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(54) **PIPE TOWER AND BASE STATION**

ROHRTURM UND BASISSTATION

TOUR TUBULAIRE ET STATION DE BASE

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of communications technologies, and in particular, to a tube tower and a base station.

BACKGROUND

[0002] The development of mobile communication services brings a large quantity of requirements for communication site locations. Previous base stations are all deployed on the ground surface, including communications towers, and cabinets matching tower pipes. A monopole tube tower is easy to mount, has a simple structure, and has a beautiful appearance, so that more monopole towers are applied to planned projects in urban centers, for example, communications base stations, square lighting, street lamps, power transmission, and landscape signs. Usually, a cabinet is separately deployed around a tube tower to mount a power supply, an electric control device, a communications device, and the like, and a heat dissipation system is also disposed. However, the disadvantage is that an equipment room needs to occupy an independent area. This is not beautiful, not conducive to city planning, and easy for thefts.

[0003] EP2151833 A1 describes a cooling system which comprises a transformer guard housing having a first opening for supply of a transformer cooling medium and having a second opening for discharge of the transformer cooling medium.

[0004] US2011298218 A1 describes a wind generator which effectively utilizes an opening of a door opening and a shell plate, and in which an outside air-circulation flow path for introducing outside air into a cooling heat exchanger in a tower is formed.

In the wind generator, a cooling medium that cools a heating element disposed in the tower circulates through a cooling heat exchanger, and heat is absorbed by exchanging heat with outside air, an outside air-circulation flow path of a closed space having an outside-air inflow opening and an outside-air discharge opening that are in communication with a door opening of a shell plate is formed in an interior space in the tower, and the cooling heat exchanger is disposed in the outside air-circulation flow path.

SUMMARY

[0005] Embodiments of the present invention provide a tube tower and a base station as defined by the appended claims, to resolve a problem that a storage bottom surface of the tube tower and a cabinet occupies a large space.

[0006] The tube tower includes a tower wall, an accommodation space and a heat dissipation apparatus that are defined by the tower wall, where a compartment door including an air intake vent and an air exhaust vent is disposed on the tower wall, the accommodation space includes an accommodation compartment, and the accommodation compartment includes a sealing room and a ventilation room located above the sealing room; the compartment door closes the accommodation compartment, the air exhaust vent is in communication with the ventilation room, and the air intake vent is located outside the accommodation compartment. The sealing room is configured to accommodate a communications device, a power supply, and the like of a base station. The cabinet connected to the tube tower does not need to be externally disposed, thereby saving external space and further reducing costs.

[0007] The heat dissipation apparatus includes an external power portion, a first power portion, and a first heat exchanger, where the first power portion is located at a top of the sealing room, the first heat exchanger is disposed on a side wall of the sealing room and includes a first internal air duct and a first external air duct, the external power portion is located in the ventilation room and in communication with one end of the first external air duct; the other end of the first external air duct is in communication with the air intake vent, and after air absorbed from the air intake vent passes through the first external air duct, the external power portion exhausts the air through the air exhaust vent.

[0008] The first power portion is configured to: form, in the sealing room, an air flow that circularly flows, and transfer heat of the air flow to an outside of the sealing room through the first internal air duct. The external power portion and the first power portion perform heat dissipation inside and outside the sealing room, to improve heat dissipation efficiency.

[0009] The accommodation compartment is defined by a top plate, a bottom plate disposed opposite to the top plate, and the tower wall located between the top plate and the bottom plate, and a partition plate, a first side plate, a second side plate, and a third side plate that are located between the top plate and the bottom plate are disposed in the accommodation compartment; and the first side plate and the second side plate are located between the top plate and the bottom plate and pass through the partition plate, the third side plate is located between the partition plate and the bottom plate, the first side plate, the second side plate, and the third side plate are disposed at intervals along a circumferential direction of the tower wall, the first side plate, the second side plate, and the third side plate are all connected by using the tower wall on two opposite sides to define a side wall of the sealing room, and the partition plate, the top plate, and the tube wall form the ventilation room. The accommodation compartment directly uses the tower wall of the tube tower as the side wall, and a heat dissipation wall and the accommodation space is defined by using the first side plate, the second side plate, and the third side plate, to properly use an internal space and structure of the tube tower.

[0010] A cabling channel that runs through the top plate and the bottom plate and through which cabling passes is formed between the tower wall and each of the first side plate and the second side plate, so that cables can be accommodated and arranged, thereby avoiding damage and disorder caused when the cables are disposed outside the tube tower.

[0011] The heat dissipation apparatus includes a second power portion disposed adjacent to the first power portion and a second heat exchanger, the second heat exchanger is disposed on the third side plate and faces away from the outside of the sealing room, the second heat exchanger includes a second internal air duct and a second air duct, one end of the second external air duct is in communication with the external power portion, the other end is in communication with the air intake vent, the second heat exchanger is located in the second external air duct, and the second power portion is configured to: form heat in the sealing room into the air flow that circularly flows, and transfer the heat of the air flow to the outside of the sealing room through the second internal air duct.

[0012] The first internal air duct is provided with a ventilation opening in communication with the sealing room and the first power portion, and the second internal air duct is provided with a ventilation opening in communication with the sealing room and the second power portion.

[0013] The first side plate, the second side plate, and the third side plate are arranged in an arc shape in the sealing room, and the compartment door is located in a center position of the arc shape. A support rack connected to the first side plate, the second side plate, and the third side plate is disposed in the sealing room, the support rack, the first side plate, the second side plate, and the third side plate separate a plurality of support areas, and the plurality of support areas are arranged in an arc shape. The arrangement can facilitate taking and placing of a device in the sealing room after the compartment door is opened.

[0014] The compartment door includes a door frame, a door plate, and a sealing portion, the door frame is provided on the tower wall and in communication with the accommodation compartment, the door plate is flippable and mounted on the door frame, and the sealing portion seals an area between the door plate and the door frame, so that the sealing room can be effectively sealed.

[0015] The external power portion, the first power portion, and the second power portion each include an air deflector and a centrifugal fan located in the air deflector. Two through holes are provided on the bottom plate, and the two through holes respectively enable the first external air duct and the second external air duct to be in communication with the air intake vent.

[0016] The accommodation space further includes several accommodation cavities located above the accommodation compartment, and the accommodation cavities are configured to accommodate other devices.

[0017] The base station provided in the present disclosure includes the tube tower, a base station application device, and a power supply, where the base station application device and the power supply are mounted in the sealing room.

[0018] A cabling channel that runs through the top plate and a bottom plate and through which cabling passes is formed between the tower wall and each of the first side plate and a second side plate, and cabling of the base station application device and the power supply is connected to another device of the tube tower through the channel.

[0019] In the embodiments, the tube tower is provided with the sealing room to accommodate the base station application device and the power supply, the cabling channel, and the heat dissipation apparatus inside. This not only resolves a problem that the cabinet disposed outside the tube tower occupies an area and affects an appearance, but also saves a design of the cabinet, and fully uses an internal space of the tube tower for properly arranging a device placement position, cabling, and heat dissipation, so that the tube tower and the cabinet are actually integrated.

BRIEF DESCRIPTION OF DRAWINGS

[0020] To describe technical solutions in embodiments of the present invention or in the background more clearly, the following describes the accompanying drawings required for describing the embodiments of the present invention or the background.

FIG. 1 is a schematic diagram of a tube tower according to the present invention;

FIG. 2 is a schematic structural diagram of a part of an accommodation compartment of the tube tower shown in FIG. 1;

FIG. 3 to FIG. 5 are schematic diagrams of different angles of an internal structure of the accommodation compartment of the tube tower shown in FIG. 2, where a part of a tower wall is removed;

FIG. 6 is a schematic diagram in which an external power portion, a first power portion, and a second power portion are disposed inside the tube tower shown in FIG. 2;

FIG. 7 is a top view of the tube tower shown in FIG. 2 in which an internal structure can be seen; and

FIG. 8 is a schematic diagram of a heat dissipation direction inside the tube tower in FIG. 1.

DESCRIPTION OF EMBODIMENTS

[0021] The following describes embodiments of the present invention with reference to the accompanying drawings in the embodiments of the present invention.

[0022] The tube tower disclosed in the present disclosure usually has a tube tower structure used in a tube

tower type base station to accommodate a device inside, but is not limited thereto, or may have a tube tower structure that is applied to another occasion to accommodate a device inside. The tube tower is mounted vertically or approximately vertically. Expressions of upper, lower, and height are all based on a vertical state that the tube tower has after the tube tower is mounted. The described position in an upper part or a lower part of an object is a position in the upper half part or the lower half part of the object. The described position above or below an object is a position outside the object and above or below the object. The corresponding means that between corresponding objects, there is cooperation for jointly implementing a function, or a location correspondence, and a person skilled in the art may determine a meaning of the "corresponding" based on a scenario.

[0023] Referring to FIG. 1 and FIG. 2, the tube tower provided in an embodiment of the present invention includes a tower wall 10, an accommodation space 11 and a heat dissipation apparatus (not shown in the figure) that are defined by the tower wall 10. A compartment door 12 including an air intake vent 121 and an air exhaust vent 122 is disposed on the tower wall 10. The accommodation space 11 includes an accommodation compartment 20, the accommodation compartment 20 includes a sealing room 21 and a ventilation room 22 located above the sealing room 21, the compartment door 12 closes the accommodation compartment 20, the air exhaust vent 122 is in communication with the ventilation room 22, and the air intake vent 121 is located outside the accommodation compartment 20. The sealing room 21 is configured to accommodate a communications device, a power supply, and the like of a base station.

[0024] Referring to FIG. 3, FIG. 6, and FIG. 8 together, the heat dissipation apparatus includes an external power portion 30, a first power portion 31, and a first heat exchanger (not shown in the figure). The first power portion 31 is located at the top of the sealing room 21. The first heat exchanger is disposed on a side wall of the sealing room 21, and includes a first internal air duct (not shown in the figure) and a first external air duct A isolated from the first internal air duct. The external power portion 30 is located in the ventilation room 22 and in communication with one end of the first external air duct A, and the other end of the first external air duct A is in communication with the air intake vent 121. After air absorbed from the air intake vent passes through the first external air duct, the external power portion 30 exhausts the air through the air exhaust vent 122, to perform external circulation heat dissipation on the sealing room 21. The first power portion 31 is configured to form an air flow that circularly flows in the sealing room 21, and transfers heat of the air flow to an outside of the sealing room 21 through the first internal air duct, to form an internal circulation air duct that dissipates heat for the sealing room 21. Specifically, a heat exchange core of the first heat exchanger and a housing of the heat exchanger form the first internal air duct and the first external air duct A that are isolated from each other. The first internal air duct is provided with a first ventilation opening 215 in communication with the sealing room 21 and a second ventilation opening 216 in communication with the first power portion 31. The first ventilation opening 215 is located at the bottom of the sealing room, and the second ventilation opening 216 is located at the top of the sealing room and in communication with the first power portion 31.

[0025] In this embodiment, the tower wall 10 of the tube tower defines the cylindrical accommodation space 11, and an interior of the accommodation space further includes several accommodation cavities located above the accommodation compartment 20, and the accommodation cavities are configured to accommodate a device such as a communications device of a base station. The accommodation compartment is a cylindrical structure in the accommodation space. In this embodiment, the accommodation compartment 20 is defined by a top plate 201, a bottom plate 202 disposed opposite to the top plate 201, and the tower wall located between the top plate 201 and the bottom plate 202. That is, the tower wall located between the top plate 201 and the bottom plate 202 is a side wall of the accommodation compartment.

[0026] Referring to FIG. 3 to FIG. 5 and FIG. 7 together, further, a partition plate 23, a first side plate 24, a second side plate 25, and a third side plate 26 that are located between the top plate 201 and the bottom plate 202 are disposed in the accommodation compartment 20. The first side plate 24 and the second side plate 25 are located between the top plate 201 and the bottom plate 202 and pass through the partition plate 23. The third side plate 26 is located between the partition plate 23 and the bottom plate 202. The first side plate 24, the second side plate 25, and the third side plate 26 are disposed (on a part located between the top plate 201 and the bottom plate 202) at intervals along a circumferential direction of the tower wall 10. In addition, the first side plate 24, the second side plate 25, and the third side plate 26 are all connected by using the tower wall 10 on two opposite sides to define the sealing room 21. The partition plate 23, the top plate 201, and the tube wall 10 form the ventilation room 22. The external power portion 30 is fastened in the ventilation room 22 and includes an air deflector and a centrifugal fan.

[0027] As shown in FIG. 2, FIG. 3, and FIG. 5, specifically, the top plate 201, the bottom plate 202, and the partition plate 23 are approximately circular plates, and the top plate 201, the partition plate 23, and the bottom plate 202 are sequentially disposed, at intervals along a length direction of the tube tower in parallel, in the accommodation space defined by the tube wall 10. Two through holes (not shown in the figure) are provided on the bottom plate 202, and one of the two through holes enables the first external air duct A to be in communication with the air intake vent 121. A baffle plate 203 is further disposed on a side that is of the bottom wall 202 and that is away from the top plate 201. An air intake

cavity is formed between the baffle plate 203 and the bottom plate 202. The air intake vent 121 of the compartment door 12 is in communication with the air intake cavity, so that air flows from the air intake vent 121 into the first external air duct A through the air intake cavity. A through hole is provided on the partition plate 23 and in communication with the first external air duct A, and the air that flows out of the first external air duct A is exhausted by using the ventilation room 22 between the partition plate 23 and the top plate 201. The tower wall between the first side plate 24 and the second side plate 25, the tower wall between the second side plate 25 and the third side plate 26, the tower wall between the third side plate 26 and the first side plate 24, the first side plate 24, the second side plate 25, and the third side plate 26 jointly form a circumferential side wall of the sealing room 21. The first heat exchanger is fastened on the first side plate 24 and is located in the sealing room 21.

[0028] A cross section of the first side plate 24 is approximately V-shaped, and the first side plate 24 includes a V-shaped surface 241. Two opposite sides of the first side plate 24 are connected to an internal surface of the tower wall 10, and the V-shaped surface 241 faces the tower wall 10 and a cabling channel 242 is formed between the V-shaped surface 241 and the tower wall. A cross section of the second side plate 25 is approximately V-shaped, and the second side plate 25 includes a V-shaped surface 251. Two opposite sides of the second side plate 25 are connected to the internal surface of the tower wall 10, and the V-shaped surface 251 faces the tower wall 10 and a cabling channel 252 is formed between the V-shaped surface 251 and the tower wall. The cabling channel 242 and the channel 252 run through the top plate 201 and/or the bottom plate 202. Two opposite sides of the third side plate 26 are connected to the tower wall and a cavity is formed between the third side plate 26 and the tower wall. The cavity runs through the partition plate 23.

[0029] Further, the first side plate 24, the second side plate 25, and the third side plate 26 are arranged in an arc shape in the sealing room 21. The compartment door 12 is approximately located at a center of the arc shape. A displacement faces the first side plate 24, the second side plate 25, and the third side plate 26. The first side plate 24, the second side plate 25, and the third side plate 26 are located at an arc line of a same center. Further, a support rack 27 connected to the first side plate 24, the second side plate 25, and the third side plate 26 is disposed in the sealing room 21, and the support rack 27, the first side plate 24, the second side plate 25, and the third side plate 26 separate a plurality of support areas B (FIG. 2 and FIG. 4), configured to: accommodate and fasten a base station application device, a power supply, and the like that are of a communications base station. The plurality of support areas are arranged in an arc shape, to fully use a cylindrical space structure of the tube tower. The device is disposed in close contact with an outer wall of the first heat exchanger or with the second side plate 25 or with the third side plate 26. This is more conducive to heat dissipation of the device. An internal structure of the sealing room and a design of the compartment door in this embodiment can facilitate taking and placing the device located in the sealing room 21 from the compartment door 12, and a replacement of components of air ducts in which the first side plate 24, the second side plate 25, and the third side plate 26 are located, to properly arrange and use an internal space of the tube tower.

[0030] Referring to FIG. 2 again, the compartment door 12 includes a door frame 123, a door plate 124, and a sealing portion. The door frame is provided on the tower wall 10, is in communication with the accommodation compartment 20, and is used for taking and placing the device inside the sealing room. The door plate 124 may be flippable and mounted on the door frame 123. The sealing portion is a sealing ring disposed at a circumferential edge of the prime number door plate 124 and a circumferential edge of the door frame 123. After the door plate 124 is closed, the sealing portion seals an area between the door plate 124 and the door frame 123. The air intake vent 121 and the air exhaust vent 122 are disposed at two opposite ends of the door plate 124. The first side plate 24, the second side plate 25, and the third side plate 26 are arranged in an arc shape, and the plurality of support areas are arranged in an arc shape, so that the tube tower and the device are highly integrated, and a hole area of the tube tower is reduced, thereby improving a strength and reliability of the tube tower.

[0031] In this embodiment, the first heat exchanger is disposed on the first side plate 24, and the first side plate 24 may be used as the housing of the first heat exchanger. Certainly, the first side plate 24 may be used as a support of the first heat exchanger. The external power portion 30 is located in the ventilation room 22 and in communication with the first external air duct A through the through hole on the partition plate 23. Referring to FIG. 8, after being started, the external power portion 30 draws the air from the air intake vent 121 into the first external air duct A, and then the external power portion 30 exhausts the air in the ventilation room 22 out of the tube tower, to form a flow channel for external circulation heat dissipation on the sealing room 21, and an air flow direction is W in the figure. After being started, the first power portion 31 extracts heat in the sealing room, exhausts the heat into the first internal air duct of the first heat exchanger through the second ventilation opening 216, and then returns the heat to the sealing room 21 through the first ventilation opening 215, to form an air flow and circulate the air flow. In this process, the heat exhausted from the first power portion 31 into the first internal air duct passes through the heat exchange core and the air in the first external air duct for heat dissipation, and then returns to the sealing room 21, to form a flow channel for internal circulation heat dissipation on the sealing room 21, and an air flow direction is N in the figure, to implement both internal circulation heat dissi-

pation and external circulation heat dissipation on the sealing room 21.

[0032] In the embodiments, the tube tower is provided with the sealing room 21 to accommodate the base station application device and the power supply, the cabling channel, and the heat dissipation apparatus inside. This not only resolves a problem that the cabinet disposed outside the tube tower occupies an area and affects an appearance, but also saves a housing of the cabinet, and fully uses the internal space of the tube tower for properly arranging a device placement position, cabling, and heat dissipation, so that the tube tower and the cabinet are actually integrated, and an anti-theft effect of the internal device, and the like can be enhanced.

[0033] As shown in FIG. 6, further, the heat dissipation apparatus further includes a second power portion 33 disposed adjacent to the first power portion 31 and a second heat exchanger. The second heat exchanger is disposed on the third side plate 26 and faces away from the outside of the sealing room 21, that is, inside the cavity. The second heat exchanger includes a second internal air duct and a second external air duct C. One end of the second external air duct C is in communication with the external power portion 30, and the other end is in communication with the air intake vent 121 through another through hole provided on the bottom plate 202. The second power portion 33 is in communication with the second internal air duct, and is configured to: form the heat in the sealing room 21 into an air flow that circularly flows, and transfer the heat of the air flow to the outside of the sealing room through the second heat exchanger, thereby further enhancing a heat dissipation effect of the sealing room 21. The first power portion 31 and the second power portion 33 each include an air deflector and a centrifugal fan, and external air and internal heat are formed, by using the centrifugal fan, into an air flow to flow.

[0034] The third side plate 26 may be used as a housing of the second heat exchanger, and a heat exchange core of the second heat exchanger and the housing of the heat exchanger form the second internal air duct and the second external air duct C that are isolated from each other. The second internal air duct is provided with a third ventilation opening 217 in communication with the sealing room 21 and a fourth ventilation opening 218 in communication with the second power portion 33. The third ventilation opening 217 is located at the bottom of the sealing room, and the fourth ventilation opening 218 is located at the top of the sealing room and in communication with the second power portion 33. After being started, the external power portion 30 draws air from the air intake vent 121 into the second external air duct C, and then the external power portion 30 exhausts the air in the ventilation room 22 out of the tube tower, to perform external circulation heat dissipation on the sealing room 21. After being started, the second power portion 33 extracts the heat in the sealing room, exhausts the heat into the second internal air duct of the second heat exchanger through the second ventilation opening 216, and then returns the heat to the sealing room 21 through the third ventilation opening 217, to form internal circulation heat dissipation. The device is mounted in the support area, and may be in close contact with the third side plate 26, thereby helping remove the heat. Setting of the second heat exchanger further assists heat dissipation of the first heat exchanger, and heat dissipation of a communications device with a relatively large heat emission volume can be more efficient, thereby reducing damage to the device.

[0035] In the tube tower in this embodiment, the first power portion 31 and the second power portion 33 are disposed to cooperate with the first heat exchanger and the second heat exchanger, to form two internal circulation flow channels inside the sealing room and two external circulation flow channels outside the sealing room. In addition, the external power portion 30, the first external air duct, and the second external air duct are cooperated to take away heat of the first heat exchanger and the second heat exchanger, to implement efficient heat dissipation.

[0036] The present disclosure further provides a base station, including the tube tower, a base station application device, and a power supply. The base station application device and the power supply are mounted in the sealing room 20. The base station application device includes a communications device, a monitoring device, and the like. Cables of the base station application device and the power supply, and an optical cable, a cable, and the like of the tube tower may extend out from the cabling channel, and be connected to an external cable or another device of the tube tower.

[0037] In the base station of the present disclosure, the base station application device and components such as the power supply, the optical cable, and the cable are arranged inside the tube tower and a heat dissipation system is added to dissipate heat. The cabinet does not need to occupy an additional area, so that a design and costs of the cabinet are saved, and an occupied space of the bottom surface is reduced, an entire occupation area of the base station is reduced, and an appearance completeness of the base station is increased.

[0038] In the foregoing preferred embodiments, the objectives, technical solutions, and advantages of the present disclosure are further described in detail. It should be understood that the foregoing descriptions are merely preferred embodiments of the present invention, but are not intended to limit it.

Claims

1. A tube tower, comprising a tower wall (10), an accommodation space (11) and a heat dissipation apparatus that are defined by the tower wall, wherein a compartment door comprising an air intake vent (121) and an air exhaust vent (124) is disposed on

the tower wall, the accommodation space comprises an accommodation compartment (20), and the accommodation compartment comprises a sealing room (21) and a ventilation room (20) located above the sealing room, the compartment door closes the accommodation compartment, the air exhaust vent is in communication with the ventilation room, and the air intake vent is located outside the accommodation compartment;

the heat dissipation apparatus comprises an external power portion (30), a first power portion (31), and a first heat exchanger, wherein the first power portion is located at a top of the sealing room, the first heat exchanger is disposed on a side wall of the sealing room and comprises a first internal air duct and a first external air duct isolated from the first internal air duct, the external power portion is located in the ventilation room and in communication with one end of the first external air duct, the other end of the first external air duct is in communication with the air intake vent, and after air absorbed from the air intake vent passes through the first external air duct, the external power portion exhausts the air through the air exhaust vent; and
the first power portion is configured to: form, in the sealing room, an air flow that circularly flows, and transfer heat of the air flow to an outside of the sealing room through the first internal air duct.

2. The tube tower according to claim 1, wherein the accommodation compartment is defined by a top plate, a bottom plate disposed opposite to the top plate, and the tower wall located between the top plate and the bottom plate, and a partition plate, a first side plate, a second side plate, and a third side plate that are located between the top plate and the bottom plate are disposed in the accommodation compartment; and the first side plate and the second side plate are located between the top plate and the bottom plate and pass through the partition plate, the third side plate is located between the partition plate and the bottom plate, the first side plate, the second side plate, and the third side plate are disposed at intervals along a circumferential direction of the tower wall, the first side plate, the second side plate, and the third side plate are all connected by using the tower wall on two opposite sides to define a side wall of the sealing room, and the partition plate, the top plate, and the tube wall form the ventilation room.

3. The tube tower according to claim 2, wherein a cabling channel (252) that runs through the top plate and the bottom plate and through which cabling passes is formed between the tower wall and each of the first side plate and the second side plate.

4. The tube tower according to claim 2, wherein the heat dissipation apparatus comprises a second power portion (33) disposed adjacent to the first power portion and a second heat exchanger, the second heat exchanger is disposed on the third side plate and faces away from the outside of the sealing room, the second heat exchanger comprises a second internal air duct and a second external air duct, one end of the second external air duct is in communication with the external power portion, the other end is in communication with the air intake vent, and the second power portion is in communication with the second internal air duct, and is configured to: form heat in the sealing room into the air flow that circularly flows, and transfer the heat of the air flow to the outside of the sealing room through the second internal air duct.

5. The tube tower according to claim 4, wherein the first internal air duct is provided with a ventilation opening (215) in communication with the sealing room and the first power portion, and the second internal air duct is provided with a ventilation opening in communication with the sealing room and the second power portion.

6. The tube tower according to any one of claims 2 to 5, wherein the first side plate, the second side plate, and the third side plate are arranged in an arc shape in the sealing room, and the compartment door is located in a center position of the arc shape.

7. The tube tower according to claim 6, wherein a support rack connected to the first side plate, the second side plate, and the third side plate is disposed in the sealing room, the support rack, the first side plate, the second side plate, and the third side plate separate a plurality of support areas, and the plurality of support areas are arranged in an arc shape.

8. The tube tower according to claim 6, wherein the compartment door comprises a door frame, a door plate, and a sealing portion, the door frame is provided on the tower wall and in communication with the accommodation compartment, the door plate is flippable and mounted on the door frame, and the sealing portion seals an area between the door plate and the door frame.

9. The tube tower according to claim 5, wherein the external power portion, the first power portion, and the second power portion each comprise an air deflector and a centrifugal fan located in the air deflector.

10. The tube tower according to claim 5, wherein two

through holes are provided on the bottom plate, and the two through holes respectively enable the first external air duct and the second external air duct to be in communication with the air intake vent.

11. The tube tower according to claim 1, wherein the accommodation space further comprises several accommodation cavities located above the accommodation compartment.

12. Abase station, comprising the tube tower according to any one of claims 1 to 11, a base station application device, and a power supply, wherein the base station application device and the power supply are mounted in the sealing room.

13. The base station according to claim 12, wherein a cabling channel that runs through the top plate and a bottom plate and through which cabling passes is formed between the tower wall and each of the first side plate and a second side plate, and cabling of the base station application device and the power supply is connected to another device of the tube tower through the channel.

Patentansprüche

1. Rohrmast, der eine Mastwand (10), einen Aufnahmebereich (11) und eine Wärmeableitungseinrichtung umfasst, die durch die Mastwand definiert sind, wobei eine Abteiltür, die eine Lufteinlassöffnung (121) und eine Luftauslassöffnung (124) umfasst, an der Mastwand angeordnet ist, der Aufnahmebereich ein Aufnahmeabteil (20) umfasst und das Aufnahmeabteil einen Dichtungsraum (21) und einen Belüftungsraum (20) umfasst, der sich über dem Dichtungsraum befindet, die Abteiltür das Aufnahmeabteil schließt, die Luftauslassöffnung mit dem Belüftungsraum in Verbindung steht und die Lufteinlassöffnung sich außerhalb des Aufnahmeabteils befindet;

wobei die Wärmeableitungseinrichtung einen externen Leistungsabschnitt (30), einen ersten Leistungsabschnitt (31) und einen ersten Wärmetauscher umfasst, wobei sich der erste Leistungsabschnitt an einer Oberseite des Dichtungsraums befindet, der erste Wärmetauscher an einer Seitenwand des Dichtungsraums angeordnet ist und einen ersten internen Luftschacht und einen ersten externen Luftschacht umfasst, der von dem ersten internen Luftschacht isoliert ist, der externe Leistungsabschnitt sich in dem Belüftungsraum befindet und mit einem Ende des ersten externen Luftschachts in Verbindung steht, das andere Ende des ersten externen Luftschachts mit der Lufteinlassöffnung in Verbindung steht und, nachdem Luft, die von der Lufteinlassöffnung eingesaugt wird, den ersten externen Luftschacht durchlaufen hat, der externe Leistungsabschnitt die Luft durch die Luftauslassöffnung auslässt; und

wobei der erste Leistungsabschnitt zu Folgendem konfiguriert ist: Ausbilden, in dem Dichtungsraum, eines Luftstroms, der zirkulär strömt, und Übertragen einer Wärme des Luftstroms durch den ersten internen Luftschacht an eine Außenseite des Dichtungsraums.

2. Rohrmast nach Anspruch 1, wobei das Aufnahmeabteil durch eine obere Platte, eine untere Platte, die zu der oberen Platte gegenüberliegend angeordnet ist, und die Mastwand definiert ist, die sich zwischen der oberen Platte und der unteren Platte befindet, und eine Trennplatte, eine erste Seitenplatte, eine zweite Seitenplatte und eine dritte Seitenplatte, die sich zwischen der oberen Platte und der unteren Platte befinden, in dem Aufnahmeabteil angeordnet sind; und die erste Seitenplatte und die zweite Seitenplatte sich zwischen der oberen Platte und der unteren Platte befinden und die Trennplatte durchlaufen, die dritte Seitenplatte sich zwischen der Trennplatte und der unteren Platte befindet, die erste Seitenplatte, die zweite Seitenplatte und die dritte Seitenplatte in Abständen entlang einer Umfangsrichtung der Mastwand angeordnet sind, die erste Seitenplatte, die zweite Seitenplatte und die dritte Seitenplatte alle durch Verwenden der Mastwand an zwei gegenüberliegenden Seiten verbunden sind, um eine Seitenwand des Dichtungsraums zu definieren, und die Trennplatte, die obere Platte und die Rohrwand den Belüftungsraum ausbilden.

3. Rohrmast nach Anspruch 2, wobei ein Verkabelungskanal (252), der durch die obere Platte und die untere Platte verläuft und den die Verkabelung durchläuft, zwischen der Mastwand und jeder der ersten Seitenplatte und der zweiten Seitenplatte ausgebildet ist.

4. Rohrmast nach Anspruch 2, wobei die Wärmeableitungseinrichtung einen zweiten Leistungsabschnitt (33), der angrenzend an den ersten Leistungsabschnitt angeordnet ist, und einen zweiten Wärmetauscher umfasst, der zweite Wärmetauscher auf der dritten Seitenplatte angeordnet ist und von der Außenseite des Dichtungsraums abgewandt ist, der zweite Wärmetauscher einen zweiten internen Luftschacht und einen zweiten externen Luftschacht umfasst, ein Ende des zweiten externen Luftschachts mit dem externen Leistungsabschnitt in Verbindung steht, das andere Ende mit der Lufteinlassöffnung in Verbindung steht und der zweite Leistungsabschnitt mit dem zweiten internen Luftschacht in Ver-

bindung steht und zu Folgendem konfiguriert ist: Ausbilden der Wärme in dem Dichtungsraum in den Luftstrom hinein, der zirkulär strömt, und Übertragen der Wärme des Luftstroms durch den zweiten internen Luftschacht an die Außenseite des Dichtungsraums.

5. Rohrmast nach Anspruch 4, wobei der erste interne Luftschacht mit einem Belüftungsloch (215) in Verbindung mit dem Dichtungsraum und dem ersten Leistungsabschnitt versehen ist und der zweite interne Luftschacht mit einem Belüftungsloch in Verbindung mit dem Dichtungsraum und dem zweiten Leistungsabschnitt versehen ist.

6. Rohrmast nach einem der Ansprüche 2 bis 5, wobei die erste Seitenplatte, die zweite Seitenplatte und die dritte Seitenplatte in einer Bogenform in dem Dichtungsraum angeordnet sind und die Abteiltür sich in einer Mittelposition der Bogenform befindet.

7. Rohrmast nach Anspruch 6, wobei ein Stützgestell, das mit der ersten Seitenplatte, der zweiten Seitenplatte und der dritten Seitenplatte verbunden ist, in dem Dichtungsraum angeordnet ist, das Stützgestell, die erste Seitenplatte, die zweite Seitenplatte und die dritte Seitenplatte mehrere Stützflächen separieren und die mehreren Stützflächen in einer Bogenform angeordnet sind.

8. Rohrmast nach Anspruch 6, wobei die Abteiltür einen Türrahmen, eine Türplatte und einen Dichtungsabschnitt umfasst, der Türrahmen an der Mastwand bereitgestellt ist und mit dem Aufnahmeabteil in Verbindung steht, die Türplatte drehbar und auf dem Türrahmen montiert ist und der Dichtungsabschnitt eine Fläche zwischen der Türplatte und dem Türrahmen abdichtet.

9. Rohrmast nach Anspruch 5, wobei der externe Leistungsabschnitt, der erste Leistungsabschnitt und der zweite Leistungsabschnitt jeweils ein Luftleitblech und ein Zentrifugalgebläse umfassen, das sich in dem Luftleitblech befindet.

10. Rohrmast nach Anspruch 5, wobei zwei Durchgangsbohrungen auf der unteren Platte bereitgestellt sind und die zwei Durchgangsbohrungen es dem ersten externen Luftschacht beziehungsweise dem zweiten externen Luftschacht ermöglichen, mit der Lufteinlassöffnung in Verbindung zu stehen.

11. Rohrmast nach Anspruch 1, wobei der Aufnahmebereich ferner einige Aufnahmehohlräume umfasst, die sich über dem Aufnahmeabteil befinden.

12. Basisstation, die den Rohrmast nach einem der Ansprüche 1 bis 11, eine Basisstationsanwendungsvorrichtung und eine Stromversorgung umfasst, wobei die Basisstationsanwendungsvorrichtung und die Stromversorgung in dem Dichtungsraum montiert sind.

13. Basisstation nach Anspruch 12, wobei ein Verkabelungskanal, der durch die obere Platte und eine untere Platte verläuft und den die Verkabelung durchläuft, zwischen der Mastwand und jeder der ersten Seitenplatte und einer zweiten Seitenplatte ausgebildet ist und die Verkabelung der Basisstationsanwendungsvorrichtung und der Stromversorgung mit einer anderen Vorrichtung des Rohrmasten durch den Kanal verbunden ist.

Revendications

1. Tour tubulaire, comprenant une paroi de tour (10), un espace de logement (11) et un appareil de dissipation thermique qui sont définis par la paroi de tour, une porte de compartiment comprenant un évent d'entrée d'air (121) et un évent d'évacuation d'air (124) étant disposée sur la paroi de tour, l'espace de logement comprenant un compartiment de logement (20), et le compartiment de logement comprenant une chambre d'étanchéité (21) et une chambre de ventilation (20) située au-dessus de la chambre étanchéité, la porte de compartiment fermant le compartiment de logement, l'évent d'évacuation d'air étant en communication avec la chambre de ventilation, et l'évent d'entrée d'air étant situé à l'extérieur du compartiment de logement ;

l'appareil de dissipation thermique comprend une partie d'alimentation externe (30), une première partie d'alimentation (31) et un premier échangeur thermique, la première partie d'alimentation étant située au niveau d'une partie supérieure de la chambre d'étanchéité, le premier échangeur thermique étant disposé sur une paroi latérale de la chambre d'étanchéité et comprenant un premier conduit d'air interne et un premier conduit d'air externe isolé du premier conduit d'air interne, la partie d'alimentation externe étant située dans la chambre de ventilation et en communication avec une extrémité du premier conduit d'air externe, l'autre extrémité du premier conduit d'air externe étant en communication avec l'évent d'entrée d'air, et après le passage de l'air absorbé à partir de l'évent d'entrée d'air à travers le premier conduit d'air externe, la partie d'alimentation externe évacuant l'air à travers l'évent d'évacuation d'air ; et
la première partie d'alimentation étant configurée pour : former, dans la chambre d'étanchéité, un écoulement d'air qui s'écoule de manière circulaire, et transférer la chaleur de l'écoulement

d'air vers un extérieur de la chambre d'étanchéité à travers le premier conduit d'air interne.

2. Tour tubulaire selon la revendication 1, le compartiment de logement étant défini par une plaque supérieure, une plaque inférieure disposée à l'opposé de la plaque supérieure, et la paroi de tour étant située entre la plaque supérieure et la plaque inférieure, et une plaque de séparation, une première plaque latérale, une deuxième plaque latérale et une troisième plaque latérale qui sont situées entre la plaque supérieure et la plaque inférieure étant disposées dans le compartiment de logement ; et la première plaque latérale et la deuxième plaque latérale étant situées entre la plaque supérieure et la plaque inférieure et passant à travers la plaque de séparation, la troisième plaque latérale étant située entre la plaque de séparation et la plaque inférieure, la première plaque latérale, la deuxième plaque latérale et la troisième plaque latérale étant disposées à intervalles le long d'une direction circonférentielle de la paroi de tour, la première plaque latérale, la deuxième plaque latérale et la troisième plaque latérale étant toutes reliées à l'aide de la paroi de tour sur deux côtés opposés pour définir une paroi latérale de la chambre d'étanchéité et la plaque de séparation, la plaque supérieure et la paroi tubulaire formant la chambre de ventilation.

3. Tour tubulaire selon la revendication 2, un canal de câblage (252) qui traverse la plaque supérieure et la plaque inférieure et à travers lequel passe le câblage étant formé entre la paroi de tour et chacune de la première plaque latérale et de la deuxième plaque latérale.

4. Tour tubulaire selon la revendication 2, l'appareil de dissipation thermique comprenant une seconde partie d'alimentation (33) disposée à proximité de la première partie d'alimentation et un second échangeur thermique, le second échangeur thermique étant disposé sur la troisième plaque latérale et étant orienté à l'opposé de l'extérieur de la chambre d'étanchéité, le second échangeur thermique comprenant un second conduit d'air interne et un second conduit d'air externe, une extrémité du second conduit d'air externe étant en communication avec la partie d'alimentation externe, l'autre extrémité étant en communication avec l'évent d'entrée d'air, et la seconde partie d'alimentation étant en communication avec le second conduit d'air interne, et étant configurée pour : former de la chaleur dans la chambre d'étanchéité dans l'écoulement d'air qui s'écoule de manière circulaire, et transférer la chaleur de l'écoulement d'air vers l'extérieur de la chambre d'étanchéité à travers le second conduit d'air interne.

5. Tour tubulaire selon la revendication 4, le premier conduit d'air interne étant pourvu d'une ouverture de ventilation (215) en communication avec la chambre d'étanchéité et la première partie d'alimentation, et le second conduit d'air interne étant pourvu d'une ouverture de ventilation en communication avec la chambre d'étanchéité et la seconde partie d'alimentation.

6. Tour tubulaire selon l'une quelconque des revendications 2 à 5, la première plaque latérale, la deuxième plaque latérale et la troisième plaque latérale étant disposées en forme d'arc dans la chambre d'étanchéité, et la porte de compartiment étant située dans une position centrale de la forme en arc.

7. Tour tubulaire selon la revendication 6, un bâti de support relié à la première plaque latérale, à la deuxième plaque latérale et à la troisième plaque latérale étant disposé dans la chambre d'étanchéité, le bâti de support, la première plaque latérale, la deuxième plaque latérale et la troisième plaque latérale séparant une pluralité de zones de support, et la pluralité de zones de support étant disposées en forme d'arc.

8. Tour tubulaire selon la revendication 6, la porte de compartiment comprenant un cadre de porte, une plaque de porte et une partie d'étanchéité, le cadre de porte étant prévu sur la paroi de tour et en communication avec le compartiment de logement, la plaque de porte pouvant être basculée et montée sur le cadre de porte, et la partie d'étanchéité scellant une zone entre la plaque de porte et le cadre de porte.

9. Tour tubulaire selon la revendication 5, la partie d'alimentation externe, la première partie d'alimentation et la seconde partie d'alimentation comprenant chacune un déflecteur d'air et un ventilateur centrifuge situé dans le déflecteur d'air.

10. Tour tubulaire selon la revendication 5, deux trous traversants étant prévus sur la plaque inférieure, et les deux trous traversants permettant respectivement au premier conduit d'air externe et au second conduit d'air externe d'être en communication avec l'évent d'entrée d'air.

11. Tour tubulaire selon la revendication 1, l'espace de logement comprenant en outre plusieurs cavités de logement situées au-dessus du compartiment de logement.

12. Station de base, comprenant la tour tubulaire selon l'une quelconque des revendications 1 à 11, un dispositif d'application de station de base et une alimentation électrique, le dispositif d'application de station de base et l'alimentation électrique étant montés

dans la chambre d'étanchéité.

13. Station de base selon la revendication 12, un canal de câblage qui traverse la plaque supérieure et une plaque inférieure et à travers lequel le câblage passe étant formé entre la paroi de tour et chacune de la première plaque latérale et d'une deuxième plaque latérale, et le câblage du dispositif d'application de la station de base et l'alimentation électrique étant reliés à un autre dispositif de la tour tubulaire à travers le canal.

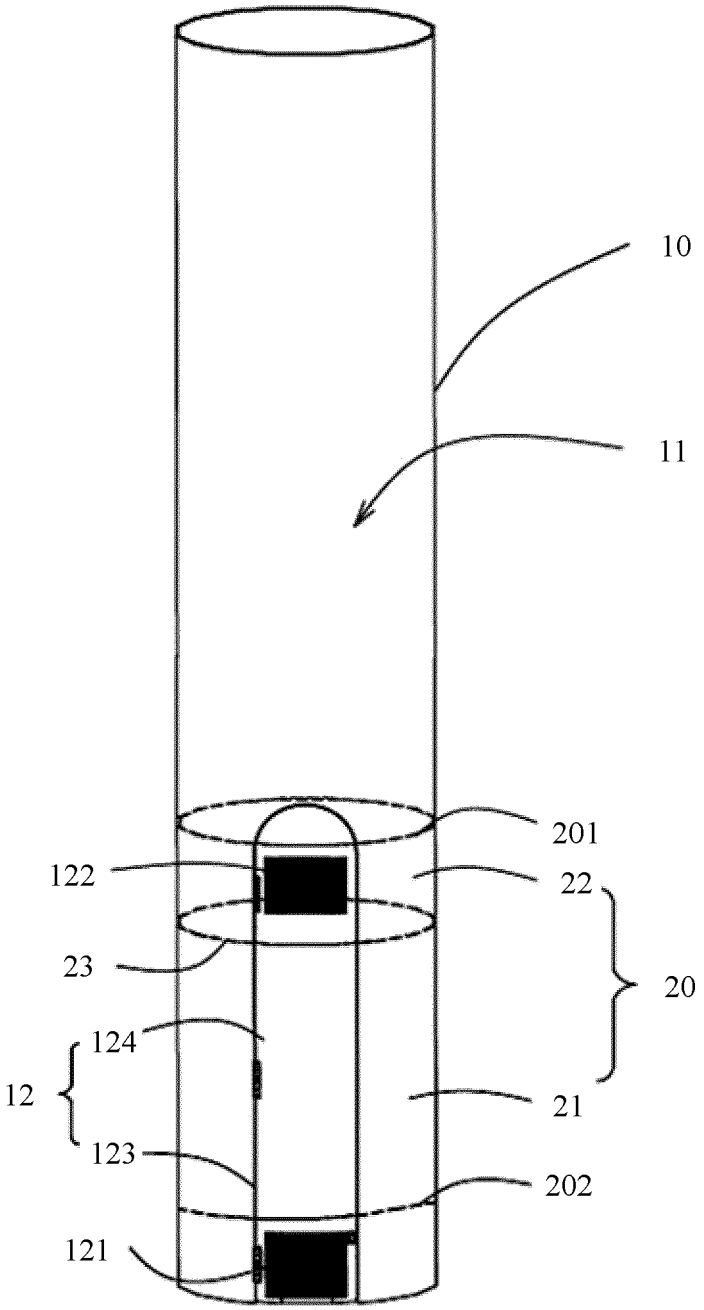

FIG. 1

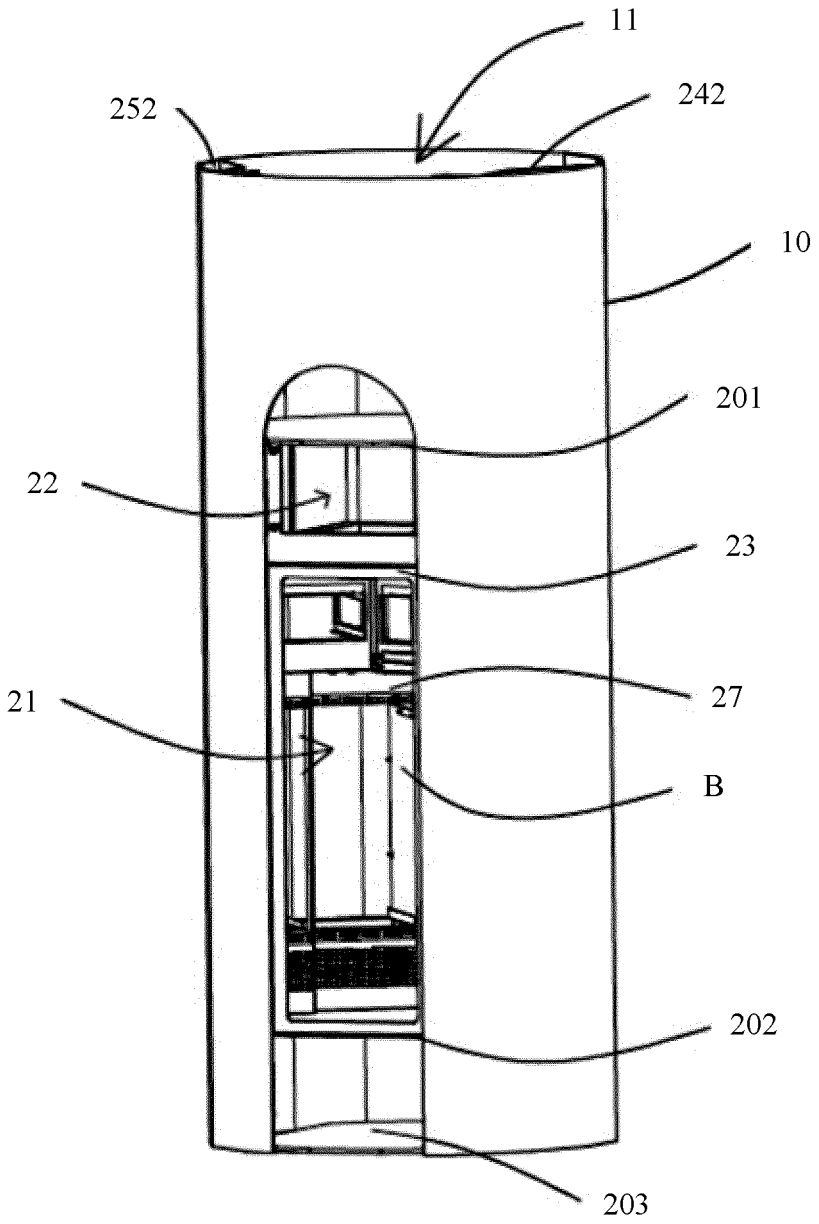

FIG. 2

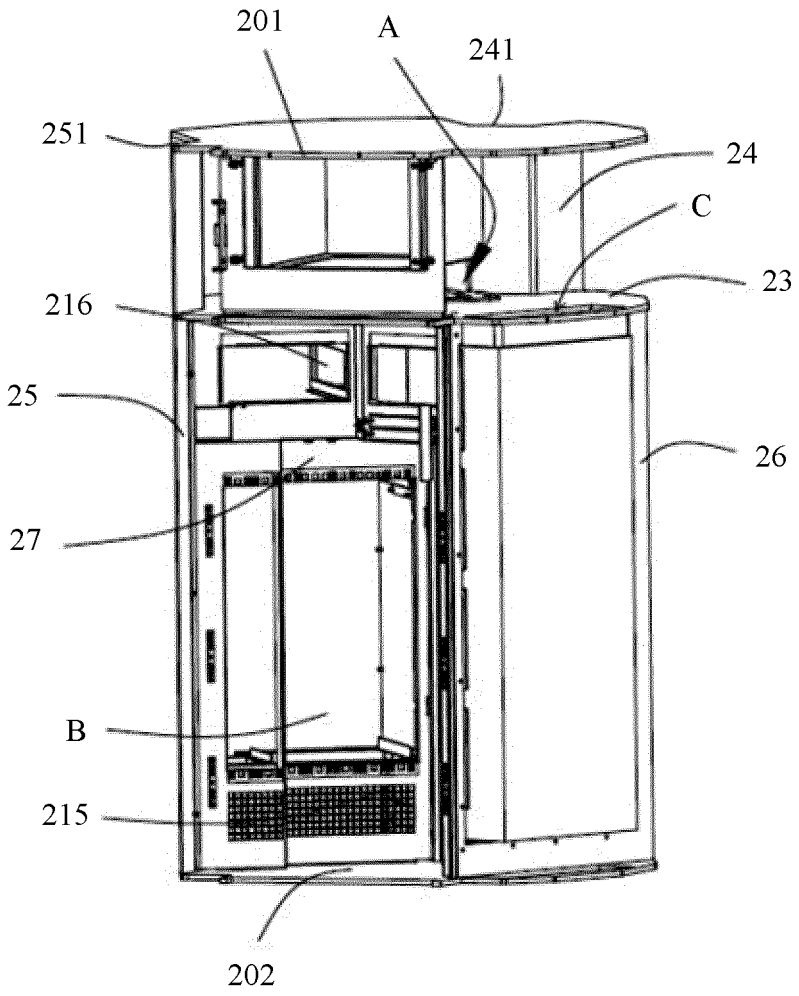

FIG. 3

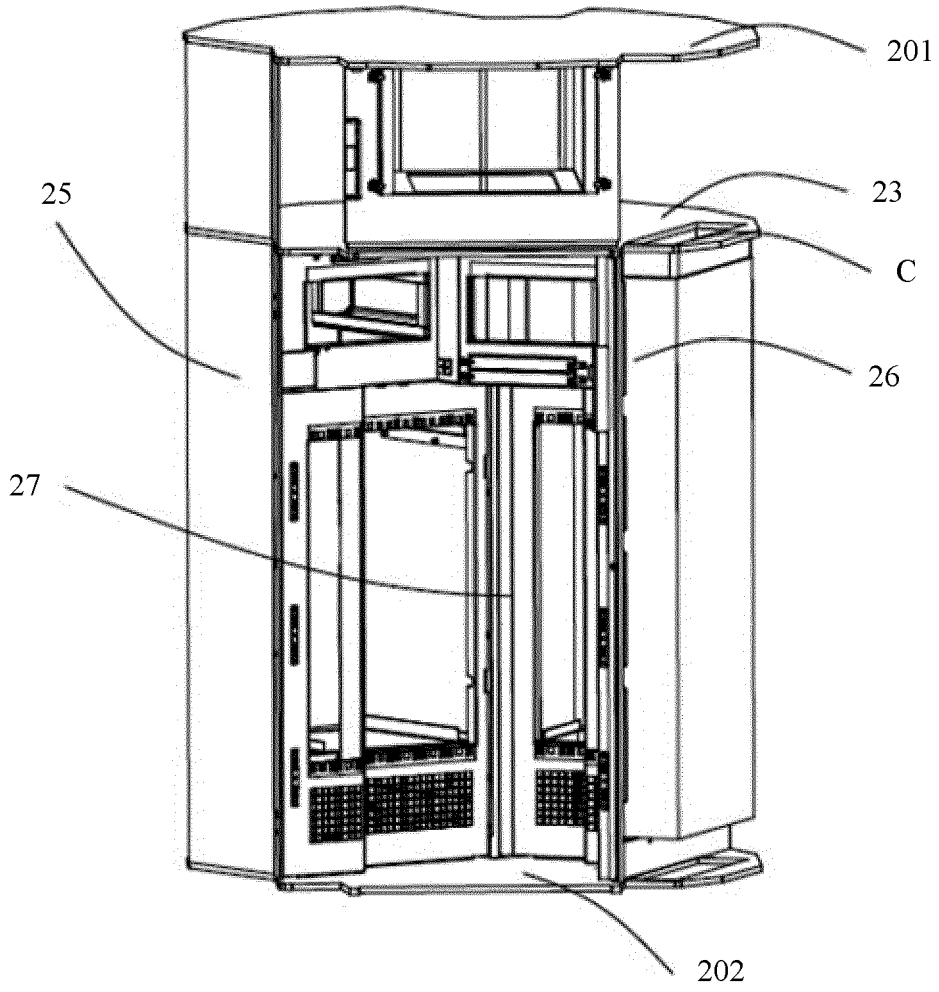

FIG. 4

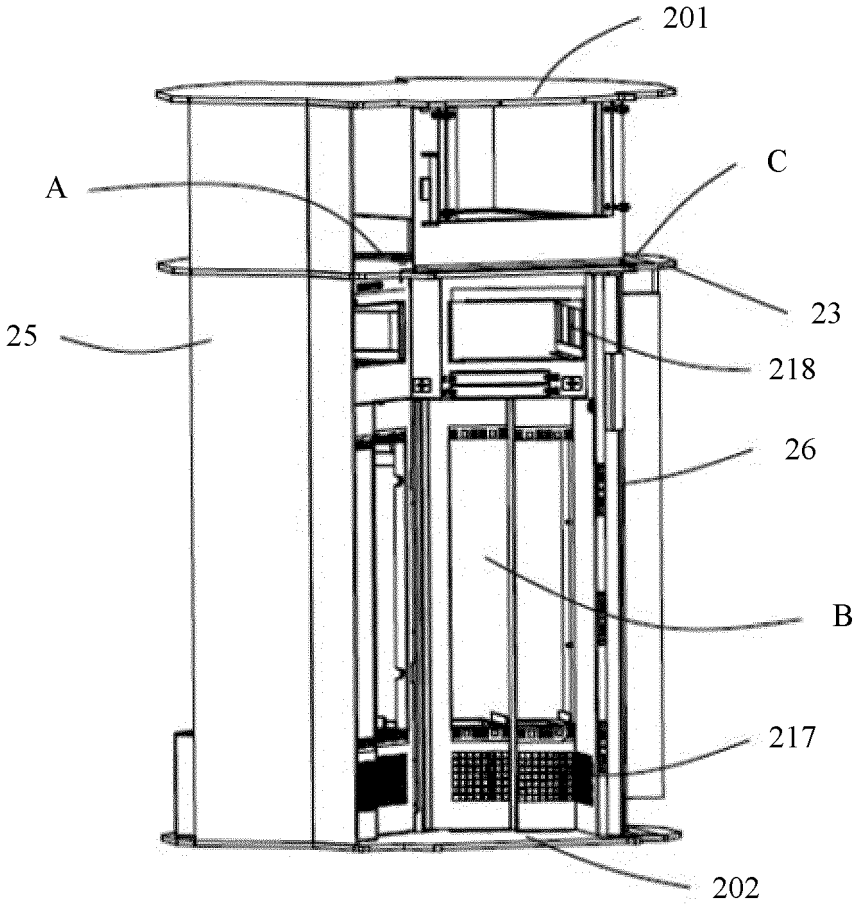

FIG. 5

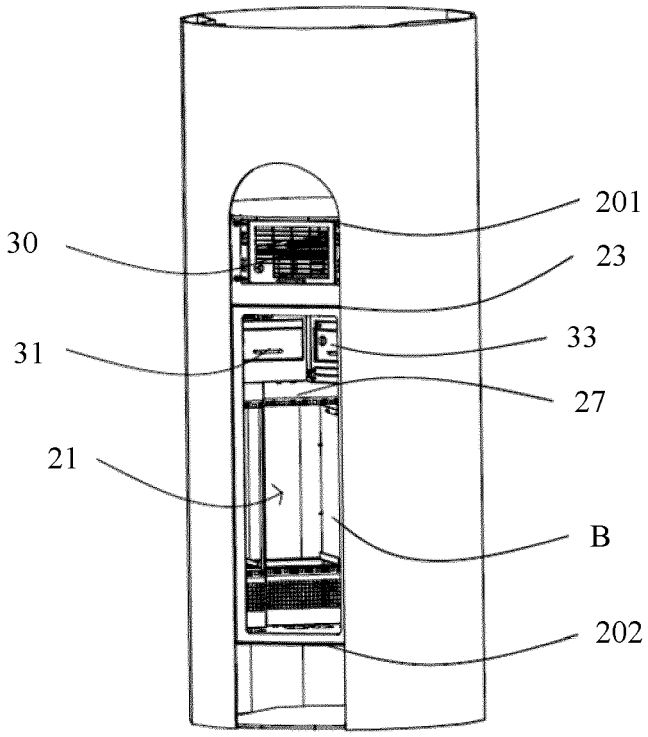

FIG. 6

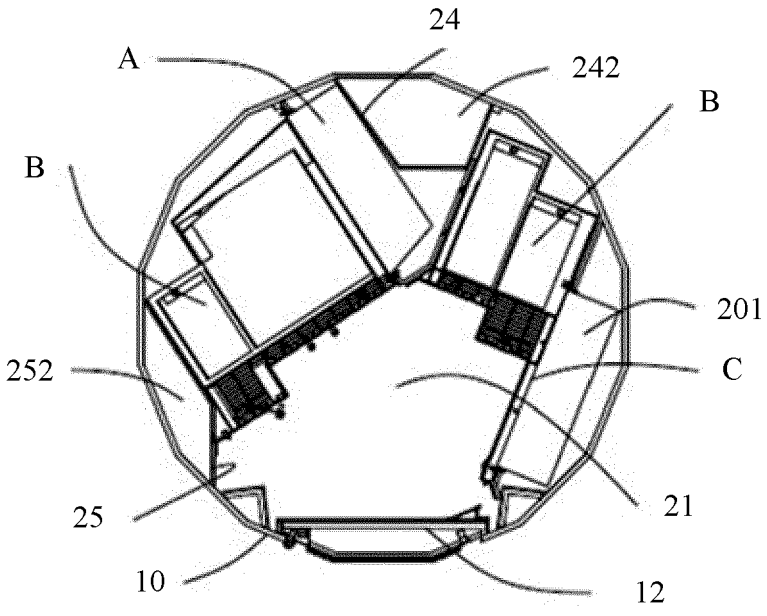

FIG. 7

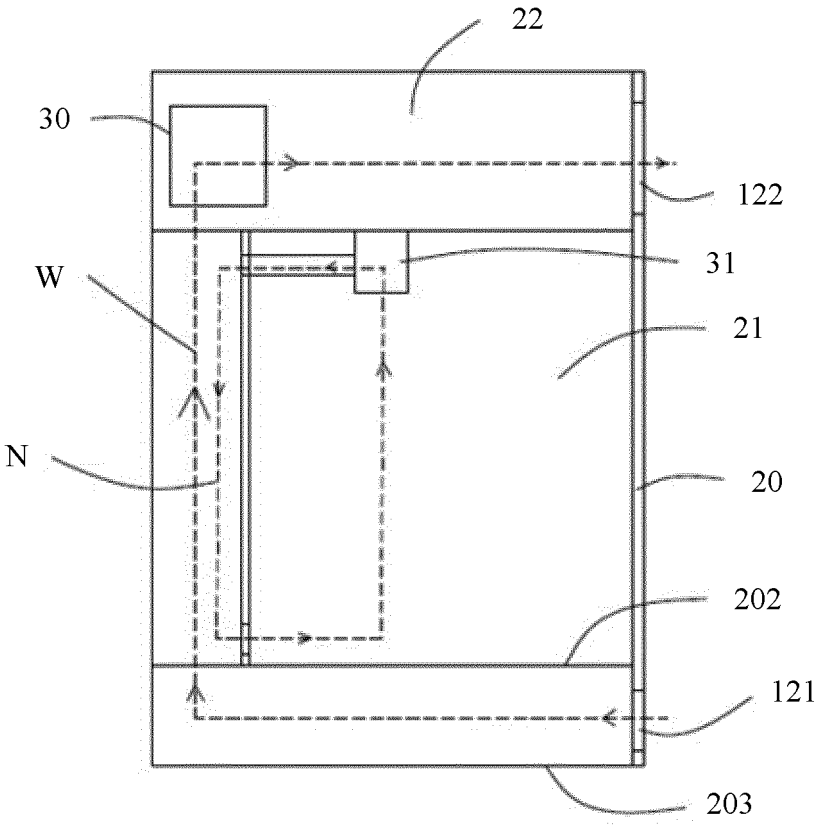

FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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- US 2011298218 A1 **[0004]**