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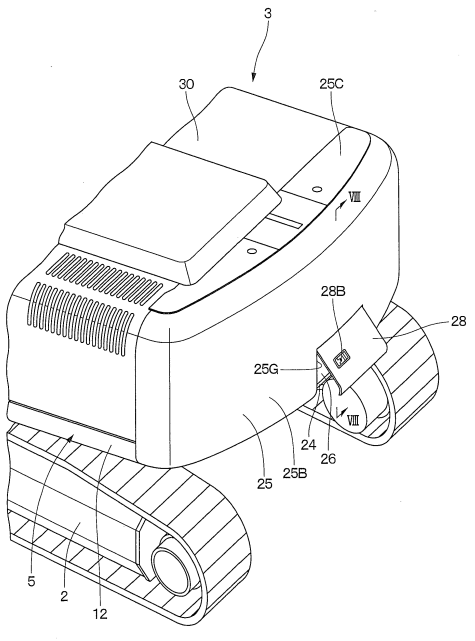
(54) CONSTRUCTION MACHINE

(57) A left weight mounting part (16) and a right weight mounting part (17) are provided with rear ends of a left vertical plate (8) and a right vertical plate (9) of a main frame (6), and a placing plate (24) adapted to place a battery (29) thereon is provided between the left weight mounting part (16) and the right weight mounting part (17). An accommodating groove (25G) is provided in a counterweight (25) by notching, in a front-rear direction, a part that faces the placing plate (24) in an up-down direction. A space (26A) formed by the placing plate (24) and the accommodating groove (25G) can be configured as an article accommodating room (26) that accommodates the battery (29).

Fig.6



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Description

TECHNICAL FIELD

[0001] The present invention relates to a construction machine such as, for example, a hydraulic excavator or the like that a counterweight has been mounted to a rear end of a vehicle body frame.

BACKGROUND ART

[0002] In general, the hydraulic excavator that is a representative example of the construction machine is configured by an automotive lower traveling structure, an upper revolving structure revolvably loaded on the lower traveling structure and a working mechanism tiltably provided on the front side of the upper revolving structure.

[0003] The upper revolving structure is configured by including a revolving frame that forms a support structure, a counterweight mounted to the rear end of the revolving frame in order to balance weight with the working mechanism, and an engine located on the front side of the counterweight and loaded on the aforementioned revolving frame.

[0004] The whole of the hydraulic excavator is formed small so as to reduce a working range when revolving. In this case, since the upper revolving structure is miniaturized, it becomes difficult to assure a space that various articles to be loaded on the upper revolving structure such as, for example, a battery to be used when starting the engine, an excavation pawl of the working machine and other consumption articles are to be placed. Likewise, it is also difficult to assure a working space when inspecting and maintaining the engine and so forth and the working property of maintenance work is reduced.

[0005] Therefore, there is known a hydraulic excavator of the type that a concave space part is provided by partially notching an upper side part of the counterweight and the concave space part is used as the working space so as to readily perform the maintenance work (Patent Document 1).

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0006] Patent Document 1: Japanese Patent Laid-Open No. 2010-270586 A

SUMMARY OF THE INVENTION

[0007] Incidentally, in the one according to the above-mentioned Patent Document 1, since the concave space part is provided in the upper side part of the counterweight, this concave space part can be also utilized as an article accommodating room. However, since the concave space part is provided on the upper side of the counterweight, in a case where the article that is connected via an electric wire such as, for example, a battery has been accommodated, there is such a problem that the electric wire leading to the battery should be disconnected when mounting/demounting the counterweight and labor is required for work of mounting/demounting the counterweight.

[0008] In view of the above-discussed problems with the conventional art, it is an object of the present invention to provide a construction machine that makes it possible to readily mount/demount the counterweight even in a state that articles are left accommodated in the article accommodating room.

(1) A construction machine according to the present invention comprises: a vehicle body frame that forms a support structure of a vehicle body, on the front side of which a working mechanism is mounted and on which a prime mover is mounted; and a counterweight mounted on a rear end of the vehicle body frame in order to balance weight with the working mechanism, wherein the vehicle body frame is configured by a main frame that is formed from a bottom plate and left and right vertical plates arranged upright on the bottom plate, left and right side frames that are located on left and right both sides of the main frame and extend in a front-rear direction, a plurality of extension beams that extend in a left-right direction at intervals in the front-rear direction in order to connect the left and right side frames and the main frame, and left and right weight mounting parts that are provided with rear ends of the left and right vertical plates of the main frame and on which the counterweight is mounted.

[0009] In order to solve the above-mentioned problem, a characteristic of a configuration that the present invention adopts is the point that a placing member adapted to place an article thereon is provided between the left weight mounting part and the right weight mounting part, an accommodating groove is provided in the counterweight by notching, in the front-rear direction, a part that faces the placing member in an up-down direction, and a space formed by the placing member and the accommodating groove in the counterweight is configured as an article accommodating room that accommodates the article.

[0010] With this arrangement, the space formed by the placing member and the accommodating groove in the counterweight can be used as the article accommodating room. Therefore, the counterweight can be utilized as the article accommodating room by placing the various articles on the placing member.

[0011] As a result, since the various articles can be placed on the placing member located on the vehicle body frame side, in a case where the counterweight is to be mounted on or demounted from the vehicle body frame, only the counterweight can be mounted/demounted in a state that the articles are left placed on the placing

member. That is, since it is not necessary to disconnect an electric wire or piping and to provide a joint in the middle even in a case where the article placed thereon is connected to the vehicle body side via the electric wire or the pipe, the work of mounting/demounting the counterweight can be readily performed.

(2) According to the present invention, the placing member is arranged on lower parts of the left and right weight mounting parts. Thereby, the placing member can be prevented from protruding toward the lower side of the vehicle body frame and the external appearance can be made favorable while assuring an internal volume of the article accommodating room.

(3) According to the present invention, the left and right weight mounting parts are formed into I-shapes in section by left and right rear vertical plates that contiguously extend from the left and right vertical plates, left and right upper flanges that contiguously extend from upper flanges of the left and right vertical plates and left and right lower flanges that contiguously extend from lower flanges of the left and right vertical plates, and the placing member is provided between the left and right lower flanges. With this arrangement, the placing member can be mounted by utilizing the left and right weight mounting parts that are formed integrally with the left and right vertical plates.

(4) According to the present invention, a partition member that partitions off the article accommodating room from a machine room that the prime mover is to be accommodated is provided on the front side of the article accommodating room. Thereby, the machine room and the article accommodating room can be partitioned by using the partition member and the articles accommodated in the article accommodating room can be protected from heat by the prime mover and oil for lubrication.

(5) According to the present invention, a lid member that closes the rear side of the article accommodating room to be openable/closable is provided on the rear surface side of the counterweight. Thereby, the articles accommodated in the article accommodating room can be protected from external rainwater, dust and so forth in a state that the lid member is left closed. On the other hand, the articles accommodated in the article accommodating room can be taken in and out and the maintenance work can be performed in a state that the lid member is left opened.

(6) According to the present invention, a rear part lateral plate that extends in the left-right direction is arranged upright on the front sides of the left and right weight mounting parts, and the rear part lateral plate also functions as a partition member that partitions off the front side of the article accommodating room.

With this arrangement, the rear part lateral plate provided on the front sides of the left and right weight mounting parts can partition off the front side of the article accommodating room as the partition member while functioning as the structure of the vehicle body frame. Thereby, the article accommodating room can be partitioned off from the machine room without providing a separate partition member.

(7) According to the present invention, a box the front side of which is closed and the rear side of which is opened is provided on the upper side of the placing member, and a lid member that closes the box to be openable/closable is provided on the rear side of the box. Thereby, the box and the lid member can be readily mounted to the placing member as one unit. The articles accommodated in the article accommodating room can be protected from external rainwater and dust in a state that the lid member is left closed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is a front view showing a hydraulic excavator to be applied to a first embodiment of the present invention.

Fig. 2 is a plan view showing an upper revolving structure in a state that part of a housing cover is omitted.

Fig. 3 is a plan view showing a revolving frame with a placing plate mounted.

Fig. 4 is an essential part enlarged perspective view showing a state that the placing plate has been mounted between weight mounting parts of a revolving frame.

Fig. 5 is an essential part enlarged exploded perspective view showing a state that the placing plate has been demounted from between the weight mounting parts of the revolving frame.

Fig. 6 is a perspective view showing a rear part of a hydraulic excavator in an enlarged state.

Fig. 7 is a perspective view that a counterweight has been viewed from the left lower side as a single unit.

Fig. 8 is an essential part enlarged sectional view that a state that a battery is being accommodated in an article accommodating room has been viewed from a VIII-VIII direction shown by an arrow in Fig. 6.

Fig. 9 is an essential part enlarged perspective view showing a revolving frame, a placing plate, a box, a lid member and so forth according to a second embodiment of the present invention.

Fig. 10 is an essential part enlarged sectional view that a state that the battery is being accommodated in the article accommodating room has been viewed from the same position as that in Fig. 8.

Fig. 11 is an essential part enlarged perspective view showing a state that a placing plate has been mounted between weight mounting parts of a revolving frame according to a third embodiment of the present

invention.

Fig. 12 is an essential part enlarged perspective view showing a state that a placing frame has been mounted between weight mounting parts of a revolving frame according to a fourth embodiment of the present invention.

Fig. 13 is an essential part enlarged sectional view that a state that the battery is being accommodated in an article accommodating room according to a fifth embodiment of the present invention has been viewed from the same position as that in Fig. 8.

Fig. 14 is a front view showing a state that a lid member has been mounted to a counterweight according to a sixth embodiment of the present invention.

Fig. 15 is an essential part enlarged exploded view showing a state that the lid member has been demounted from the counterweight in Fig. 14.

Fig. 16 an essential part enlarged sectional view that a state that the battery is being accommodated in an article accommodating room according to a seventh embodiment of the present invention has been viewed from the same position as that in Fig. 8.

Fig. 17 is an essential part enlarged sectional view that a state that the battery is being accommodated in an article accommodating room according to a modified example of the present invention has been viewed from the same position as that in Fig. 8.

MODE FOR CARRYING OUT THE INVENTION

[0013] Hereinafter, description will be made in detail in accordance with appended drawings by giving a crawler-type hydraulic excavator as an example of a construction machine according to an embodiment of the present invention.

[0014] Fig. 1 to Fig. 8 show a first embodiment of the construction machine according to the present invention.

[0015] In Fig. 1, designated at 1 is a hydraulic excavator as the construction machine used for earth and sand excavating work and so forth. This hydraulic excavator 1 is configured by an automotive crawler-type lower traveling structure 2, an upper revolving structure 3 that is revolvably loaded on the lower traveling structure 2 and constitutes a vehicle body together with the lower traveling structure 2, and a working mechanism 4 that is tiltably provided on the front side of the upper revolving structure 3.

[0016] The working mechanism 4 is provided with a boom 4A, an arm 4B and a bucket 4C and these are rotationally moved by a boom cylinder 4D, an arm cylinder 4E and a bucket cylinder 4F. The base end of the boom 4A is rotatably connected to boom mounting portions 8A and 9A of left and right vertical plates 8 and 9 of a revolving frame 5, which will be described later.

[0017] The upper revolving structure 3 is configured by including the revolving frame 5, an engine 18, a cab 21, a counterweight 25, an article accommodating room 26 and a battery 29, which will be described later.

[0018] Indicated at 5 is the revolving frame as a vehicle body frame that constitutes a support structure of the upper revolving structure 3. As shown in Fig. 3, this revolving frame 5 is configured by including a main frame 6, left and right side frames 12 and 13 and each extension beam 14, which will be described later.

[0019] The main frame 6 configures a central part of the revolving frame 5 and the main frame 6 is revolvably mounted to the lower traveling structure 2. This main frame 6 is configured by including a bottom plate 7, the left vertical plate 8 and the right vertical plate 9, which will be described later.

[0020] The bottom plate 7 constitutes a base of the main frame 6 and the bottom plate 7 is provided by extending in a front-rear direction along an intermediate part in a left-right direction of the revolving frame 5. This bottom plate 7 is configured by a front bottom plate part 7A that is located on the forward side and has been flatly formed by using a thick steel plate, and a rear bottom plate part 7B that extends rearward from a rear part of the front bottom plate part 7A and has been flatly formed by using a steel plate that is thinner than the front bottom plate part 7A. The front bottom plate part 7A is formed into a rectangular shape that is wider in the left-right direction than the later described respective vertical plates 8 and 9. On the other hand, the rear bottom plate part 7B is formed into a rectangular shape that is long in the front-rear direction so as to be held in a space between the respective vertical plates 8 and 9. As shown in Fig. 8, the rear bottom plate part 7B is arranged at height positions of lower flanges 8C and 9C that respectively form the vertical plates 8 and 9.

[0021] The left vertical plate 8 extends in the front-rear direction and is arranged upright at a left-shifted position on the bottom plate 7. On the other hand, the right vertical plate 9 extends in the front-rear direction and is arranged upright at a right-shifted position on the bottom plate 7. These left and right vertical plates 8 and 9 are arranged in parallel while keeping a fixed space in the left-right direction.

[0022] It should be noted that a case where the left and right vertical plates 8 and 9 each has been formed from one plate body that is continuous in a length direction (the front-rear direction) is illustrated. However, each of the vertical plates 8 and 9 may be also configured such that it is divided into a plurality of plate bodies in the length direction, for example, into a front vertical plate and a rear vertical plate and they are firmly fixed integrally by using a welding means in consideration of the working property when manufacturing it. In this case, a configuration that the front vertical plate and the rear vertical plate are connected together at a boundary position between the front bottom plate part 7A and the rear bottom plate part 7B of the aforementioned bottom plate 7 is general. A frame that is divided on the rearward side of the main frame 6 in this way is called a tail frame.

[0023] Here, the forward side of the left vertical plate 8 constitutes the boom mounting portion 8A that rises

like a mountain and the forward side of the right vertical plate 9 constitutes the boom mounting portion 9A that rises like a mountain. A base end of the boom 4A of the working mechanism 4 is rotatably pin-connected to these left and right boom mounting portions 8A and 9A. On the other hand, the rearward side of the left vertical plate 8 extends rearward in an I-shaped sectional form (an I-flange structure) sandwiched between an upper flange 8B and a lower flange 8C, and the rearward side of the right vertical plate 9 extends rearward in the I-shaped sectional form sandwiched between an upper flange 9B and a lower flange 9C. These lower flanges 8C and 9C constitute lower parts of the respective vertical plates 8 and 9 and the rear bottom plate part 7B of the bottom plate 7 is arranged so as to have the same height position as the height positions of the respective lower flanges 8C and 9C. Further, later described weight mounting parts 16 and 17 are provided with the rear sides of the respective vertical plates 8 and 9.

[0024] A connecting plate 10 is located on an intermediate part in the front-rear direction between the respective vertical plates 8 and 9, extends in the left-right direction and is arranged upright. This connecting plate 10 is consisted of a horizontally long rectangular plate body and is integrally fixed to the rear bottom plate part 7B of the bottom plate 7 and the left and right vertical plates 8 and 9.

[0025] Indicated at 11A, 11B and 11C are three rear part lateral plates that are located on the front sides of the later described left and right mounting parts 16 and 17, extended in the left-right direction and arranged upright (hereinafter, generally referred to as a rear part lateral plate 11). The center rear part lateral plate 11A is arranged between the respective weight mounting parts 16 and 17, the left rear part lateral plate 11B is arranged between the left weight mounting part 16 and the left side frame 12, and the right rear part lateral plate 11C is arranged between the right weight mounting part 17 and the right side frame 13. The center rear part lateral plate 11A is consisted of a horizontally long rectangular plate body and rises upward at a boundary position between the main frame 6 and each of the weight mounting parts 16 and 17, that is, on the front side of the later described article accommodating room 26. Thereby, the center rear part lateral plate 11A can also function as a partition member for partitioning off the article accommodating room 26 from a machine room 31, which will be described later.

[0026] On the other hand, the left rear part lateral plate 11B also functions as an extension beam that supports the left side frame 12. Further, the right rear part lateral plate 11C also functions as an extension beam that supports the right side frame 13.

[0027] The left side frame 12 is arranged on the left sides of the bottom plate 7 and the left vertical plate 8 with a space interposed. The right side frame 13 is arranged on the right sides of the bottom plate 7 and the right vertical plate 9 with a space interposed. Each of the side frames 12 and 13 is formed by using, for example, a D-type frame constituted of a cylinder that is D-shaped in section and extends in the front-rear direction along each of the vertical plates 8 and 9.

[0028] Left extension beams 14A, 14B and 14C extend from the bottom plate 7 and the left vertical plate 8 leftward in the left-right direction, and the respective left extension beams 14A, 14B and 14C are disposed in plural, for example, three at intervals in the front-rear direction of the revolving frame 5. The respective left extension beams 14A, 14B and 14C are adapted to arrange the left side frame 12 at a left position separated from the bottom plate 7 and the left vertical plate 8.

[0029] On the other hand, right extension beams 14D, 14E and 14F extend from the bottom plate 7 and the right vertical plate 9 rightward in the left-right direction, and the respective right extension beams 14D, 14E and 14F are disposed in plural, for example, three at intervals in the front-rear direction of the revolving frame 5 similarly to the aforementioned respective left extension beams 14A, 14B and 14C. The respective right extension beams 14D, 14E and 14F are adapted to arrange the right side frame 13 at a right position separated from the bottom plate 7 and the right vertical plate 9.

[0030] Front engine brackets 15A and 15B that are located on the left and right are provided on the rear side of the connecting plate 10, and rear engine brackets 15C and 15D that are located on the left and right are provided on the front side of the center rear part lateral plate 11A. These engine brackets 15A to 15D are adapted to support the later described engine 18.

[0031] Designated at 16 is the left weight mounting part that is provided with a rear end of the left vertical plate 8 of the main frame 6. As shown in Fig. 4 and Fig. 5, this left weight mounting part 16 is provided so as to protrude rearward from between the center rear part lateral plate 11A and the left rear part lateral plate 11B. Specifically, the left weight mounting part 16 is formed into the I-shape in section (the I-flange structure) by a rear vertical plate 16A that extends rearward contiguously to the left vertical plate 8, an upper flange 16B that extends rearward contiguously to the upper flange 8B and a lower flange 16C that extends rearward contiguously to the lower flange 8C. Further, columns 16D are provided at two places separated in the front-rear direction between the upper flange 16B and the lower flange 16C, and a bolt insertion hole 16D1 is provided through each of the columns 16D in the up-down direction. A bolt (not shown) adapted to fix the later described counterweight 25 onto the left weight mounting part 16 is inserted into this bolt insertion hole 16D1.

[0032] Designated at 17 is the right weight mounting part that is provided with a rear end of the right vertical plate 9 of the main frame 6. This right weight mounting part 17 is provided so as to protrude rearward from between the center rear part lateral plate 11A and the right rear part lateral plate 11C similarly to the aforementioned left weight mounting part 16 and is formed into the I-shape

in section (the I-flange structure) by a rear vertical plate 17A, an upper flange 17B and a lower flange 17C. Further, columns 17D are provided at two places separated in the front-rear direction between the upper flange 17B and the lower flange 17C, and a bolt insertion hole 17D1 is provided through each of the columns 17D in the up-down direction. A bolt (not shown) adapted to fix the counterweight 25 onto the right weight mounting part 17 is inserted into this bolt insertion hole 17D1.

[0033] Here, the left weight mounting part 16 and the right weight mounting part 17 are arranged with a space of a dimension that is equal to a width dimension in the left-right direction of the rear bottom plate part 7B that configures the bottom plate 7, and a later described placing plate 24 is mounted between these weight mounting parts 16 and 17. Thus, in the respective weight mounting parts 16 and 17, plural, for example, two mounting brackets 16E and 17E are provided by protruding inwards from the lower flanges 16C and 17C that configure the lower parts so as to mutually face.

[0034] Indicated at 18 is the engine (see, Fig. 2) as the prime mover provided on the rear side of the revolving frame 5. This engine 18 is arranged in the machine room 31 that is defined on the front side of the later described counterweight 25 and is mounted to each of the engine brackets 15A to 15D of the main frame 6 in a transversely installed state that it extends in the left-right direction in a vibration isolation state. A hydraulic pump 19 that is adapted to deliver hydraulic oil as pressurized oil is mounted to the right side of the engine 18. On the other hand, a heat exchanger 20 that is formed by including a radiator and an oil-cooler is arranged on the left side of the engine 18.

[0035] The cab 21 is provided on the left front side of the revolving frame 5, and this cab 21 is the one on which an operator gets in order to operate the hydraulic excavator 1. In the cab 21, a driver's seat that the operator sits, levers for performing various operations and pedals (none of them is shown) are disposed.

[0036] An hydraulic oil tank 22 is located on the front side of the engine 18 and is provided on the right side of the revolving frame 5, and the hydraulic oil tank 22 is adapted to store hydraulic oil therein. A fuel tank 23 is provided on the right side of the revolving frame 5 so as to be adjacent to the front side of the hydraulic oil tank 22, and the fuel tank 23 is adapted to store fuel therein.

[0037] Next, configurations of the placing plate 24 and an accommodating groove 25G in the counterweight 25 that form the article accommodating room 26 for accommodating the later described battery 29 will be described.

[0038] Designated at 24 is the placing plate as the placing member according to the present invention that is provided between the left weight mounting part 16 and the right weight mounting part 17. This placing plate 24 configures a bed plate on which the later described battery 29 is to be placed. As shown in Fig. 5, the placing plate 24 is formed as a rectangular plate body having a width dimension that is within a dimension of a distance, for example, between the left weight mounting part 16 and the right weight mounting part 17. On the other hand, as shown in Fig. 8, a length dimension in the front-rear direction of the placing plate 24 is set such that a rear end thereof is located on the front side ahead of a rear surface 25B of the later described counterweight 25. Thereby, the placing plate 24 can be made not to interfere with surrounding obstacles in revolving operation.

[0039] Here, the placing plate 24 can be mounted between the respective weight mounting parts 16 and 17 by placing both side parts in the left-right direction on the respective mounting brackets 16E and 17E of the left and right weight mounting parts 16 and 17 and screwing bolts 24A into the respective mounting brackets 16E and 17E in this state. Thereby, the placing plate 24 can be arranged on the lower flanges 16C and 17C that constitute lower parts of the respective weight mounting parts 16 and 17.

[0040] Designated at 25 is the counterweight mounted to a rear end of the revolving frame 5. This counterweight 25 is adapted to balance weight with the working mechanism 4. As shown in Fig. 2 and Fig. 7, the counterweight 25 is configured by a front surface 25A that extends almost flatly in the left-right direction so as to face the engine 18 and the rear engine brackets 15C and 15D in the front-rear direction, the rear surface 25B that extends in a convex arc shape such that a central part in the left-right direction protrudes rearward from both ends of the front surface 25A, an upper surface 25C formed on the aforementioned front surface 25A and the rear surface 25B and a lower surface 25D formed under the aforementioned front surface 25A and the rear surface 25B.

[0041] Convex groove-shape left mounting groove portion 25E and right mounting groove portion 25F that extend from the front surface 25A up to the vicinity of the rear surface 25B while opening toward the lower surface 25D are provided in the counterweight 25 at its lower inboard positions. The left and right mounting groove portions 25E and 25F are the ones into which the left and right weight mounting parts 16 and 17 will fit and are arranged corresponding to the dimension of spacing between the respective weight mounting parts 16 and 17. The left and right weight mounting parts 16 and 17 are configured to be almost held in the left and right mounting groove portions 25E and 25F in a state that the left and right weight mounting parts 16 and 17 are fitted in the left and right mounting groove portions 25E and 25F.

[0042] Further, in the counterweight 25, the accommodating groove 25G is provided by notching, in the front-rear direction, a part that faces the placing plate 24 in the up-down direction, that is, between the left and right mounting groove portions 25E and 25F. This accommodating groove 25G is formed into an angular groove shape by left and right side surface portions 25G1 and 25G2 that rise from inner side portions of the respective mounting groove portions 25E and 25F and extended in the front-rear direction, and a top surface portion 25G3 that extends in the front-rear direction in a horizontal state

so as to connect together upper ends of the respective side surface portions 25G1 and 25G2. The accommodating groove 25G is formed through it from the front surface 25A to the rear surface 25B in the front-rear direction.

[0043] Here, the width dimension in the left-right direction of the accommodating groove 25G is set to be equal to the dimension of spacing between the left weight mounting part 16 and the right weight mounting part 17. Thereby, since the width dimension of the accommodating groove 25G can be made equal to the width dimension of the placing plate 24, an accommodating space on the placing plate 24 can be made large.

[0044] As shown in Fig. 8, a screw seat 25H is provided on the top surface portion 25G3 of the accommodating groove 25G, located nearer the rear side that opens toward the outside of the upper revolving structure 3. A hinge 28A that supports the later described lid member 28 to be openable/closable (rotatable) is mounted to this screw seat 25H. On the other hand, a connecting tool (not shown) that is brought into connection with a lock device 28B provided on the lid member 28 when the lid member 28 has been closed is provided on the left side surface portion 25G1 of the accommodating groove 25G.

[0045] The counterweight 25 so configured brings the left and right mounting groove portions 25E and 25F into fit on the left and right weight mounting parts 16 and 17 of the revolving frame 5, brings bolts (not shown) into insertion into the bolt insertion holes 16D1 and 17D1 in the left and right columns 16D and 17D and fastens the bolts. Thereby, the counterweight 25 can be integrally mounted to the weight mounting parts 16 and 17. On the other hand, the counterweight 25 can be demounted from the weight mounting parts 16 and 17 by loosening and removing the aforementioned bolts.

[0046] The later described article accommodating room 26 can be defined between the placing plate 24 and the accommodating groove 25G in the counterweight 25 in a state that the counterweight 25 is mounted to the left and right weight mounting parts 16 and 17.

[0047] That is, designated at 26 is the article accommodating room that is formed by the placing plate 24 between the left and right weight mounting parts 16 and 17 and the accommodating groove 25G in the counterweight 25. The inside of this article accommodating room 26 is configured as a rectangular parallelepiped space 26A formed by covering the upper part of the placing plate 24 with the accommodating groove 25G. Although the later described battery 29, the excavation pawl to be mounted to the bucket 4C and other consumption articles (none of them is shown) can be accommodated in the article accommodating room 26, a case where the battery 29 has been accommodated is shown in the present embodiment.

[0048] Here, since the article accommodating room 26 has a structure that the battery 29 is to be placed on the placing plate 24, this battery 29 can be brought into a state of being mounted to the revolving frame 5 side. Therefore, in a case where the counterweight 25 is to be demounted from the revolving frame 5, only the counterweight can be demounted in a state that the battery 29 is left placed on the placing plate 24.

[0049] Indicated at 27 is the partition member provided on the front side of the article accommodating room 26. This partition member 27 can partition off the article accommodating room 26 from the machine room 31 by closing the inside of the upper revolving structure 3, that is, a front side opening that opens toward the later described machine room 31 with the accommodating groove 25G in the counterweight 25. The partition member 27 is formed as a rectangular flat plate that extends throughout front ends of the respective side surface portions 25G1 and 25G2 and the top surface portion 25G3 of the accommodating groove 25G and is mounted to the counterweight 25 by using a firmly fixing means including, for example, welding and bolting. Thereby, the partition member 27 can protect the battery 29 accommodated in the article accommodating room 26 from, for example, heat that the engine 18 generates and oil liquid for lubrication by partitioning off and completely isolating the article accommodating room 26 from the machine room 31.

[0050] Indicated at 28 is the lid member provided on the rear side of the article accommodating room 26 that is located on the rear surface 25B side of the counterweight 25, and the lid member 28 is adapted to close a rear side opening of the article accommodating room 26 to be openable/closable. This lid member 28 is constituted of a plate body having a width dimension that is almost equal to a width dimension of the accommodating groove 25G in the counterweight 25 and the lower side thereof is curved in an arc shape modeling on the counterweight 25. As shown in Fig. 8, the lid member 28 is bolted to the screw seat 25H of the counterweight 25 via the hinge 28A at an upper end. Here, the lid member 28 is arranged so as to be on the same plane as the rear surface 25B of the counterweight 25 or to be located more deeply than the rear surface 25B in a state that the rear side opening of the article accommodating room 26 is closed. Thereby, the lid member 28 is prevented from being damaged in contact with the surrounding obstacles and so forth in the revolving operation.

[0051] Further, the lid member 28 is provided with the lock device 28B at a position on one side, for example, the left side in the left-right direction. This lock device 28B is adapted to maintain the lid member 28 in the closed state by connecting to the connection tool provided on the left side surface portion 25G1 of the counterweight 25 when the lid member 28 has been closed. On the other hand, the lid member 28 can be opened by operating the lock device 28B to release connection. The lock device 28B is provided with a cylinder lock that can be locked and unlocked, for example, by an engine key (none of them is shown) and stealing, mischief and so forth on the battery 29 accommodated in the article accommodating room 26 can be prevented by locking this cylinder lock.

[0052] The battery 29 configures one of various articles accommodated in the article accommodating room 26. Two batteries 29 are disposed on the placing plate 24 in a line in the front-rear direction. Each battery 29 is adapted to store electrical charges for starting the engine 18 and operating various electric components. Each battery 29 is fixed onto the placing plate 24 using a not shown fixing tool and an electric wire that extends from a terminal is connected to the revolving frame 5 or the electric component (none of them is shown) loaded on the revolving frame 5.

[0053] Each battery 29 is electrically and structurally mounted to the revolving frame 5 in this way. However, since the partition member 27 and the lid member 28 are provided on the counterweight 25 side, the counterweight 25 can be demounted together with the partition member 27 and the lid member 28 in a state that the battery 29 is left placed on the placing plate 24.

[0054] As shown in Fig. 1, a housing cover 30 is located between the cab 21 and the counterweight 25 and is provided on the revolving frame 5. As shown in Fig. 2, this housing cover 3 0 forms the machine room 31 that accommodates the engine 18, the hydraulic pump 19, the heat exchanger 20 and so forth on the front side of the counterweight 25.

[0055] The hydraulic excavator 1 according to the first embodiment has a configuration as mentioned above and next the operation thereof will be described.

[0056] The operator who has gotten on the cab 21 starts the engine 18 and drives the hydraulic pump 19. He can move the lower traveling structure 2 forward or rearward by operating the lever and so forth for traveling in this state. On the other hand, he can perform earth and sand excavating work and so forth by operating the lever for work so as to move the working mechanism 4 upward and downward.

[0057] Thus, according to the first embodiment, the placing plate 24 for placing the batteries 29 is provided between the left and right weight mounting parts 16 and 17. The accommodating groove 25G is provided in the counterweight 25 by notching, in the front-rear direction, the part that faces the placing plate 24 in the up-down direction. Thereby, the space 26A formed by the placing plate 24 and the accommodating groove 25G can be configured as the article accommodating room 26 for accommodating the batteries 29.

[0058] Accordingly, the two batteries 29 can be accommodated in the article accommodating room 26 formed by the accommodating groove 25G in the counterweight 25 by placing them on the placing plate 24 and each battery 29 can be put in a part of the counterweight 25.

[0059] As a result, since each battery 29 can be placed on the placing plate 24 located on the revolving frame 5 side, in a case where the counterweight 25 is to be mounted/demounted to/from the revolving frame 5, only the counterweight 25 can be mounted/demounted in a state that each battery 29 is left placed on the placing plate 24. That is, since it is not necessary to disconnect the electric wire and to provide a connector in the middle even in a case where each battery 29 is connected to the revolving frame 5 side via the electric wire, work of mounting/demounting the counterweight 25 can be readily performed.

[0060] Since, on the front side of the article accommodating room 26, there is provided the partition member 27 that partitions off it from the machine room 31 that the engine 18 is accommodated, this partition member 27 can completely isolate the machine room 31 from the article accommodating room 26. Thereby, each battery 29 in the article accommodating room 26 can be protected from the heat that the engine 18 generates, the oil liquid for lubrication and so forth.

[0061] The lid member 28 for closing the rear side of the article accommodating room 26 to be openable/closable is provided on the rear surface 25B side of the counterweight 25. Thereby, the batteries 29 accommodated in the article accommodating room 26 can be protected from external rainwater, dust and so forth in a state that the lid member 28 is left closed. On the other hand, the batteries 29 accommodated in the article accommodating room 26 can be taken in and out and maintenance work can be performed in a state that the lid member 28 is left opened.

[0062] In addition, the lid member 28 is configured such that the hinge 28A is mounted to the top surface portion 25G3 of the accommodating groove 25G in the counterweight 25 and the lock device 28B is connected to the connection tool provided on the left side surface portion 25G1 of the counterweight 25. Accordingly, alignment work when mounting the lid member 28 can be readily performed and, in addition, the counterweight 25 can be demounted in a state that the lid member 28 is left mounted.

[0063] Further, since the placing plate 24 is arranged on the lower flanges 16C and 17C that constitute the lower parts of the left and right weight mounting parts 16 and 17, the placing plate 24 can be prevented from protruding toward the lower side of the revolving frame 5. Thereby, the external appearance can be made favorable while assuring the internal volume of the article accommodating room 26.

[0064] Next, Fig. 9 and Fig. 10 show a second embodiment of the present invention. A feature of the present embodiment is a configuration that a box the front side of which is closed and the rear side of which is opened is provided on a placing member and a lid member that closes it to be openable/closable is provided on the rear side of the box. Incidentally, in the second embodiment, component elements that are identical to those in the foregoing first embodiment will be simply denoted by the same reference numerals to avoid repetitions of similar explanations.

[0065] As shown in Fig. 9 and Fig. 10, indicated at 41 is a placing plate as the placing member that is provided between the left weight mounting part 16 and the right weight mounting part 17 and is to be applied to the second

embodiment. This placing plate 41 is formed as a rectangular plate body having a width dimension that is held between the respective weight mounting parts 16 and 17 almost similarly to the placing plate 24 according to the first embodiment. However, the placing plate 41 according to the second embodiment is different from the placing plate 24 according to the first embodiment in the point that a plurality of screw holes (none of them is shown) are formed on the both sides in the left-right direction at intervals in the front-rear direction.

[0066] Indicated at 42 is a counterweight according to the second embodiment that is mounted to the rear end of the revolving frame 5. This counterweight 42 is constituted of a front surface 42A, a rear surface 42B, an upper surface 42C and a lower surface 42D almost similarly to the counterweight 25 according to the first embodiment and left and right mounting groove portions (none of them is shown) are provided at lower part inboard positions. The counterweight 42 is provided with an accommodating groove 42E on a part that faces the placing plate 41 in the up-down direction and this accommodating groove 42E is formed into an angular groove shape by a left side surface portion (not shown), a right side surface portion 42E2 and a top surface portion 42E3. However, the counterweight 42 according to the second embodiment is different from the counterweight 25 according to the first embodiment in the point that the screw seat is not provided on the top surface portion 42E3.

[0067] Indicated at 43 is an article accommodating room according to the second embodiment that is formed by the placing plate 41 and the accommodating groove 42E in the counterweight 42. This article accommodating room 43 is configured as a rectangular parallelepiped space 43A almost similarly to the article accommodating room 26 according to the first embodiment. The batteries 29 are accommodated in the article accommodating room 43 together with a later described box 44.

[0068] Designated at 44 is the box that is located in the article accommodating room 43 and mounted onto the placing plate 41. This box 44 is configured by left and right side plate portions 44A and 44B that are arranged upright with a space interposed in the left-right direction, a top plate portion 44C that extends horizontally so as to connect together upper ends of the left and right side plate portions 44A and 44B and a front plate portion 44D that closes front ends of the aforementioned respective side plate portions 44A and 44B and the top plate portion 44C. The box 44 exhibits a box structure the front side off which is closed and the rear side of which is opened by bolting, for example, lower ends of the left and right side plate portions 44A and 44B to the placing plate 41. Incidentally, the box 44 may be configured to be firmly fixed to the placing plate 41 by a welding means.

[0069] Here, the box 44 is put in the article accommodating room 43 having an external dimension that is slightly smaller than that of the article accommodating room 43. Thereby, the front plate portion 44D functions as a partition member that partitions off the article accommodating room 43 from the machine room 31 and can protect the batteries 29 from the heat that the engine 18 generates and the oil liquid for lubrication.

[0070] Indicated at 45 is the lid member that is provided on the rear side of the article accommodating room 43 located on the rear surface 42B side of the counterweight 42, that is, on the rear side of the box 44. This lid member 45 is adapted to close a rear side part of the article accommodating room 43 located on the rear surface side of the counterweight 42, specifically, a rear side opening of the box 44 to be openable/closable. The lid member 45 is constituted of a plate body having a width dimension that is almost equal to a width dimension of the accommodating groove 42E in the counterweight 42 and an upper end thereof is bolted to a rear end of the top plate portion 44C of the box 44 via a hinge 45A. Further, a lock device 45B equipped with a cylinder lock is provided on the lid member 45 at a position on one side in the left-right direction, for example, on the left side similarly to the lid member 28 according to the first embodiment. This lock device 45B is adapted to maintain the lid member 45 in a closed state by connecting to a connection tool (not shown) provided on the left side plate portion 44A of the box 44 when the lid member 45 has been closed. On the other hand, the lid member 45 can be opened by operating the lock device 45B to release connection.

[0071] Thus, also in the second embodiment so configured, almost the same operational effects as those in the aforementioned first embodiment can be obtained. That is, according to the second embodiment, a configuration is such that only the accommodating groove 42E is provided in the counterweight 42 and the front plate portion 44D of the box 44 that configures the partition member and the lid member 45 are provided on the revolving frame 5 side. Thereby, the box 44 and the lid member 45 can be mounted to the placing plate 41 as one unit by simple work.

[0072] Next, Fig. 11 shows a third embodiment of the present invention. A feature of the third embodiment is a configuration that a placing member is mounted to the left and right weight mounting parts of the revolving frame by the welding means. Incidentally, in the third embodiment, component elements that are identical to those in the foregoing first embodiment will be simply denoted by the same reference numerals to avoid repetitions of similar explanations.

[0073] As shown in Fig. 11, designated at 51 is a placing plate as a placing member that is provided between the left weight mounting part 16 and the right weight mounting part 17 and is to be applied to the third embodiment. This placing plate 51 is formed as a rectangular plate body almost similarly to the placing plate 24 according to the first embodiment. However, the placing plate 51 according to the third embodiment is different from the placing plate 24 according to the first embodiment in the point that the both ends in the left-right direction are firmly fixed to the lower flanges 16C and 17C of the respective weight mounting parts 16 and 17 by using the

welding means.

[0074] Thus, also in the third embodiment so configured, almost the same operational effects as those in the aforementioned first embodiment can be obtained. That is, according to the third embodiment, since the placing plate 51 is configured to be mounted to the respective weight mounting parts 16 and 17 by using the welding means, the mounting brackets 16E and 17E of the respective weight mounting parts 16 and 17 and the bolt insertion hole in the placing plate 51 can be omitted.

[0075] Next, Fig. 12 shows a fourth embodiment of the present invention. A feature of the present embodiment is a configuration that a placing member is mounted to the left and right weight mounting parts of the revolving frame by using the welding means and the placing member is arranged at a position lower than the lower part of the weight mounting part. Incidentally, in the fourth embodiment, component elements that are identical to those in the foregoing first embodiment will be simply denoted by the same reference numerals to avoid repetitions of similar explanations.

[0076] As shown in Fig. 12, designated at 61 is a placing frame as a placing member that is provided between the left weight mounting part 16 and the right weight mounting part 17 and is to be applied to the fourth embodiment. This placing frame 61 is generally configured as a frame body of a U-shaped section by a rectangular bottom plate portion 61A having a width dimension that is held between the respective weight mounting parts 16 and 17 and left and right side plate portions 61B and 61C that rise from both ends in the left-right direction of the bottom plate portion 61A. Upper ends of the respective side plate portions 61B and 61C are firmly fixed to the lower flanges 16C and 17C of the respective weight mounting parts 16 and 17 by using the welding means.

[0077] Here, in the placing frame 61, the bottom plate portion 61A is arranged at a position that is lower than the lower flanges 16C and 17C that constitute the lower parts of the respective weight mounting parts 16 and 17 by a height dimension H owing to the respective side plate portions 61B and 61C. Thereby, the placing frame 61 can make the article accommodating room 26 wider in the top-down direction by the amount of the height dimension H.

[0078] Thus, also in the fourth embodiment so configured, almost the same operational effects as those in the aforementioned first embodiment can be obtained. That is, according to the fourth embodiment, since a configuration is such that the placing frame 61 is mounted to the respective weight mounting parts 16, 17 by using the welding means, the mounting brackets 16E and 17E of the respective weight mounting parts 16 and 17 and the bolt insertion hole in the placing frame 61 can be omitted. In addition, since in the U-shaped placing frame 61, the bottom plate portion 61A is arranged at the position that is lower than the lower flanges 16C and 17C of the respective weight mounting parts 16 and 17 by the height dimension H, large articles can be accommodated as much as the widened space and work of taking in and out the articles, maintenance work and so forth can be readily performed.

[0079] Next, Fig. 13 shows a fifth embodiment of the present invention. A feature of the present embodiment is the point that the bottom plate of the main frame and a placing member are configured as one plate body. Incidentally, in the fifth embodiment, component elements that are identical to those in the foregoing first embodiment will be simply denoted by the same reference numerals to avoid repetitions of similar explanations.

[0080] As shown in Fig. 13, designated at 71 is a placing plate as the placing member that is provided between the left weight mounting part 16 and the right weight mounting part 17 and is to be applied to the fifth embodiment. This placing plate 71 is integrally formed on the rear side of a rear bottom plate part 7B' that configures the bottom plate 7 of the main frame 6. Specifically, the placing plate 71 is formed as a plate body that is provided between the respective weight mounting parts 16 and 17 by extending the rear bottom plate part 7B' rearward up to a position beyond the center rear part lateral plate 11A. This placing plate 71 is firmly fixed to the lower flanges 16C and 17C of the weight mounting parts 16 and 17 by using the welding means.

[0081] Thus, also in the fifth embodiment so configured, almost the same operational effects as those in the aforementioned first embodiment can be obtained. That is, according to the fifth embodiment, since the rear bottom plate part 7B' of the bottom plate 7 of the main frame and the placing plate 71 are integrally formed, when the rear bottom plate part 7B' is to be welded to the left and right vertical plates 8 and 9, the placing plate 71 can be welded to the left and right weight mounting parts 16 and 17 following this welding work. As a result, manufacturing cost for providing the placing plate 71 can be suppressed.

[0082] Next, Fig. 14 and Fig. 15 show a sixth embodiment of the present invention. A feature of the present embodiment is a configuration that a lid member that closes the rear side of the article accommodating room is mounted to a counterweight by using a bolt. Incidentally, in the sixth embodiment, component elements that are identical to those in the foregoing first embodiment will be simply denoted by the same reference numerals to avoid repetitions of similar explanations.

[0083] As shown in Fig. 14, designated at 81 is a counterweight according to the sixth embodiment. This counterweight 81 is provided with a front surface (not shown), a rear surface 81A, an upper surface 81B, a lower surface 81C, left and right mounting groove portions (not shown) and an accommodating groove 81D almost similarly to the counterweight 25 according to the first embodiment. However, the counterweight 81 according to the sixth embodiment is different from the counterweight 25 according to the first embodiment in the point that plural, for example, every two mounting brackets 81E (see Fig. 15) are provided on the left and right of the rear side of the accommodating groove 81D.

[0084] Indicated at 82 is a lid member according to the sixth embodiment. This lid member 82 is provided on the rear side of the article accommodating room (not shown) located on the rear surface 81A side of the counterweight 81 so as to close the rear side opening of this article accommodating room to be openable/closable almost similarly to the lid member 28 according to the first embodiment. However, the lid member 82 according to the sixth embodiment is different from the lid member 28 according to the first embodiment in the point that the lid member 82 is mounted to the counterweight 81 by using bolts 83 to be mountable/demountable (openable/closable).

[0085] That is, four bolt insertion holes 82A are formed in the left and right both sides of the lid member 82 corresponding to the respective mounting brackets 81E of the counterweight 81. The lid member 82 can be mounted to the counterweight 81 by screwing the bolts 83 inserted into the respective bolt insertion holes 82A to the mounting brackets 81E. On the other hand, the lid member 82 can be demounted by loosening each bolt 83.

[0086] Thus, also in the sixth embodiment so configured, almost the same operational effects as those in the aforementioned first embodiment can be obtained. In particular, according to the six embodiment, the lid member 82 can be mounted to the counterweight 81 by a simple mounting structure by the respective bolts 83.

[0087] Next, Fig. 16 shows a seventh embodiment of the present invention. A feature of the present embodiment is the point that a placing member and a partition member are formed by one plate body. Incidentally, in the seventh embodiment, component elements that are identical to those in the foregoing first embodiment will be simply denoted by the same reference numerals to avoid repetitions of similar explanations.

[0088] As shown in Fig. 16, designated at 91 is a placing frame as the placing member to be applied to the seventh embodiment. This placing frame 91 is formed as an L-shaped frame body, for example, by bending one rectangular plate body to an angle of about 90 degrees on an intermediate part in a length direction. The placing frame 91 is configured by a rectangular placing plate portion 91A that is held in between the left weight mounting part 16 and the right weight mounting part 17 and a partition plate portion 91B as the rectangular partition member that rises from a front end of the placing plate portion 91A at the position of the center rear part lateral plate 11A.

[0089] Here, the placing plate portion 91A is mounted to the mounting brackets 16E and 17E of the respective weight mounting parts 16 and 17 by using bolts (not shown) on its left and right both sides. Thereby, the partition plate portion 91B can partition off the article accommodating room 26 from the machine room 31 by closing the front side of the article accommodating room 26.

[0090] Thus, also in the seventh embodiment so configured, almost the same operational effects as those in the aforementioned first embodiment can be obtained. In particular, according to the seventh embodiment, since the placing plate portion 91A and the partition plate portion 91B can be formed on one placing frame 91, they can be readily provided and can be readily assembled to the respective weight mounting parts 16 and 17.

[0091] It should be noted that in the first embodiment, description has been made by giving the case where the partition member 27 provided on the front side of the article accommodating room 26 in order to partition off the article accommodating room 26 from the machine room 31 was formed as the rectangular flat plate that extended throughout the front ends of the left and right side surface portions 25G1 and 25G2 and the top surface portion 25G3 of the accommodating groove 25G in the counterweight 25 by way of example. However, the present invention is not limited to this and may be configured as in a modified example, for example, shown in Fig. 17. That is, as shown in Fig. 17, it may be configured such that the partition member 27 according to the first embodiment is abolished and the article accommodating room 26 is partitioned off from the machine room 31 by the center rear part lateral plate 11A that also serves as the partition member. This configuration is also applicable to the third to sixth embodiments in the same way.

[0092] In the first embodiment, description has been made by giving the case where the lid member 28 was structured so as to lift upward and open upward the lower part of the lid member 28 by providing the hinge 28A on the upper part of the lid member 28 by way of example. However, the present invention is not limited to this and the lid member may have a lateral opening structure that the hinge is so provided on one side in the left-right direction of the lid member as to open the lid member by holding the other side of the lid member. Further, it may have a structure that the hinge is so provided on the lower part of the lid member as to open the upper part of the lid member downward. These configurations are also applicable to other embodiments except the sixth embodiment in the same way.

[0093] In the first embodiment, description has been made by giving the case where the partition member 27 was formed as the rectangular flat plate and configured to be mounted to the counterweight 25 by using the welding and bolting means by way of example. However, the present invention is not limited to this and may be configured such that the accommodating groove is formed in a state that the front surface is left as it is such that the accommodating groove does not pass through the front surface of the counterweight, thereby using a part of this front surface as the partition member. This configuration is also applicable to other embodiments except the second and seventh embodiments in the same way.

[0094] On the other hand, in the first embodiment, the case where the placing plate 24 was formed as the rectangular plate body having the width dimension that is held in between the left and right weight mounting parts 16 and 17 is shown. However, the present invention is not limited to this and may be configured that the placing member has a duckboard structure, for example, by

bridging a plurality of rod-like bodies at intervals in the front-rear direction between the left and right weight mounting parts 16 and 17. This duckboard structure is also applicable to the partition member 27 and the lid member 28. These configurations are also applicable to other embodiments in the same way.

[0095] In each embodiment, description has been made by giving the case where the engine 18 was loaded on the revolving frame 5 as the prime mover by way of example. However, the present invention is not limited to this and, for example, an electric motor may be used as the prime mover, and further, it may be formed as a hybrid type prime mover that the electric motor is used together with the engine.

[0096] Further, in each embodiment, description has been made by giving the crawler type hydraulic excavator by way of example as the construction machine. However, the present invention is not limited to this and may be applied to a wheel type hydraulic excavator. Aside from this, it can be widely applied to other construction machines such as a hydraulic crane, a wheel loader and so forth.

DESCRIPTION OF REFERENCE NUMERALS

[0097]

1: Hydraulic excavator (Construction machine)
2: Lower traveling structure (Vehicle body)
3: Upper revolving structure (Vehicle body)
4: Working mechanism
5: Revolving frame
6: Main frame
7: Bottom plate
7A: Front bottom plate part
7B, 7B': Rear bottom plate part
8: Left vertical plate
8B, 9B, 16B, 17B: Upper flange
8C, 9C: Lower flange
9: Right vertical plate
11A, 11B, 11C: Rear part lateral plate
12: Left side frame
13: Right side frame
14A to 14F: Extension beam
16: Left weight mounting part
16A, 17A: Rear vertical plate
16C, 17C: Lower flange (Lower part)
17: Right weight mounting part
18: Engine (Prime mover)
24, 41, 51, 71: Placing plate (Placing member)
25, 42, 81: Counterweight
25G, 42E, 81D: Accommodating groove
26, 43: Article accommodating room
26A, 43A: Space
27: Partition member
28, 45, 82: Lid member
29: Battery (Article)
31: Machine room
44: Box
44A: Left side plate portion
44B: Right side plate portion
44C: Top plate portion
44D: Front plate portion (Partition member)
61, 91: Placing frame (Placing member)
91A: Placing plate portion
91B: Partition plate portion (Partition member)

Claims

1. A construction machine comprising:

a vehicle body frame (5) that forms a support structure of a vehicle body (2, 3), on the front side of which a working mechanism (4) is mounted and on which a prime mover (18) is mounted; and

a counterweight (25, 42, 81) mounted on a rear end of said vehicle body frame (5) in order to balance weight with said working mechanism (4), wherein

said vehicle body frame (5) is configured by a main frame (6) that is formed from a bottom plate (7) and left and right vertical plates (8, 9) arranged upright on said bottom plate (7), left and right side frames (12, 13) that are located on left and right both sides of said main frame (6) and extend in a front-rear direction, a plurality of extension beams (14A to 14F) that extend in a left-right direction at intervals in the front-rear direction in order to connect said left and right side frames (12, 13) and said main frame (6), and left and right weight mounting parts (16, 17) that are provided with rear ends of said left and right vertical plates (8, 9) of said main frame (6) and on which said counterweight (25, 42, 81) is mounted, **characterized in that**:

a placing member (24, 41, 51, 61, 71, 91) adapted to place an article (29) thereon is provided between said left weight mounting part (16) and said right weight mounting part (17),

an accommodating groove (25G, 42E, 81D) is provided in said counterweight (25, 42, 81) by notching, in the front-rear direction, a part that faces said placing member (24, 41, 51, 61, 71, 91) in an up-down direction, and

a space formed by said placing member (24, 41, 51, 61, 71, 91) and said accommodating groove (25G, 42E, 81D) in said counterweight (25, 42, 81) is configured as an article accommodating room (26, 43) that accommodates said article (29).

2. The construction machine according to claim 1, wherein
said placing member (24, 41, 51, 61, 71, 91) is arranged on lower parts (16C, 17C) of said left and right weight mounting parts (16, 17).

3. The construction machine according to claim 1, wherein
said left and right weight mounting parts (16, 17) are formed into I-shapes in section by left and right rear vertical plates (16A, 17A) that contiguously extend from said left and right vertical plates (8, 9), left and right upper flanges (16B, 17B) that contiguously extend from upper flanges (8B, 9B) of said left and right vertical plates (8, 9) and left and right lower flanges (16C, 17C) that contiguously extend from lower flanges (8C, 9C) of said left and right vertical plates (8, 9), and said placing member (24, 41, 51, 61, 71, 91) is provided between said left and right lower flanges (16C, 17C).

4. The construction machine according to claim 1, wherein
a partition member (27, 44D, 91B) that partitions off said article accommodating room (26, 43) from a machine room (31) that said prime mover (18) is to be accommodated is provided on the front side of said article accommodating room (26, 43).

5. The construction machine according to claim 1, wherein
a lid member (28, 82) that closes the rear side of said article accommodating room (26) to be openable/closable is provided on the rear surface side of said counterweight (25, 81).

6. The construction machine according to claim 1, wherein
a rear part lateral plate (11A) that extends in the left-right direction is arranged upright on the front sides of said left and right weight mounting parts (16, 17), and said rear part lateral plate (11A) also functions as a partition member that partitions off the front side of said article accommodating room (26, 43).

7. The construction machine according to claim 1, wherein
a box (44) the front side of which is closed and the rear side of which is opened is provided on the upper side of said placing member (41), and a lid member (45) that closes said box (44) to be openable/closable is provided on the rear side of said box (44).

Amended claims under Art. 19.1 PCT

1. (Amended) A construction machine comprising:
a vehicle body frame (5) that forms a support structure of a vehicle body (2, 3), on the front side of which a working mechanism (4) is mounted and on which a prime mover (18) is mounted; and
a counterweight (25, 42, 81) mounted on a rear end of said vehicle body frame (5) in order to balance weight with said working mechanism (4), wherein
said vehicle body frame (5) is configured by a main frame (6) that is formed from a bottom plate (7) and left and right vertical plates (8, 9) arranged upright on said bottom plate (7), left and right side frames (12, 13) that are located on left and right both sides of said main frame (6) and extend in a front-rear direction, a plurality of extension beams (14A to 14F) that extend in a left-right direction at intervals in the front-rear direction in order to connect said left and right side frames (12, 13) and said main frame (6), and left and right weight mounting parts (16, 17) that are provided with rear ends of said left and right vertical plates (8, 9) of said main frame (6) and on which said counterweight (25, 42, 81) is mounted, **characterized in that**:

said left and right weight mounting parts (16, 17) are formed into I-shapes in section by left and right rear vertical plates (16A, 17A) that contiguously extend from said left and right vertical plates (8, 9), left and right upper flanges (16B, 17B) that contiguously extend from upper flanges (8B, 9B) of said left and right vertical plates (8, 9) and left and right lower flanges (16C, 17C) that contiguously extend from lower flanges (8C, 9C) of said left and right vertical plates (8, 9),
a placing member (24, 41, 51, 61, 71, 91) adapted to place an article (29) thereon is provided between said left weight mounting part (16) and said right weight mounting part (17) and between said left and right lower flanges (16C, 17C),
an accommodating groove (25G, 42E, 81D) is provided in said counterweight (25, 42, 81) by notching, in the front-rear direction, a part that faces said placing member (24, 41, 51, 61, 71, 91) in an up-down direction, and
a space formed by said placing member (24, 41, 51, 61, 71, 91) and said accommodating groove (25G, 42E, 81D) in said counterweight (25, 42, 81) is configured as an article accommodating room (26, 43) that accommodates said article (29).

2. (Canceled)

3. (Canceled)

4. The construction machine according to claim 1, wherein
a partition member (27, 44D, 91B) that partitions off said article accommodating room (26, 43) from a machine room (31) that said prime mover (18) is to be accommodated is provided on the front side of said article accommodating room (26, 43).

5. The construction machine according to claim 1, wherein
a lid member (28, 82) that closes the rear side of said article accommodating room (26) to be openable/closable is provided on the rear surface side of said counterweight (25, 81) .

6. The construction machine according to claim 1, wherein
a rear part lateral plate (11A) that extends in the left-right direction is arranged upright on the front sides of said left and right weight mounting parts (16, 17), and said rear part lateral plate (11A) also functions as a partition member that partitions off the front side of said article accommodating room (26, 43).

7. The construction machine according to claim 1, wherein
a box (44) the front side of which is closed and the rear side of which is opened is provided on the upper side of said placing member (41), and a lid member (45) that closes said box (44) to be openable/closable is provided on the rear side of said box (44).

Statement under Art. 19.1 PCT

In new Claim 1, the configuration that "a placing member (24, 41, 51, 61, 71, 91) adapted to place an article (29) thereon is provided between said left weight mounting part (16) and right weight mounting part (17) and between said left and right lower flanges (16C, 17C)" has been clarified by combining together Claims 1 and 3 as originally filed.

In contrast, in JP 2000-080697 A (Patent Document 1), a heater accommodating space (35) is provided in a counterweight (34) and a support bracket (37) for a preheater (36) is merely fixed to the rear surface side of a weight mounting plate (32) by a means such as welding or the like.

On the other hand, in JP Hei9-268601 A (Patent Document 2), a weight support part (13) provided on a rear end of a revolving frame (4) is merely configured, having a frame structure, by a left side beam (14) and a right side beam (15) that are paired in a left-right direction and a front side beam (16) and a rear side beam (17) that extend in the left-right direction and are paired in a front-rear direction.

Therefore, such a configuration that the placing member 24 adapted to place the article 29 thereon in the article accommodating room 26 is provided between the left and right lower flanges 16C and 17C that form the left and right weight mounting parts 16 and 17 as in the invention of the application cannot be found even if Patent Documents 1 and 2 were simply combined with each other. Moreover, the configuration that the space 26A formed by the accommodating groove 25G provided in the counterweight 25 and the placing member 24 is configured as the article accommodating room 26 that accommodates the article 29 is not disclosed in Patent Documents 1 and 2.

Fig.1

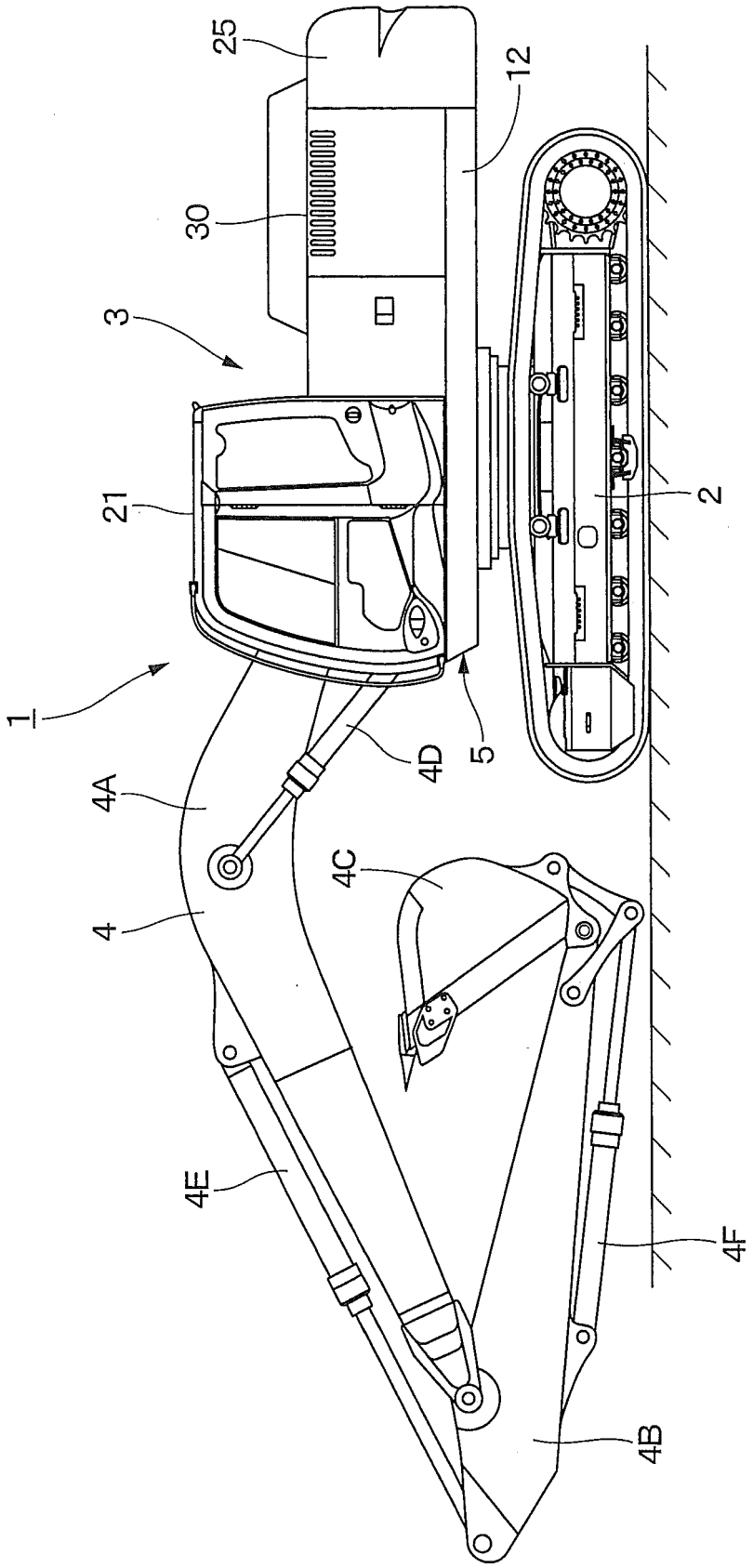
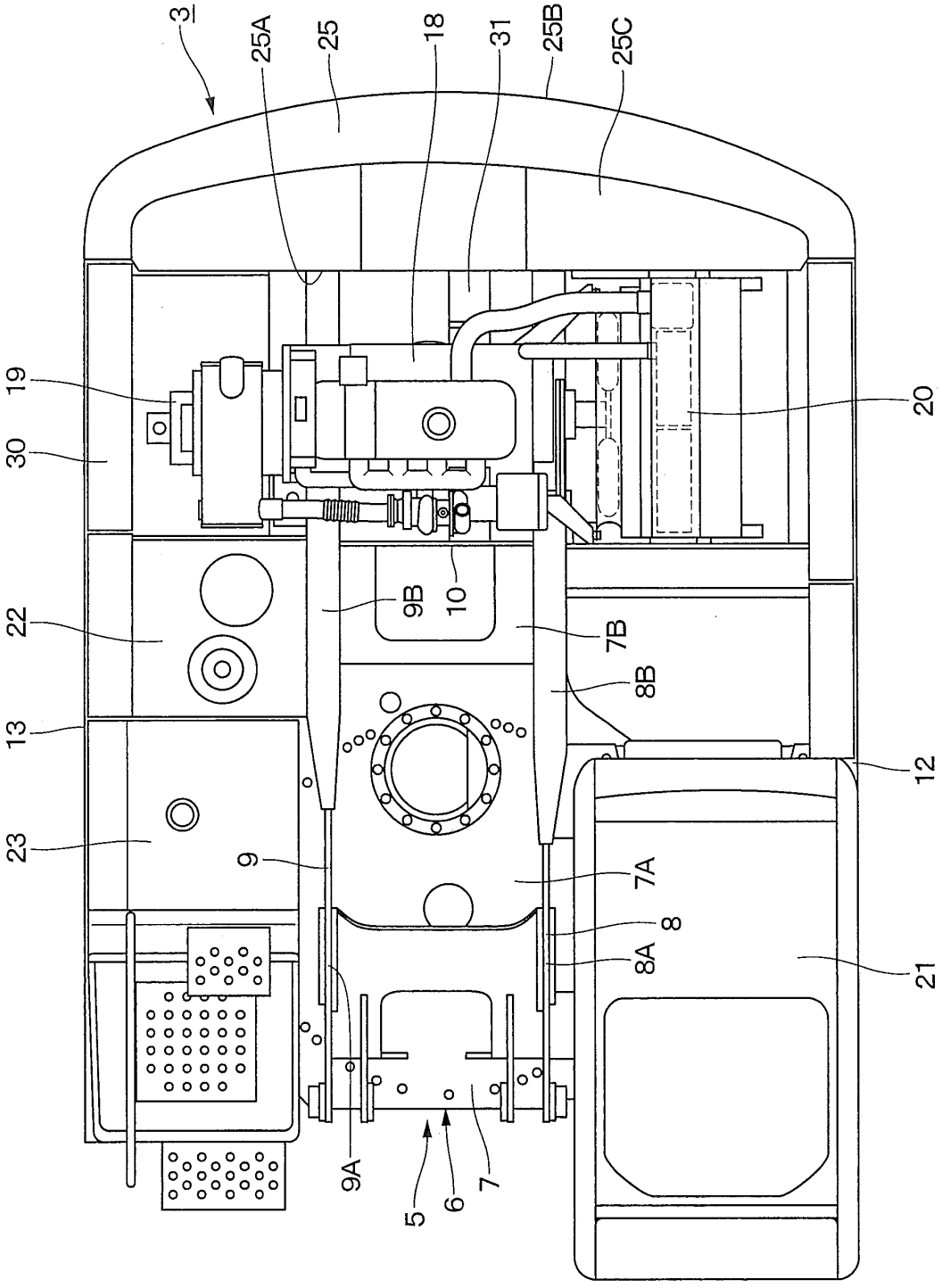


Fig.2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25B
25C
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22
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6
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9B
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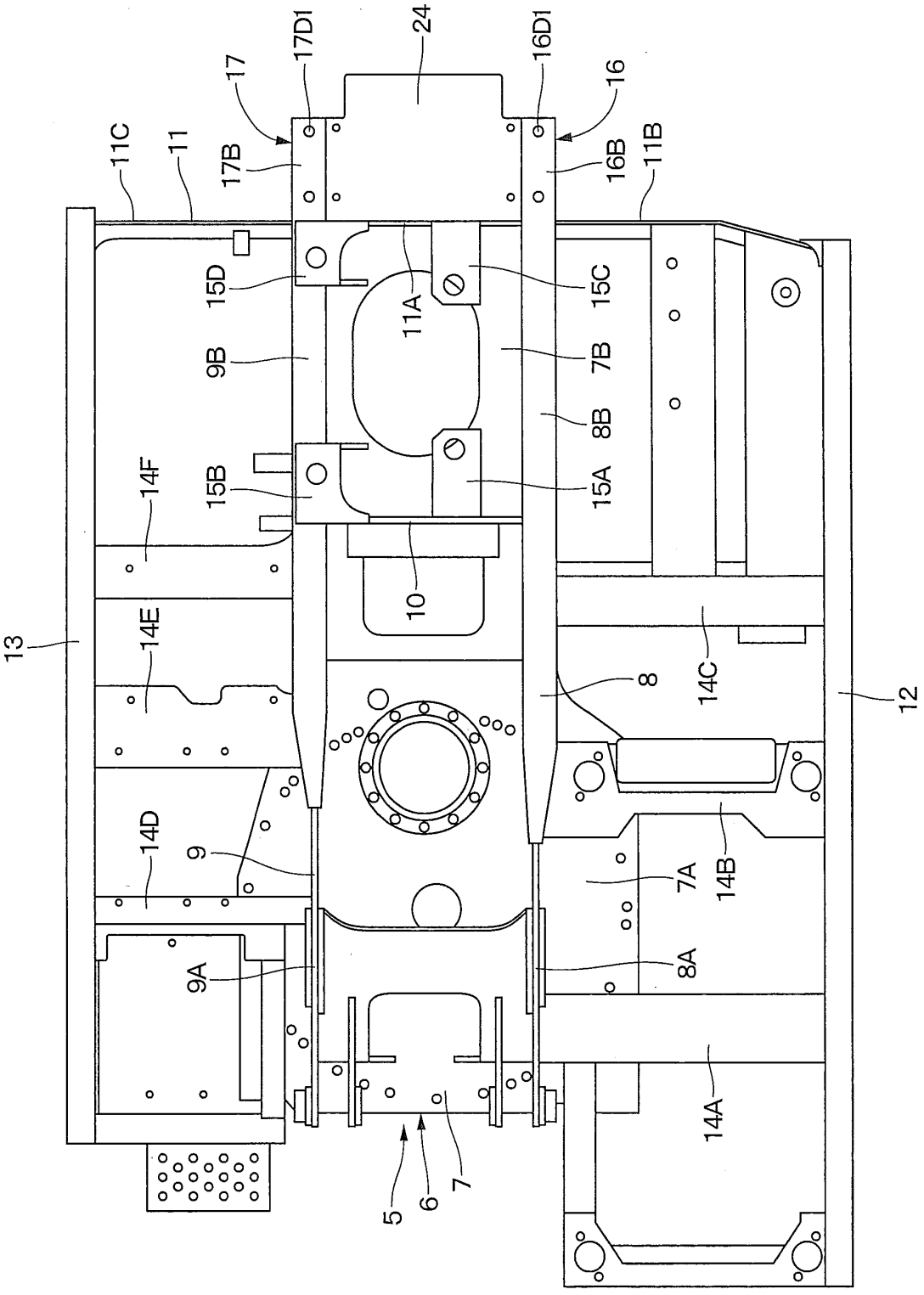
7B
8B
12
7A
8
8A
21
20

Fig.3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11C
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17B
16B
11B
15D
11A
15C
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7B
8B
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15A
14F
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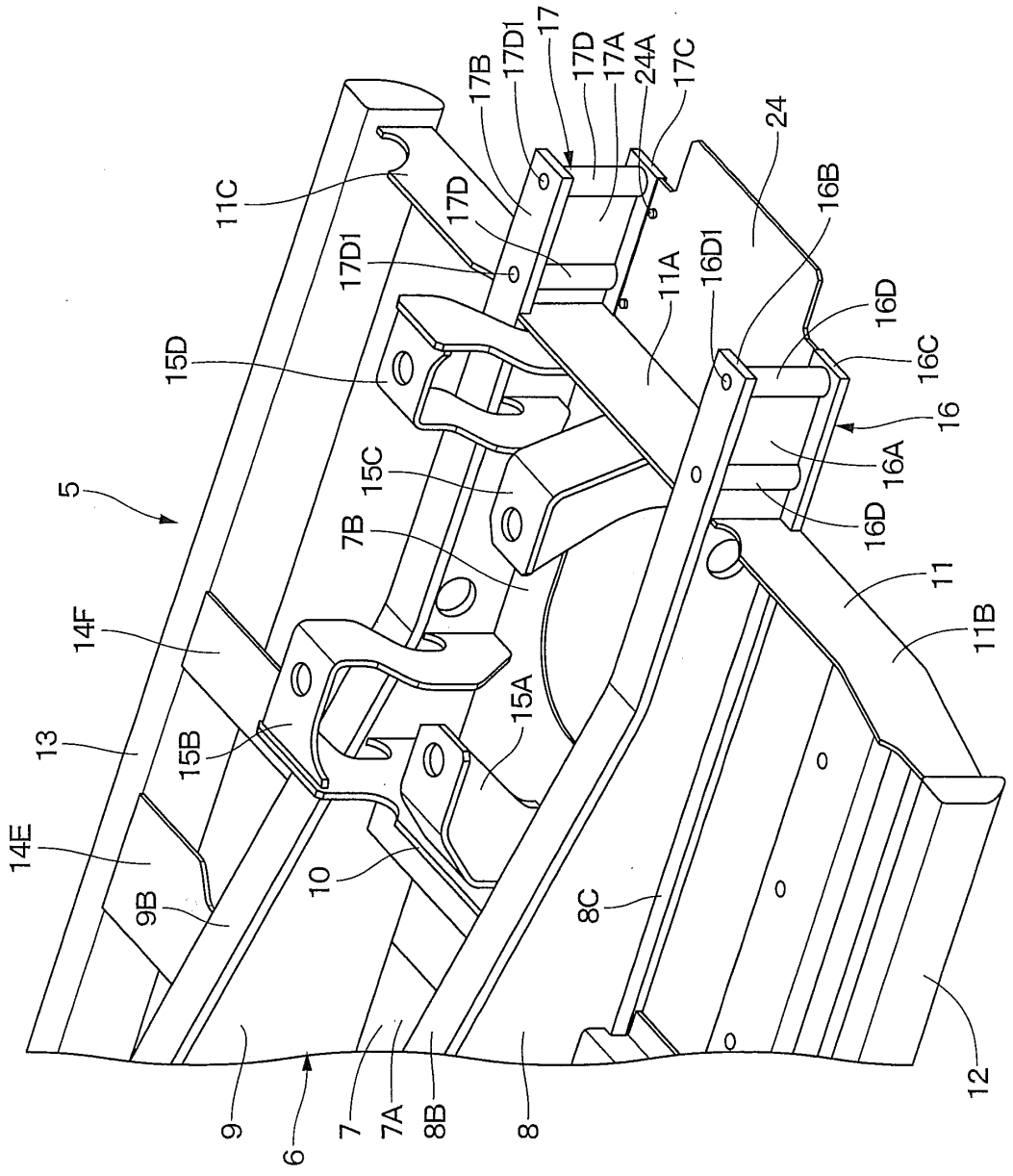
14E
8
14C
12
14D
9
7A
14B
9A
8A
14A
5
6
7

Fig.4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8B
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8C
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9B
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11B
11C
11A
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15A
15B
15C
15D
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16C
16D
16D1
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17A
17B
17C
17D
17D1
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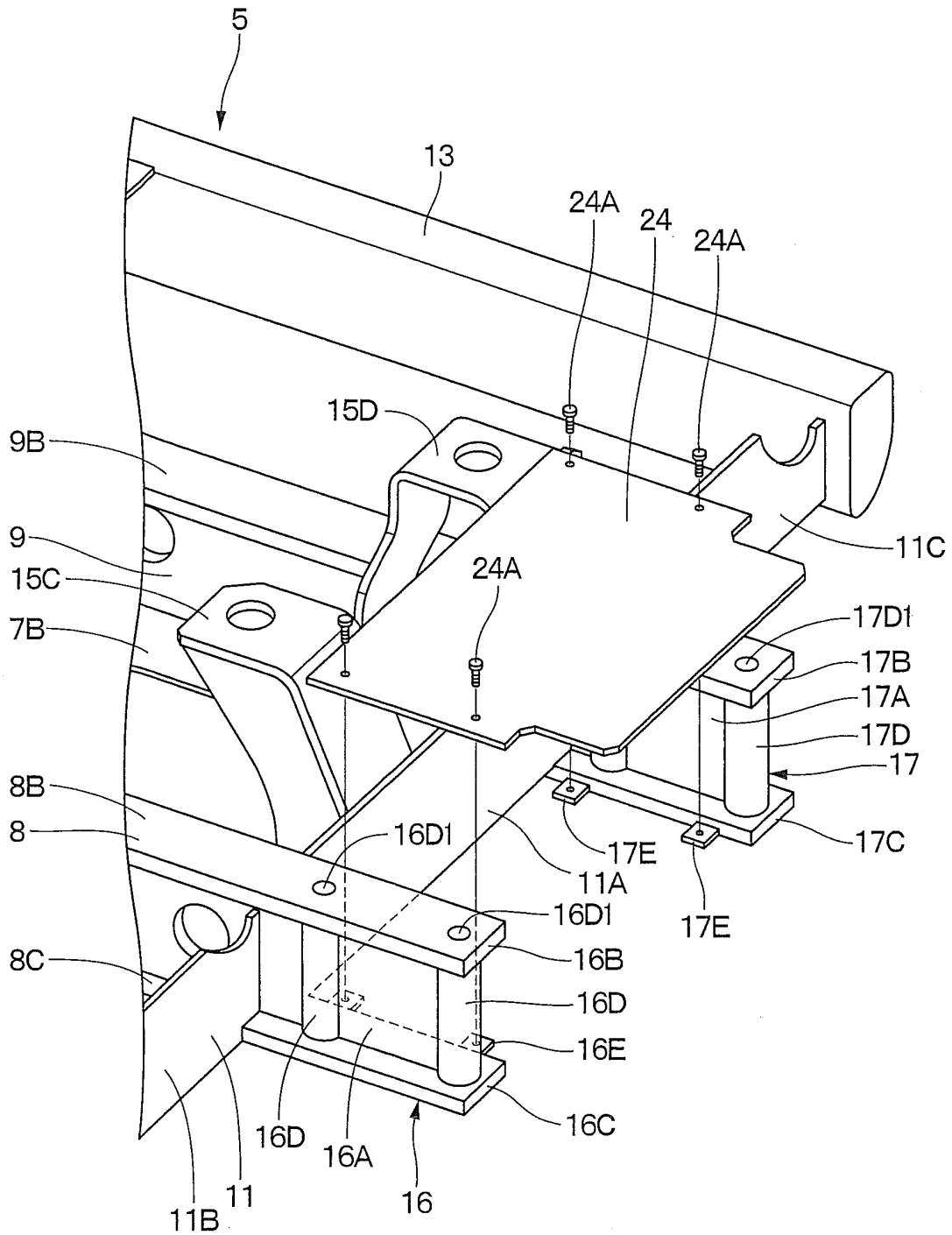
24A

Fig.5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9B
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15C
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24A
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8B
8
16D1
17E
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16D
16E
16C
16D
16A
11
16
11B

Fig.6

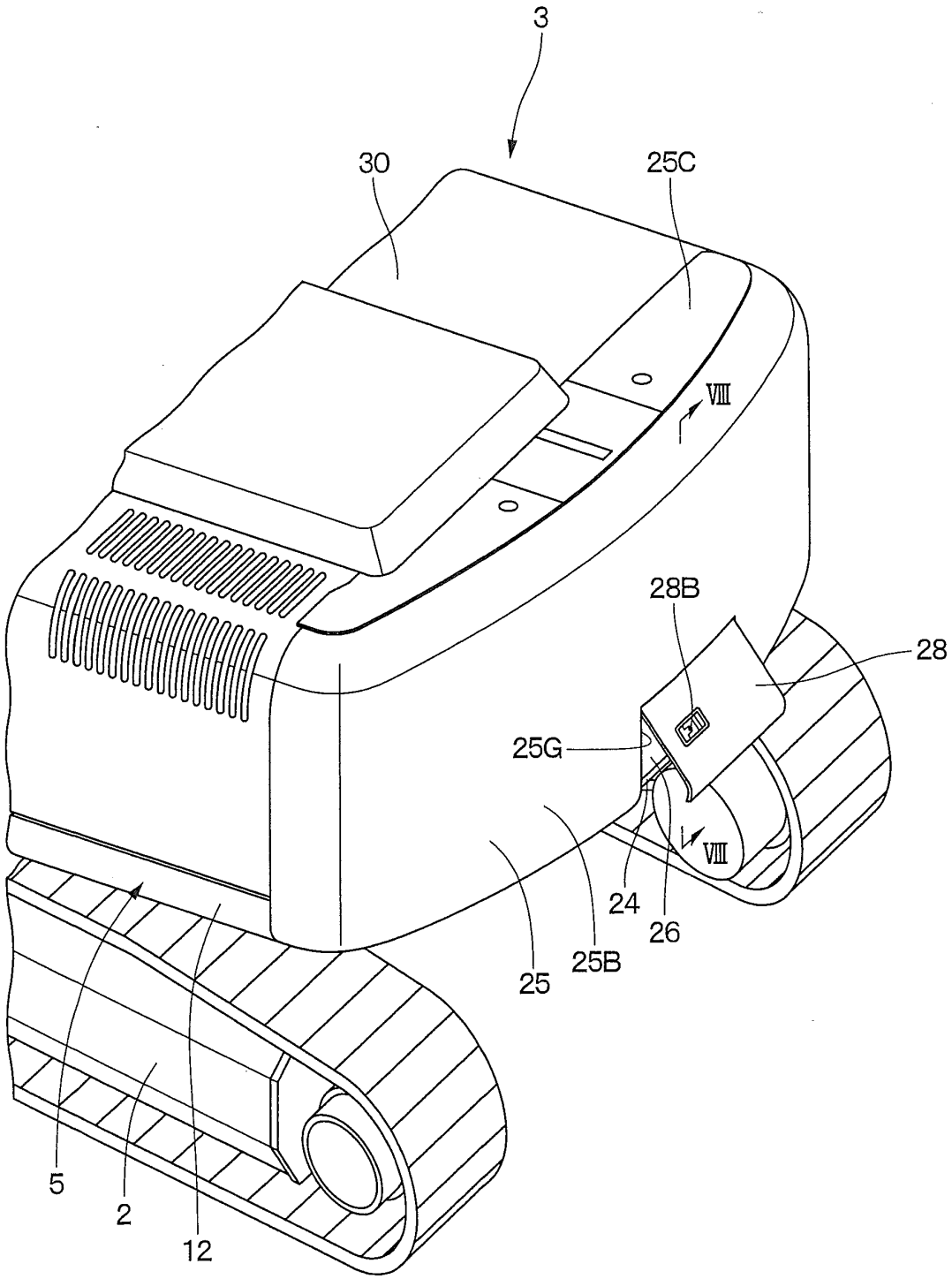


Fig.7

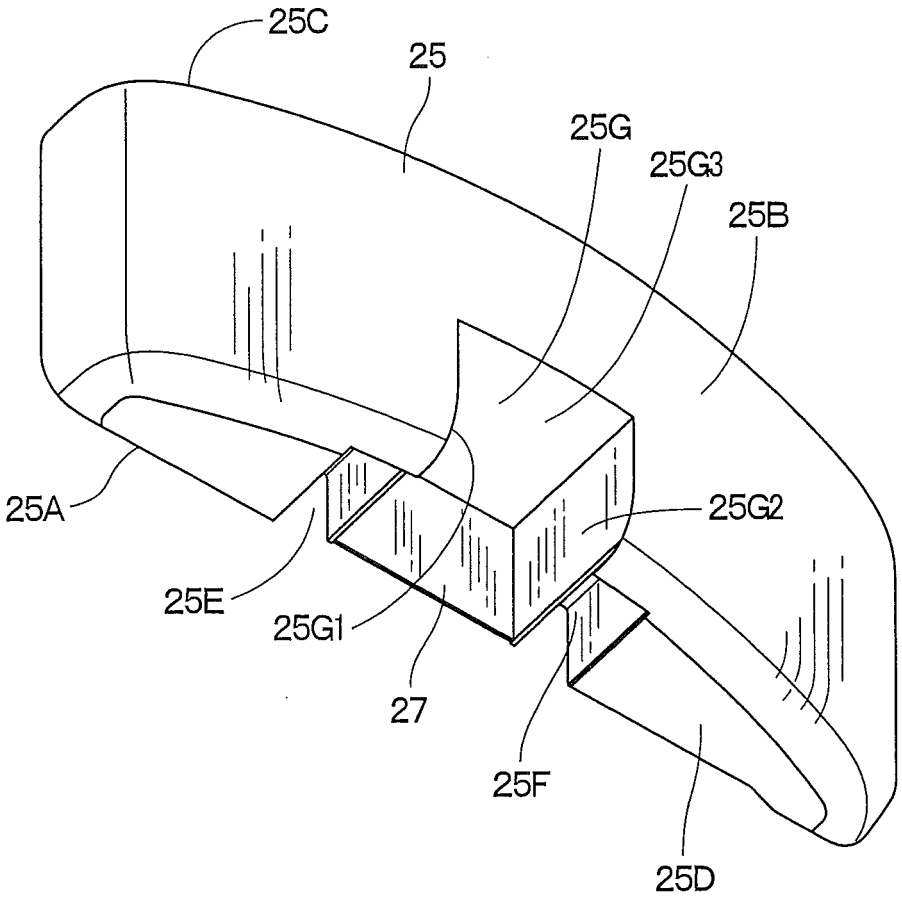
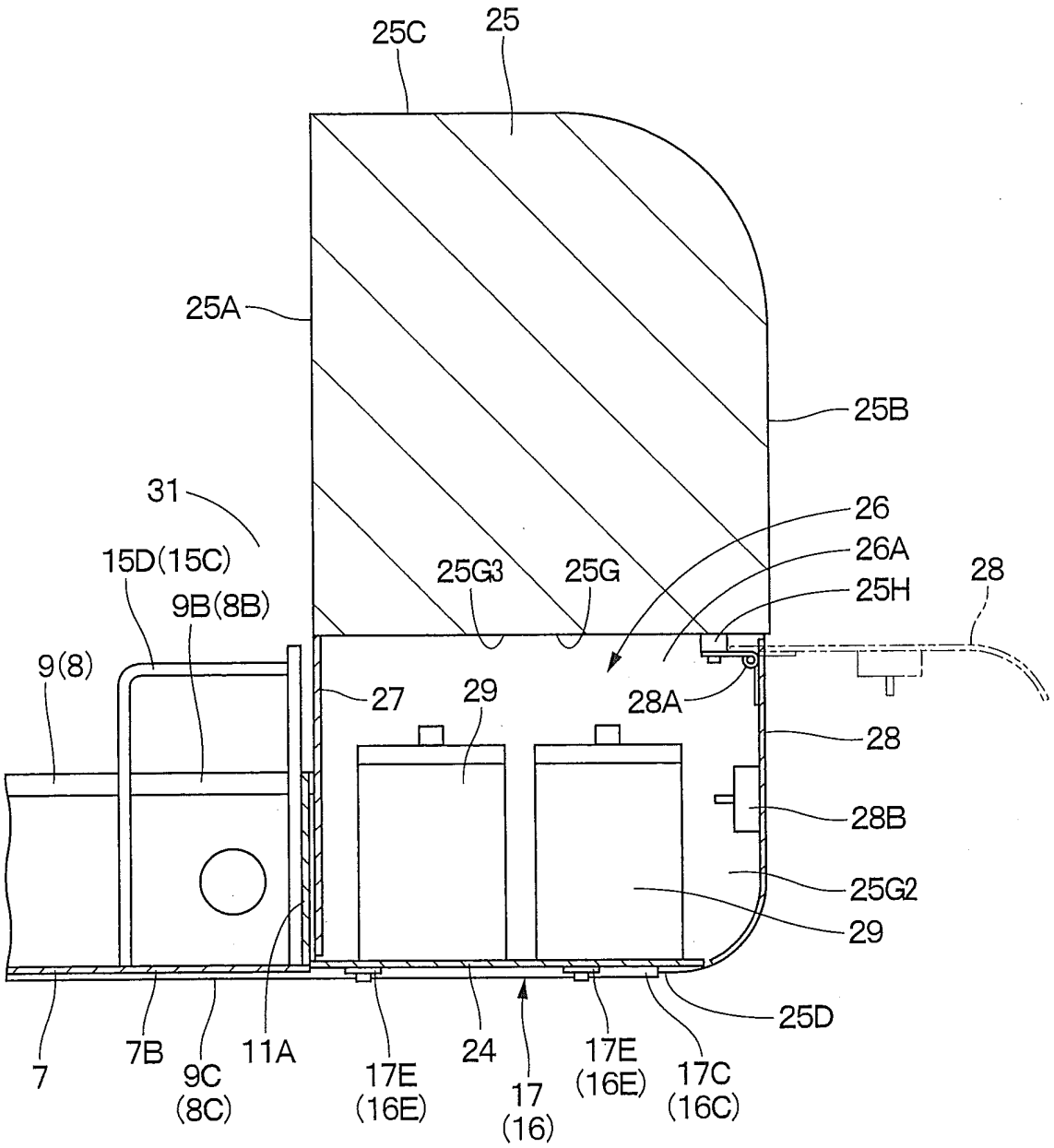


Fig.8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28A
28
28B
25G2
29
25D
7
7B
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17E
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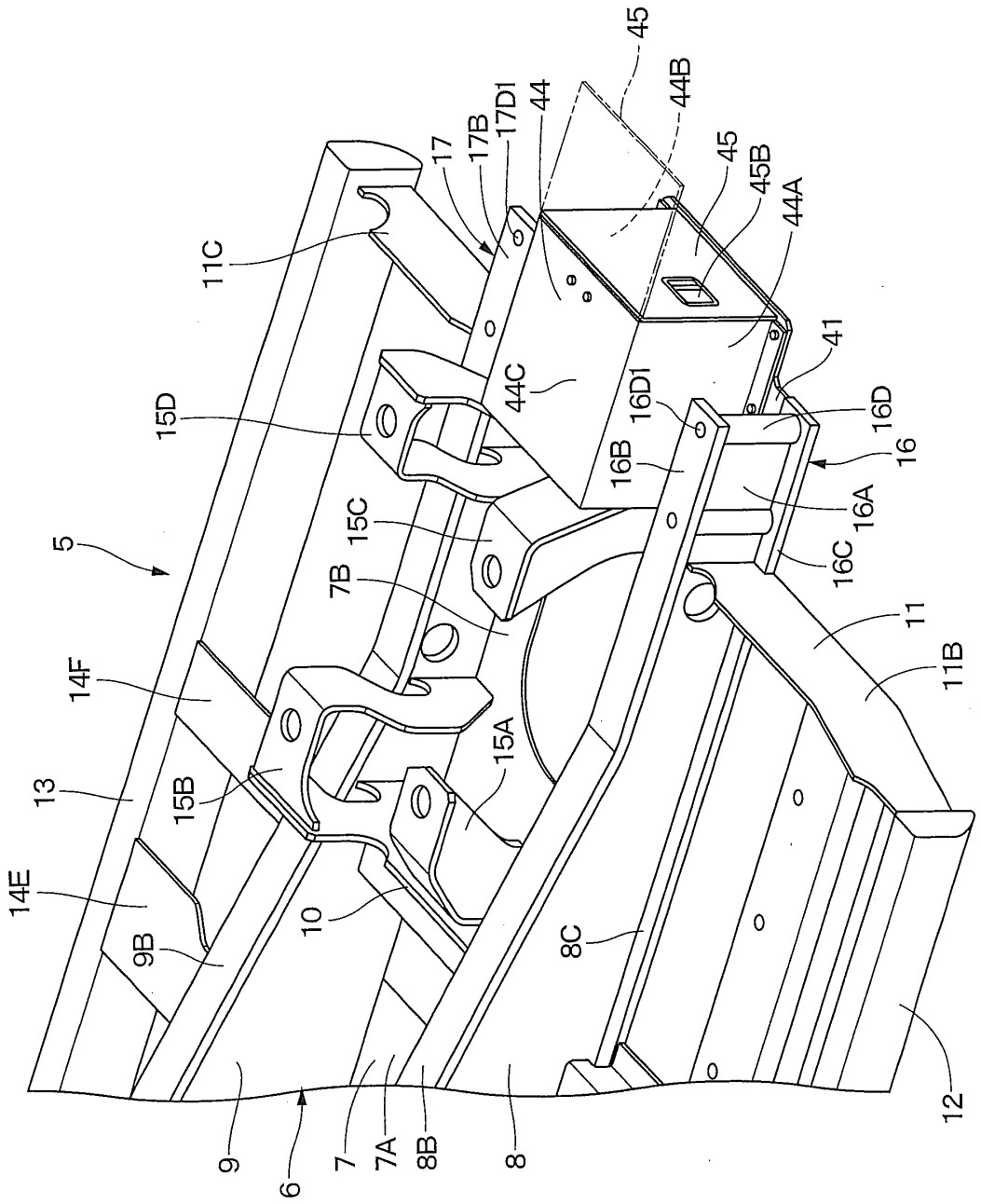
17
(16)
17E
(16E)
17C
(16C)

Fig.9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9B
14E
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14F
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15A
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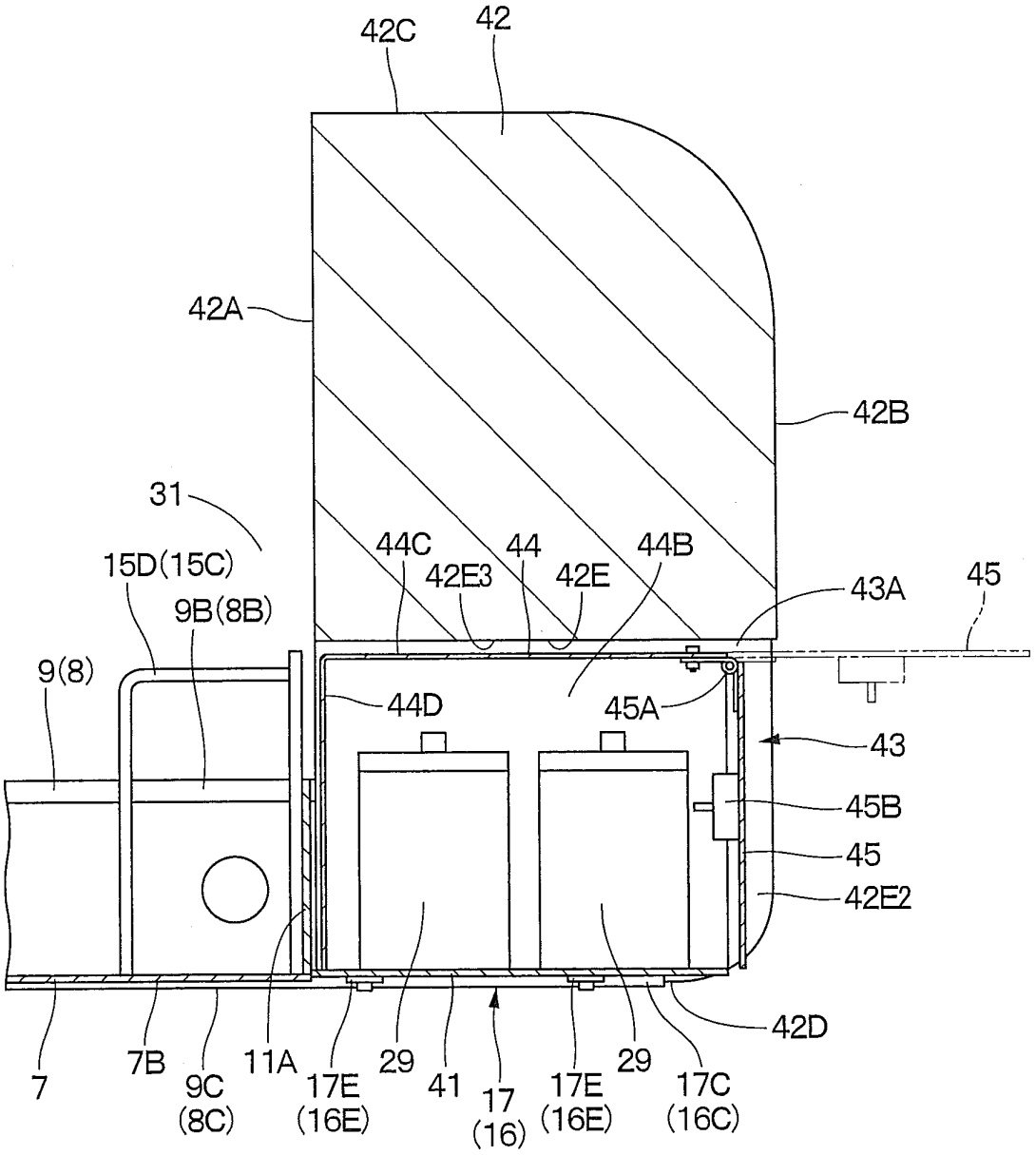
Fig.10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44D
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7B
9C
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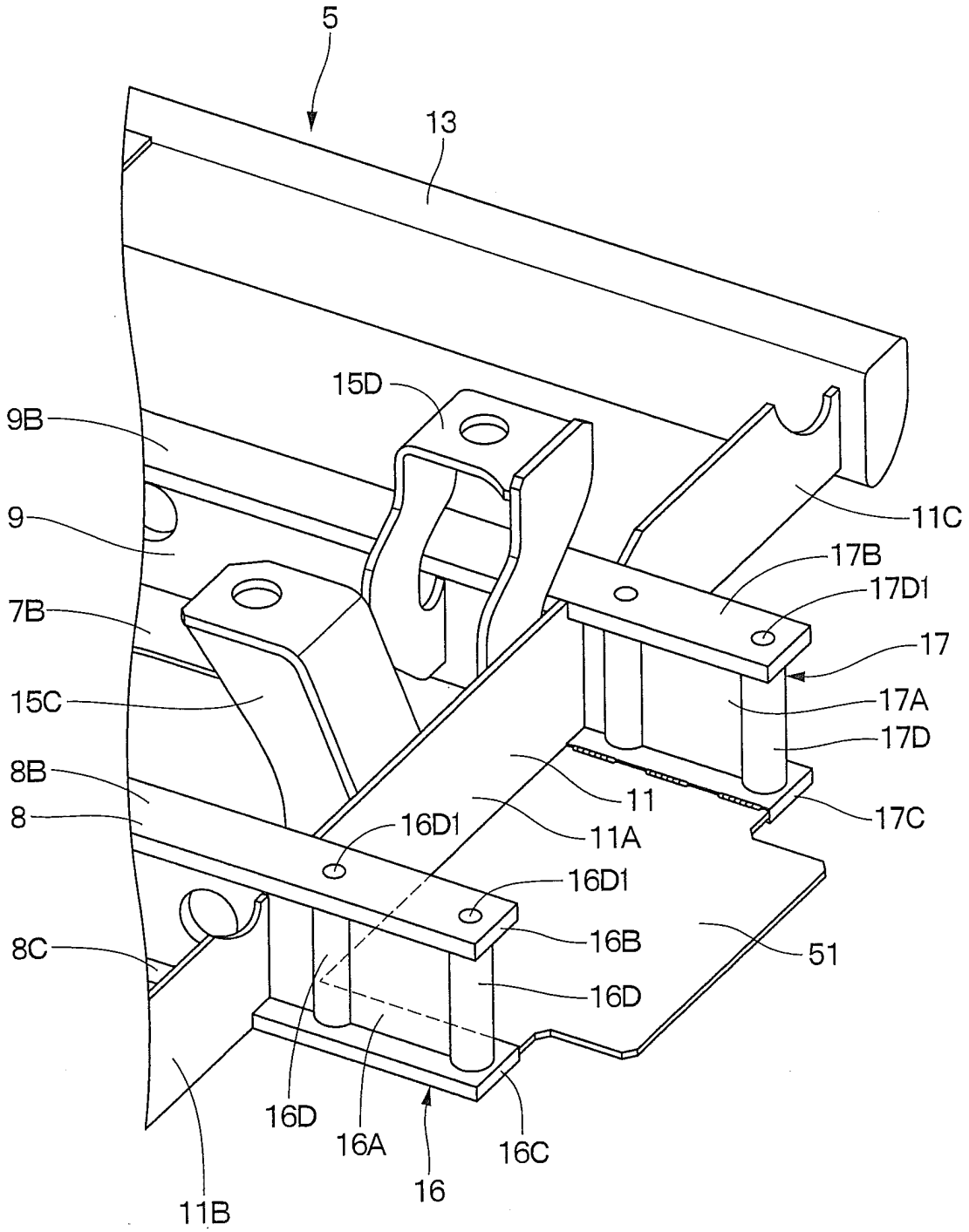
(16C)

Fig.11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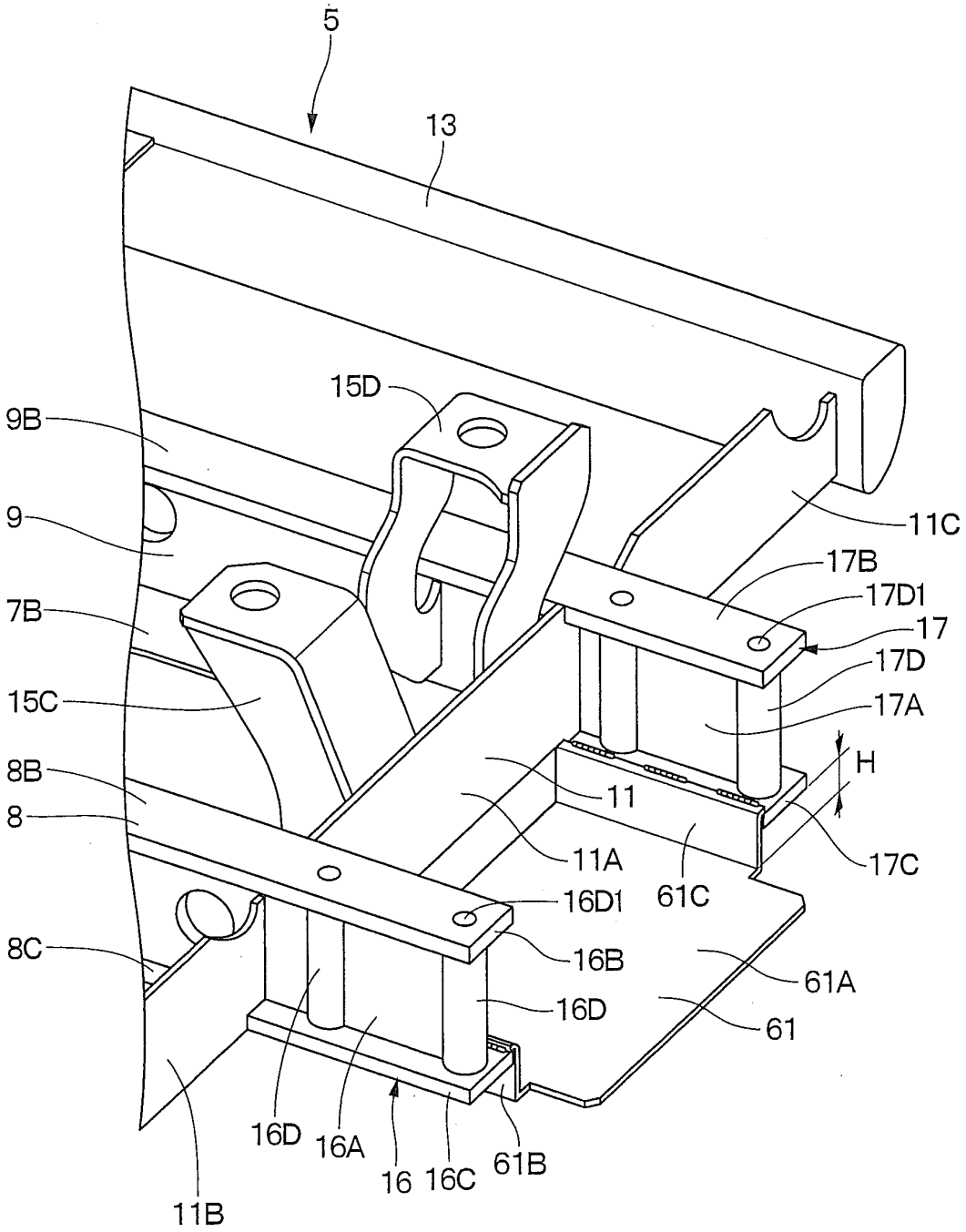
16C
11B

Fig.12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16C
61B
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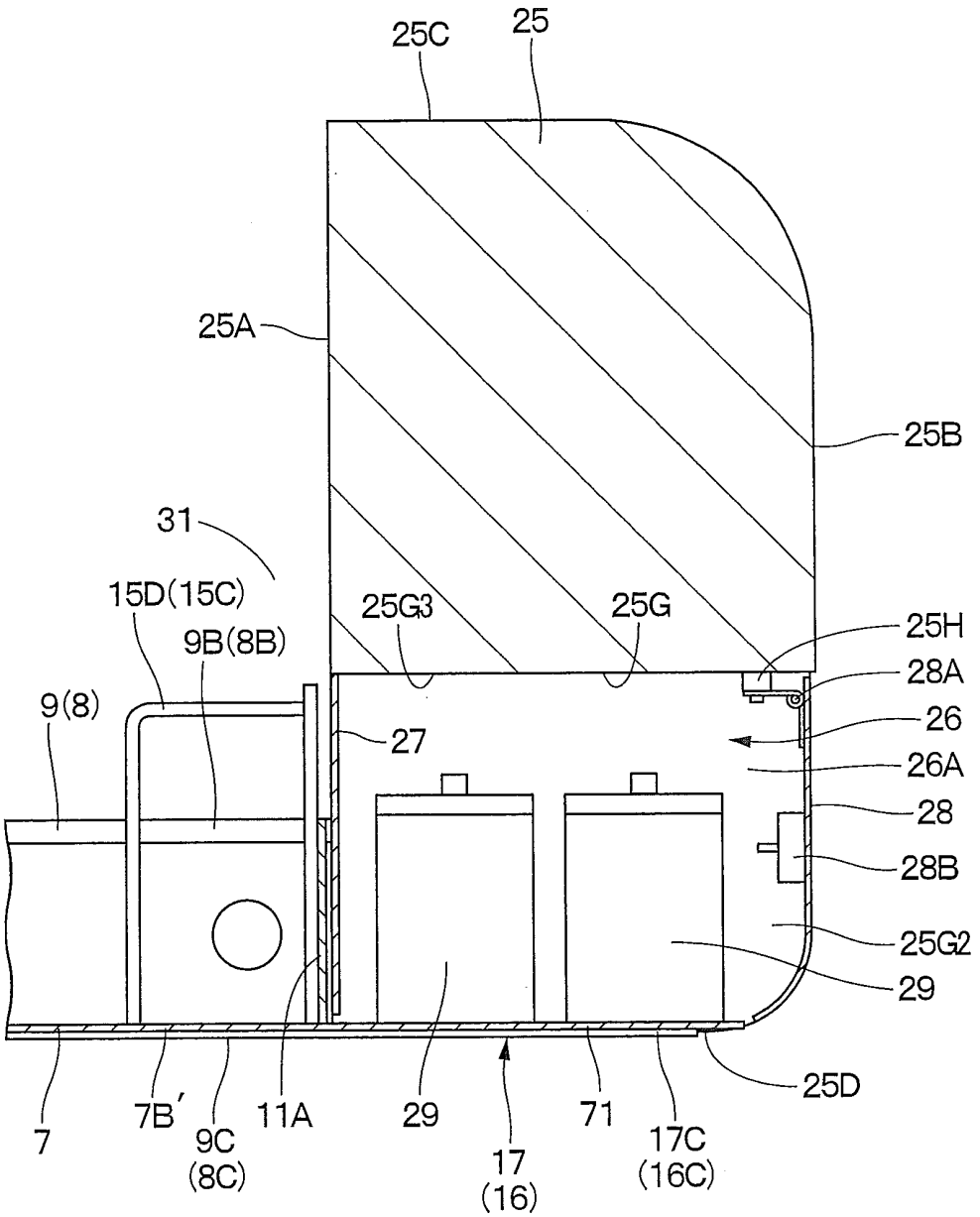
Fig.13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(16C)

Fig.14

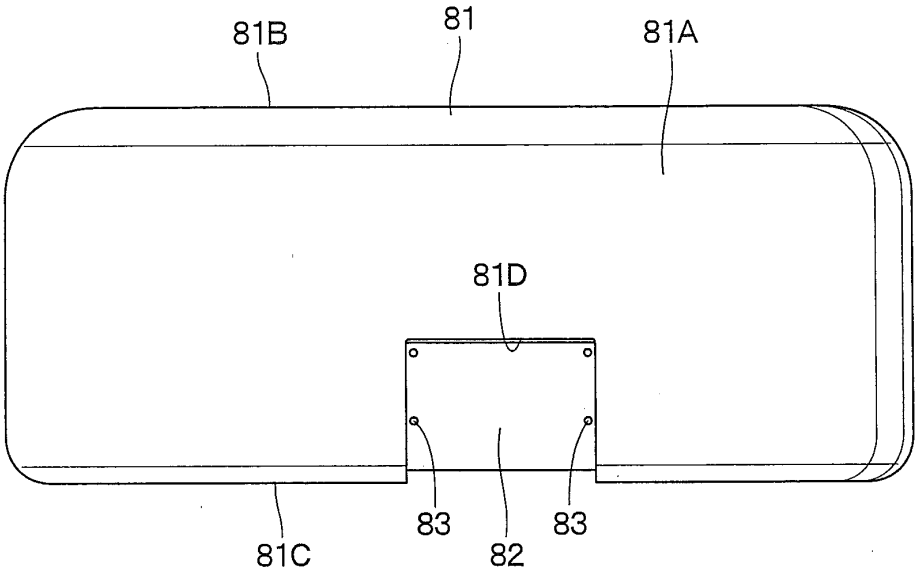
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Fig.15

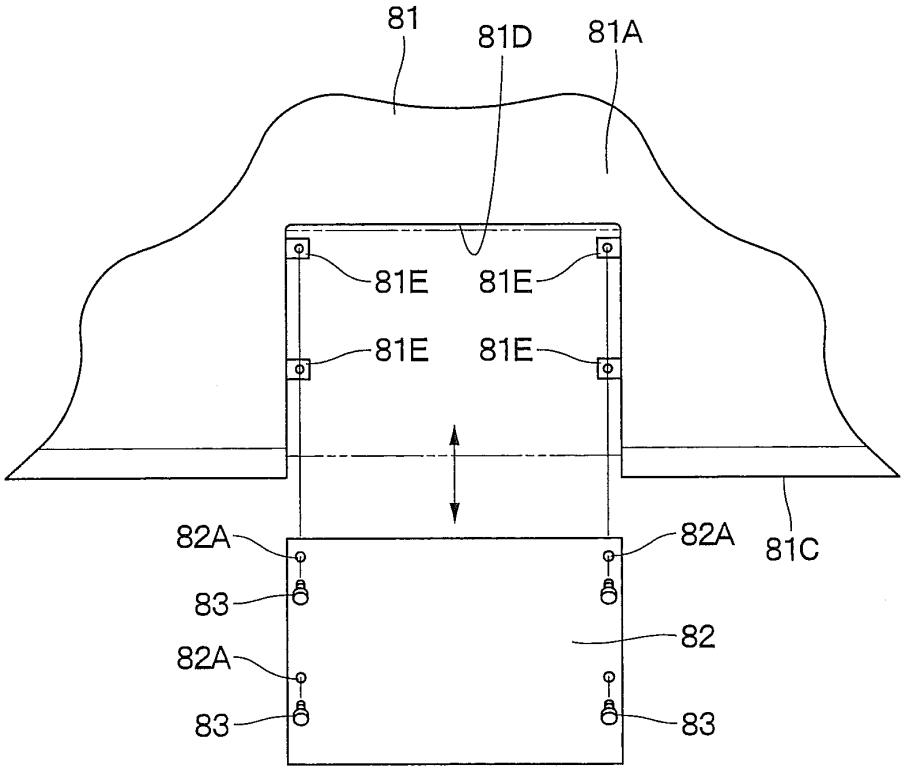
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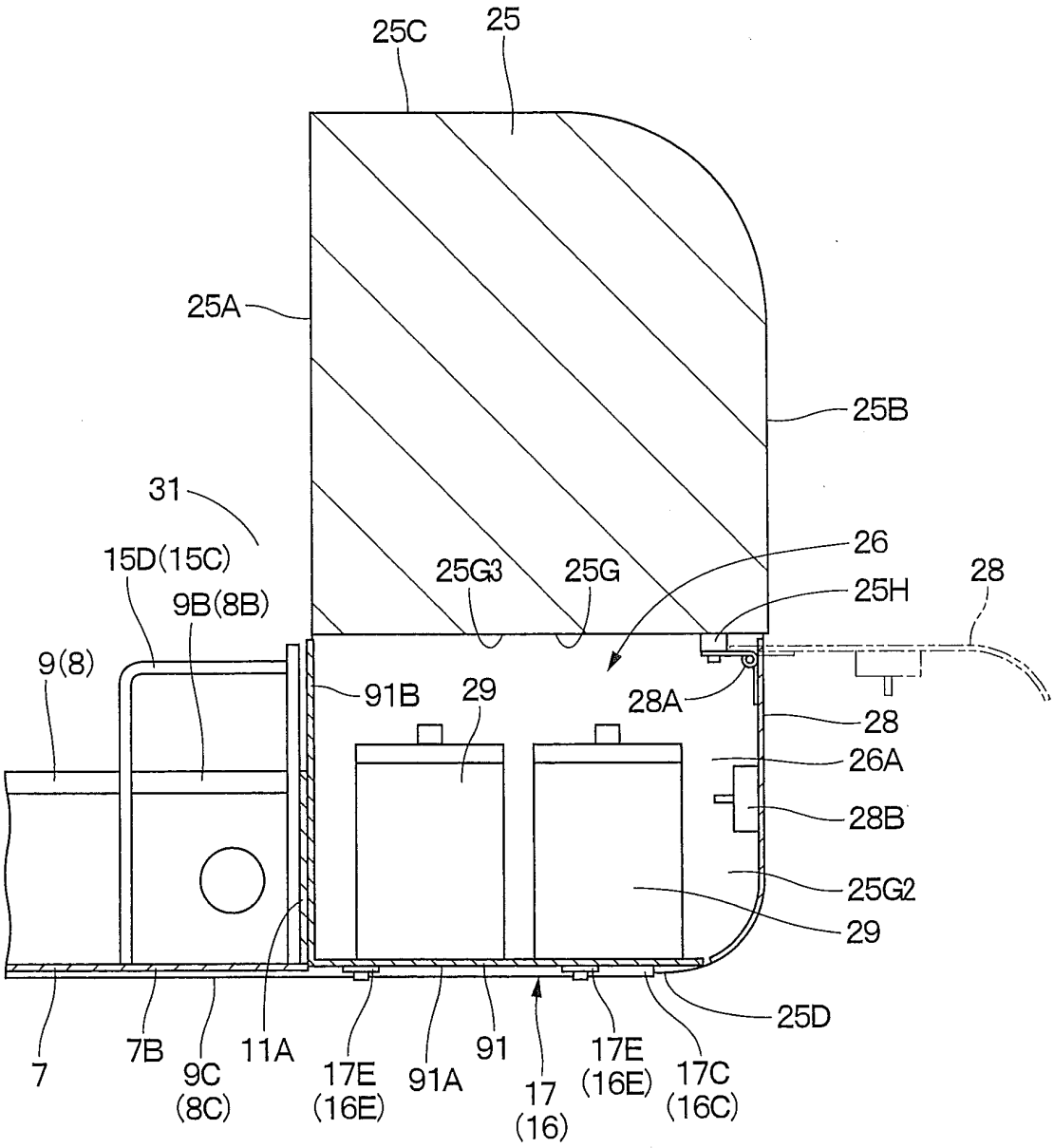
Fig.16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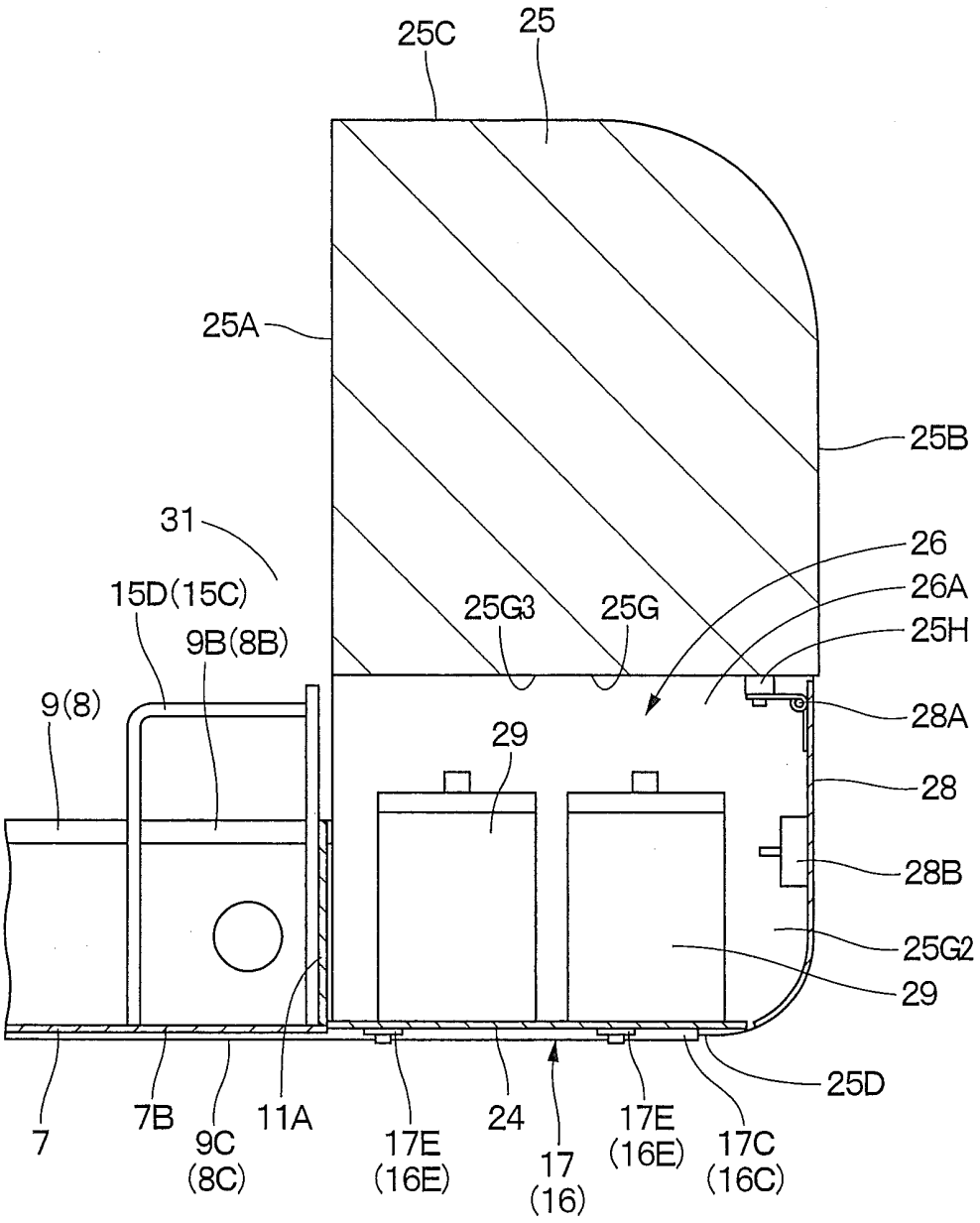
(16C)

Fig.17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(16E)
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17E
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17C
(16C)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/064092

A. CLASSIFICATION OF SUBJECT MATTER
E02F9/18(2006.01)i, *E02F9/00*(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E02F9/18, E02F9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013
Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2000-080679 A (Hitachi Construction Machinery Co., Ltd.), 21 March 2000 (21.03.2000), entire text; all drawings (Family: none)	1-6 7
Y A	JP 9-268601 A (Hitachi Construction Machinery Co., Ltd.), 14 October 1997 (14.10.1997), paragraphs [0023], [0024]; fig. 2 (Family: none)	1-6 7
A	JP 2000-265496 A (Kato Works Co., Ltd.), 26 September 2000 (26.09.2000), entire text; all drawings (Family: none)	1-7

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
07 June, 2013 (07.06.13)	18 June, 2013 (18.06.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/064092

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2010-189869 A (Caterpillar Japan Ltd.), 02 September 2010 (02.09.2010), entire text; all drawings (Family: none)	1-7

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Patent documents cited in the description

- JP 2010270586 A **[0006]**