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(54) DOUBLE-SIDE EXPANSION CABIN TYPE MOBILE NUCLEIC ACID DETECTION LABORATORY

MOBILES LABOR ZUM NACHWEIS VON NUKLEINSÄUREN MIT DOPPELSEITIGER
AUSDEHNUNG IN KABINENFORM

LABORATOIRE MOBILE DE DÉTECTION D'ACIDES NUCLÉIQUES DE TYPE CABINE À
EXPANSION LATÉRALE DOUBLE

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the technical field of biosafety protection equipment and peripheral supporting facilities thereof, and in particular to a double-side expansion cabin type mobile nucleic acid detection laboratory.

BACKGROUND

[0002] Global infectious disease outbreaks occur frequently. In this century, many major outbreaks, such as SARS, H5N1 avian influenza, H1N1 influenza, and H7N9 avian influenza, have successively occurred in China. Public health and safety issue has become an important factor that seriously affects people's health, economic development, and social stability in China. International threat of high-risk pathogenic microorganisms is increasing, so does the risk of imported infectious diseases in China. However, some countries have weak relevant biosafety protection capabilities and lack of biosafety facilities, which increase the threat of the high-risk pathogenic microorganisms.

[0003] Developed countries in Europe and the United States have successively developed fast-deployable mobile biosafety third-level laboratories to ensure biosafety in local and overseas missions, with efficient emergency prevention and control capabilities for epidemics. In recent years, China has developed vehicle-mounted mobile biosafety laboratories, which play an important role in microbiological detection. However, the vehicle-mounted mobile biosafety laboratories of China also expose the disadvantages: the existing mobile laboratory adopts a vehicle cabin type structure, which consists of two cabins, so it is large in size, poor in transportation convenience, and difficult to transport over long distances, thereby resulting in that it is difficult to meet the needs of rapid detection of the pathogenic microorganisms in epidemic areas. The nucleic acid detection method which is a main method for pathogenic microorganism detection currently needs to be carried out in a PCR laboratory. However, functional layouts of existing mobile laboratories are difficult to meet the requirements on PCR detection.

[0004] In the patent application with publication number US2011/132421 A1, a portable expandable shelter includes an enclosure with one or more movable portions such as a side or end, and further includes a foldable frame configured and arranged for operation in unison with movement of the movable portion of the enclosure. This example of the portable expandable shelter also includes a cover that encloses at least a portion of a space defined by the movable portion and the foldable frame.

[0005] The patent application with publication number CN110656790A discloses an expanded intelligent shelter.

The expanded intelligent shelter solves the problems in the prior art that the interior space is fixed and narrow, and has weak natural illumination. The expanded intelligent shelter comprises a shelter main body, wherein the entire surface or part of at least one side of the shelter main body is a movable side plate; after being expanded and flatly laid, the movable side plate is a spreading wing platform; a tent structure matched with the spreading wing platform is stored in the shelter main body; the tent structure is constructed on the spreading wing platform to form a side wing command room; the side wing command room is connected to the inner space of the shelter main body to jointly form a shelter command room; and the movable side plate is provided with a driving mechanism. The used space of the interior of the shelter can be effectively expanded, and meanwhile the sufficient natural illumination is ensured; and the interior space of the shelter is spacious and bright, and thus, the command efficiency of the shelter is improved.

[0006] Therefore, how to change the present situations, in the prior art, that an expandable mobile nucleic acid detection laboratory is large in size, poor in transportation convenience, and difficult to transport over long distances, and the functional layouts do not meet the requirements of PCR detection, becomes an urgent problem to be solved by those skilled in the art.

SUMMARY

[0007] The objective of the present disclosure is to provide a double-side expansion cabin type mobile nucleic acid detection laboratory to solve the problems in the prior art, so as to facilitate the transportation and improve the convenience of vehicle-mounted mobile nucleic acid detection laboratories.

[0008] To achieve the above objective, the present disclosure provides the following technical solution: the present disclosure provides a double-side expansion cabin type mobile nucleic acid detection laboratory, including a fixed cabin, an expansion cabin, and an expansion tent; an equipment room and a central control area are arranged in the fixed cabin; the expansion cabin serves as a preparation room and a PCR room; the expansion tent serves as a core workroom and a liquid preparation room; a buffer room is arranged in each of the fixed cabin, the expansion cabin, and the expansion tent; the expansion cabin and the expansion tent are separately connected to the fixed cabin; both the expansion cabin and the expansion tent can be folded; when completely folded, the expansion cabin and the expansion tent are located in the fixed cabin; when the expansion cabin and the expansion tent are unfolded, both the expansion cabin and the expansion tent communicate with the fixed cabin; the expansion tent is in sealed connection with the fixed cabin.

[0009] Preferably, the expansion cabin includes a first base plate, a cabin body, and a bracket. The first base plate is hinged to the fixed cabin. The cabin body is con-

nected to the first base plate. The cabin body is made of a flexible material. The bracket is connected to the first base plate and the cabin body. When a relative angle between the first base plate and the fixed cabin changes, the bracket can drive the cabin body to move.

[0010] Preferably, the first base plate is hinged to the bottom of the fixed cabin. The bracket includes first connecting rods, a second connecting rod, first long support rods, and a second long support rod. One end of the first long support rod is hinged to one end, far away from the fixed cabin, of the first base plate. The second long support rod is connected to the top, far away from the fixed cabin, of the cabin body. The other end of the first long support rod is hinged to one end of the second long support rod. One end of the first connecting rod is hinged to the top of the fixed cabin, and the other end of the first connecting rod is hinged to the first long support rod. A hinge point of the first connecting rod and the first long support rod is located between a hinge point of the first long support rod and the second long support rod and a hinge point of the first long support rod and the first base plate. The second connecting rod is connected to the top of the cabin body. One end of the second connecting rod is hinged to the second long support rod. A hinge point of the second connecting rod and the second long support rod is located between a hinge point of the second long support rod and the first long support rod and a hinge point of the second long support rod and the cabin body.

[0011] Preferably, there are two first long support rods and two first connecting rods. Both the second long support rod and the second connecting rod are U-shaped rods. The two opposite ends of the second long support rod are respectively connected to the two first long support rods. The two opposite ends of the second connecting rod are respectively connected to the two opposite ends of the second long support rod. The bottoms of the second long support rod and the second connecting rod are separately connected to the cabin body.

[0012] The expansion tent includes a second base plate, an inner tent, an outer tent, and a telescopic skeleton. The second base plate is hinged to the fixed cabin. One end of the telescopic skeleton is connected to the fixed cabin. The inner tent is connected to the telescopic skeleton. The outer tent is arranged outside the telescopic skeleton. The inner tent is in sealed connection with the fixed cabin. The telescopic skeleton can stretch and retract. The telescopic skeleton can drive the inner tent to move in a direction far away from the fixed cabin and be tilted to the second base plate. The outer tent is detachably connected to the inner tent. Both the inner tent and the outer tent are made of a flexible material.

[0013] Preferably, the expansion tent further includes a support rail. The support rail, which is used for supporting the second base plate, is arranged at the bottom of the fixed cabin in a sliding manner.

[0014] Preferably, the second base plate is of a foldable structure. The second base plate can be pressed against the support rail. The second base plate includes

two plate bodies, where one end of one of the plate bodies is hinged to the fixed cabin, and the opposite end of the plate body is hinged to the other plate body.

[0015] Preferably, the telescopic skeleton includes a plurality of sliding frames. The plurality of the sliding frames is connected through rhombus-shaped telescopic frames. The inner tent is arranged inside the sliding frames. Reciprocating movement of the sliding frames along the second base plate can drive the inner tent to fold or unfold.

[0016] Preferably, pulley wheels are arranged at the bottoms of the sliding frames. A slide rail that is adapted to the pulley wheels is arranged on the second base plate. The pulley wheels are arranged on the slide rail in a sliding manner.

[0017] Preferably, the expansion cabin and the expansion tent are respectively arranged on two opposite sides of the fixed cabin.

[0018] Compared with the prior art, the present disclosure achieves the following technical effects: the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure includes the fixed cabin, the expansion cabin, and the expansion tent. The expansion cabin and the expansion tent are separately connected to the fixed cabin. Both the expansion cabin and the expansion tent can be folded. When completely folded, the expansion cabin and the expansion tent are located in the fixed cabin. When the expansion cabin and the expansion tent are unfolded, both the expansion cabin and the expansion tent communicate with the fixed cabin. The expansion tent is in sealed connection with the fixed cabin. The equipment room and the central control area are arranged in the fixed cabin. The expansion cabin serves as the preparation room and the PCR room. The expansion tent serves as the core workroom and the liquid preparation room. The buffer room is arranged in each of the fixed cabin, the expansion cabin, and the expansion tent. According to the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure, both the expansion cabin and the expansion tent can be folded and unfolded automatically. The expansion cabin and the expansion tent are located in the fixed cabin after being folded, so the double-side expansion cabin type mobile nucleic acid detection laboratory has the advantages of small size after being folded and large operation area after being unfolded, thereby facilitating the transportation of the laboratory, and improving the flexibility and convenience of the double-side expansion cabin type mobile nucleic acid detection laboratory.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] To describe the technical solutions in the embodiments of the present disclosure or in the prior art more clearly, the following briefly describes the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the

following description show merely some embodiments of the present disclosure, and those of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a front-view schematic structural diagram of a double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 2 is a vertical-view schematic structural diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure;

FIG. 3 is a left-view schematic structural diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 4 is a right-view schematic structural diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure;

FIG. 5 is a cross-sectional schematic diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure when folded;

FIG. 6 is an internal layout diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure;

FIG. 7 is a schematic structural diagram of an expansion cabin of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure;

FIG. 8 is a schematic structural diagram of an expansion cabin in other implementation manners of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure;

FIG. 9 is a schematic structural diagram of an expansion tent of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure.

[0020] In the drawings: 1-fixed cabin; 2-expansion cabin; 3-expansion tent; 4-lifting device; 5-first base plate; 6-cabin body; 7-bracket; 701-first connecting rod; 702-second connecting rod; 703-first long support rod; 704-second long support rod; 8-second base plate; 9-inner tent; 10-outer tent; 11-telescopic skeleton; 12-support rail; 13-pulley wheel; 14-walking wheel; 15-preparation room; 16-buffer room; 17-equipment room; 18-core workroom; 19-central control area; 20-liquid preparation room; 21-PCR room.

DETAILED DESCRIPTION

[0021] The technical solutions in the embodiments of the present disclosure will be clearly and completely described herein below with reference to the accompanying drawings in the embodiments of the present disclosure. Apparently, the described embodiments are merely part rather than all of the embodiments of the present disclosure.

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[0022] The objective of the present disclosure is to provide a double-side expansion cabin type mobile nucleic acid detection laboratory to solve the problems in the prior art, so as to facilitate the transportation and improve the convenience of the vehicle-mounted mobile nucleic acid detection laboratories.

[0023] In order to make the above objective, features, and advantages of the present disclosure more apparent and more comprehensible, the present disclosure is further described in detail below with reference to the accompanying drawings and specific implementation manners.

[0024] Please refer to FIGs. 1 to 9, where FIG. 1 is a front-view schematic structural diagram of a double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 2 is a vertical-view schematic structural diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 3 is a left-view schematic structural diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 4 is a right-view schematic structural diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 5 is a cross-sectional schematic diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure when folded; FIG. 6 is an internal layout diagram of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 7 is a schematic structural diagram of an expansion cabin of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 8 is a schematic structural diagram of an expansion cabin in other implementation manners of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure; FIG. 9 is a schematic structural diagram of an expansion tent of the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure.

[0025] The present disclosure provides a double-side expansion cabin type mobile nucleic acid detection laboratory, including a fixed cabin 1, an expansion cabin 2, and an expansion tent 3. The expansion cabin 2 and the expansion tent 3 are separately connected to the fixed cabin 1. Both the expansion cabin 2 and the expansion tent 3 can be folded. When completely folded, the expansion cabin 2 and the expansion tent 3 are located in the fixed cabin 1. When the expansion cabin 2 and the expansion tent 3 are unfolded, both the expansion cabin 2 and the expansion tent 3 communicate with the fixed cabin 1. An equipment room 17 and a central control area 19 are arranged in the fixed cabin 1. The expansion cabin 2 serves as a preparation room 15 and a PCR room 21. The expansion tent 3 serves as a core workroom 18 and a liquid preparation room 20. A buffer room 16 is arranged in each of the fixed cabin 1, the expansion cabin 2, and

the expansion tent 3. The expansion tent 3 is in sealed connection with the fixed cabin 1. The expansion tent 3 is large in size after being unfolded, and serves as the core workroom 18 and the liquid preparation room 20, which increases the operation space.

[0026] According to the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure, both the expansion cabin 2 and the expansion tent 3 can be unfolded, and are located in the fixed cabin 1 after being folded, so the double-side expansion cabin type mobile nucleic acid detection laboratory has the advantages of small size after being folded and large operation area after being unfolded, thereby facilitating the transportation of the laboratory, and improving the flexibility and convenience of the double-side expansion cabin type mobile nucleic acid detection laboratory. It should be noted that, the fixed cabin 1 may be connected to a lifting device 4. The lifting device 4 can drive the fixed cabin 1 to ascend, descend, or move, so as to facilitate the movement and transportation of the fixed cabin 1.

[0027] The expansion cabin 2 includes a first base plate 5, a cabin body 6, and a bracket 7. The first base plate 5 is hinged to the fixed cabin 1. The cabin body 6 is connected to the first base plate 5. The cabin body 6 is made of a flexible material. The bracket 7 is connected to the first base plate 5 and the cabin body 6. When a relative angle between the first base plate 5 and the fixed cabin 1 changes, the bracket 7 can drive the cabin body 6 to move. The rotation of the bracket 7 can drive the flexible cabin body 6 to unfold and fold. The first base plate 5 is hinged to the fixed cabin 1. When the cabin body 6 is unfolded completely, the first base plate 5 is parallel to the ground, and when the cabin body 6 is completely folded, the first base plate 5 is flush with a side wall of the fixed cabin 1.

[0028] Specifically, the first base plate 5 is hinged to the bottom of the fixed cabin 1. The bracket 7 includes first connecting rods 701, a second connecting rod 702, first long support rods 703, and a second long support rod 704. One end of the first long support rod 703 is hinged to one end, far away from the fixed cabin 1, of the first base plate 5. The second long support rod 704 is connected to the top, far away from the fixed cabin 1, of the cabin body 6. The other end of the first long support rod 703 is hinged to one end of the second long support rod 704. One end of the first connecting rod 701 is hinged to the top of the fixed cabin 1, and the other end of the first connecting rod 701 is hinged to the first long support rod 703. A hinge point of the first connecting rod 701 and the first long support rod 703 is located between a hinge point of the first long support rod 703 and the second long support rod 704 and a hinge point of the first long support rod 703 and the first base plate 5. The second connecting rod 702 is connected to the top of the cabin body 6. One end of the second connecting rod 702 is hinged to the second long support rod 704. A hinge point of the second connecting rod 702 and the second long

support rod 704 is located between a hinge point of the second long support rod 704 and the first long support rod 703 and a hinge point of the second long support rod 704 and the cabin body 6. A driving cylinder is arranged between the first base plate 5 and the fixed cabin 1. The driving cylinder pushes the first base plate 5. The first base plate 5 rotates around the fixed cabin 1 to drive the first long support rod 703 and the second long support rod 704 to rotate. The first connecting rods 701 and the second connecting rod 702 are respectively connected to the cabin body 6, the first long support rods 703 and the second long support rod 704 to drive the cabin body 6 to unfold. When the cabin body 6 is gathered, the driving cylinder drives the first base plate 5 to rotate. Under an acting force of the first base plate 5, the first long support rods 703 and the second long support rod 704 rotate and drive, together with the first connecting rods 701 and the second connecting rod 702, the flexible cabin body 6 to fold and be gathered in the fixed cabin 1. A second base plate 8 is overturned to be flush with the side surface of the fixed cabin 1.

[0029] In addition, there are two first long support rods 703 and two first connecting rods 701. Both the second long support rod 704 and the second connecting rod 702 are U-shaped rods. The two opposite ends of the second long support rod 704 are respectively connected to the two first long support rods 703. The two opposite ends of the second connecting rod 702 are respectively connected to the two opposite ends of the second long support rod 704. The bottoms of the second long support rod 704 and the second connecting rod 702 are separately connected to the cabin body 6. It should be noted here that the structure of the bracket 7 of the expansion cabin 2 of the present disclosure is not limited to the above structure. The bracket 7 shall be able to realize the folding and unfolding of the cabin body 6. In other specific implementation manners of the present disclosure, the bracket 7 is of a rhombus-shaped telescopic frame structure. The bracket 7 is connected to the top of the cabin body 6. When the second base plate 8 is overturned, the bracket 7 can drive the cabin body 6 to unfold and fold.

[0030] More specifically, the expansion tent 3 includes a second base plate 8, an inner tent 9, an outer tent 10, and a telescopic skeleton 11. The second base plate 8 is hinged to the fixed cabin 1. A driving cylinder is arranged between the second base plate 8 and the fixed cabin 1. The driving cylinder can drive the second base plate 8 to unfold. One end of the telescopic skeleton 11 is connected to the fixed cabin 1. The inner tent 9 is connected to the telescopic skeleton 11. The inner tent 9 is in sealed connection with the fixed cabin 1 to ensure the air tightness in the tent after the inner tent 9 is connected to the fixed cabin 1. The telescopic skeleton 11 can stretch and retract. The telescopic skeleton 11 can drive the inner tent 9 to move in the direction far away from the fixed cabin 1 and be tiled on the second base plate 8. After the second base plate 8 is unfolded, the telescopic skeleton 11 drives the inner tent 9 to unfold, the

outer tent 10 is detachably connected to the inner tent 9. The outer tent 10 is additionally mounted after the inner tent 9 is unfolded. Both the inner tent 9 and the outer tent 10 are made of a flexible material. There is a gap between the inner tent 9 and the outer tent 10, which can achieve a heat insulating effect.

[0031] To improve the stability of the expansion tent 3, the expansion tent 3 further includes a support rail 12. The support rail 12 is arranged at the bottom of the fixed cabin 1 in a sliding manner. When the expansion tent 3 needs to be unfolded, first, the support rail 12 is pulled out. The second base plate 8 is located at the top of the support rail 12 after being unfolded. The support rail 12 can support the second base plate 8 to improve the stability of the expansion tent 3. In other specific implementation manners of the present disclosure, the expansion tent 3 may also be fixed by tent pegs and wind ropes, so as to further improve the structural strength of the expansion tent 3.

[0032] Further, to increase the use area of the expansion tent 3, the second base plate 8 is of a foldable structure. The second base plate 8 can be pressed against the support rail 12. The second base plate 8 includes two plate bodies. One end of one of the plate bodies is hinged to the fixed cabin 1. The opposite end of the plate body is hinged to the other plate body. The second base plate 8 adopts a split structure, so that the use area of the expansion tent 3 is increased without affecting the size of the laboratory after the expansion tent 3 is gathered, thereby improving the applicability of the laboratory.

[0033] In addition, the telescopic skeleton 11 includes a plurality of sliding frames. The plurality of the sliding frames is connected through rhombus-shaped telescopic frames. The inner tent 9 is arranged inside the sliding frames. Reciprocating movement of the sliding frames along the second base plate 8 can drive the inner tent 9 to fold or unfold. After the inner tent 9 is completely unfolded, the outer tent 10 is connected to the inner tent 9 for mounting, which improves the convenience in operation.

[0034] To improve the work efficiency when the telescopic skeleton 11 is unfolded and folded, pulley wheels 13 are arranged at the bottom of the sliding frames, a slide rail that is adapted to the pulley wheels 13 is arranged on the second base plate 8, which ensures the movement trajectory of the sliding frames. The pulley wheels 13 are arranged on the slide rail in a sliding manner, which prevents the dislocation of the sliding frames from affecting the work of the expansion tent 3.

[0035] Furthermore, the expansion cabin 2 and the expansion tent 3 are respectively arranged on the two opposite sides of the fixed cabin 1. The fixed cabin 1 lands onto the ground, and the expansion cabin 2 and the expansion tent 3 are folded, which improves the convenience in operation of the laboratory.

[0036] According to the double-side expansion cabin type mobile nucleic acid detection laboratory of the present disclosure, both the expansion cabin 2 and the

expansion tent 3 can be unfolded, and are located in the fixed cabin 1 after being folded, so the double-side expansion cabin type mobile nucleic acid detection laboratory has the advantages of small size after being folded and large operation area after being unfolded, thereby facilitating the transportation of the laboratory, and improving the flexibility and convenience of the double-side expansion cabin type mobile nucleic acid detection laboratory. In the present specific implementation manner, the equipment room 17 and the central control area 19 are arranged in the fixed cabin 1. The expansion cabin 2 serves as the preparation room 15 and the PCR room 21. The expansion tent 3 serves as the core workroom 18 and the liquid preparation room 20. The buffer room 16 is arranged in each of the fixed cabin 1, the expansion cabin 2, and the expansion tent 3. A liftable mast is mounted outside the fixed cabin 1. A lighting device and a camera are mounted on the mast. The central control area 19 is arranged in the laboratory. A control system and a UPS are arranged in the central control area 19, where the UPS mainly supplies power to laboratory supply fans, exhaust fans, lighting, and instruments, equipment and control systems in the laboratory. In addition, a high efficiency filter is arranged at an exhaust outlet of the core workroom 18. A scanning leak detection and sampling device is arranged downstream of the high efficiency filter, which can realize in-situ leak detection of the high efficiency filter. Exhaust outlets are fitted in the buffer rooms 16, the PCR room 21, and the preparation room 15. High efficiency filters are arranged at the exhaust outlets. Exhaust pipelines are mounted in a side wall, and a downstream aerosol sampling port is mounted on a downstream pipeline of each high efficiency filter. The exhaust air of the core workroom 18, the buffer rooms 16, and the preparation room 15 is finally collected into an exhaust static pressure box. Two exhaust fans are mounted in the exhaust static pressure box. Air supply of the laboratory is supplied into each of the core workroom 18, the buffer rooms 16, the liquid preparation room 20, the PCR room 21, and the preparation room 15 after passing through a primary efficiency filter, a medium efficiency filter, an air conditioning unit, and a high efficiency filter. It should be noted that a communicating door is arranged between every two of the core workroom 18, the buffer rooms 16, the preparation room 15, and the equipment room 17. The arrangement of the communicating doors is a common method used by those skilled in the art, which will not be described in detail here.

[0037] Specific examples are applied in the present disclosure to illustrate the principle and implementation manner of the present disclosure.

Claims

1. A double-side expansion cabin type mobile nucleic acid detection laboratory, comprising a fixed cabin (1), an expansion cabin (2), and an expansion tent

(3), wherein an equipment room (17) and a central control area (19) are arranged in the fixed cabin (1); the expansion cabin (2) serves as a preparation room (15) and a PCR room (21); the expansion tent (3) serves as a core workroom (18) and a liquid preparation room (20); a buffer room (16) is arranged in each of the fixed cabin (1), the expansion cabin (2), and the expansion tent (3); the expansion cabin (2) and the expansion tent (3) are separately connected to the fixed cabin (1); both the expansion cabin (2) and the expansion tent (3) can be folded; when completely folded, the expansion cabin (2) and the expansion tent (3) are located in the fixed cabin (1); when the expansion cabin (2) and the expansion tent (3) are unfolded, both the expansion cabin (2) and the expansion tent (3) communicate with the fixed cabin (1); the expansion tent (3) is in sealed connection with the fixed cabin (1);

wherein the expansion tent (3) comprises a second base plate (8), an inner tent (9), an outer tent (10), and a telescopic skeleton (11); the second base plate (8) is hinged to the fixed cabin (1); one end of the telescopic skeleton (11) is connected to the fixed cabin (1); the inner tent (9) is connected to the telescopic skeleton (11); the outer tent is arranged outside the telescopic skeleton; the inner tent (9) is in sealed connection with the fixed cabin (1); the telescopic skeleton (11) can stretch and retract; the telescopic skeleton (11) can drive the inner tent (9) to move in a direction far away from the fixed cabin (1) and be tilted to the second base plate (8); the outer tent (10) is detachably connected to the inner tent (9); both the inner tent and the outer tent are made of a flexible material;

wherein the core workroom (18) is provided at an exhaust outlet thereof with a first high efficiency filter, and a scanning leak detection and sampling device is arranged downstream of the first high efficiency filter, to allow in-situ leak detection of the first high efficiency filter; the buffer room (16), the PCR room (21), and the preparation room (15) each are provided at a respective exhaust outlet with a second high efficiency filter, respective exhaust pipelines are mounted in a side wall of the laboratory; and a downstream aerosol sampling port is mounted on a downstream pipeline of the second high efficiency filter; exhausted air from the core workroom (18), the buffer room (16), and the preparation room (15) is collected into an exhaust static pressure box in which two exhaust fans are mounted; external air is supplied into each of the core workroom (18), the buffer room (16), the liquid preparation room (20), the PCR room (21), and the preparation room (15) after passing through a primary efficiency filter, a medium ef-

ficiency filter, an air conditioning unit, and a third high efficiency filter, among which communicating doors are provided.

2. The double-side expansion cabin type mobile nucleic acid detection laboratory according to claim 1, wherein the expansion cabin (2) comprises a first base plate (5), a cabin body (6), and a bracket (7); the first base plate (5) is hinged to the fixed cabin (1); the cabin body (6) is connected to the first base plate (5); the cabin body (6) is made of a flexible material; the bracket (7) is connected to the first base plate (5) and the cabin body (6); when a relative angle between the first base plate (5) and the fixed cabin (1) changes, the bracket (7) can drive the cabin body (6) to move
3. The double-side expansion cabin type mobile nucleic acid detection laboratory according to claim 2, wherein the first base plate (5) is hinged to the bottom of the fixed cabin (1); the bracket (7) comprises first connecting rods (701), a second connecting rod (702), first long support rods (703), and a second long support rod (704); one end of the first long support rod (703) is hinged to one end, far away from the fixed cabin (1), of the first base plate (5); the second long support rod (704) is connected to the top, far away from the fixed cabin (1), of the cabin body (6); the other end of the first long support rod (703) is hinged to one end of the second long support rod (704); one end of the first connecting rod (701) is hinged to the top of the fixed cabin (1), and the other end of the first connecting rod (701) is hinged to the first long support rod (703); a hinge point of the first connecting rod (701) and the first long support rod (703) is located between a hinge point of the first long support rod (703) and the second long support rod (704) and a hinge point of the first long support rod (703) and the first base plate (5); the second connecting rod (702) is connected to the top of the cabin body (6); one end of the second connecting rod (702) is hinged to the second long support rod (704); a hinge point of the second connecting rod (702) and the second long support rod (704) is located between a hinge point of the second long support rod (704) and the first long support rod (703) and a hinge point of the second long support rod (704) and the cabin body (6).
4. The double-side expansion cabin type mobile nucleic acid detection laboratory according to claim 3, wherein there are two first long support rods (703) and two first connecting rods (701); both the second long support rod (704) and the second connecting rod (702) are U-shaped rods; the two opposite ends of the second long support rod (704) are respectively connected to the two first long support rods (703); the two opposite ends of the second con-

necting rod (702) are respectively connected to the two opposite ends of the second long support rod (704); the bottoms of the second long support rod (704) and the second connecting rod (702) are separately connected to the cabin body (6).

5. The double-side expansion cabin type mobile nucleic acid detection laboratory according to claim 1, wherein the expansion tent (3) further comprises a support rail (12); the support rail (12) which is used for supporting the second base plate (8) is arranged at the bottom of the fixed cabin (1) in a sliding manner.
6. The double-side expansion cabin type mobile nucleic acid detection laboratory according to claim 5, wherein the second base plate (8) is of a foldable structure; the second base plate (8) can be pressed against the support rail (12); the second base plate (8) comprises two plate bodies, wherein one end of one of the plate bodies is hinged to the fixed cabin (1), and the opposite end of the plate body is hinged to the other plate body.
7. The double-side expansion cabin type mobile nucleic acid detection laboratory according to claim 6, wherein the telescopic skeleton (11) comprises a plurality of sliding frames; the plurality of the sliding frames is connected through rhombus-shaped telescopic frames; the inner tent (9) is arranged inside the sliding frames; reciprocating movement of the sliding frames along the second base plate (8) can drive the inner tent (9) to fold or unfold.
8. The double-side expansion cabin type mobile nucleic acid detection laboratory according to claim 7, wherein pulley wheels (13) are arranged at the bottom of the sliding frames; a slide rail that is adapted to the pulley wheels (13) is arranged on the second base plate (8); the pulley wheels are arranged on the slide rail in a sliding manner.

Patentansprüche

1. Mobiles Labor zum Nachweis von Nukleinsäuren mit doppelseitiger Ausdehnung in Kabinenform, umfassend eine feste Kabine (1), eine Erweiterungskabine (2) und ein Erweiterungszelt (3), wobei ein Geräte-
raum (17) und ein zentraler Kontrollbereich (19) in der festen Kabine (1) angeordnet sind; die Erweiterungskabine (2) dient als Vorbereitungsraum (15) und PCR-Raum (21); das Erweiterungszelt (3) dient als Kernarbeitsraum (18) und Flüssigkeitsaufbereitungsraum (20); in der festen Kabine (1), der Erweiterungskabine (2) und dem Erweiterungszelt (3) ist jeweils ein Pufferraum (16) angeordnet; die Erweiterungskabine (2) und das Erweiterungszelt (3) sind

separat mit der festen Kabine (1) verbunden; sowohl die Erweiterungskabine (2) als auch das Erweiterungszelt (3) sind faltbar; im vollständig zusammengefalteten Zustand befinden sich die Erweiterungskabine (2) und das Erweiterungszelt (3) in der festen Kabine (1); wenn die Erweiterungskabine (2) und das Erweiterungszelt (3) entfaltet sind, kommunizieren sowohl die Erweiterungskabine (2) als auch das Erweiterungszelt (3) mit der festen Kabine (1); das Erweiterungszelt (3) steht in abgedichteter Verbindung mit der festen Kabine (1);

wobei das Erweiterungszelt (3) eine zweite Grundplatte (8), ein Innenzelt (9), ein Außenzelt (10) und ein Teleskopskelett (11) umfasst; die zweite Grundplatte (8) ist an der festen Kabine (1) angelenkt; ein Ende des Teleskopskeletts (11) ist mit der festen Kabine (1) verbunden; das Innenzelt (9) ist mit dem Teleskopskelett (11) verbunden; das Außenzelt ist außerhalb des Teleskopskeletts angeordnet; das Innenzelt (9) steht in abgedichteter Verbindung mit der festen Kabine (1); das Teleskopskelett (11) lässt sich aus- und einfahren; das Teleskopskelett (11) kann das Innenzelt (9) in eine Richtung weit weg von der festen Kabine (1) in Bewegung versetzen und es auf der zweiten Grundplatte (8) positionieren; das Außenzelt (10) ist lösbar mit dem Innenzelt (9) verbunden; sowohl das Innenzelt als auch das Außenzelt bestehen aus einem flexiblen Material;

wobei der Kernarbeitsraum (18) an einem Abluftauslass davon mit einem ersten Filter mit hohem Wirkungsgrad ausgestattet ist und eine scannende Leckerkennungs- und Probenahmeverrichtung stromabwärts des ersten Filters mit hohem Wirkungsgrad angeordnet ist, um eine In-situ-Leckerkennung des ersten Filters mit hohem Wirkungsgrad zu ermöglichen; der Pufferraum (16), der PCR-Raum (21) und der Vorbereitungsraum (15) sind jeweils an einem jeweiligen Abluftauslass mit einem zweiten Filter mit hohem Wirkungsgrad ausgestattet, entsprechende Abluftleitungen sind in einer Seitenwand des Labors montiert; und ein stromabwärts gelegener Aerosol-Probenahmeanschluss ist an einer stromabwärts gelegenen Rohrleitung des zweiten Filters mit hohem Wirkungsgrad angebracht; die Abluft aus dem Kernarbeitsraum (18), dem Pufferraum (16) und dem Vorbereitungsraum (15) wird in einem statischen Abluftdruckkasten gesammelt, in dem zwei Abluftventilatoren montiert sind; Außenluft wird jeweils dem Kernarbeitsraum (18), dem Pufferraum (16), dem Flüssigkeitsvorbereitungsraum (20), dem PCR-Raum (21) und dem Vorbereitungsraum (15) zugeführt, nachdem sie durch einen Filter mit primärem Wirkungsgrad, einen Filter

mit mittlerem Wirkungsgrad, eine Klimaanlage und einen dritten Filter mit hohem Wirkungsgrad geleitet wurde, zwischen denen Verbindungsstüben vorgesehen sind.

2. Mobiles Labor zum Nachweis von Nukleinsäuren mit doppelseitiger Ausdehnung in Kabinenform nach Anspruch 1, wobei die Erweiterungskabine (2) eine erste Grundplatte (5), einen Kabinenkörper (6) und eine Halterung (7) umfasst; die erste Grundplatte (5) ist an der festen Kabine (1) angelenkt; der Kabinenkörper (6) ist mit der ersten Grundplatte (5) verbunden; der Kabinenkörper (6) besteht aus einem flexiblen Material; die Halterung (7) ist mit der ersten Grundplatte (5) und dem Kabinenkörper (6) verbunden; wenn sich ein relativer Winkel zwischen der ersten Grundplatte (5) und der festen Kabine (1) ändert, kann die Halterung (7) den Kabinenkörper (6) in Bewegung versetzen.
3. Mobiles Labor zum Nachweis von Nukleinsäuren mit doppelseitiger Ausdehnung in Kabinenform nach Anspruch 2, wobei die erste Grundplatte (5) an der Unterseite der festen Kabine (1) angelenkt ist; die Halterung (7) umfasst erste Verbindungsstangen (701), eine zweite Verbindungsstange (702), erste lange Stützstangen (703) und eine zweite lange Stützstange (704); ein Ende der ersten langen Stützstange (703) ist an einem von der festen Kabine (1) weit entfernten Ende der ersten Grundplatte (5) angelenkt; die zweite lange Stützstange (704) ist mit der von der festen Kabine (1) weit entfernten Oberseite des Kabinenkörpers (6) verbunden; das andere Ende der ersten langen Stützstange (703) ist an einem Ende der zweiten langen Stützstange (704) angelenkt; ein Ende der ersten Verbindungsstange (701) ist an der Oberseite der festen Kabine (1) angelenkt, und das andere Ende der ersten Verbindungsstange (701) ist an der ersten langen Stützstange (703) angelenkt; ein Gelenkpunkt der ersten Verbindungsstange (701) und der ersten langen Stützstange (703) liegt zwischen einem Gelenkpunkt der ersten langen Stützstange (703) und der zweiten langen Stützstange (704) und einem Gelenkpunkt der ersten langen Stützstange (703) und der ersten Grundplatte (5); die zweite Verbindungsstange (702) ist mit der Oberseite des Kabinenkörpers (6) verbunden; ein Ende der zweiten Verbindungsstange (702) ist an der zweiten langen Stützstange (704) angelenkt; ein Gelenkpunkt der zweiten Verbindungsstange (702) und der zweiten langen Stützstange (704) liegt zwischen einem Gelenkpunkt der zweiten langen Stützstange (704) und der ersten langen Stützstange (703) und einem Gelenkpunkt der zweiten langen Stützstange (704) und dem Kabinenkörper (6).
4. Mobiles Labor zum Nachweis von Nukleinsäuren mit

doppelseitiger Ausdehnung in Kabinenform nach Anspruch 3, wobei es zwei erste lange Stützstangen (703) und zwei erste Verbindungsstangen (701) gibt; sowohl die zweite lange Stützstange (704) als auch die zweite Verbindungsstange (702) sind U-förmige Stangen; die beiden gegenüberliegenden Enden der zweiten langen Stützstange (704) sind jeweils mit den beiden ersten langen Stützstangen (703) verbunden; die beiden gegenüberliegenden Enden der zweiten Verbindungsstange (702) sind jeweils mit den beiden gegenüberliegenden Enden der zweiten langen Stützstange (704) verbunden; die Unterseiten der zweiten langen Stützstange (704) und der zweiten Verbindungsstange (702) sind separat mit dem Kabinenkörper (6) verbunden.

5. Mobiles Labor zum Nachweis von Nukleinsäuren mit doppelseitiger Ausdehnung in Kabinenform nach Anspruch 1, wobei das Erweiterungszelt (3) außerdem eine Stützschiene (12) umfasst; die Stützschiene (12), die zur Abstützung der zweiten Grundplatte (8) verwendet wird, ist verschiebbar am Boden der festen Kabine (1) angeordnet.
6. Mobiles Labor zum Nachweis von Nukleinsäuren mit doppelseitiger Ausdehnung in Kabinenform nach Anspruch 5, wobei die zweite Grundplatte (8) eine faltbare Struktur aufweist; die zweite Grundplatte (8) kann gegen die Stützschiene (12) gedrückt werden; die zweite Grundplatte (8) umfasst zwei Plattenkörper, wobei ein Ende eines der Plattenkörper an der festen Kabine (1) angelenkt ist und das gegenüberliegende Ende des Plattenkörpers an dem anderen Plattenkörper angelenkt ist.
7. Mobiles Labor zum Nachweis von Nukleinsäuren mit doppelseitiger Ausdehnung in Kabinenform nach Anspruch 6, wobei das Teleskopskelett (11) eine Vielzahl von Gleitrahmen umfasst; die Vielzahl von Gleitrahmen ist durch rhombusförmige Teleskoprahmen verbunden; das Innenzelt (9) ist innerhalb der Gleitrahmen angeordnet; durch die Hin- und Herbewegung der Gleitrahmen entlang der zweiten Grundplatte (8) kann das Innenzelt (9) zum Falten oder Entfalten in Bewegung versetzt werden.
8. Mobiles Labor zum Nachweis von Nukleinsäuren mit doppelseitiger Ausdehnung in Kabinenform nach Anspruch 7, wobei Riemenscheiben (13) an der Unterseite der Gleitrahmen angeordnet sind; auf der zweiten Grundplatte (8) ist eine an die Riemenscheiben (13) angepasste Gleitschiene angeordnet; die Riemenscheiben sind gleitend auf der Gleitschiene angeordnet.

Revendications

1. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double, comprenant une cabine fixe (1), une cabine d'expansion (2) et une tente d'expansion (3), dans lequel une salle d'équipement (17) et une zone de commande centrale (19) sont agencées dans la cabine fixe (1) ; la cabine d'expansion (2) sert de salle de préparation (15) et de salle PCR (21) ; la tente d'expansion (3) sert de salle de travail principale (18) et de salle de préparation de liquides (20) ; une salle tampon (16) est agencée dans chaque élément parmi la cabine fixe (1), la cabine d'expansion (2) et la tente d'expansion (3) ; la cabine d'expansion (2) et la tente d'expansion (3) sont reliées séparément à la cabine fixe (1) ; la cabine d'expansion (2) et la tente d'expansion (3) peuvent être pliées ; lorsqu'elles sont complètement pliées, la cabine d'expansion (2) et la tente d'expansion (3) sont situées dans la cabine fixe (1) ; lorsque la cabine d'expansion (2) et la tente d'expansion (3) sont dépliées, la cabine d'expansion (2) et la tente d'expansion (3) communiquent avec la cabine fixe (1) ; la tente d'expansion (3) est en liaison étanche avec la cabine fixe (1) ;

dans lequel la tente d'expansion (3) comprend une seconde plaque de base (8), une tente intérieure (9), une tente extérieure (10) et un squelette télescopique (11) ; la seconde plaque de base (8) est articulée sur la cabine fixe (1) ; une extrémité du squelette télescopique (11) est reliée à la cabine fixe (1) ; la tente intérieure (9) est reliée au squelette télescopique (11) ; la tente extérieure est agencée à l'extérieur du squelette télescopique ; la tente intérieure (9) est en liaison étanche avec la cabine fixe (1) ; le squelette télescopique (11) peut s'étirer et se rétracter ; le squelette télescopique (11) peut amener la tente intérieure (9) à se déplacer dans une direction éloignée de la cabine fixe (1) et se plaquer sur la seconde plaque de base (8) ; la tente extérieure (10) est reliée de manière amovible à la tente intérieure (9) ; la tente intérieure et la tente extérieure sont toutes deux constituées d'un matériau flexible ;

dans lequel la salle de travail principale (18) est dotée, au niveau d'une sortie d'échappement correspondante, d'un premier filtre à haute efficacité et un dispositif de détection de fuite et d'échantillonnage par balayage est agencé en aval du premier filtre à haute efficacité, pour permettre une détection de fuite in situ du premier filtre à haute efficacité ; la salle tampon (16), la salle PCR (21) et la salle de préparation (15) sont chacune dotées, au niveau d'une sortie d'échappement respective, d'un deuxième filtre à haute efficacité, des conduites d'échappe-

ment respectives sont montées dans une paroi latérale du laboratoire ; et un orifice d'échantillonnage d'aérosol en aval est monté sur une canalisation en aval du deuxième filtre à haute efficacité ; l'air évacué de la salle de travail principale (18), de la salle tampon (16) et de la salle de préparation (15) est collecté dans une boîte à pression statique d'échappement dans laquelle sont montés deux ventilateurs d'extraction ; de l'air extérieur est introduit dans chaque élément parmi la salle de travail principale (18), la salle tampon (16), la salle de préparation de liquides (20), la salle PCR (21) et la salle de préparation (15) après passage à travers un filtre d'efficacité primaire, un filtre d'efficacité moyenne, une unité de climatisation et un troisième filtre à haute efficacité, entre lesquels sont prévues des portes communicantes.

2. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double selon la revendication 1, dans lequel la cabine d'expansion (2) comprend une première plaque de base (5), un corps de cabine (6) et un support (7) ; la première plaque de base (5) est articulée sur la cabine fixe (1) ; le corps de cabine (6) est relié à la première plaque de base (5) ; le corps de cabine (6) est constitué d'un matériau flexible ; le support (7) est relié à la première plaque de base (5) et au corps de cabine (6) ; lorsqu'un angle relatif entre la première plaque de base (5) et la cabine fixe (1) change, le support (7) peut amener le corps de cabine (6) à se déplacer.
3. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double selon la revendication 2, dans lequel la première plaque de base (5) est articulée sur le fond de la cabine fixe (1) ; le support (7) comprend des premières bielles (701), une seconde bielle (702), des premières tiges de support longues (703) et une seconde tige de support longue (704) ; une extrémité de la première tige de support longue (703) est articulée sur une extrémité, éloignée de la cabine fixe (1), de la première plaque de base (5) ; la seconde tige de support longue (704) est reliée au sommet, éloigné de la cabine fixe (1), du corps de cabine (6) ; l'autre extrémité de la première tige de support longue (703) est articulée sur une extrémité de la seconde tige de support longue (704) ; une extrémité de la première bielle (701) est articulée sur le dessus de la cabine fixe (1) et l'autre extrémité de la première bielle (701) est articulée sur la première tige de support longue (703) ; un point d'articulation de la première bielle (701) et de la première tige de support longue (703) est situé entre un point d'articulation de la première tige de support longue (703) et de la seconde tige de support longue (704) et un point d'articulation de la première tige de support longue (703) et de la

- première plaque de base (5) ; la seconde bielle (702) est reliée sur le dessus du corps de cabine (6) ; une extrémité de la seconde bielle (702) est articulée sur la seconde tige de support longue (704) ; un point d'articulation de la seconde bielle (702) et de la seconde tige de support longue (704) est situé entre un point d'articulation de la seconde tige de support longue (704) et de la première tige de support longue (703) et un point d'articulation de la seconde tige de support longue (704) et du corps de cabine (6).
4. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double selon la revendication 3, dans lequel il existe deux premières tiges de support longues (703) et deux premières bielles (701) ; la seconde tige de support longue (704) et la seconde bielle (702) sont toutes deux des tiges en forme de U ; les deux extrémités opposées de la seconde tige de support longue (704) sont respectivement reliées aux deux premières tiges de support longues (703) ; les deux extrémités opposées de la seconde bielle (702) sont respectivement reliées aux deux extrémités opposées de la seconde tige de support longue (704) ; les bas de la seconde tige de support longue (704) et de la seconde bielle (702) sont reliés séparément au corps de cabine (6).
5. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double selon la revendication 1, dans lequel la tente d'expansion (3) comprend en outre un rail de support (12) ; le rail de support (12), qui sert à supporter la seconde plaque de base (8), est agencé de manière coulissante au fond de la cabine fixe (1).
6. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double selon la revendication 5, dans lequel la seconde plaque de base (8) présente une structure pliable ; la seconde plaque de base (8) peut être pressée contre le rail de support (12) ; la seconde plaque de base (8) comprend deux corps de plaque, dans lequel une extrémité de l'un des corps de plaque est articulée sur la cabine fixe (1) et l'extrémité opposée du corps de plaque est articulée sur l'autre corps de plaque.
7. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double selon la revendication 6, dans lequel le squelette télescopique (11) comprend une pluralité de cadres coulissants ; la pluralité des cadres coulissants sont reliés par l'intermédiaire de cadres télescopiques en forme de losange ; la tente intérieure (9) est agencée à l'intérieur des cadres coulissants ; le mouvement alternatif des cadres coulissants le long de la seconde plaque de base (8) peut amener la tente intérieure (9) à se plier ou à se déplier.
8. Laboratoire mobile de détection d'acides nucléiques de type cabine à expansion latérale double selon la revendication 7, dans lequel des galets (13) sont agencés sur le fond des cadres coulissants ; un rail coulissant adapté aux galets (13) est agencé sur la seconde plaque de base (8) ; les galets sont agencés de manière coulissante sur le rail coulissant.

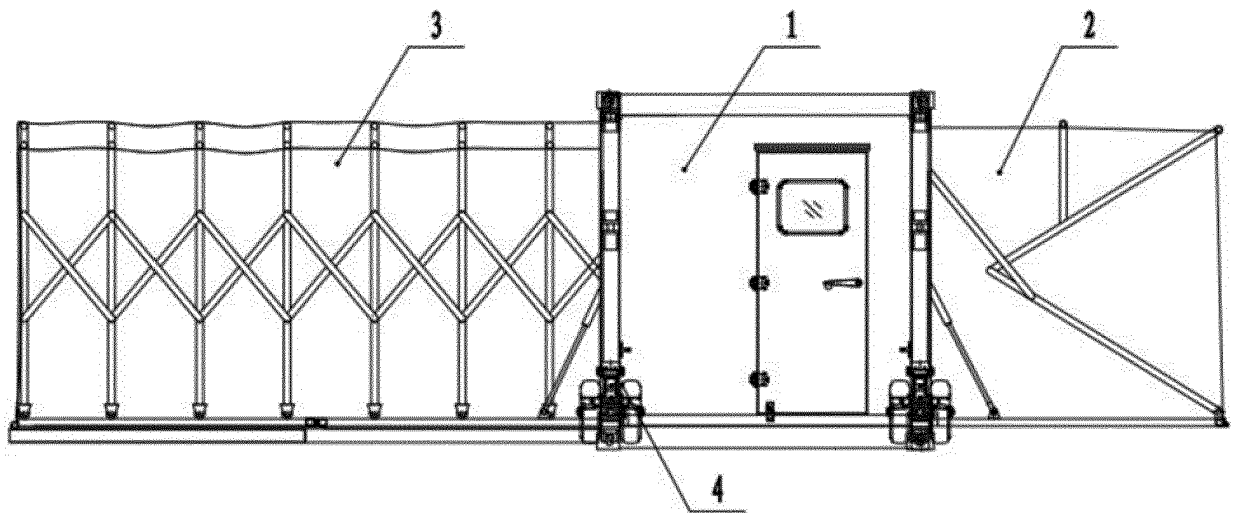


FIG. 1

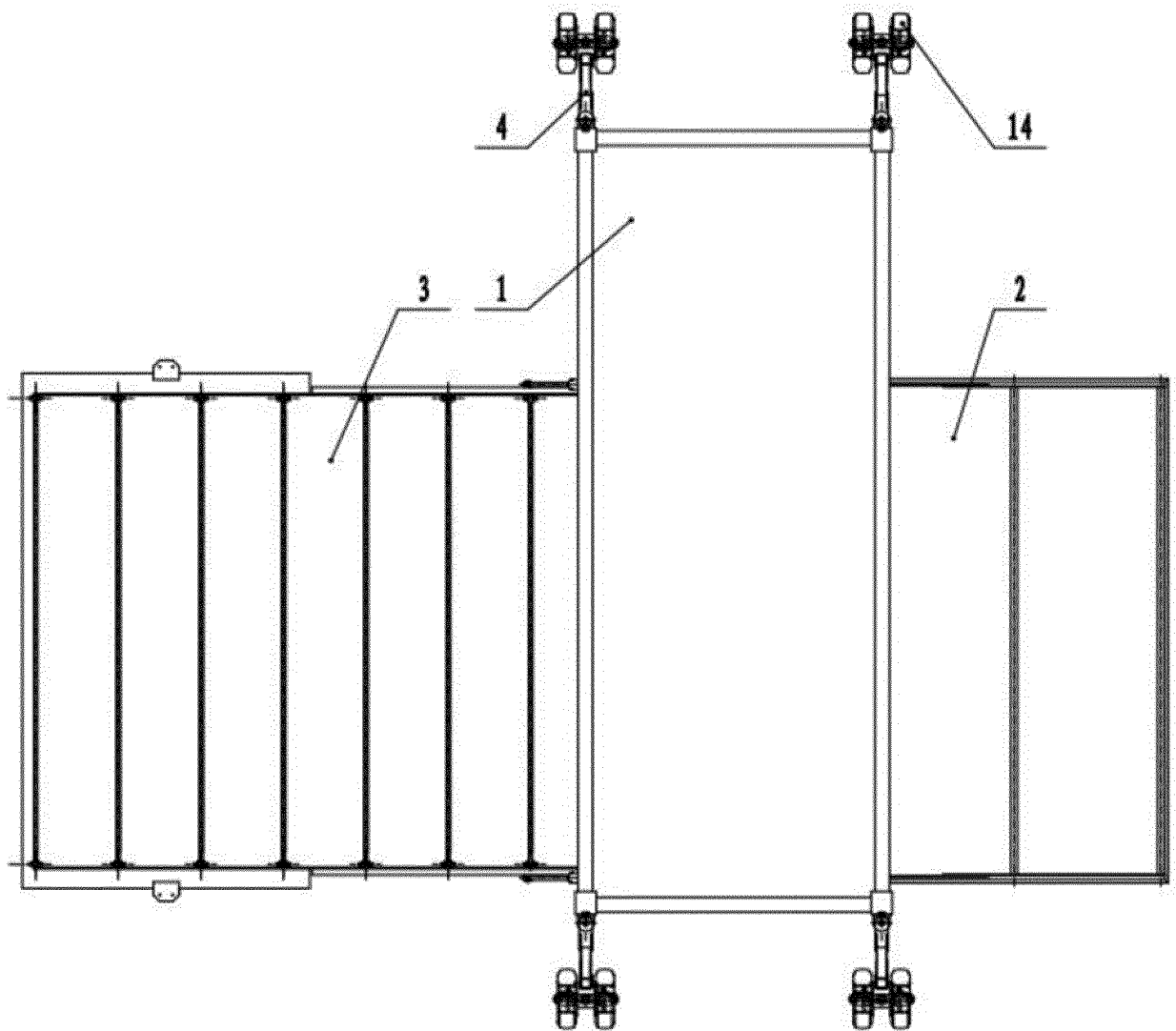


FIG. 2

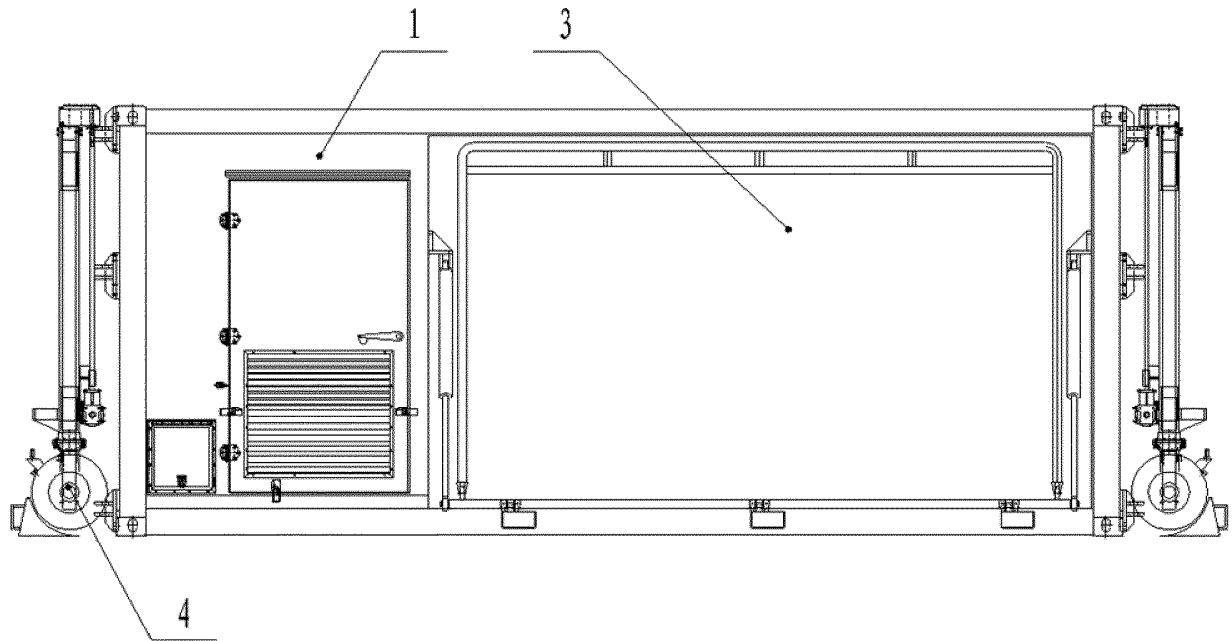


FIG. 3

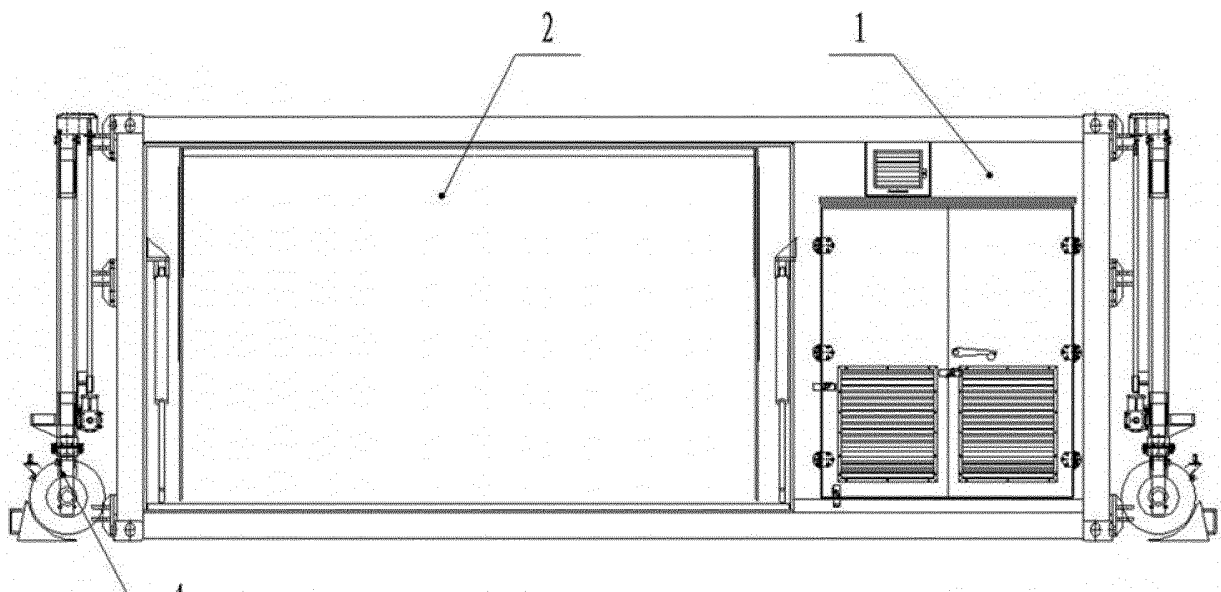


FIG. 4

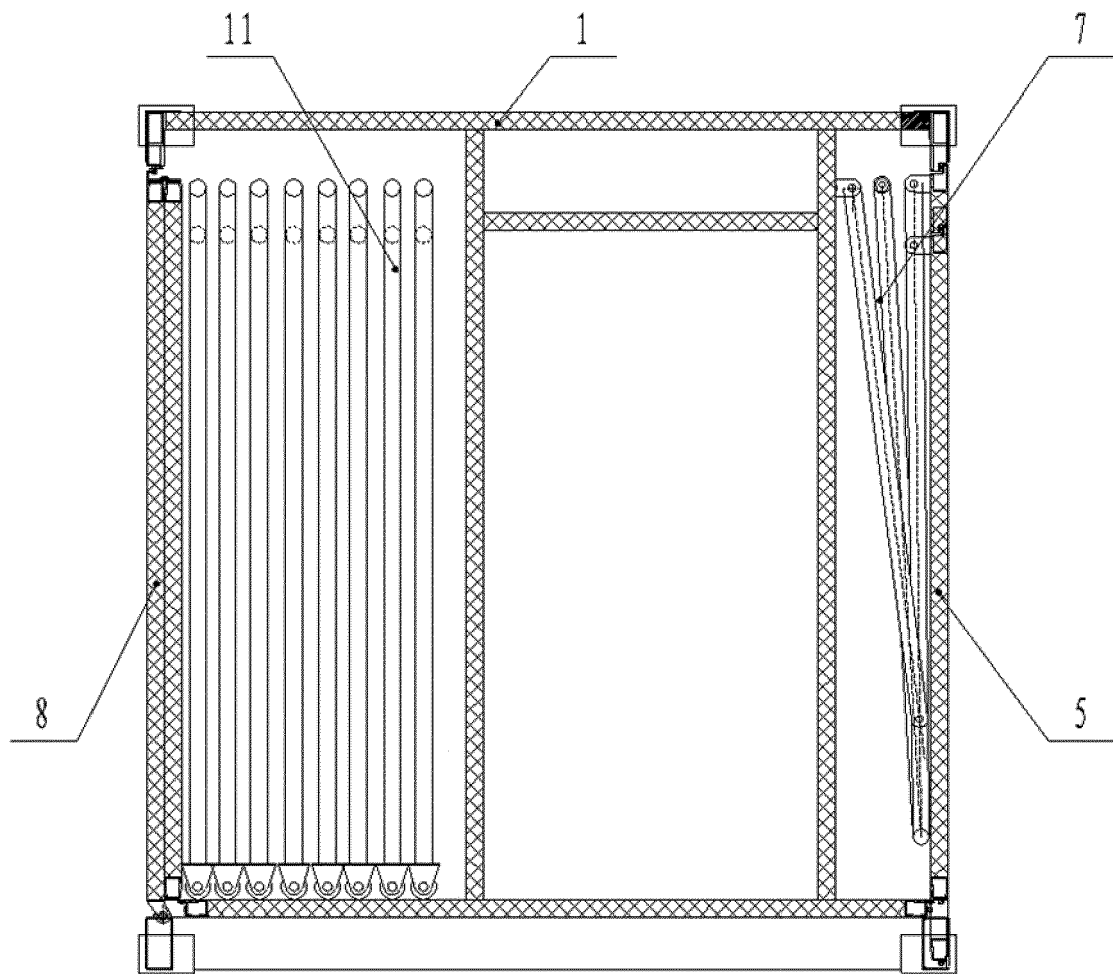


FIG. 5

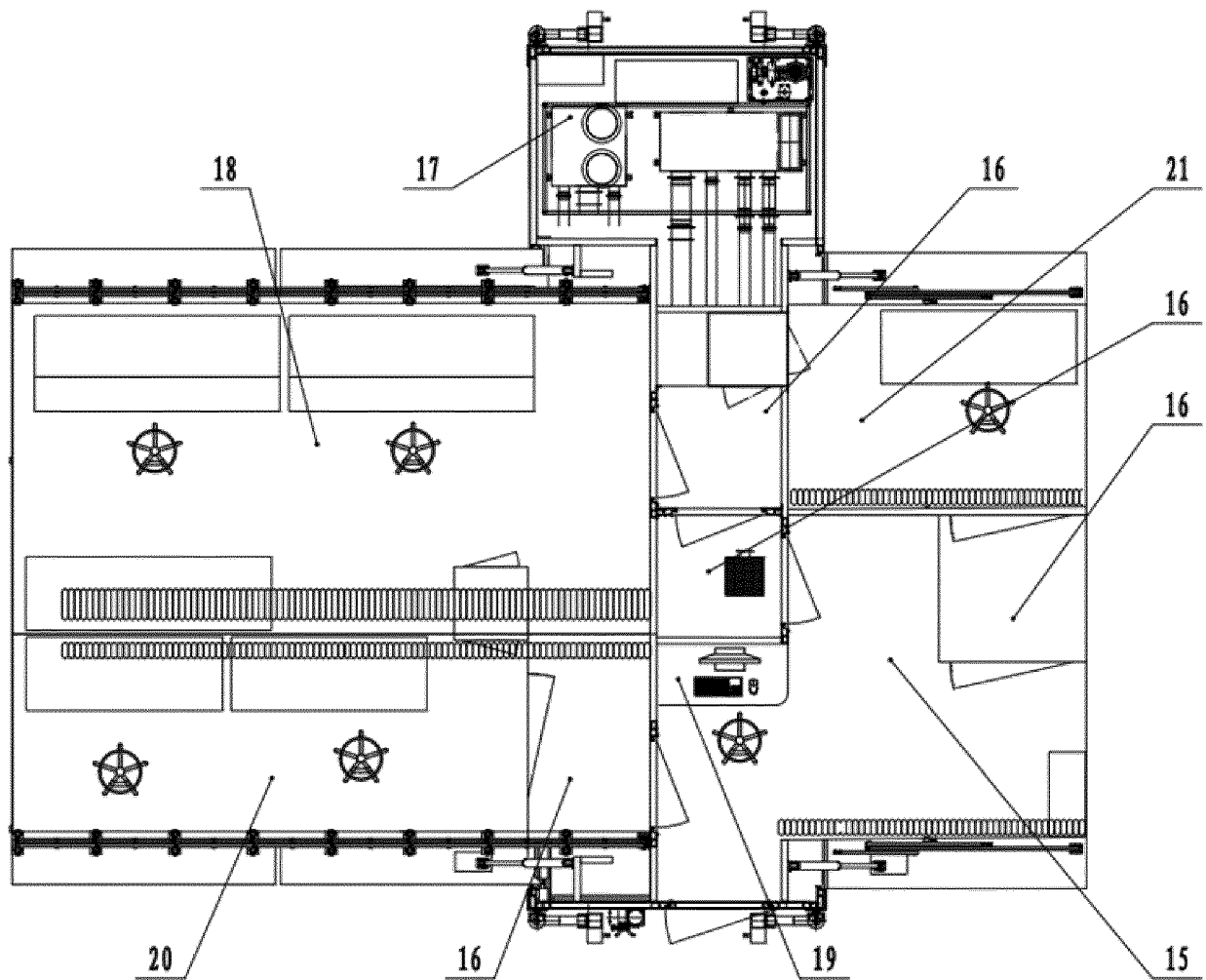


FIG. 6

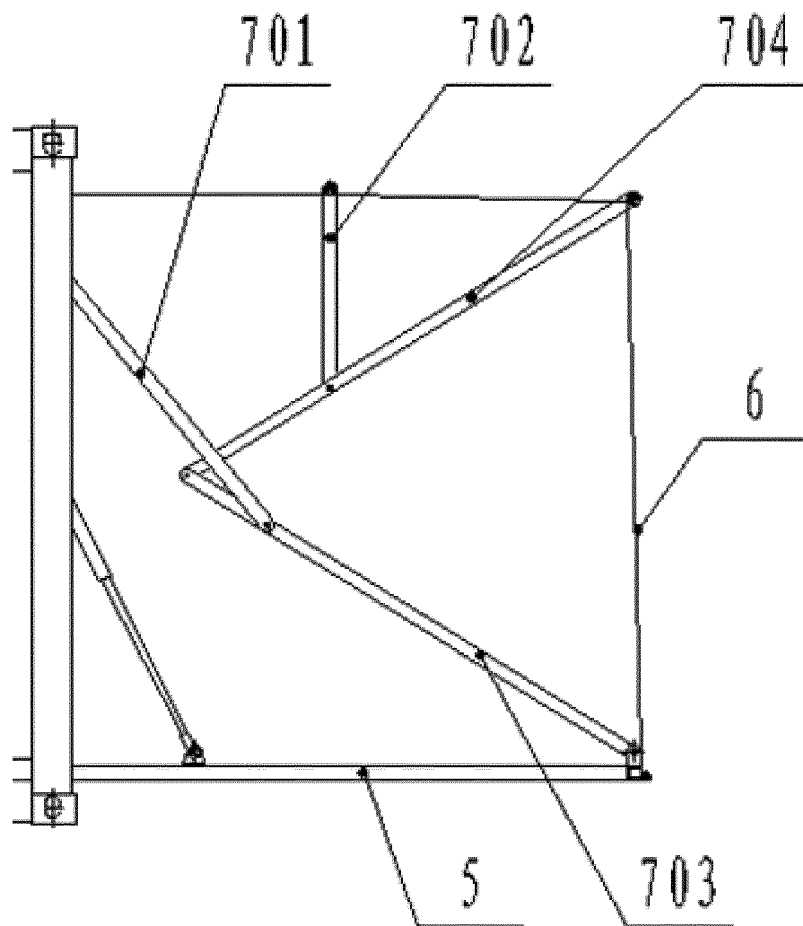


FIG. 7

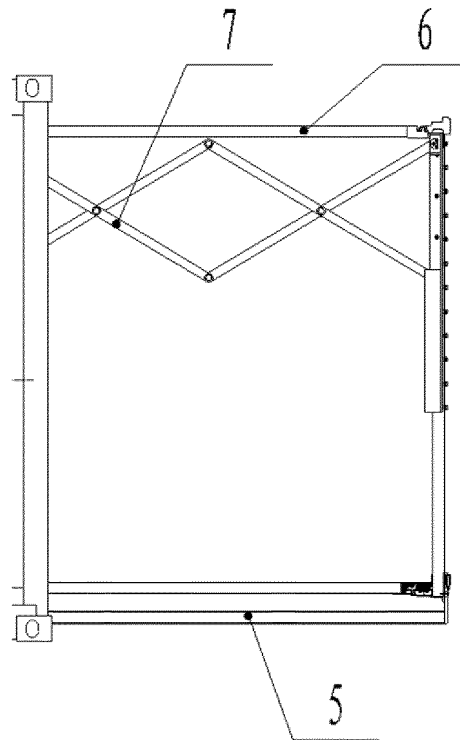


FIG. 8

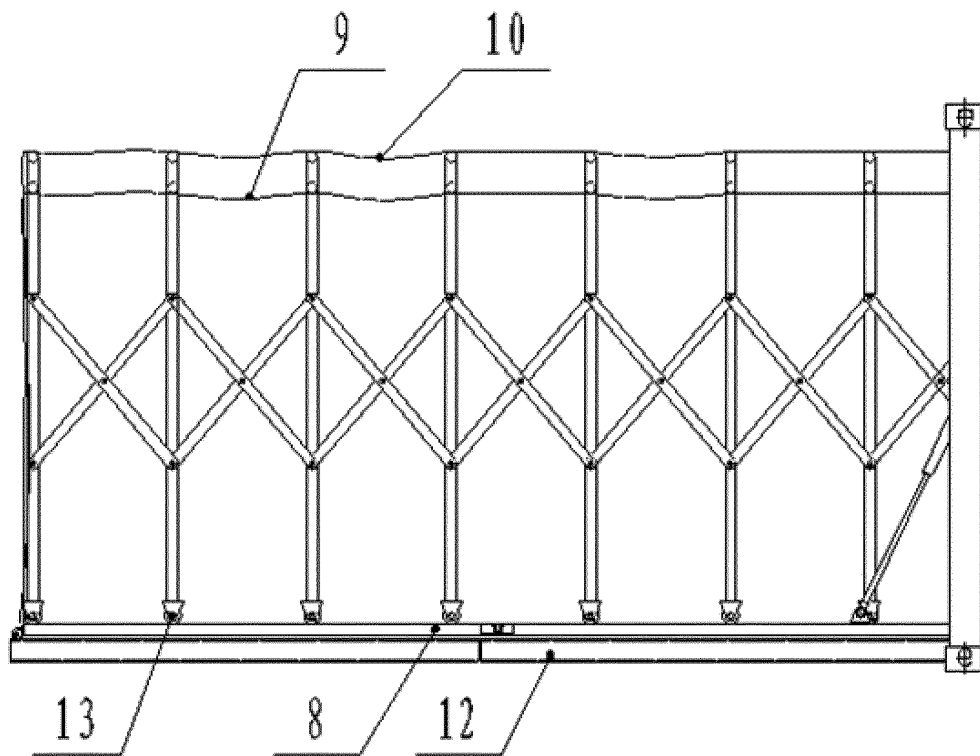


FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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