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(54) **CHILLER**

(57) The invention provides a chiller including a compressor (1) and a condenser (3), in which an outlet (11) of the compressor (1) communicates with an inlet (31) of the condenser (3) through a discharge pipe (2), a rotating shaft (4) and a valve plate (5) having a counterweight are further disposed in the discharge pipe (2), the rotating shaft (4) is fixed on an inner wall of the discharge pipe (2), the valve plate (5) can rotate around the rotating shaft (4), and a rotatable stroke of the valve plate (5) includes swinging down to a first position to close the discharge pipe (2), and swinging up to a second position toward a side away from the outlet (11) of the compressor (1) to open the discharge pipe (2).

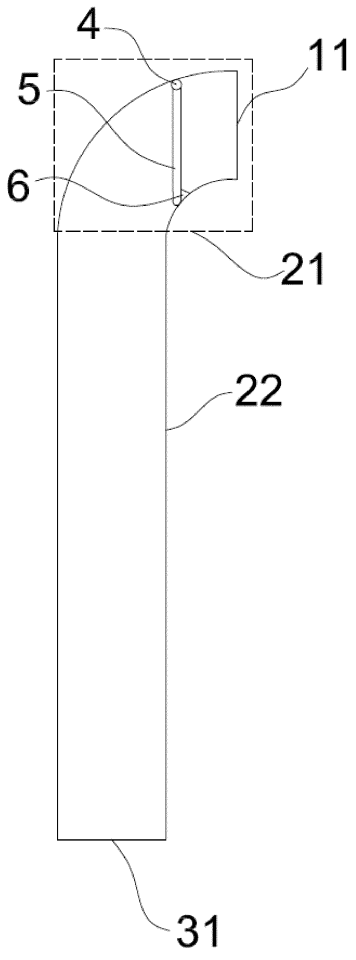

FIG. 3

EP 4 545 879 A1

Description

Technical Field

[0001] The invention relates to the technical field of air conditioners, in particular to a chiller.

Background Art

[0002] When a chiller of a heating, ventilation, and air conditioning system operates normally, a refrigerant is compressed by a compressor and then discharged into a condenser from an outlet of the compressor through a discharge pipe. When the chiller is shut down unexpectedly, the uncondensed refrigerant may flow back into the compressor through the discharge pipe, which brings a risk to the stability of a bearing component and a rotating shaft of the compressor, thereby affecting the subsequent normal operation of the chiller.

[0003] At present, a common solution is to install a spring-loaded check valve in the discharge pipe. However, a maximum opening of the spring-loaded check valve is usually 45 degrees, which may hinder the normal discharge of the compressor, causing a constant pressure drop (about 1 psi to 2 psi) on two sides of the spring-loaded check valve and affecting the working efficiency of the chiller. Further, since a spring is likely to age and be damaged in the working environment at the outlet of the compressor, the reliability of the spring-loaded check valve is greatly limited by the reliability of the spring, which reduces the overall reliability of the chiller and increases maintenance costs.

Summary of the Invention

[0004] An object of the invention is to provide a chiller to at least solve or alleviate some of the problems existing in the related art.

[0005] According to a first aspect of the invention there is provided a chiller including a compressor and a condenser, in which an outlet of the compressor communicates with an inlet of the condenser through a discharge pipe, a rotating shaft and a valve plate having a counterweight are further disposed in the discharge pipe, the rotating shaft is fixed on an inner wall of the discharge pipe, the valve plate can rotate around the rotating shaft, and a rotatable stroke of the valve plate includes swinging down to a first position to close the discharge pipe, and swinging up to a second position toward a side away from the outlet of the compressor to open the discharge pipe.

[0006] Optionally, the compressor is disposed above the condenser, the discharge pipe has a main body section extending in a vertical direction and a bent section formed by bending the main body section laterally, the bent section communicates with the outlet located on a side surface of the compressor, and the rotating shaft and the valve plate are both disposed in the bent section.

[0007] Optionally, the bent section further includes a horizontal section extending horizontally, and the rotating shaft and the valve plate are disposed in the horizontal section.

[0008] Optionally, the chiller further includes a limiting portion formed by the inner wall of the discharge pipe extending radially inward and disposed on a side of the valve plate closer to the outlet of the compressor, in which an outer edge of the valve plate at the first position abuts against an inner edge of the limiting portion.

[0009] Optionally, the limiting portion is an integrally formed limiting plate having a complete outer edge and connected to the inner wall of the discharge pipe over entire circumferential range.

[0010] Optionally, the limiting portion includes a side plate formed by a side portion of the inner wall of the discharge pipe extending radially inward, and a bottom plate formed by a bottom portion of the inner wall of the discharge pipe extending radially inward, a top portion of the valve plate at the first position abuts against the inner wall of the discharge pipe, a side edge of the valve plate abuts against the side plate, and a lower edge of the valve plate abuts against the bottom plate.

[0011] Optionally, the limiting portion is elastic.

[0012] Optionally, the limiting portion is fixed to the inner wall of the discharge pipe by welding.

[0013] Optionally, the limiting portion is inclined at an angle of 0° to 3° with respect to the vertical direction.

[0014] Optionally, the compressor is a centrifugal compressor.

[0015] Optionally, the valve plate swings down to the first position only by self weight that provides a driving force.

[0016] Optionally, the counterweight has a weight of 1 kg to 15 kg.

[0017] According to the chiller of the invention, the valve plate having the counterweight is rotatably mounted on the rotating shaft. When the chiller operates normally, the valve plate can rotate about the rotating shaft and swing up to the second position to maintain a large opening. The valve plate can also spontaneously adjust the opening in response to a change in a flow rate of a refrigerant, depending on the flow rate of the refrigerant. When the chiller is shut down, the valve plate can swing down to the first position only under the driving of gravity so as to close the discharge pipe and prevent refrigerant backflow. Since there is no need to provide deformation driving components such as springs and the closing of the valve plate is driven only by gravity, the reliability of the check valve is better, and maintenance costs can be effectively reduced.

Descriptions of the Drawings

[0018] Certain exemplary embodiments will now be described in greater detail by way of example only and with reference to the accompanying drawings in which:

FIG. 1 shows an overall diagram of a chiller.

FIG. 2 shows a schematic cross-sectional view of a discharge pipe of the chiller.

FIG. 3 shows a schematic structural diagram of a valve plate in a bent section rotating to a first position.

FIG. 4 shows a schematic structural diagram of the valve plate in the bent section rotating to a second position.

FIG. 5 shows a right view of a horizontal section of the discharge pipe of the chiller.

FIG. 6 shows a left view of the horizontal section of the discharge pipe of the chiller.

FIG. 7 shows a right view of a horizontal section of a discharge pipe of another chiller.

FIG. 8 shows a left view of the horizontal section of the discharge pipe of another chiller.

FIG. 9 shows a schematic cross-sectional view of the horizontal section of the discharge pipe of another chiller.

[0019] List of Reference Numerals: 1-compressor; 11-outlet of compressor; 2-discharge pipe; 21-bent section; 21a-upper bent section; 21b-lower bent section; 22-main body section; 3-condenser; 3 1-inlet of condenser; 4-rotating shaft; 5-valve plate; 6-limiting portion; 61-limiting plate; 62-side plate; 63-bottom plate.

Detailed Description

[0020] First, it should be noted that compositions, working principles, characteristics, advantages and the like of a chiller according to the invention will be described below in an illustrative manner. However, it should be understood that all descriptions are given for illustrative purposes only and therefore should not be construed as any limitation to the invention.

[0021] In addition, for any single technical feature described or implied in the embodiments mentioned herein, or any single technical feature shown or implied in the accompanying drawings, the invention still allows any combination or deletion between these technical features (or equivalents thereof) without any technical obstacles, thereby obtaining more other embodiments of the invention that may not be directly mentioned herein.

[0022] The term "swings down" means to swing downward or sideways in the direction of gravity, and "swings up" means to swing upward or sideways in the direction of gravity.

[0023] The valve plate has a "counterweight", which may mean that a valve plate with a heavy weight is used, or additional accessories such as a counterweight block or a counterweight plate may be added and fixed to a main body of the valve plate. The weight of the counterweight may be selected as long as a discharge pipe can be normally opened when a compressor is discharged and the discharge pipe can be stably closed when backflow occurs. In some embodiments, the weight of the counterweight may be 2 kg to 15 kg. When a valve plate within this counterweight range is closed, the force acting on a unit flow area is about 1 psi to 10 psi, which can ensure the reliable closing of the discharge pipe. At the same time, when a refrigerant flows normally in the discharge pipe, the valve plate can also be quickly driven to open.

[0024] FIG. 1 shows an overall diagram of a chiller according to an embodiment of the invention. As shown in FIG. 1, the chiller according to the embodiment of the invention includes a compressor 1 and a condenser 3. An outlet 11 of the compressor communicates with an inlet 31 of the condenser through a discharge pipe 2. The specific type of the compressor 1 is not limited here. In some embodiments, the compressor 1 may be a screw compressor, a centrifugal compressor, a scroll compressor, or the like.

[0025] Preferably, the compressor 1 is a centrifugal compressor.

[0026] The specific type of the condenser 3 is not limited here. In some embodiments, the condenser may be a water-cooled condenser, an air-cooled condenser, or the like, preferably a water-cooled condenser.

[0027] Taking a centrifugal compressor as an example, the centrifugal compressor uses centrifugal force to drive a refrigerant to discharge from a low-pressure side to a high-pressure side of a system, and the high-pressure refrigerant is discharged from the outlet 11 of the compressor to the condenser 3 through the discharge pipe 2. When the exhaust pressure is too high, that is, the pressure in the condenser 3 or the discharge pipe 2 is too high, the centrifugal compressor may stop pumping as a pressure difference cannot be overcome, and a "surge" phenomenon may occur. In addition, when the chiller is shut down, the high-temperature and high-pressure refrigerant may flow back along the discharge pipe 2 and impact a bearing component or a rotating shaft of the centrifugal compressor, thereby affecting the subsequent normal operation of the chiller.

[0028] FIG. 2 shows a schematic cross-sectional view of a discharge pipe of the chiller according to the embodiment of the invention. As shown in FIG. 2, the chiller according to the embodiment of the invention further includes a rotating shaft 4 disposed in the discharge pipe 2 and a valve plate 5 having a counterweight. The rotating shaft 4 is fixed to an inner wall of the discharge pipe 2, and the valve plate 5 can rotate around the rotating shaft 4 under the action of gravity or a combination of gravity and other driving forces.

[0029] In the chiller according to the embodiment of the invention, the valve plate 5 having a counterweight is rotatably mounted on the rotating shaft 4.

[0030] When the chiller operates normally, the compressor 1 continuously discharges a refrigerant into the discharge pipe 2, the high-temperature and high-pressure refrigerant continuously flows from the outlet 11 of the compressor to the inlet 31 of the condenser, and the valve plate 5 swings up to a side away from the outlet 11 of the compressor under the driving of the refrigerant. Since no spring is provided and there is no restriction of the

spring elastic force, the valve plate 5 can rotate to a second position under the driving of a pressure difference on two sides and maintain a large opening. Further, depending on a flow rate of the refrigerant, the driving force of the refrigerant on the valve plate 5 also changes accordingly. Therefore, the opening of the valve plate 5 can spontaneously respond to a change in the flow rate of the refrigerant, thereby avoiding excessive pressure drop of the outlet 11 of the compressor caused by obstruction of the flow of the refrigerant in a discharge pipe 2 and avoiding the loss of pressure heads.

[0031] When the chiller is normally shut down, that is, there is no refrigerant flowing in the discharge pipe 2, the valve plate 5 can swing down to the first position only by its own gravity to close the discharge pipe 2 and avoid backflow of the high-temperature and high-pressure refrigerant. In a case of unexpected shutdown, if a certain amount of refrigerant flows back, the refrigerant flowing back can further accelerate the downward swing of the valve plate 5, thereby reducing the backflow as much as possible.

[0032] In some embodiments of the invention, the valve plate 5 and the rotating shaft 4 of the chiller can maintain a large opening when the chiller operates normally, and can spontaneously adjust the opening in response to a change in the flow rate of the refrigerant. In addition, since there is no need to provide elastic elements such as springs and the closing of the valve plate 5 is driven only by gravity, the reliability of the check valve is better, and maintenance costs can be effectively reduced.

[0033] The valve plate 5 may rotate and swing down to a first position where the valve plate extends in the direction of gravity, or may swing down to a first position inclined to the direction of gravity, as long as the valve plate 5 can stop swinging down and close the discharge pipe 2 in this position. For example, the valve plate 5 may be inclined at an angle of 0° to 3° with respect to the direction of gravity. The own gravity of the valve plate 5 can be used to set a certain inclination angle, increase the stress between the valve plate 5 and a limiting portion 6, and increase the reliability of the valve plate 5 closing the discharge pipe 2 when the valve plate 5 is in the first position.

[0034] In the chiller according to the embodiment of the invention, the compressor 1 and the condenser 3 may be disposed according to the actual use environment. For example, the compressor 1 and the condenser 3 may be stacked at least partially overlapped in a height direction, the outlet 11 of the compressor and the inlet 31 of the condenser may be disposed on the same side, and two ends of the discharge pipe 2 are bent to respectively communicate with the outlet 11 of the compressor and the inlet 31 of the condenser, so that the internal structure of the chiller is more compact.

[0035] In some embodiments, a bent section 21 further includes a horizontal section extending horizontally, and the rotating shaft 4 and the valve plate 5 are disposed in the horizontal section of the discharge pipe 2. The valve plate 5 can quickly swing down to abut against a bottom portion of the inner wall of the discharge pipe 2 in the horizontal discharge pipe 2, or can be opened to a position close to, equal to or even exceeding 90° to increase the maximum opening of the discharge pipe 2.

[0036] In some other embodiments, the compressor 1 is disposed above the condenser 3, and the discharge pipe 2 has a main body section 22 extending in a vertical direction and the bent section 21 formed by bending the main body section 22 laterally. With reference to FIG. 1, an upper portion and a lower portion of the discharge pipe 2 are each formed with the bent section 21. An upper bent section 21a communicates with the outlet located on a side surface of the compressor 1, and a lower bent section 21b communicates with the inlet located on a side surface of the condenser 3. The compressor 1 and the condenser 3 are stacked up and down to make the internal structure of the chiller more compact.

[0037] Hereinafter, an assembly structure of the valve plate 5 and the rotating shaft 4 in the bent section 21 of the discharge pipe 2 will be described by taking the case in which the valve plate 5 and the rotating shaft 4 are disposed in the upper bent section 21a as an example. FIG. 3 shows a schematic structural diagram of the valve plate 5 in the bent section 21 rotating to the first position according to the embodiment of the invention. FIG. 4 shows a schematic structural diagram of the valve plate 5 in the bent section 21 rotating to the second position according to the embodiment of the invention.

[0038] With reference to FIGS. 3 and 4, in the bent section 21, the rotating shaft 4 is fixed to a top portion of an inner wall of the bent section 21, and the valve plate 5 is disposed below the rotating shaft 4 and can rotate around the rotating shaft 4.

[0039] When the compressor is not operating and no refrigerant flows in the discharge pipe 2, the valve plate 5 rotates to swing down to the first position under the driving of its own gravity. The valve plate 5 has a height greater than a diameter of the discharge pipe 2. After the valve plate 5 swings down, a bottom end of the valve plate 5 can directly abut against a bent lower surface of the inner wall of the bent section 21, thereby closing the discharge pipe 2 and blocking the refrigerant flowing back from the condenser 3 if necessary. When the compressor operates, the refrigerant discharged from the compressor 1 is discharged to the condenser 3 through the discharge pipe 2, and the valve plate 5 is driven by the pressure difference and the flowing refrigerant to swing up to the second position toward the side away from the outlet 11 of the compressor, thereby opening the discharge pipe 2. When the pressure difference is large enough, the valve plate 5 can be opened until abutting against the top portion of the inner wall of the bent section 21 of the discharge pipe 2, thereby reducing the obstruction to the flow of the refrigerant in the discharge pipe 2 and maintaining smooth flow of the refrigerant in the discharge pipe 2.

[0040] The chiller further includes the limiting portion 6 formed by the inner wall of the discharge pipe 2 extending radially inward. The limiting portion 6 is disposed on a side of the valve plate 5 closer to the outlet 11 of the compressor, and an outer edge of the valve plate 5 in the first position abuts against an inner edge of the limiting portion 6. The arrangement in which the limiting portion 6 abuts against the valve plate 5 can ensure the reliability of the valve plate 5 closing the discharge pipe 2 in the first position, and prevent the valve plate 5 from swinging in the opposite direction (that is, swinging to the side closer to the outlet of the compressor) under the impact of the refrigerant flowing back.

[0041] The limiting portion 6 may be directly formed by a protrusion on the inner wall of the discharge pipe 2 (as shown in the structure of FIGS. 3 and 4), or may be fixedly mounted on the inner wall of the discharge pipe 2. Alternatively, in some embodiments, an inner diameter of the discharge pipe 2 on the side of the valve plate 5 closer to the outlet 11 of the compressor may be slightly reduced (as shown in FIG. 2) to form the limiting portion 6, so that when the valve plate swings down and is closed, the outer edge of the valve plate can abut against the entire circumference of the discharge pipe 2 with a small inner diameter, and the above can be applied to the chiller of the specification.

[0042] In some embodiments, the discharge pipe 2 and the limiting portion 6 are both made of metal, and the limiting portion 6 is welded and fixed to the inner wall of the discharge pipe 2, which can increase the reliability and firmness of the limiting portion 6.

[0043] In some embodiments of the invention, the limiting portion 6 may be an integrally formed limiting plate 61 having a complete outer edge and connected to the inner wall of the discharge pipe 2 over entire circumferential range. Therefore, when the valve plate 5 is in the first position, the outer edge of the entire circumference of the valve plate 5 can abut against the inner edge of the limiting plate 61, so that the discharge pipe 2 can be closed more tightly, and a small amount of refrigerant is prevented from flowing back through a gap between the valve plate 5 and the limiting portion 6.

[0044] In some other embodiments of the invention, the limiting portion 6 may not have a complete outer edge, but one or more limiting plates 61 are disposed at intervals in a circumferential range of the inner wall of the discharge pipe 2. Correspondingly, the outer edge of the valve plate 5 is in contact with the inner wall of the discharge pipe 2, and the other portion of the valve plate 5 abuts against the limiting plate 61. Since the limiting plate 61 is not connected to the inner wall of the discharge pipe 2 in the entire circumference, the flow of the refrigerant in the discharge pipe 2 is less affected, a maximum flow rate in the discharge pipe 2 is larger, and the working efficiency of the chiller is improved.

[0045] FIGS. 5 to 9 show two assembly structures the valve plates 5 and the rotating shaft 4 in the discharge pipe of the chiller according to the invention. Hereinafter, further description will be given with reference to the accompanying drawings and specific examples.

[0046] FIG. 5 and FIG. 6 respectively show a right view and a left view of a horizontal section of the discharge pipe of the chiller according to the embodiment of the invention. With reference to FIGS. 5 and 6, the rotating shaft 4 is fixed to a top portion of the inner wall of the discharge pipe 2, an upper edge of the valve plate 5 is connected to the rotating shaft 4, two side edges of the valve plate 5 are formed as parallel straight outer edges, and a lower edge of the valve plate 5 matches the shape of the inner wall at the bottom portion of the pipe. Therefore, in a process in which the valve plate 5 rotates and swings from the first position to the second position, the bottom portion of the valve plate 5 swings upward and the upper edge and the outer edges on two sides of the valve plate 5 are not in contact with the inner wall of the pipe. Therefore, it is possible to ensure a flow area while not scraping the inner wall of the discharge pipe 2.

[0047] Correspondingly, referring to FIG. 6, the limiting portion 6 is an integrally formed limiting plate 61. The outer edge of the limiting plate 61 matches the circumferential shape of the inner wall of the discharge pipe 2, and can be fixedly mounted (for example, welded) with the inner wall of the discharge pipe 2 over the entire circumferential range. Inner edges of the side portions, the bottom portion and the top portion of the limiting plate 61 enclose to form a flow port. The inner edges of the limiting plate 61 on the side portions abuts against the parallel straight outer edges on both the two sides of the valve plate 5, the top limiting plate 61 corresponds to the rotating shaft 4, a lower edge of the top limiting plate 61 abuts against the upper edge of the valve plate 5, and the bottom limiting plate 61 abuts against the lower edge of the valve plate 5, so that the valve plate 5 can completely cover the flow port in the first position to close the discharge pipe 2. Since the outer edges of the valve plate 5 abut against the limiting portion 6, the sealing performance of the closed structure of the valve plate 5 to the discharge pipe 2 is better, and the valve plate 5 is firmer and more reliable.

[0048] FIG. 7 and FIG. 8 respectively show a right view and a left view a horizontal section of a discharge pipe of another chiller according to the embodiment of the invention. FIG. 9 shows a schematic cross-sectional view of the horizontal section of the discharge pipe of another chiller according to the embodiment of the invention. With reference to FIGS. 7 to 9, the rotating shaft 4 is fixed to the top portion of the inner wall of the discharge pipe 2, two side edges of the valve plate 5 are formed as parallel straight outer edges, and the upper edge and the lower edge of the valve plate 5 match the shape of the inner wall of the bottom portion of the pipe, so that the top portion and the bottom portion of the valve plate 5 in the first position (the position of the solid line valve plate 5 in the drawing) both abut against the inner wall of the discharge pipe 2, and the rotating shaft 4 is connected to a middle portion of the valve plate 5 (excluding the upper edge and

the lower edge of the valve plate 5). In a process in which the valve plate 5 rotates and swings from the first position to the second position (the position of the dotted line valve plate 5 in the drawing), the outer edges on two sides of the valve plate 5 are not in contact with the inner wall of the pipe, so that a larger flow area can be obtained and scratches with the inner wall of the discharge pipe 2 can be reduced.

[0049] Correspondingly, the limiting portion 6 includes a side plate 62 and a bottom plate 63. The side plate 62 is formed by a side portion of the inner wall of the discharge pipe 2 extending radially inward, the bottom plate 63 is formed by a bottom portion of the inner wall of the discharge pipe 2 extending radially inward, and inner edges of the side plate 62 and the bottom plate 63 and the inner wall of the discharge pipe 2 enclose to form a large flow port. The inner edges of the side plate 62 abuts against the parallel straight outer edges on two sides of the valve plate 5, and the bottom plate 63 abuts against the lower edge of the valve plate 5, so that the valve plate 5 can abut against the limiting portion 6 in the first position to close the discharge pipe 2. When the valve plate 5 rotates and swings to the second position, since the area of the limiting portion 6 is smaller than that of the embodiments of FIGS. 5 and 6, the area of the flow port through which the refrigerant flows is larger, which helps to improve the working efficiency of the chiller.

[0050] The limiting portion 6 of the chiller according to some embodiments of the invention may have elasticity, so that when the lower edge of the valve plate 5 abuts against the limiting portion 6, the valve plate 5 can be elastically pressed against the limiting portion 6, thereby improving the sealing performance and having a certain buffering effect on the impact of the refrigerant flowing back.

[0051] In some embodiments of the invention, both the rotating shaft 4 and the valve plate 5 are disposed close to the outlet of the compressor 1, so that a distance between a one-way valve including the rotating shaft 4 and the valve plate 5 and the outlet of the compressor 1 is reduced as much as possible, thereby minimizing the gas capacity in this section of the pipeline and reducing the possibility of reverse rotation of the compressor caused by backflow.

[0052] The above embodiments are merely preferred embodiments of the invention and are not intended to limit the invention.

Claims

1. A chiller comprising:

a compressor (1);
a condenser (3);
a discharge pipe (2) configured to allow an outlet (11) of the compressor to communicate with an inlet (31) of the condenser;
a rotating shaft (4) fixed to an inner wall of the discharge pipe; and
a valve plate (5) having a counterweight and configured to rotate about the rotating shaft, a rotatable stroke of the valve plate including swinging down to a first position to close the discharge pipe, and swinging up to a second position toward a side away from the outlet of the compressor to open the discharge pipe.

2. The chiller according to claim 1, wherein the compressor (1) is disposed above the condenser (3), the discharge pipe (2) has a main body section (22) extending in a vertical direction and a bent section (21) formed by bending the main body section laterally, the bent section communicates with the outlet (11) located on a side surface of the compressor, and the rotating shaft (4) and the valve plate (5) are both disposed in the bent section.

3. The chiller according to claim 2, wherein the bent section (21) further includes a horizontal section extending horizontally, and the rotating shaft (4) and the valve plate (5) are disposed in the horizontal section.

4. The chiller according to any preceding claim, further comprising: a limiting portion (6) formed by the inner wall of the discharge pipe extending radially inward and disposed on a side of the valve plate (5) closer to the outlet (11) of the compressor (1), wherein an outer edge of the valve plate at the first position abuts against an inner edge of the limiting portion.

5. The chiller according to claim 4, wherein the limiting portion (6) is an integrally formed limiting plate (61) having a complete outer edge and connected to the inner wall of the discharge pipe (2) over entire circumferential range.

6. The chiller according to claim 4, wherein the limiting portion (6) includes a side plate (62) formed by a side portion of the inner wall of the discharge pipe (2) extending radially inward, and a bottom plate (63) formed by a bottom portion of the inner wall of the discharge pipe extending radially inward, a top portion of the valve plate (5) at the first position abuts against the inner wall of the discharge pipe, a side edge of the valve plate abuts against the side plate, and a lower edge of the valve plate abuts against the bottom plate.

7. The chiller according to any of claims 4 to 6, wherein the limiting portion (6) is elastic.

8. The chiller according to any of claims 4 to 7, wherein the limiting portion (6) is fixed to the inner wall of the discharge pipe (2) by welding.

9. The chiller according to any of claims 4 to 8, wherein the limiting portion (6) is inclined at an angle of 0° to 3° with respect to the vertical direction.

10. The chiller according to any preceding claim, wherein the compressor (1) is a centrifugal compressor.

11. The chiller according to any preceding claim, wherein the valve plate (5) swings down to the first position only by self weight that provides a driving force.

12. The chiller according to any preceding claim, wherein the counterweight has a weight of 1 kg to 15 kg.

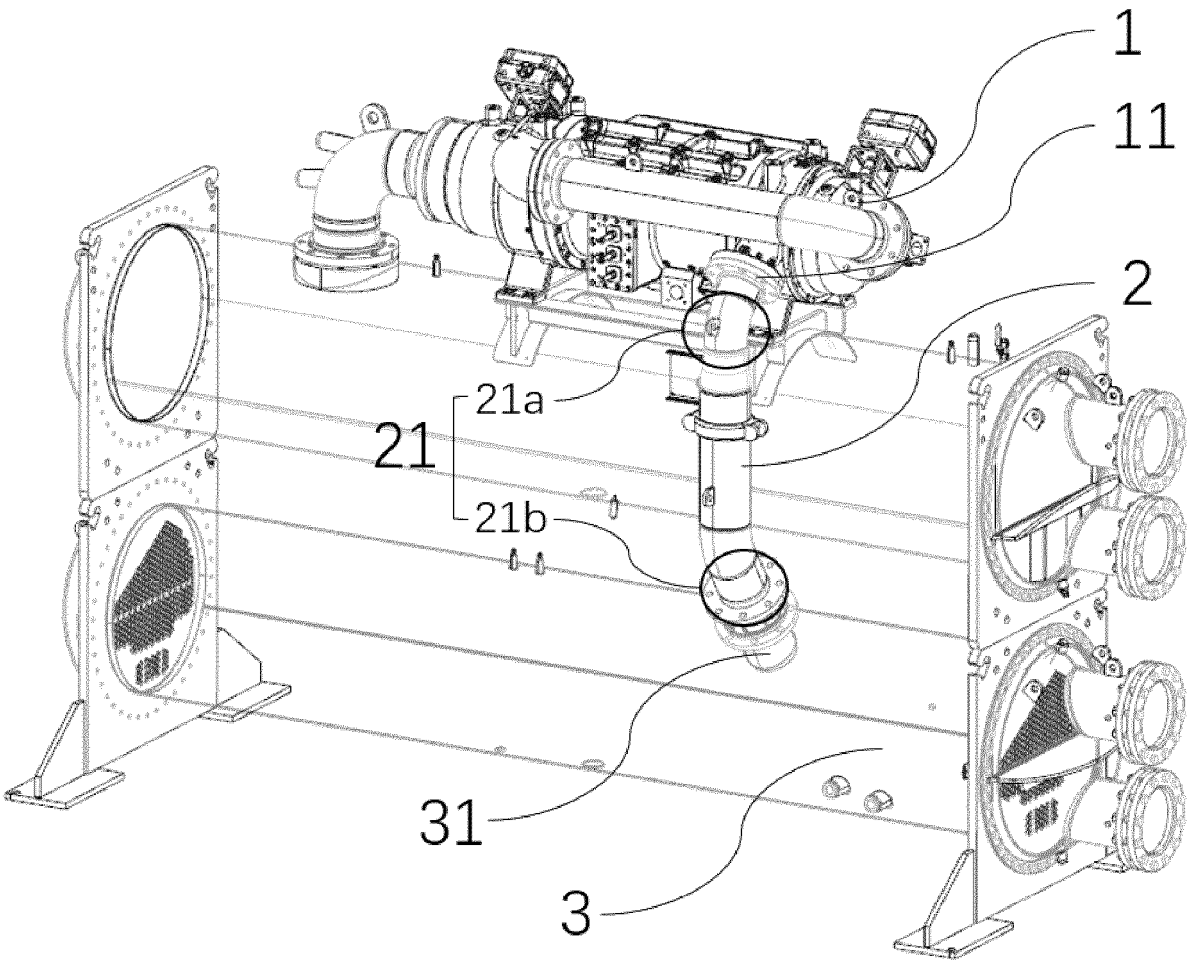

FIG. 1

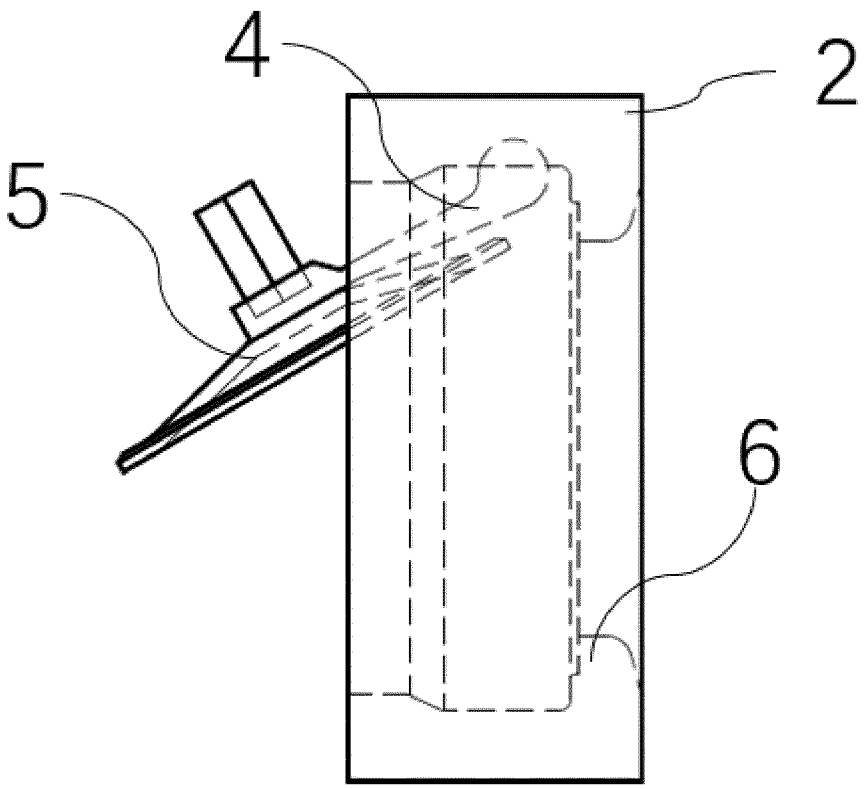

FIG. 2

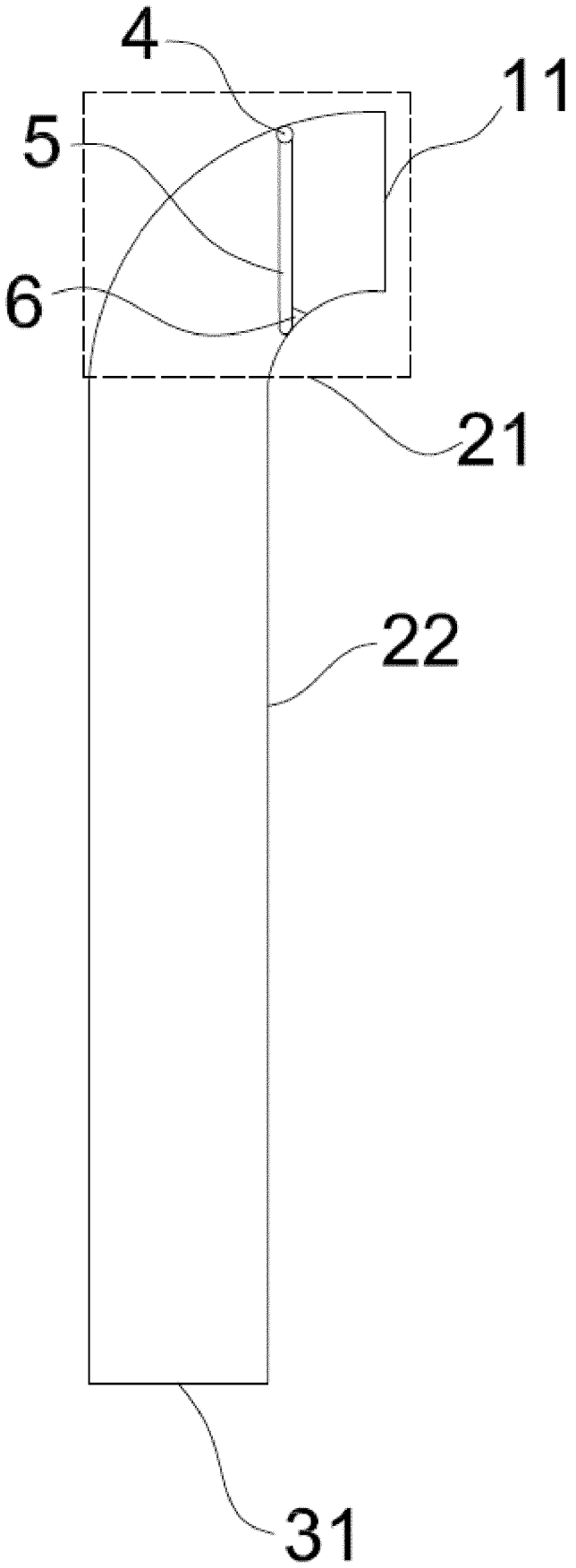

FIG. 3

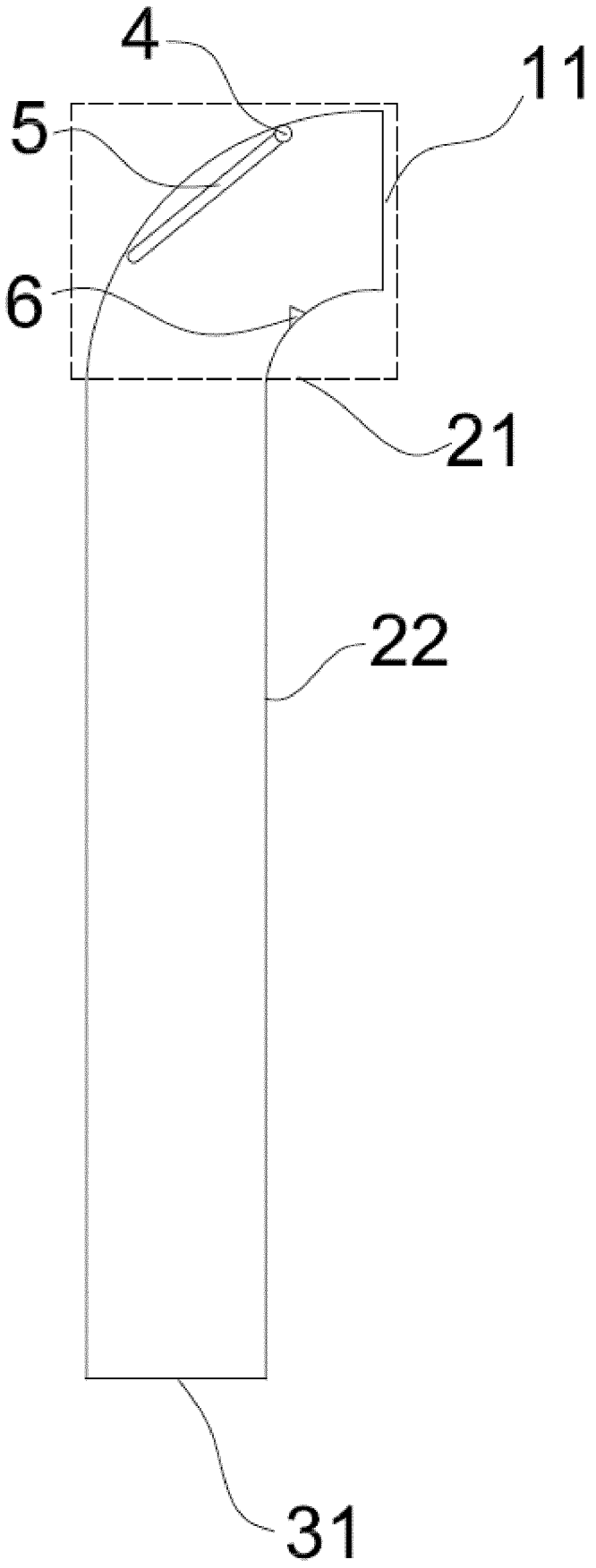

FIG. 4

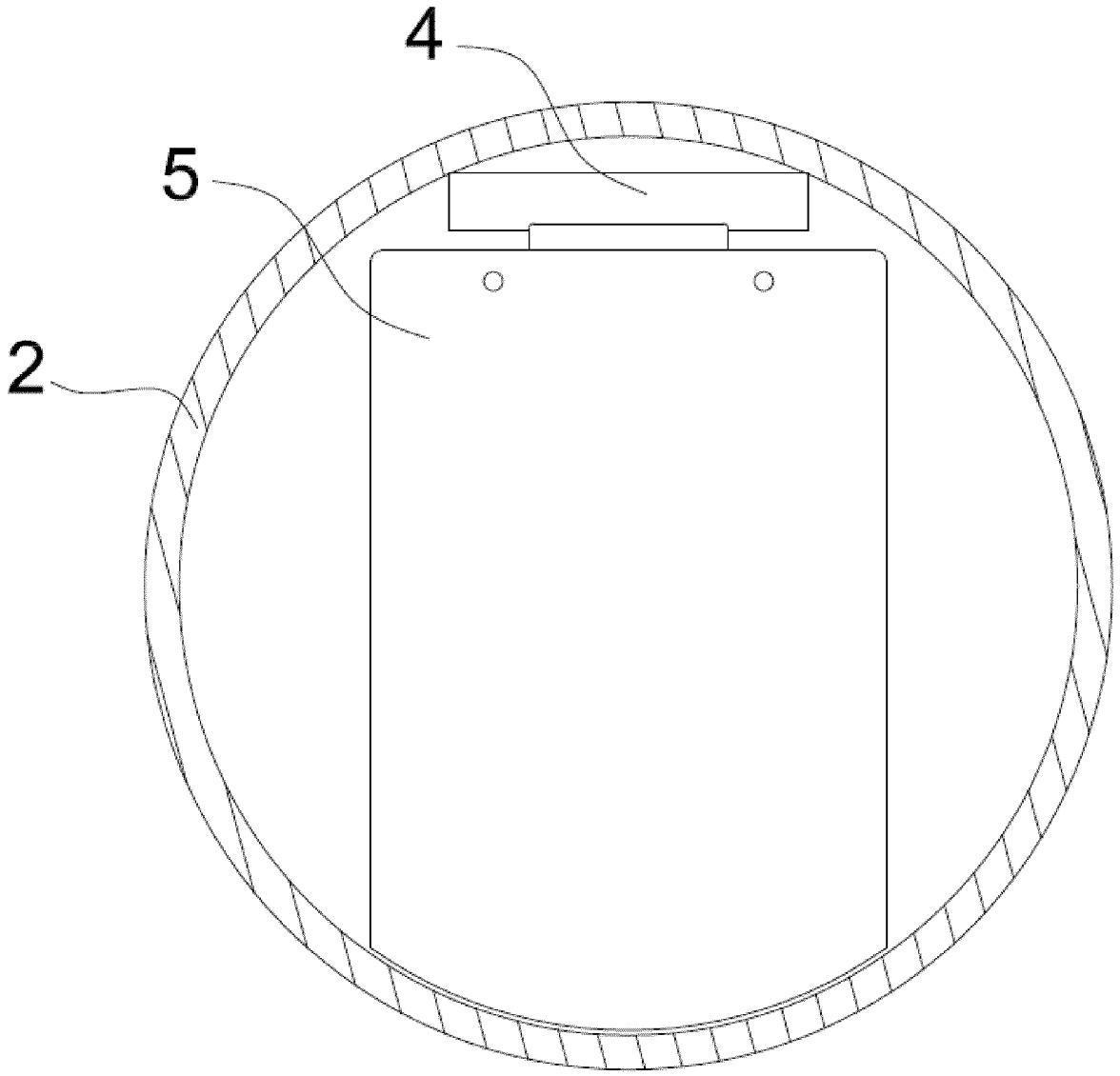

FIG. 5

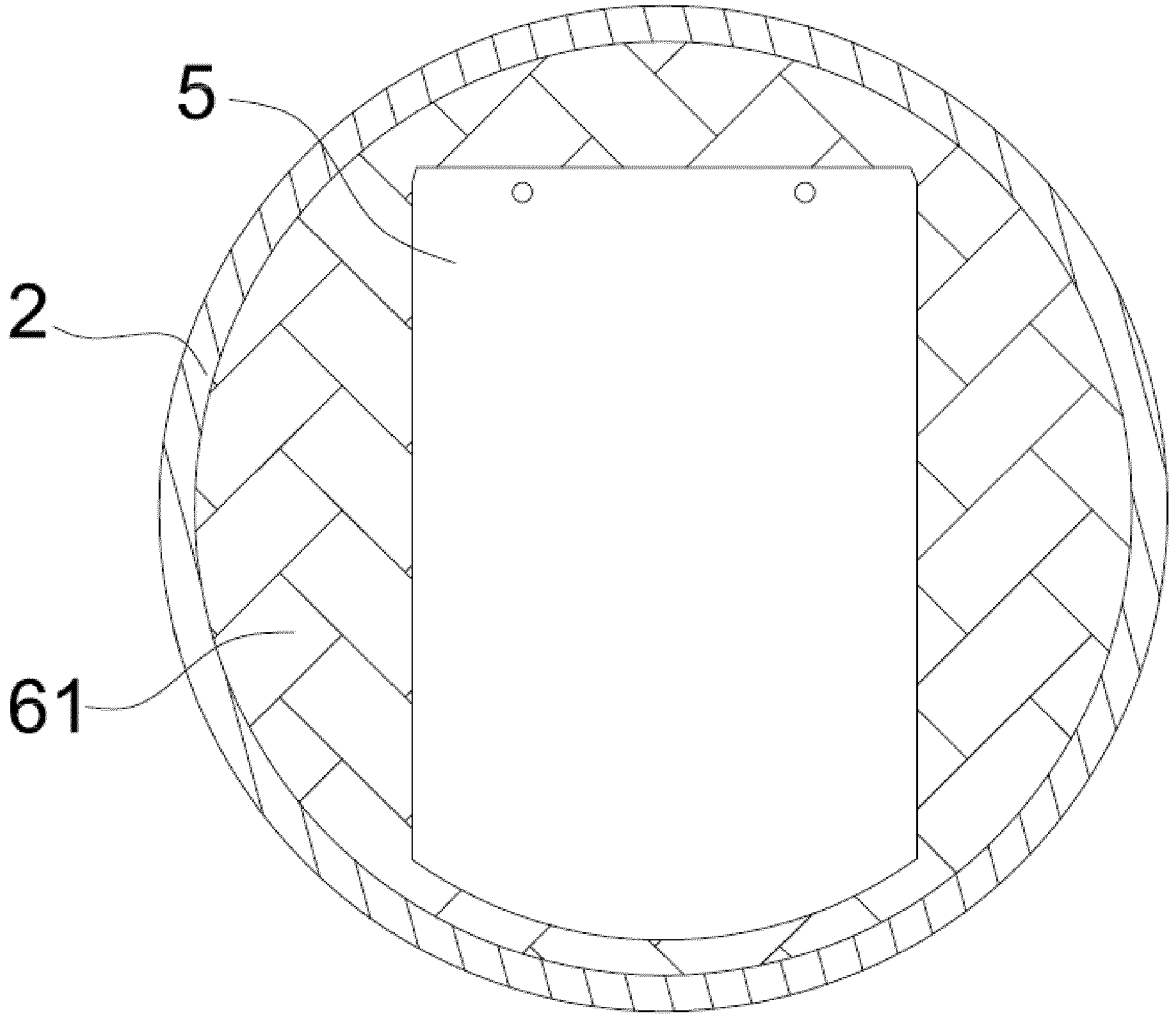

FIG. 6

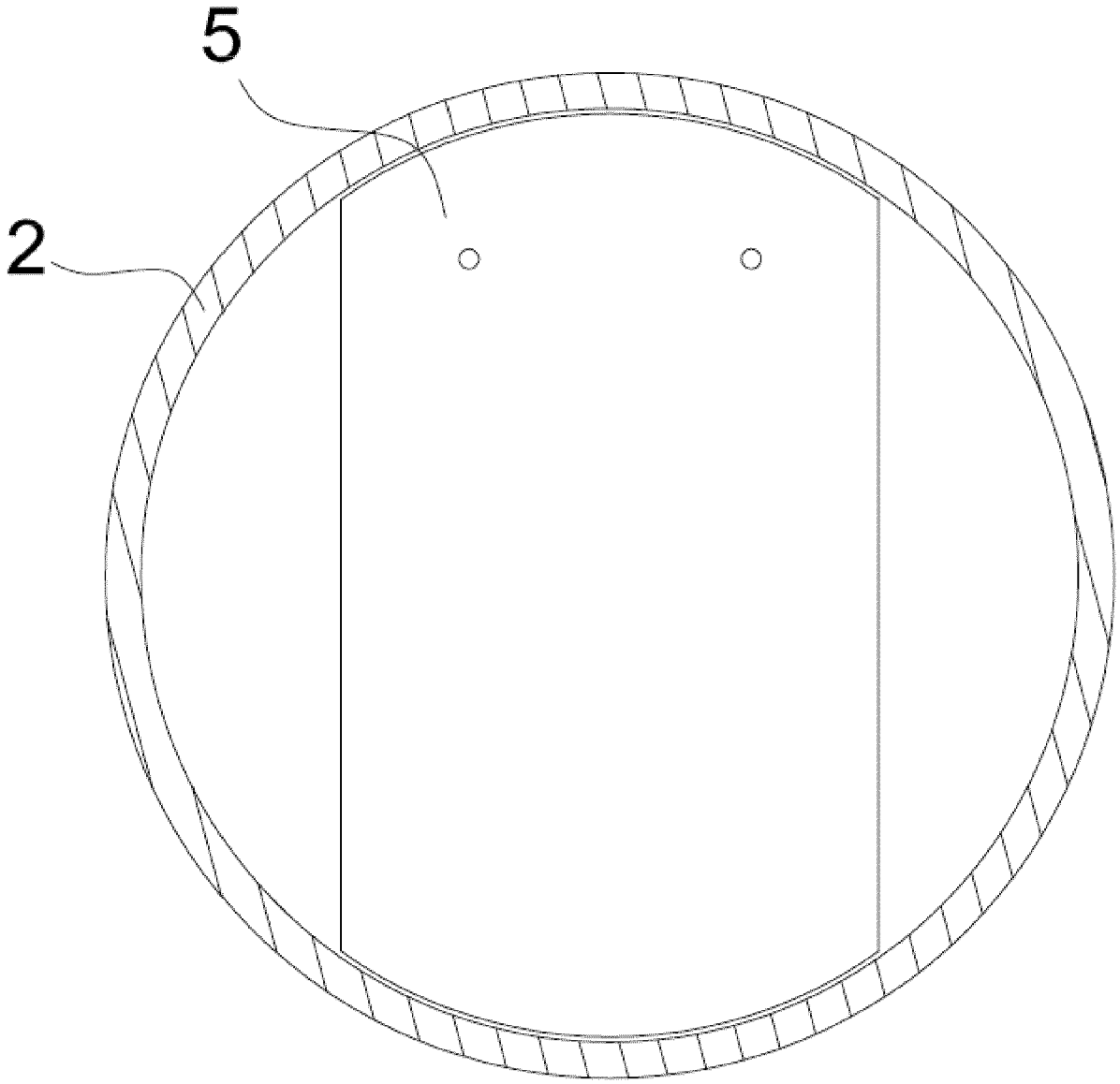

FIG. 7

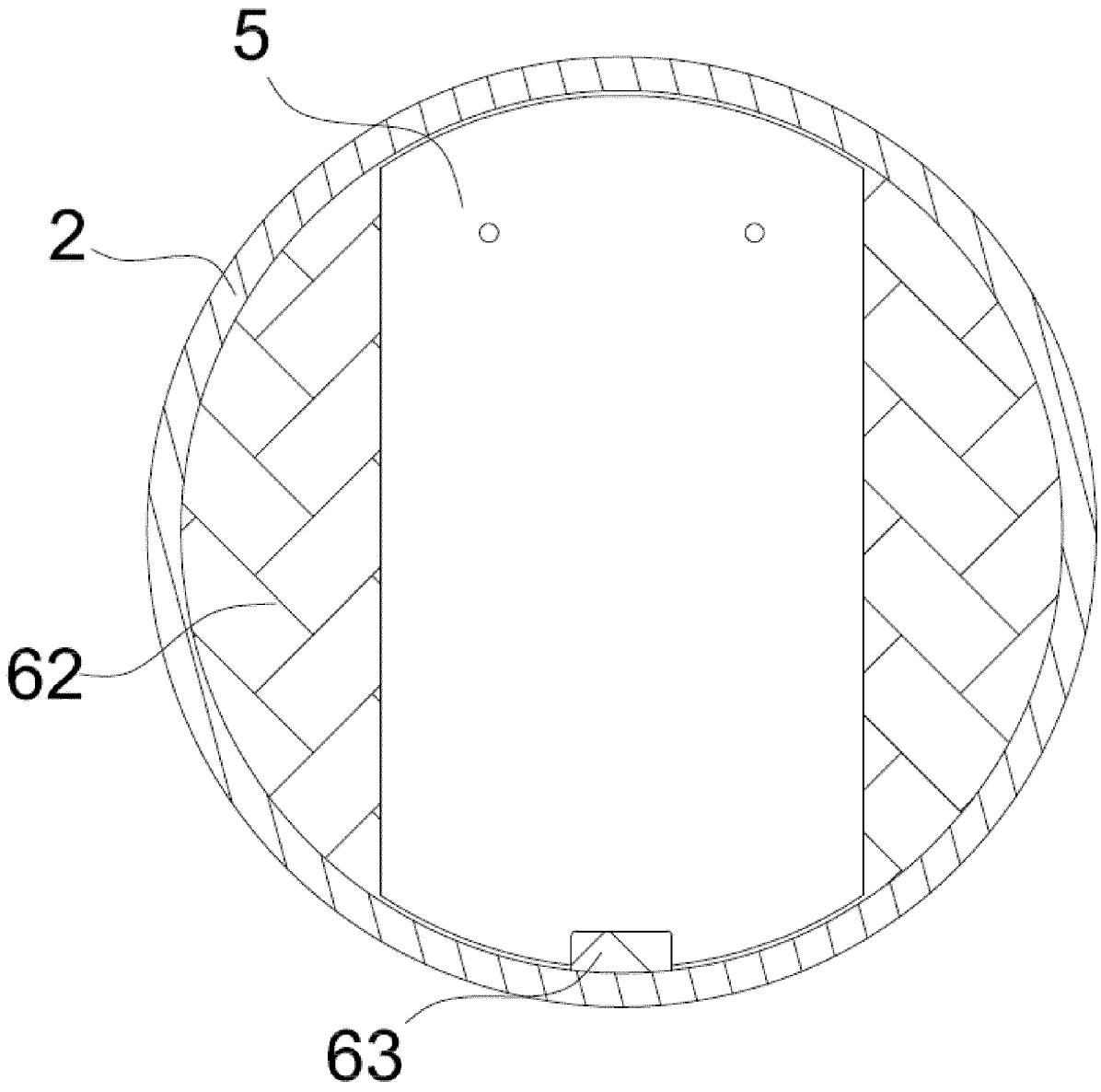

FIG. 8

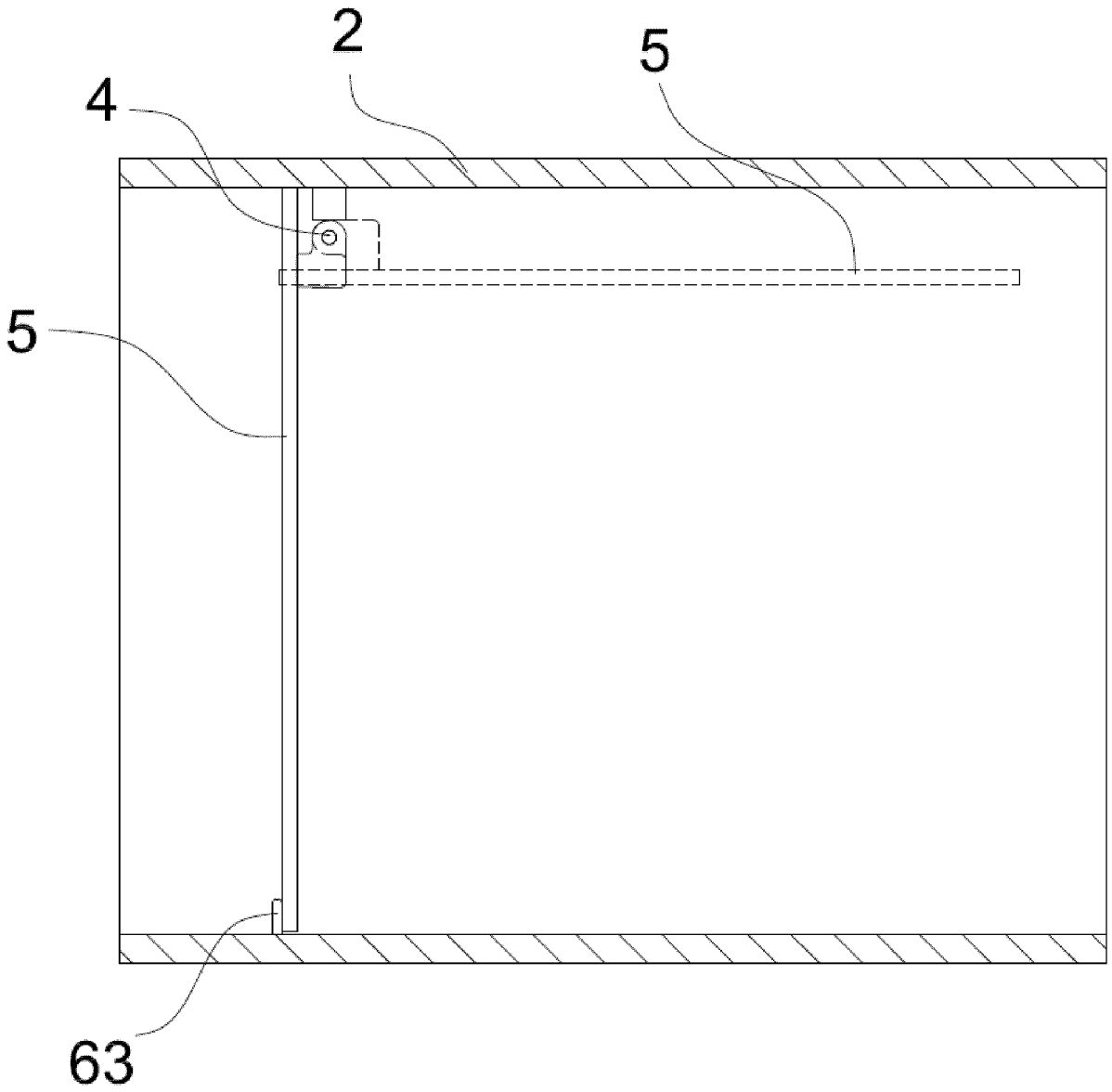

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 24 20 8355

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

F25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 February 2025	Amous, Moez

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26-02-2025

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