



## Description

### CROSS-REFERENCE TO RELATED APPLICATION

**[0001]** This application claims priority to and the benefit of the Chinese Patent Application No. "201911211248.1" filed on December 02, 2019, the entire content of which is incorporated herein by reference.

### FIELD

**[0002]** The present disclosure relates to the compressor field, specifically to a control circuit, an air conditioner and a control method.

### BACKGROUND

**[0003]** At present, a compressor and a pressure vessel are important parts for an air conditioner system. In a system containing a compressor and a pressure vessel, when a system pressure is high, if no precautionary measures are taken for the compressor, to control the compressor to stop operation, it will cause the system pressure to continue rising, which is prone to danger.

**[0004]** In the related art, the pressure vessel is provided with a pressure relief valve. When a pressure in the pressure vessel exceeds a safety pressure, the pressure relief valve is opened to reduce the pressure in the pressure vessel. However, the pressure relief valve arranged at the pressure vessel is poor in sealing performance, leading to leakage easily.

### SUMMARY

**[0005]** The present disclosure aims to solve at least one of the technical problems existing in the prior art or the related art.

**[0006]** For this, a first aspect of the present disclosure provides a control circuit.

**[0007]** A second aspect of the present disclosure provides an air conditioner.

**[0008]** A third aspect of the present disclosure provides a control method.

**[0009]** In view of this, the first aspect of the present disclosure provides a control circuit, including a drive module, a drive circuit, a first switch module, and a pressure detection module. The drive circuit is connected to the drive module. The first switch module is arranged at the drive circuit. The pressure detection module is connected to the first switch module and configured to control the first switch module to be connected or disconnected, and thus control the drive circuit to turn on or turn off.

**[0010]** The control circuit provided by the present disclosure controls the first switch assembly by the pressure detection module, and thus controls the drive module to stop operation, such that the pressure in the pressure vessel will not continue rising after the drive module stops operation. As a result, it is not necessary to additionally

arrange a pressure relief valve for prevention of over-pressure, thus improving sealing performance of the pressure vessel and reducing leakage of refrigerant media. The drive circuit is controlled to turn on or turn off directly by the first switch assembly, thus reducing components involved in the control process to allow a simpler control circuit and a more rapid response, decreasing probability of control failure due to component damage, and improving reliability of the control circuit.

**[0011]** In addition, the control circuit in the above technical solution provided by the present disclosure may further have the following additional technical solutions.

**[0012]** In an example of the present disclosure, the control circuit further includes a control module connected to the drive module.

**[0013]** In this technical solution, the control module is connected to the drive module, and configured to control the drive module according to a status of the pressure detection module. Once a pressure detected by the pressure detection module exceeds a safety pressure, the drive module is controlled to stop operation, so as to avoid the drive module and the compressor from directly powering on when the pressure is returned to below the safety pressure and when the first switch assembly is connected, thus reducing impact on the drive module and the compressor when powered on, and prolonging service life of the drive module and the compressor.

**[0014]** According to an example of the present disclosure, the drive circuit includes a first circuit and a second circuit; the first switch module includes a first input port, a first output port, a first control port, and a second control port; the first input port is connected to the first circuit; the first output port is connected to the second circuit; the first control port is connected to the pressure detection module; and the second control port is connected to the control module.

**[0015]** In this technical solution, the control module outputs a high level to the second control port, such that the first switch assembly can be still controlled to be disconnected even if the contact of the pressure detection module is connected, thus avoiding the drive module and the compressor from directly powering on, reducing impact on the drive module and the compressor when powered on, and prolonging service life of the drive module and the compressor.

**[0016]** According to an example of the present disclosure, the control circuit further includes a second switch module and a resistor; the second switch module includes a second input port, a second output port, a third control port and a fourth control port; the second output port is connected to the second circuit; the third control port is connected to the pressure detection module; the fourth control port is connected to the control module; and an end of the resistor is connected to the second input port; and another end of the resistor is connected to the first circuit.

**[0017]** In this technical solution, by arranging the second switch assembly and the resistor, when the drive

module is powered on, the second switch assembly is controlled to be connected first; after the second switch assembly is connected, the first switch assembly is then connected, so as to reduce impact on the drive module and the compressor, and prolong service life of the drive module and the compressor.

**[0018]** According to an example of the present disclosure, the control circuit further includes a control power module, connected to the pressure detection module.

**[0019]** In this technical solution, the control power module is configured to provide power to the first switch assembly and the second switch assembly, so that the control module controls the first switch assembly and the second switch assembly by changing an interface output signal.

**[0020]** According to an example of the present disclosure, the drive circuit includes three wires; the first switch module includes at least two relays; and the at least two relays are arranged on at least two of the three wires.

**[0021]** In this technical solution, the drive circuit includes three wires, which are connected to a three-phase power, so as to drive and control a three-phase compressor.

**[0022]** According to an example of the present disclosure, the drive circuit includes two wires; the first switch module includes at least one relay; and the at least one relay is arranged on at least one of the two wires.

**[0023]** In this technical solution, the drive circuit includes two wires, which are connected to a one-phase power, so as to drive and control a one-phase compressor.

**[0024]** The second aspect of the present disclosure provides an air conditioner, including the control circuit as described in any above technical solution. Therefore, the air conditioner has all beneficial effects of the control circuit as described in any above technical solution.

**[0025]** The air conditioner further includes an outdoor heat exchanger, an indoor heat exchanger, a compressor, and a throttle. The outdoor heat exchanger, the compressor, the indoor heat exchanger and the throttle are connected in sequence, and the pressure detection component is arranged at the outdoor heat exchanger and/or the indoor heat exchanger.

**[0026]** The third aspect of the present disclosure provides a control method for the control circuit as described in any above technical solution. The control method includes: acquiring a status of a pressure detection module; and controlling a drive module and/or a first switch assembly according to the status of the pressure detection module.

**[0027]** The control method provided by the present disclosure controls the first switch assembly by the pressure detection module, and thus controls the drive module to stop operation, such that the pressure in the pressure vessel will not continue rising after the drive module stops operation. As a result, it is not necessary to additionally arrange a pressure relief valve for prevention of overpressure, thus improving sealing performance of the

pressure vessel and reducing leakage of refrigerant media. The drive circuit is controlled to turn on or turn off directly by the first switch assembly, thus reducing components involved in the control process to allow a simpler control circuit and a more rapid response, decreasing probability of control failure due to component damage, and improving reliability of the control circuit.

**[0028]** Once the pressure detected exceeds the safety pressure, the drive module is controlled to stop operation, or the first switch assembly is controlled to be disconnected, so as to avoid the drive module and the compressor from directly powering on when the pressure is returned to below the safety pressure and when the first switch assembly is connected, thus reducing impact on the drive module and the compressor when powered on, and prolonging service life of the drive module and the compressor.

**[0029]** According to an example of the present disclosure, controlling a drive module and/or a first switch assembly according to the status of the pressure detection module includes: controlling the drive module to stop operation and/or controlling the first switch assembly to be disconnected based on that the status of the pressure detection module is turned off; and controlling the drive module to start operation and/or controlling the first switch assembly to be connected based on that the status of the pressure detection module is turned on.

**[0030]** In this technical solution, when the status of the pressure detection module is detected to be turned off, it is indicated that the pressure detected by the pressure switch exceeds the safety pressure, then the drive module is controlled to stop operation, and/or the first switch assembly is controlled to be disconnected; when the status of the pressure detection module is detected to be turned on, it is indicated that the pressure detected by the pressure switch is below the safety pressure, then the drive module is controlled to start operation, and/or the first switch assembly is controlled to be connected, so as to drive the compressor to continue operation.

**[0031]** According to an example of the present disclosure, the control method further includes controlling a second switch assembly according to the status of the pressure detection module, after acquiring the status of the pressure detection module and before controlling the drive module and/or the first switch assembly according to the status of the pressure detection module.

**[0032]** In this technical solution, when the drive module is powered on, the second switch assembly is connected first. After the second switch assembly is connected, the first switch assembly is then controlled to be connected, so as to reduce impact on the drive module and the compressor by the resistor, and prolong service life of the drive module and the compressor.

**[0033]** The additional aspects and advantages of the present disclosure will be partially given in the following description, and some will become obvious from the following description, or be understood through the practice of the present disclosure.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0034]** The above and/or additional aspects and advantages of the present disclosure will become apparent and easily understood from the description of the embodiment in connection with the following drawings.

Figure 1 is a schematic diagram showing a control circuit according to an embodiment of the present disclosure.

Figure 2 is a schematic diagram showing a control circuit according to another embodiment of the present disclosure.

Figure 3 is a schematic diagram showing a first switch assembly according to an embodiment of the present disclosure.

Figure 4 is a flow chart showing a control method according to an embodiment of the present disclosure.

Figure 5 is a flow chart showing a control method according to another embodiment of the present disclosure.

Figure 6 is a flow chart showing a control method according to still another embodiment of the present disclosure.

Figure 7 is a flow chart showing a control method according to yet another embodiment of the present disclosure.

Figure 8 is a flow chart showing a control method according to yet another embodiment of the present disclosure.

Figure 9 is a flow chart showing a control method according to yet another embodiment of the present disclosure.

## Reference

**[0035]** 102 drive module; 104 drive circuit; 1042 first circuit; 1044 second circuit; 106 first switch module; 1062 first input port; 1064 first output port; 1066 first control port; 1068 second control port; 108 pressure detection module; 110 control module; 112 second switch module; 114 resistor; 116 control power module; and 118 compressor.

## DETAILED DESCRIPTION

**[0036]** In order to understand the above objects, features and advantages of the present disclosure, the following detailed description will be made in conjunction with the accompanying drawings and embodiments. It should be noted that different embodiments and features in different embodiments of the present disclosure can be combined with each other without conflict.

**[0037]** Many specific details are set forth in the following description to fully understand the present disclosure. However, the present disclosure can be implemented by other ways different from those described herein. There-

fore, the protection scope of the present disclosure is not limited to the specific embodiments disclosed below.

**[0038]** Reference is made to a control circuit, an air conditioner and a control method according to some embodiments in conjunction with Figure 1 to Figure 9.

**[0039]** In an embodiment of the first aspect of the present disclosure, as shown in Figure 1 and Figure 2, the present disclosure provides a control circuit, including a drive module 102, a drive circuit 104, a first switch module 106 and a pressure detection module 108. The drive circuit 104 is connected to the drive module 102. The first switch module 106 is arranged at the drive circuit 104. The pressure detection module 108 is connected to the first switch module 106 and configured to control the first switch module 106 to be connected or disconnected, and thus control the drive circuit 104 to turn on or turn off.

**[0040]** In this embodiment, the first switch module 106 is arranged at the drive circuit 104; the pressure detection module 108 is configured to control the first switch assembly to be connected or disconnected. When a pressure detected by the pressure detection module 108 exceeds a safety pressure, the pressure detection module 108 is turned off, a control port of the first switch assembly is powered off, the first switch assembly is disconnected, the drive circuit 104 is turned off, the drive module 102 is powered off, to make the drive module 102 stop operation, thus avoiding the pressure from further rising. As the drive module 102 is controlled to stop operation by the pressure detection module 108, and accordingly the pressure in the pressure vessel will not continue rising after the drive module 102 stops operation. As a result, it is not necessary to additionally arrange a pressure relief valve for prevention of overpressure, thus improving sealing performance of the pressure vessel and reducing leakage of refrigerant media. The drive circuit 104 is controlled to turn on or turn off directly by the first switch assembly, thus reducing components involved in the control process to allow a simpler control circuit and a more rapid response, decreasing probability of control failure due to component damage, and improving reliability of the control circuit.

**[0041]** The drive module 102 is configured to drive a compressor 118. The drive module 102 is powered by a power supply via the drive circuit 104. The pressure detection module 108 is a pressure switch and configured to detect a pressure in a heat exchanger or a refrigerant pipe. When the pressure in the heat exchanger or the refrigerant pipe exceeds the safety pressure, the pressure detection module 108 is turned off; the control port of the first switch assembly is powered off, an input port and an output port of the first switch assembly are disconnected; the drive circuit 104 is turned off; the drive module 102 is powered off; and the compressor 118 is stopped being driven to stop operation, such that the pressure in the heat exchanger or the refrigerant pipe does not continue rising, thereby avoiding dangers caused by overpressure in a refrigerating or heating device, such as an air conditioner, a water heater and a

refrigerator, and a heat exchanger, guaranteeing normal operation of the device.

**[0042]** The first switch assembly is a normally open switch. When it is detected by the pressure detection module 108 that the pressure in the heat exchanger or the refrigerant pipe exceeds the safety pressure, the contact of the pressure detection module 108 is disconnected, such that the first switch assembly is powered off; the input port and the output port of the first switch assembly are disconnected; the drive circuit 104 is turned off; the drive module 102 is powered off; and the compressor 118 is stopped being driven to stop operation, thus the pressure in the heat exchanger or the refrigerant pipe does not continue rising.

**[0043]** The first switch component is a normally closed switch. When it is detected by the pressure detection module 108 that the pressure in the heat exchanger or the refrigerant pipe exceeds the safety pressure, the contact of the pressure detection module 108 is connected, such that the first switch assembly is powered on; the input port and the output port of the first switch assembly are disconnected; the drive circuit 104 is turned off; the drive module 102 is powered off; and the compressor 118 is stopped being driven to stop operation, thus the pressure in the heat exchanger or the refrigerant pipe does not continue rising.

**[0044]** After the compressor 118 stops operation, the heat exchanger exchanges heat with air, and a temperature and a pressure of the refrigerant in the heat exchanger are reduced.

**[0045]** In an embodiment of the present disclosure, as shown in Figure 1 and Figure 2, the control circuit further includes a control module 110 connected to the drive module 102.

**[0046]** In this embodiment, the control module 110 is connected to the drive module 102, and is configured to control the drive module 102 according to a status of the pressure detection module 108. Once the pressure detected by the pressure detection module 108 exceeds the safety pressure, the drive module 102 is controlled to stop operation, so as to avoid the drive module 102 and the compressor 118 from directly powering on when the pressure is returned to below the safety pressure and when the first switch assembly is connected, thus reducing impact on the drive module 102 and the compressor 118 when powered on, and prolonging service life of the drive module 102 and the compressor 118.

**[0047]** The control module 110 is configured to detect the status of the pressure detection module 108, or receive status information from the pressure detection module 108, and thus control the drive module 102 according to the status of the pressure detection module 108.

**[0048]** In an embodiment of the present disclosure, as shown in Figure 1 to Figure 3, the drive circuit 104 includes a first circuit 1042 and a second circuit 1044; the first switch module 106 includes a first input port 1062, a first output port 1064, a first control port 1066, and a

second control port 1068, wherein the first input port 1062 is connected to the first circuit 1042, the first output port 1064 is connected to the second circuit 1044, the first control port 1066 is connected to the pressure detection module 108, and the second control port 1068 is connected to the control module 110.

**[0049]** In this embodiment, the first control port 1066 and the second control port 1068 are powered on or powered off, to control the first input port 1062 and the first output port 1064 to be connected or disconnected. The first control port 1066 is connected to the pressure detection module 108, when the contact of the pressure detection module 108 is disconnected, the first control port 1066 is powered off; while when the contact of the pressure detection module 108 is connected, the first control port 1066 is powered on. The second control port 1068 is connected to the control module 110, when the first control port 1066 is provided with a high level, and when the control module 110 outputs a low level, the first control port 1066 and the second control port 1068 are powered on; when the control module 110 outputs a high level, the first control port 1066 and the second control port 1068 are powered off, such that the control module 110 can control the first switch assembly to be connected or disconnected. When the first switch assembly is disconnected, the control module 110 outputs a high level to the second control port 1068, such that the first switch assembly can be still controlled to be disconnected even if the contact of the pressure detection module 108 is connected, thus avoiding the drive module 102 and the compressor 118 from directly powering on, reducing impact on the drive module 102 and the compressor 118 when powered on, and prolonging service life of the drive module 102 and the compressor 118.

**[0050]** In an embodiment of the present disclosure, as shown in Figure 1 and Figure 2, the control circuit further includes a second switch module 112 and a resistor 114. The second switch module 112 includes a second input port, a second output port, and a third control port and a fourth control port. The second output port is connected to the second circuit 1044. The third control port is connected to the pressure detection module 108. The fourth control port is connected to the control module 110. An end of the resistor 114 is connected to the second input port, and another end of the resistor 114 is connected to the first circuit 1042.

**[0051]** In this embodiment, by arranging the second switch assembly and the resistor 114, when the drive module 102 is powered on, the second switch assembly is connected first. After the second switch assembly is connected, the first switch assembly is then controlled to be connected, so as to reduce impact on the drive module 102 and the compressor 118 by the resistor 114, and prolong service life of the drive module 102 and the compressor 118.

**[0052]** The second switch assembly is a relay.

**[0053]** In an embodiment of the present disclosure, as shown in Figure 1 and Figure 2, the control circuit further

includes a control power module 116. The control power module 116 is connected to the pressure detection module 108.

**[0054]** In this embodiment, the control power module 116 is configured to provide power to the first switch assembly and the second switch assembly, so that the control module 110 controls the first switch assembly and the second switch assembly by changing an interface output signal.

**[0055]** The power module outputs a positive 12V voltage or a positive 24V voltage to the pressure detection module 108, and outputs a positive 3.3V voltage to the control module 110.

**[0056]** In an embodiment of the present disclosure, as shown in Figure 1, the drive circuit 104 includes three wires; the first switch module 106 includes two relays; and the two relays are arranged at two of the three wires, respectively.

**[0057]** In an embodiment of the present disclosure, the drive circuit 104 includes three wires; the first switch module 106 includes three relays; and the three relays are arranged at the three wires, respectively.

**[0058]** In an embodiment of the present disclosure, the drive circuit 104 includes three wires; the first switch module 106 includes one two-way relay; and the two-way relay is arranged at two of the three wires.

**[0059]** In an embodiment of the present disclosure, the drive circuit 104 includes three wires; the first switch module 106 includes one three-way relay; and the three-way relay is arranged at the three wires.

**[0060]** In this embodiment, the drive circuit 104 includes three wires, which are connected to a three-phase power, so as to drive and control a three-phase compressor 118.

**[0061]** In an embodiment of the present disclosure, as shown in Figure 2, the drive circuit 104 includes two wires; the first switch module 106 includes one one-way relay; and the one-way relay is arranged at one of the two wires.

**[0062]** In an embodiment of the present disclosure, the drive circuit 104 includes two wires; the first switch module 106 includes two one-way relays; and the two one-way relays are arranged at the two wires, respectively.

**[0063]** In an embodiment of the present disclosure, the drive circuit 104 includes two wires; the first switch module 106 includes one two-way relay; and the two-way relay is arranged at the two wires.

**[0064]** In this embodiment, the drive circuit 104 includes two wires, which are connected to a one-phase power, so as to drive and control a one-phase compressor 118.

**[0065]** In an embodiment of the second aspect of the present disclosure, the present disclosure provides an air conditioner, including the control circuit as described in any above embodiment. Therefore, the air conditioner has all beneficial effects of the control circuit as described in any above embodiment.

**[0066]** The air conditioner further includes an outdoor heat exchanger, an indoor heat exchanger, a compressor

and a throttle. The outdoor heat exchanger, the compressor, the indoor heat exchanger and the throttle are connected in sequence, and the pressure detection component is arranged at the outdoor heat exchanger and/or the indoor heat exchanger.

**[0067]** In an embodiment of the third aspect of the present disclosure, the present disclosure provides a control method for the control circuit as described in any above embodiment. As shown in Figure 4, the control method includes steps 402 and 404.

**[0068]** At the step 402, a status of a pressure detection module is acquired.

**[0069]** At the step 404, a drive module and/or a first switch assembly are(is) controlled according to the status of the pressure detection module.

**[0070]** In this embodiment, as the drive module is controlled to stop operation by the pressure detection module, the pressure in the pressure vessel will not continue rising once the drive module stops operation. As a result, it is not necessary to additionally arrange a pressure relief valve for prevention of overpressure, thus improving sealing performance of the pressure vessel and reducing leakage of refrigerant media. The drive circuit is controlled to turn on or turn off directly by the first switch assembly, thus reducing components involved in the control process to allow a simpler control circuit and a more rapid response, decreasing probability of control failure due to component damage, and improving reliability of the control circuit.

**[0071]** Once a pressure detected exceeds a safety pressure, the drive module is controlled to stop operation, or the first switch assembly is controlled to be disconnected, so as to avoid the drive module and the compressor from directly powering on when the pressure is returned to below the safety pressure and when the first switch assembly is connected, thus reducing impact on the drive module and the compressor when powered on, and prolonging service life of the drive module and the compressor.

**[0072]** In an embodiment of the present disclosure, as shown in Figure 5, the control method includes steps 502 and 504.

**[0073]** At the step 502, a status of a pressure detection module is acquired.

**[0074]** At the step 504, the drive module is controlled to stop operation based on that the status of the pressure detection module is turned off.

**[0075]** In an embodiment of the present disclosure, as shown in Figure 6, the control method includes steps 602 and 604.

**[0076]** At the step 602, a status of a pressure detection module is acquired.

**[0077]** At the step 604, the first switch assembly is controlled to be disconnected based on that the status of the pressure detection module is turned off.

**[0078]** In an embodiment of the present disclosure, as shown in Figure 7, the control method includes steps 702 and 704.

**[0079]** At the step 702, a status of a pressure detection module is acquired.

**[0080]** At the step 704, the drive module is controlled to start operation based on that the status of the pressure detection module is turned on.

**[0081]** In an embodiment of the present disclosure, as shown in Figure 8, the control method includes steps 802 and 804.

**[0082]** At the step 802, a status of a pressure detection module is acquired.

**[0083]** At the step 804, the first switch assembly is controlled to be connected based on that the status of the pressure detection module is turned on.

**[0084]** In this embodiment, when the status of the pressure detection module is detected to be turned off, it is indicated that the pressure detected by the pressure switch exceeds the safety pressure, then the drive module is controlled to stop operation, and/or the first switch assembly is controlled to be disconnected; when the status of the pressure detection module is detected to be turned on, it is indicated that the pressure detected by the pressure switch is below the safety pressure, then the drive module is controlled to start operation, and/or the first switch assembly is controlled to be connected, so as to drive the compressor to continue operation.

**[0085]** In an embodiment of the present disclosure, as shown in Figure 9, the control method includes steps 902, 904 and 906.

**[0086]** At the step 902, a status of a pressure detection module is acquired.

**[0087]** At the step 904, a second switch assembly is controlled according to the status of the pressure detection module.

**[0088]** At the step 906, the drive module and/or the first switch assembly are(is) controlled according to the status of the pressure detection module.

**[0089]** In this embodiment, when the drive module is powered on, the second switch assembly is connected first. After the second switch assembly is connected, the first switch assembly is then controlled to be connected, so as to reduce impact on the drive module and the compressor by the resistor, and prolong service life of the drive module and the compressor.

**[0090]** Controlling a second switch assembly according to the status of the pressure detection module includes: controlling the second switch assembly to be disconnected based on that the status of the pressure detection module is turned off; and controlling the second switch assembly to be connected based on that the status of the pressure detection module is turned on.

**[0091]** In an embodiment of the present disclosure, the control method includes:

acquiring a status of a pressure detection module;  
controlling a second switch assembly to be connected based on that the status of the pressure detection module is turned on;  
controlling the drive module to start operation and

controlling the first switch assembly to be connected.

**[0092]** In the description of the present disclosure, "a plurality of" means two or more than two this features, unless specified otherwise. The terms indicating orientation or position relationship such as "above" and "below" should be construed to refer to the orientation or position relationship as described or as shown in the drawings. These terms are merely for convenience and concision of description and do not alone indicate or imply that the device or element referred to must have a particular orientation or must be configured or operated in a particular orientation. Thus, it cannot be understood to limit the present disclosure. The terms "connected", "mounted" and "fixed" and the like are used broadly, and may be, for example, fixed connections, detachable connections, or integrated connections; may also be direct connections or indirect connections via intervening structures, which can be understood by those ordinary skilled in the art according to specific situations.

**[0093]** Reference throughout this specification to "an embodiment/example", "some embodiments/examples" or "a specific example" means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present disclosure. Thus, the appearances of the phrases such as "an embodiment/example", "some embodiments/examples" or "a specific example" in various places throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples.

**[0094]** The foregoing descriptions are only preferred embodiment of the present disclosure, but in no way to limit present disclosure. For those skilled in the art, the present disclosure may have various modifications and changes. Any modification, equivalent replacement, improvement, etc. made within the spirit and principles of the present disclosure shall be included in the protection scope of the present disclosure.

## Claims

1. A control circuit, comprising:

a drive module;  
a drive circuit, connected to the drive module;  
a first switch module, arranged at the drive circuit; and  
a pressure detection module, connected to the first switch module and configured to control the first switch module to be connected or disconnected, and thus control the drive circuit to turn on or turn off.

2. The control circuit according to claim 1, further comprising a control module, connected to the drive module.
3. The control circuit according to claim 2, wherein
  - the drive circuit comprises a first circuit and a second circuit,
  - the first switch module comprises a first input port, a first output port, a first control port, and a second control port,
  - the first input port is connected to the first circuit, the first output port is connected to the second circuit,
  - the first control port is connected to the pressure detection module, and
  - the second control port is connected to the control module.
4. The control circuit according to claim 3, further comprising a second switch module and a resistor,
  - wherein the second switch module comprises a second input port, a second output port, a third control port and a fourth control port,
  - wherein the second output port is connected to the second circuit, the third control port is connected to the pressure detection module, the fourth control is connected to the control module; and
  - wherein an end of the resistor is connected to the second input port and another end of the resistor is connected to the first circuit.
5. The control circuit according to any one of claims 1 to 4, further comprising: a control power module, connected to the pressure detection module.
6. The control circuit according to any one of claims 1 to 5, wherein
  - the drive circuit comprises three wires, and
  - the first switch module comprises at least two relays arranged on at least two of the three wires.
7. The control circuit according to any one of claims 1 to 6, wherein
  - the drive circuit comprises two wires,
  - the first switch module comprises at least one relay arranged on at least one of the two wires.
8. An air conditioner, comprising a control circuit of any one of claims 1 to 7.
9. A control method for controlling the control circuit of any one of claims 1 to 7, wherein the control method comprises:
  - acquiring a status of a pressure detection module; and
  - controlling a drive module and/or a first switch assembly according to the status of the pressure detection module.
10. The control method according to claim 9, wherein said controlling a drive module and/or a first switch assembly according to the status of the pressure detection module comprises:
  - controlling the drive module to stop operation and/or controlling the first switch assembly to be disconnected based on the status of the pressure detection module being turned off; and
  - controlling the drive module to start operation and/or controlling the first switch assembly to be connected based on the status of the pressure detection module being turned on.
11. The control method according to claim 9 or 10, further comprising controlling a second switch assembly according to the status of the pressure detection module, after acquiring the status of the pressure detection module and before controlling the drive module and/or the first switch assembly according to the status of the pressure detection module.



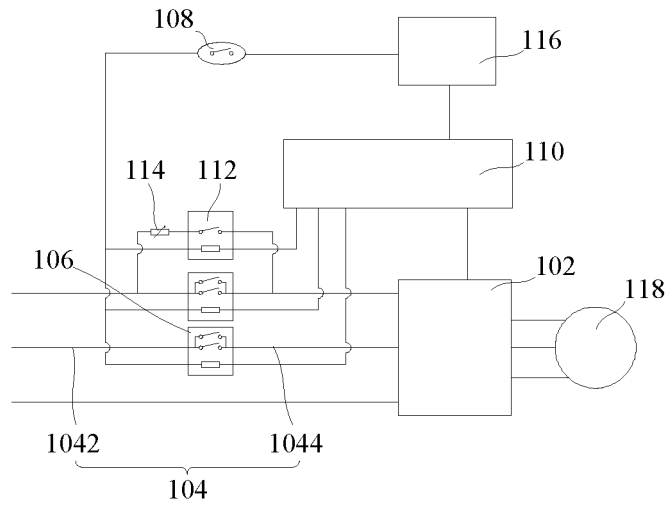


Figure 1

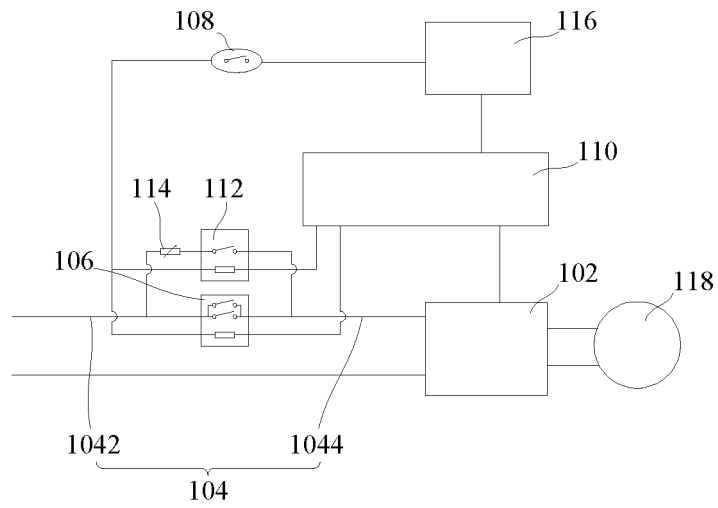


Figure 2

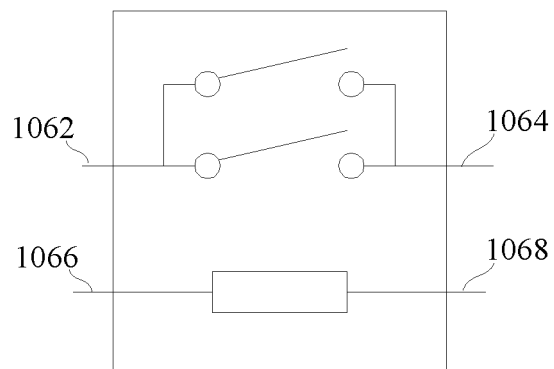


Figure 3

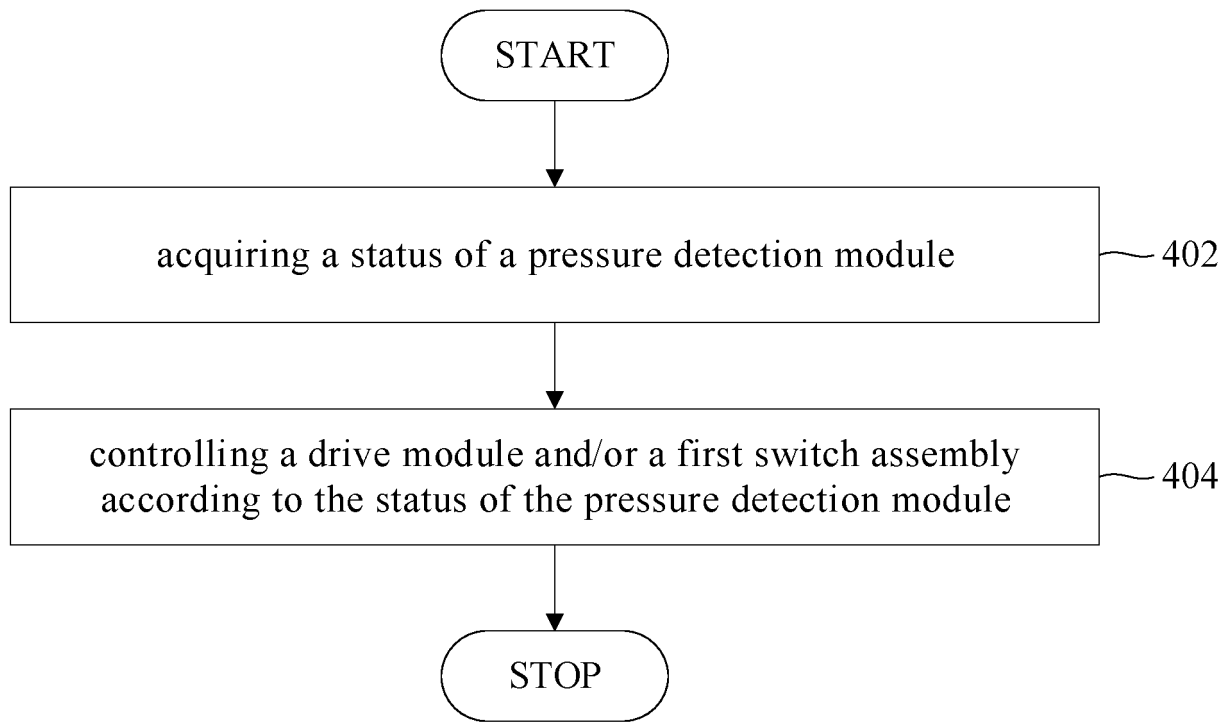


Figure 4

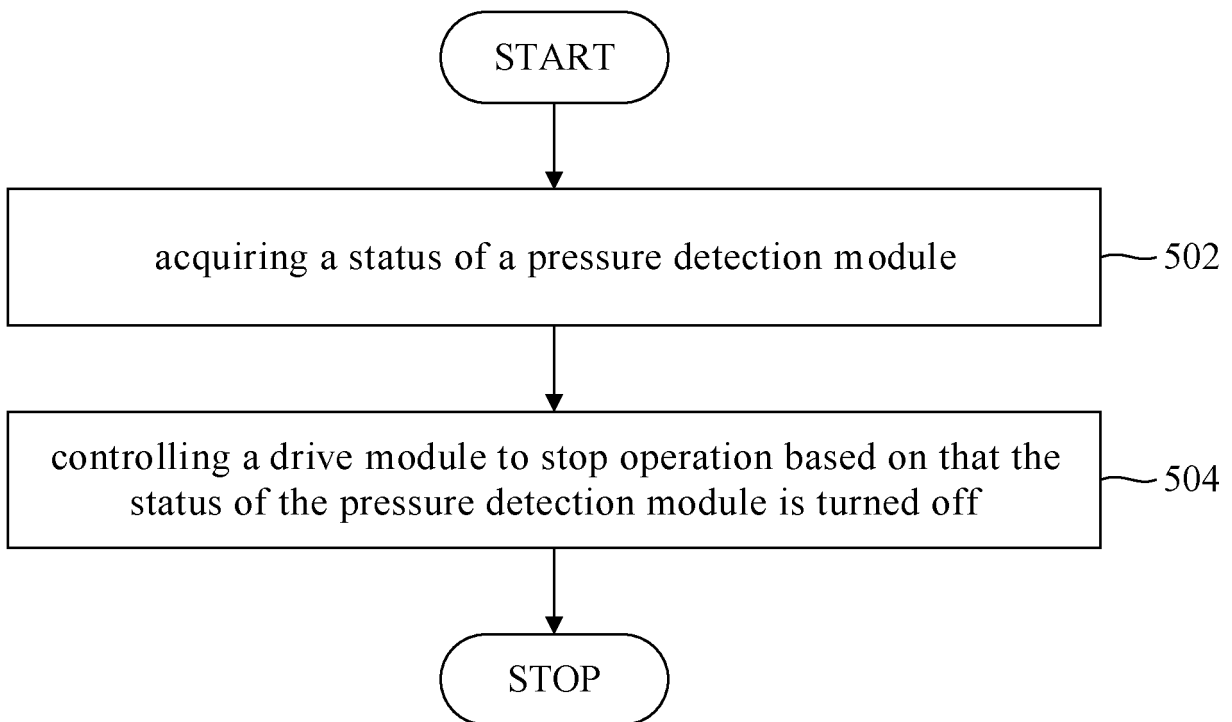


Figure 5

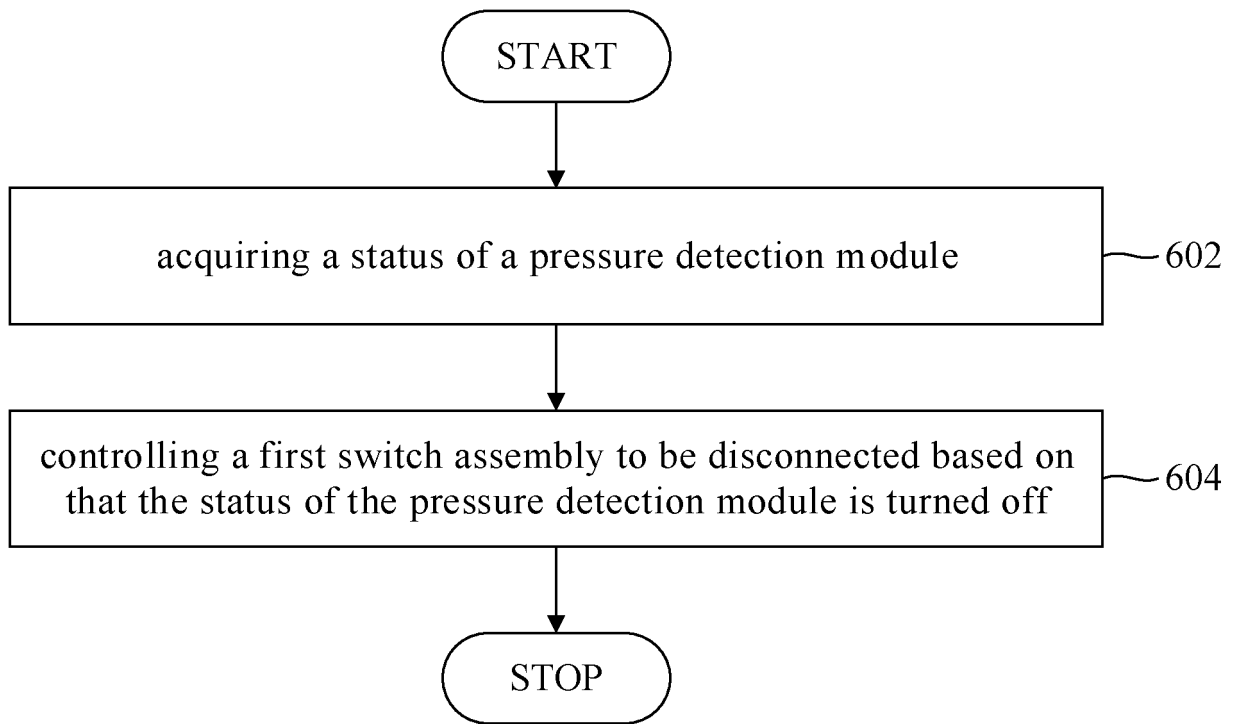


Figure 6

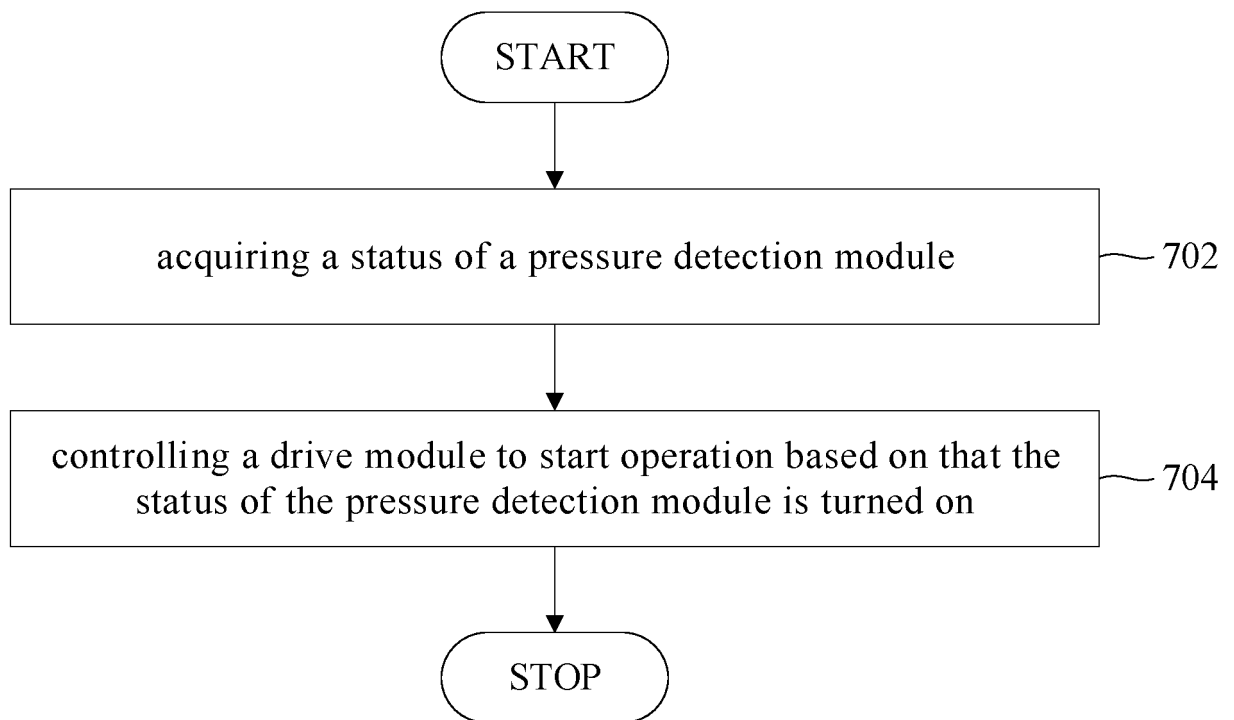


Figure 7

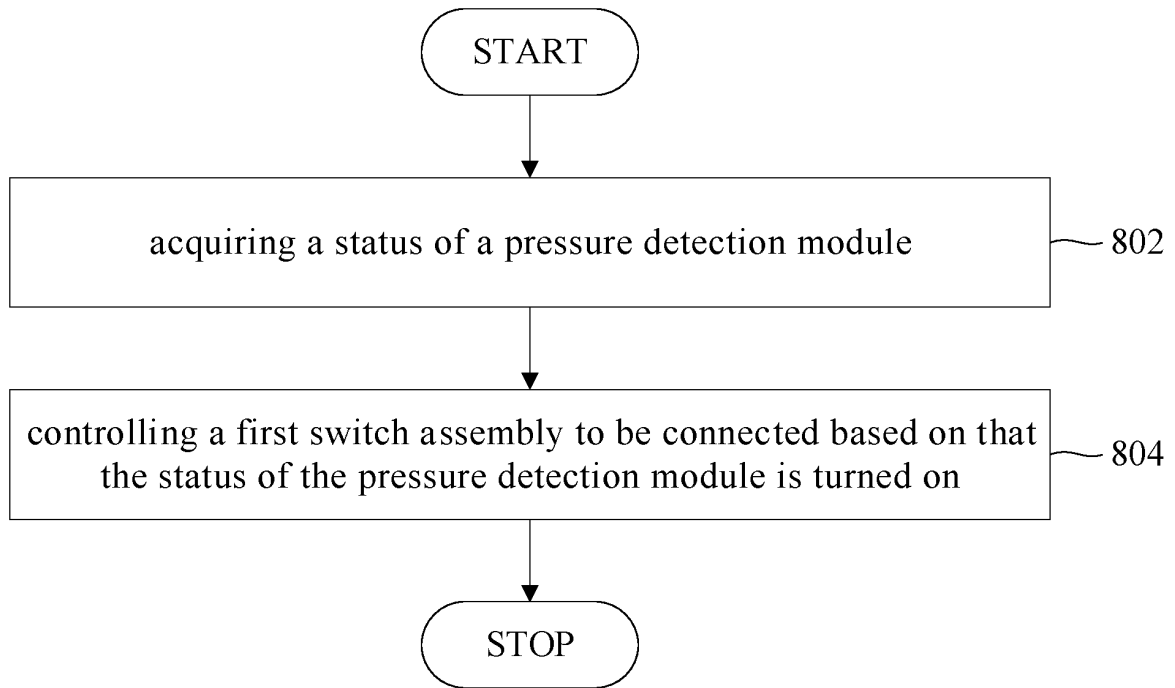


Figure 8

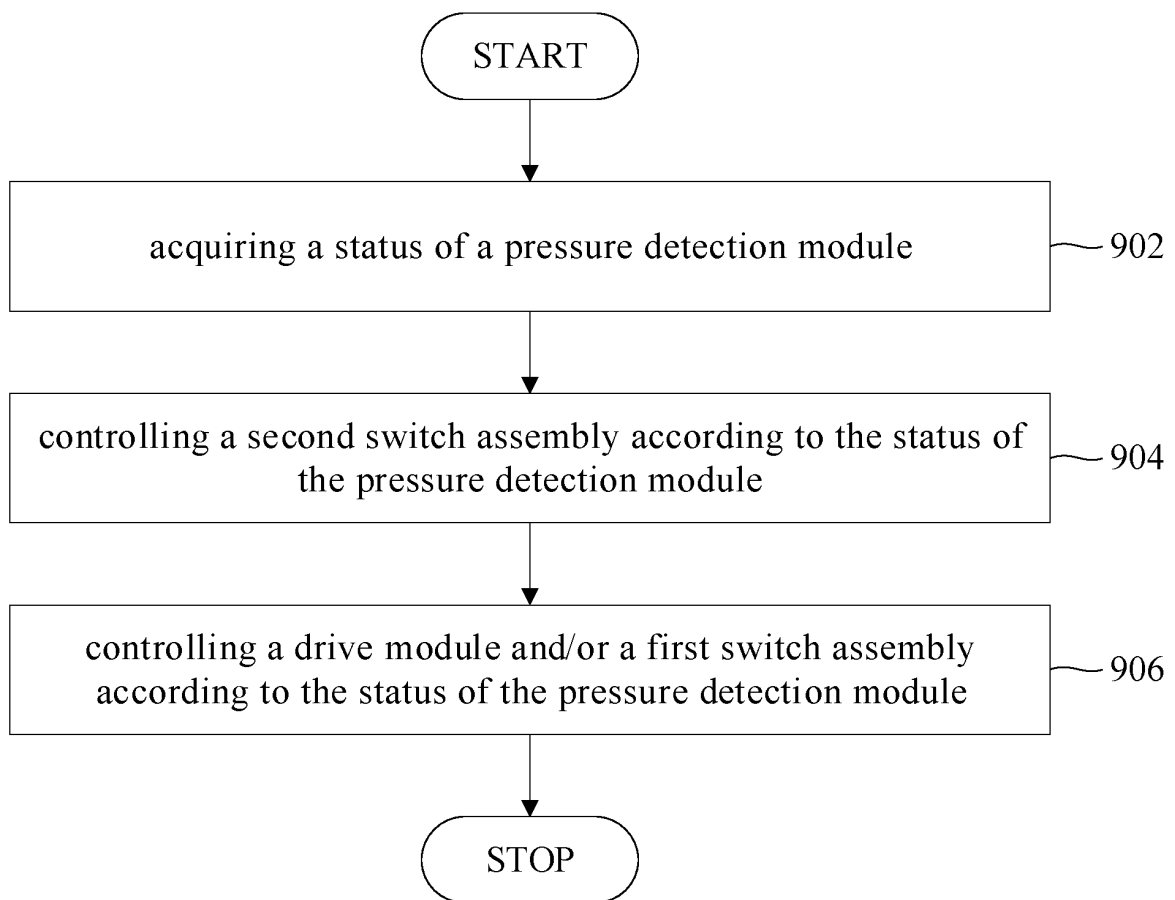


Figure 9

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2020/077212

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
F25B 49/02(2006.01)i; F04B 49/02(2006.01)i; F04B 49/06(2006.01)i		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
F25B; F04B		
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)		
VEN; CNABS; CNTXT: 断开, 开关, 控制, 电平, 驱动, 冲击, 检测, 上电, 压力, 关闭, switch, affect, level, power, detect+, pressure		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 205533145 U (WUHU MEIZHI AIR-CONDITIONING EQUIPMENT CO., LTD.) 31 August 2016 (2016-08-31) description paragraphs 24-48, figure 1	1-11
A	CN 104567158 A (LI, Ning et al.) 29 April 2015 (2015-04-29) entire document	1-11
A	KR 20190096725 A (LG ELECTRONICS INC.) 20 August 2019 (2019-08-20) entire document	1-11
A	WO 2009056336 A2 (SEIPTIUS GORDON) 07 May 2009 (2009-05-07) entire document	1-11
A	US 2017299243 A1 (LENNOX IND INC) 19 October 2017 (2017-10-19) entire document	1-11
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "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 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
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Date of the actual completion of the international search		Date of mailing of the international search report
15 July 2020		31 July 2020
Name and mailing address of the ISA/CN		Authorized officer
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Facsimile No. (86-10)62019451		Telephone No.

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**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.

**PCT/CN2020/077212**

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KR 20190096725 A	20 August 2019	None	
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		US 9726412 B2	08 August 2017

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**REFERENCES CITED IN THE DESCRIPTION**

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