 200 finishes storing oil during operating of the compressor 100, turning off the first electromagnetic valve 400.

[0053] In embodiments, the discharge superheat degree is a difference between a discharge temperature and a discharge saturation temperature of the compressor 100. The discharge superheat degree is an existing concept, and will not be described in detail here.

[0054] It is to be understood that, when the compressor is operating, and the discharge superheat degree does not continue to be greater than a preset threshold for a second preset time period, the first electromagnetic valve 400 is always in the turn-off state. At this time, optionally, the second electromagnetic valve 600 is also in the turn-off state. During operating of the compressor 100, the discharge superheat degree of the compressor 100 may be detected in real time, and it is determined whether the discharge superheat degree is greater than the preset threshold for the second preset time period.

[0055] The preset threshold may be between 5°C and 15°C. Alternatively, it can be set to 10°C. Alternatively, the second preset duration may be about 5 minutes.

[0056] When the second electromagnetic valve 600 is controlled to turn off and the first electromagnetic valve 400 is controlled to turn on for a sixth preset time period after the discharge superheat degree continues to be greater than the preset threshold for the second preset time period, it can be considered that the oil storage tank 200 finishes storing oil during operating of the compressor 100. Or, when the oil level detecting device detects that the oil-storing volume of the oil storage tank 200 reaches the preset oil volume, it can be considered that the oil storage tank 200 finishes storing oil during operating of the compressor 100.

[0057] In embodiments, when the discharge superheat degree continues to be at a high level for a long time

during the operating of the compressor 100, concentration of the refrigeration oil in the compressor 100 is relatively high, and excess refrigeration oil in the compressor 100 may be stored, which further increases the concentration of the oil storage in the oil storage tank 200, and effectively avoids the shortage of oil when the compressor 100 is shut down.

[0058] Further, in order to further improve the automatic oil storage capacity of the oil storage tank 200, based on the third embodiment of the control method of the air conditioner in the present disclosure, the present disclosure further provides a forth embodiment of a control method of an air conditioner, which further includes following operations before controlling the second electromagnetic valve 600 to turn off and controlling the first electromagnetic valve 400 to turn on to enable the oil storage tank 200 to store oil during operating of the compressor 100:

controlling the first electromagnetic valve 400 to turn off and controlling the second electromagnetic valve 600 to turn on for a third preset time period, to enable the oil storage tank 200 to switch to a negative pressure state.

[0059] In embodiments, when the discharge superheat degree continues to be greater than a preset threshold for a second preset time period, it is possible to first control the first electromagnetic valve 400 to turn off and control the second electromagnetic valve 600 to turn on for the third time period before controlling the second electromagnetic valve 600 to turn off and controlling the first electromagnetic valve 400 to turn on. Or, it is also possible to control the first electromagnetic valve 400 to turn off and control the second electromagnetic valve 600 to turn on for the third time period after the compressor 100 is on or during operating of the compressor100, such that when the discharge superheat degree continues to be greater than the preset threshold for the second preset time period, the oil storage tank 200 can be switched to a negative state in advance.

[0060] The return air port 120 of the compressor 100 has a suction force during operating of the compressor 100, and the suction force of the return air port 120 keeps existing until the stop signal is received. Therefore, when the first electromagnetic valve 400 is turned off and the second electromagnetic valve 600 is turned on, a pressure in the oil storage tank 200 will gradually decrease under the suction force of the return air port 120 of the compressor 100, reaching a low pressure state, which can be referred as a negative pressure state. Therefore, when the oil storage tank 200 is controlled to store oil, the refrigeration oil in the compressor 100 is easy to flow into the oil storage tank 200 in the negative pressure state.

[0061] Embodiments of the present disclosure further provide a non-transitory computer-readable storage medium. The storage medium is stored with computer programs, in which the programs are configured to be executed by a processor to realize the control method of the air conditioner described above.

[0062] It should be noted that, as used herein, the terms "comprise," "include," or any other variation thereof are intended to cover a non-exclusive inclusion, so that a process, method, article, or device including a serious elements not only include those elements, but also other elements that are not explicitly listed, or further include elements that are inherent to such process, method, article, or device. In the absence of more restrictions, an element defined by the phrase "includes a..." does not exclude the existence of another identical element in the process, the method, the article, or the device that includes the element.

[0063] The sequence numbers of the foregoing embodiments of the present disclosure are merely for description and do not represent the advantages and disadvantages of the embodiments.

[0064] Through the above description of the embodiments, those skilled in the art can clearly understand that the above embodiment methods can be implemented by means of software plus a necessary general hardware platform, and of course, can also be achieved through hardware. But in many cases the former is a better implementation. Based on this understanding, the technology solution of the present disclosure essentially or in a part contributing to a related technology may be embodied in the form of a software product, the computer software product is stored in a memory medium (it may be ROM/RAM, a magnetic disk, or an optical disk), several instructions are included to enable a terminal device(it may be a telephone, a computer, a server, an air conditioner, or a network device, etc.) to perform the methods described in the various embodiments of the present disclosure.

[0065] In addition, the description of "first", "second" and the like in the present disclosure is only for description purpose, it cannot be understood as indicating or implying its relative importance or implying the number of indicated technology features. Thus, features defined as "first", "second" may explicitly or implicitly include at least one of the features. In addition, the technology solutions between various embodiments can be combined with each other, but they must be based on the realization of ordinary skilled in the art, when the combination of technology solutions is contradictory or unachievable, it should be considered that the combination of such technology solutions does not exist and is not within the protection scope of the present disclosure.

[0066] The above are merely preferred embodiments of the present disclosure, and thus do not limit the scope of the present disclosure. Any equivalent structure or equivalent process transformation made by using the contents of the specification and drawings of the present disclosure, or directly or indirectly applied in other related technical fields, is similarly included in the scope of patent protection of the present disclosure.

Claims

1. An oil storage assembly for a compressor, comprising a compressor and an oil storage tank, wherein the compressor is provided with an oil drain outlet, the oil storage tank is provided with an oil inlet and an oil outlet, the oil inlet and the oil drain outlet are connected with a first pipeline, and the first pipeline is provided with a first electromagnetic valve; a second pipeline is connected between the oil outlet and a return air port of the compressor, and the second pipeline is provided with a second electromagnetic valve.

2. The assembly according to claim 1, wherein a height of the oil drain outlet relative to a bottom of the compressor is less than half a height of the compressor.

3. The assembly according to claim 2, wherein the oil drain outlet is higher than a top of a cylinder inside the compressor.

4. The assembly according to claim 1, wherein a diameter of the first pipeline is less than or equal to a diameter of an air outlet of the compressor.

5. The assembly according to any of claims 1-4, wherein the oil storage assembly for the compressor is applied to an air conditioner, both the first electromagnetic valve and the second electromagnetic valve are connected with a controller of the air conditioner, wherein,
the controller is configured to control the second electromagnetic valve to turn off and control the first electromagnetic valve to turn on when receiving a stop signal, to enable the oil storage tank to store oil when the compressor is shut down;
the controller is configured to control the first electromagnetic valve to turn off when the oil storage tank finishes storing oil during shutdown of the compressor;
the controller is configured to control the second electromagnetic valve to turn on to enable the oil storage tank to drain oil when receiving a power-on signal.

6. The assembly according to claim 5, wherein before controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on to enable the oil storage tank to store oil when the compressor is shut down, the controller is further configured to control the first electromagnetic valve to turn off and control the second electromagnetic valve to turn on for a first preset time period, to enable the oil storage tank to switch to a negative pressure state.

7. The assembly according to claim 5, wherein after controlling the second electromagnetic valve to turn on when receiving the power-on signal, the controller is further configured to turn off the second electromagnetic valve when the oil storage tank finishes draining oil.

8. The assembly according to claim 5, wherein the controller is further configured to calculate a discharge superheat degree of the compressor when the compressor is operating, and to control the second electromagnetic valve to turn off and control the first electromagnetic valve to turn on when the discharge superheat degree continues to be greater than a preset threshold for a second preset time period, to enable the oil storage tank to store oil when the compressor is operating;
the controller is further configured to turn off the first electromagnetic valve, when the oil storage tank finishes storing oil during operating of the compressor.

9. An air conditioner, comprising the oil storage assembly for a compressor according to any of claims 1-8.

10. A control method of an air conditioner according to claim 9, comprising:

    controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on when receiving a stop signal, to enable the oil storage tank to store oil when the compressor is shut down;
    turning off the first electromagnetic valve when the oil storage tank finishes storing oil during shutdown of the compressor;
    controlling the second electromagnetic valve to turn on to enable the oil storage tank to drain oil, when receiving a power-on signal.

11. The control method according to claim 10, wherein before controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on to enable the oil storage tank to store oil when the compressor is shut down, the control method further comprises:
controlling the first electromagnetic valve to turn off and controlling the second electromagnetic valve to turn on for a first preset time period, to enable the oil storage tank to switch to a negative pressure state.

12. The control method according to claim 10, wherein after controlling the second electromagnetic valve to turn on when receiving the power-on signal, the control method further comprises:
turning off the second electromagnetic valve when the oil storage tank finishes draining oil.

13. The control method according to any of claims 10-12, further comprising:

calculating a discharge superheat degree of the compressor when the compressor is operating;
controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on when the discharge superheat degree is greater than a preset threshold for a second preset time period, to enable the oil storage tank to store oil when the compressor is operating;
turning off the first electromagnetic valve, when the oil storage tank finishes storing oil during operating of the compressor .

14. The control method according to claim 13, wherein before controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to be turn on to enable the oil storage tank to store oil when the compressor is operating, the control method further comprises:
controlling the first electromagnetic valve to turn off and controlling the second electromagnetic valve to turn on for a third preset time period, to enable the oil storage tank to switch to a negative pressure state.

15. A non-transitory computer-readable storage medium, stored with computer programs, wherein the programs are configured to be executed by a processor to realize the control method according to any of claims 10-14.

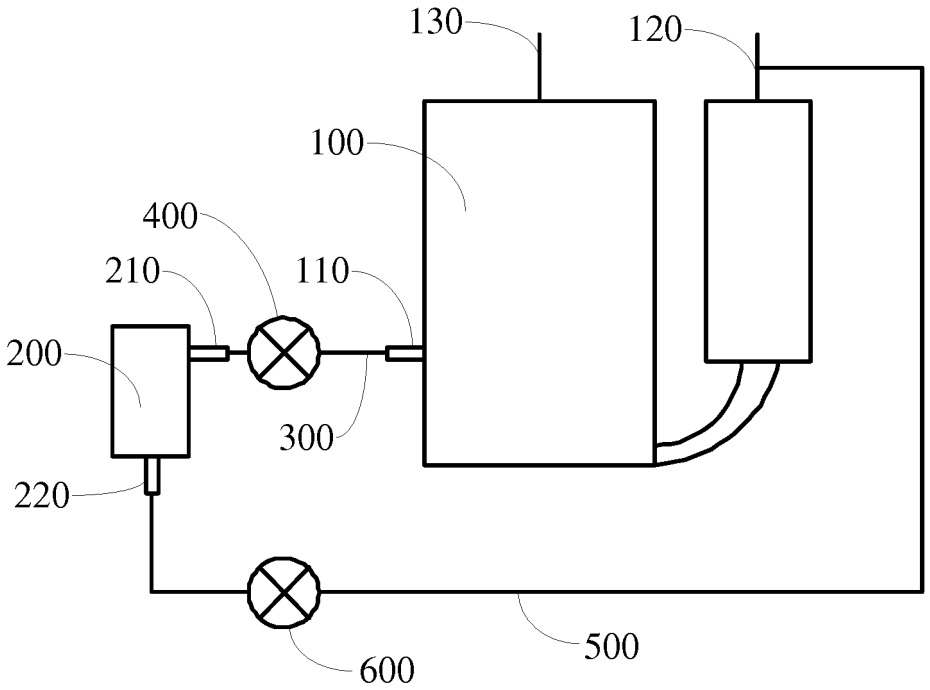
130
120
100
400
210
110
200
300
220
500
600

Fig. 1

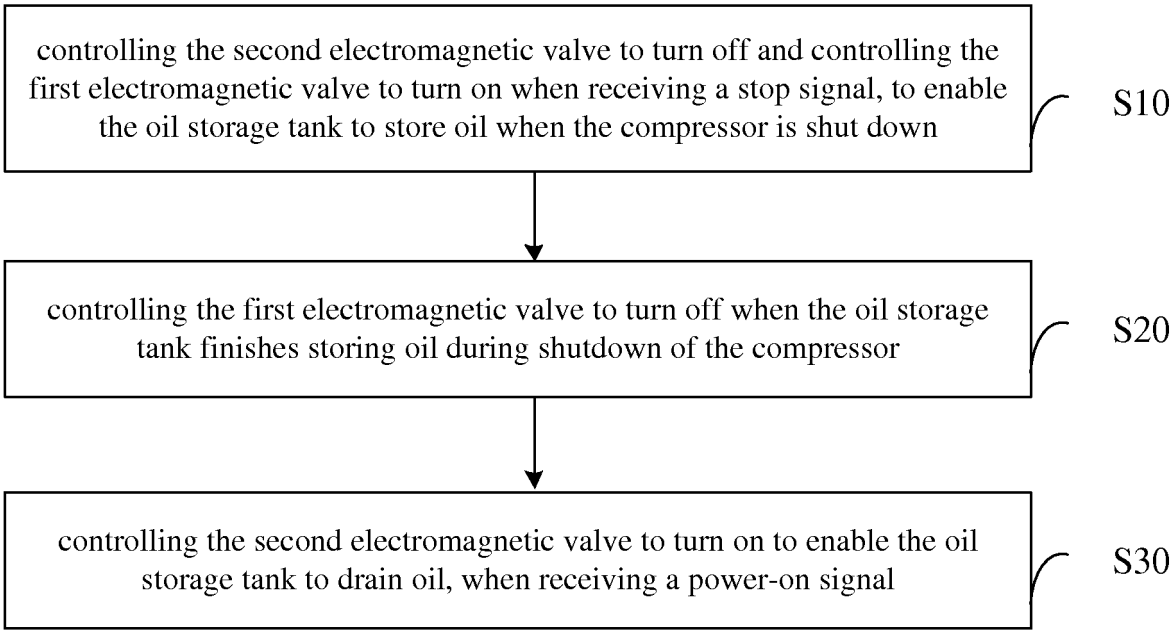
controlling the second electromagnetic valve to turn off and controlling the first electromagnetic valve to turn on when receiving a stop signal, to enable the oil storage tank to store oil when the compressor is shut down
S10
controlling the first electromagnetic valve to turn off when the oil storage tank finishes storing oil during shutdown of the compressor
S20
controlling the second electromagnetic valve to turn on to enable the oil storage tank to drain oil, when receiving a power-on signal
S30

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/086706

A. CLASSIFICATION OF SUBJECT MATTER

F25B 41/04 (2006.01) i; F25B 43/00 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F25B 41; F25B 43; F25B 49; F25B 31

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, CNTXT, CNKI, DWPI, SIPOABS: oil storage, oil separation, return oil, oil, lubrication, lubricant, storage, accumulator, receiver, separator, return+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 106091494 A (GUANGDONG MIDEA HEATING AND VENTILATION EQUIPMENT CO., LTD. et al.), 09 November 2016 (09.11.2016), description, paragraphs [0028]-[0073], and figures 1-2	1-15
X	CN 101093121 A (HAIER ELECTRONICS GROUP CO., LTD. et al.), 26 December 2007 (26.12.2007), description, pages 4-5, and figures 1-2	1-4, 9
X	CN 200952856 Y (HAIER ELECTRONICS GROUP CO., LTD. et al.), 26 September 2007 (26.09.2007), description, pages 4-5, and figures 1-2	1-4, 9
X	CN 101813396 A (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI), 25 August 2010 (25.08.2010), description, paragraphs [0018]-[0028], and figure 1	1-4, 9
A	CN 104296421 A (GUANGDONG MIDEA HEATING AND VENTILATION EQUIPMENT CO., LTD.), 21 January 2015 (21.01.2015), the whole document	1-15
A	KR 20030084426 A (CARRIER LG LTD.), 01 November 2003 (01.11.2003), the whole document	1-15
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 August 2017 (15.08.2017)	**11 September 2017 (11.09.2017)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **CHEN, Lanlan** Telephone No.: (86-10) **62084890**

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/086706

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/086706

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Form PCT/ISA/210 (patent family annex) (July 2009)