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(72) Inventors:
• **WADA, Tomohiro**
Iwata-shi, Shizuoka 438-8501 (JP)
• **NOMURA, Yoshitaka**
Iwata-shi, Shizuoka 438-8501 (JP)
• **MOCHIZUKI, Nobuaki**
Iwata-shi, Shizuoka 438-8501 (JP)

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(74) Representative: **Grünecker Patent- und Rechtsanwälte**
PartG mbB
Leopoldstraße 4
80802 München (DE)

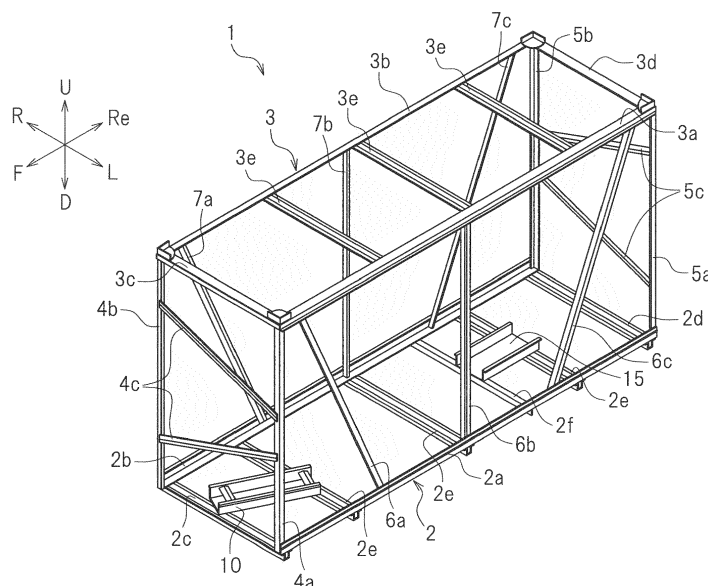
(71) Applicant: **Yamaha Hatsudoki Kabushiki Kaisha**
Iwata-shi, Shizuoka 438-8501 (JP)

(54) **MOTORCYCLE CRATE**

(57) A motorcycle crate, with which it is possible to realize reliable transportation while reducing the cost. A first bottom frame member (2a), a second bottom frame member (2b), a third bottom frame member (2c), a fourth bottom frame member (2d), a first top frame member (3a), a second top frame member (3b), a third top frame member (3c), a fourth top frame member (3d), a first front frame member (4a), a second front frame member (4b), a first rear frame member (5a), and a second rear frame member (5b) of a crate (1) are each formed by a part-

ly-bent plate material. The cross section of each plate material has a first edge portion (α), and a second edge portion (β) apart from the first edge portion (α). The transverse cross section of at least a portion of the first bottom frame member (2a) and/or the transverse cross section of at least a portion the second bottom frame member (2b) include a first curved portion (27a, 28c) having a curved shape provided at at least one of the first edge portion α and the second edge portion (β).

FIG. 1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a motorcycle crate for crating a motorcycle.

Description of the Related Art

[0002] Motorcycles have been transported by using transport devices for holding the motorcycles. For example, Japanese Laid-Open Patent Publication No. 11-43148 discloses a technique for securing a motorcycle on a transport pallet by using a front securing belt and a soft hook. Specifically, the front securing belt is provided with a hook at one end thereof and a lock at the other end thereof. The front securing belt includes one for securing the left portion of the front side of the body of the motorcycle (hereinafter referred to as a "left front belt") and another for securing the right portion of the front side of the body (hereinafter referred to as a "right front belt"). The soft hook includes a ring-shaped portion for hooking the left front belt, and a ring-shaped portion for hooking the right front belt. The soft hook is passed around the front side of the body, while hooking one of the ring-shaped portions of the soft hook on the hook of the left front belt. The other one of the ring-shaped portions of the soft hook is hooked on the hook of the right front belt. Then, the lock of the left front belt is locked on a fixture disposed leftward of the front wheel on the transport pallet, and the lock of the right front belt is locked on the fixture disposed rightward of the front wheel on the transport pallet. Thus, it is possible to secure the front portion of the motorcycle on the transport pallet.

SUMMARY OF THE INVENTION

Technical Problem

[0003] However, the conventional transport device described above requires a left front belt and a right front belt each having a hook and a lock, thereby resulting in a high cost. Moreover, providing the fixture on the transport pallet increases the size and cost of the transport pallet. With the conventional transport device described above, when transporting on an uneven road, it may be difficult to realize reliable transportation due to significant shaking of the upper portion of the motorcycle occurring during transportation.

[0004] It is an object of the present invention to provide a motorcycle crate, with which it is possible to realize reliable transportation while reducing the cost.

Solution To Problem

[0005] A motorcycle crate according to the present teaching includes: a first bottom frame member extending in a front-rear direction; a second bottom frame member placed rightward of the first bottom frame member, and extending in the front-rear direction; a third bottom frame member connected to a front end portion of the first bottom frame member and a front end portion of the second bottom frame member, and extending in a left-right direction; a fourth bottom frame member connected to a rear end portion of the first bottom frame member and a rear end portion of the second bottom frame member, and extending in the left-right direction; a first top frame member placed above the first bottom frame member, and extending in the front-rear direction; a second top frame member placed above the second bottom frame member and rightward of the first top frame member, and extending in the front-rear direction; a third top frame member placed above the third bottom frame member, connected to a front end portion of the first top frame member and a front end portion of the second top frame member, and extending in the left-right direction; a fourth top frame member placed above the fourth bottom frame member, connected to a rear end portion of the first top frame member and a rear end portion of the second top frame member, and extending in the left-right direction; a first front frame member connected to the front end portion of the first bottom frame member and the front end portion of the first top frame member, and extending in an up-down direction; a second front frame member placed rightward of the first front frame member, connected to the front end portion of the second bottom frame member and the front end portion of the second top frame member, and extending in the up-down direction; a first rear frame member placed rearward of the first front frame member, connected to the rear end portion of the first bottom frame member and the rear end portion of the first top frame member, and extending in the up-down direction; a second rear frame member placed rearward of the second front frame member and rightward of the first rear frame member, connected to the rear end portion of the second bottom frame member and the rear end portion of the second top frame member, and extending in the up-down direction; a first skid member placed rearward of the third bottom frame member and forward of the fourth bottom frame member,

connected to the first bottom frame member and the second bottom frame member, and extending in the left-right direction; and a rear wheel support member supported by the first skid member and configured to support a rear wheel of the motorcycle. The first bottom frame member, the second bottom frame member, the third bottom frame member, the fourth bottom frame member, the first top frame member, the second top frame member, the third top frame member, the fourth top frame member, the first front frame member, the second front frame member, the first rear frame member, and the second rear frame member are each formed by a partly-bent plate material; a transverse cross section of the plate material includes a first edge portion, and a second edge portion apart from the first edge portion. A transverse cross section of at least a portion of the first bottom frame member and/or a transverse cross section of at least a portion of the second bottom frame member includes a first curved portion having a curved shape, the first curved portion provided at at least one of the first edge portion and the second edge portion.

[0006] With the crate described above, the first bottom frame member, the second bottom frame member, the third bottom frame member, the fourth bottom frame member, the first top frame member, the second top frame member, the third top frame member, the fourth top frame member, the first front frame member, the second front frame member, the first rear frame member, and the second rear frame member are each formed by a partly-bent plate material, and the transverse cross section thereof is an open section such that the first edge portion and the second edge portion are apart from each other. It is possible to reduce the total cross-sectional area of each of these members as compared with a square pipe, or the like. Thus, it is possible to reduce the material cost.

[0007] When transporting a motorcycle lashed to the crate, a flexible securing belt, for example, is passed around the first bottom frame member and/or the second bottom frame member and the motorcycle, for example. When transporting the motorcycle under an uneven road environment, the upper portion of the vehicle undergoes significant shaking (low-frequency shaking) over a long period of time. Such low-frequency shaking includes shaking in the up-down direction as well as shaking in the horizontal direction. Under significant shaking lasting over a long period of time, there is friction between the securing belt and the first bottom frame member and/or the second bottom frame member. However, the first bottom frame member and/or the second bottom frame member include the first curved portion. By bringing the securing belt into contact with the first curved portion, it is possible to reduce the friction on the securing belt as compared with a case where the securing belt is in contact with a corner. Therefore, it is possible to reduce the level of durability needed for the securing belt, and it is possible to utilize a relatively inexpensive securing belt, for example. Moreover, as opposed to the conventional technique described above, there is no need for a securing belt including a hook and a lock, and a fixture for securing the lock. For example, it is possible to lash a motorcycle only with a securing belt, and the securing belt can be passed directly around the first bottom frame member and/or the second bottom frame member. Therefore, it is possible to reduce the cost. Since the securing belt is less likely to deteriorate due to friction, it is possible to realize reliable transportation.

[0008] According to one embodiment of the present teaching, at least one of the first bottom frame member, the second bottom frame member, the first top frame member, the second top frame member, the third top frame member, and the fourth top frame member is formed so that a transverse cross section thereof is L-shaped.

[0009] According to this embodiment, the cross-sectional area of the first bottom frame member, the second bottom frame member, the first top frame member, the second top frame member, the third top frame member, or the fourth top frame member can be reduced, as compared with a square pipe, or the like. Thus, it is possible to reduce the material cost.

[0010] According to one embodiment of the present teaching, a transverse cross section of at least a portion of the first top frame member and/or a transverse cross section of at least a portion of the second top frame member includes a second curved portion having a curved shape, the second curved portion provided at at least one of the first edge portion and the second edge portion.

[0011] According to this embodiment, when lashing a motorcycle, the securing belt can be passed around the second curved portion, thereby reducing the deterioration of the securing belt. Thus, it is possible to realize reliable transportation.

[0012] According to one embodiment of the present teaching, the first front frame member, the second front frame member, the first rear frame member, and the second rear frame member are each formed so that a transverse cross section thereof is L-shaped. A transverse cross section of at least one of the first front frame member, the second front frame member, the first rear frame member, and the second rear frame member includes a third curved portion having a curved shape provided at the first edge portion and/or a fourth curved portion having a curved shape provided at the second edge portion.

[0013] According to this embodiment, the cross-sectional area of the first front frame member, the second front frame member, the first rear frame member, and the second rear frame member can be reduced, as compared with a square pipe, or the like. When lashing a motorcycle, the securing belt can be passed around the third curved portion and/or the fourth curved portion, thereby reducing the deterioration of the securing belt.

[0014] According to one embodiment of the present teaching, the first front frame member, the second front frame member, the first rear frame member, and the second rear frame member are each formed so that a transverse cross section thereof is L-shaped. A transverse cross section of at least one of the first front frame member, the second front

frame member, the first rear frame member, and the second rear frame member includes a third curved portion having a curved shape provided at the first edge portion and a fourth curved portion having a curved shape provided at the second edge portion. At least one of the first curved portion, the second curved portion, the third curved portion, and the fourth curved portion is a folded-back portion formed by folding back the plate material.

[0015] According to this embodiment, there is no need to add other members for forming the first to fourth curved portions. Thus, it is possible to reduce the material cost.

[0016] According to one embodiment of the present teaching, the motorcycle crate further includes: one or a plurality of top cross members connected to the first top frame member and the second top frame member, and extending in the left-right direction. A transverse cross section of the top cross member includes a downwardly- or upwardly-depressed first groove portion, a first straight portion extending straight from one end of the first groove portion, and a second straight portion extending straight from the other end of the first groove portion. An edge portion of the first straight portion and/or an edge portion of the second straight portion include a fifth curved portion having a curved shape.

[0017] According to this embodiment, when lashing a motorcycle, the securing belt can be passed around the fifth curved portion, thereby reducing the deterioration of the securing belt. Thus, it is possible to realize reliable transportation. Moreover, since the transverse cross section of the top cross member includes the first groove portion, the first straight portion, and the second straight portion, it is possible to reduce the cross-sectional area, as compared with a square pipe, or the like. Thus, it is possible to reduce the cost.

[0018] According to one embodiment of the present teaching, a transverse cross section of the first skid member includes a downwardly- or upwardly-depressed second groove portion, a third straight portion extending straight from one end of the second groove portion, and a fourth straight portion extending straight from the other end of the second groove portion.

[0019] According to this embodiment, it is possible to reduce the cross-sectional area of the first skid member, as compared with a square pipe, or the like. Thus, it is possible to reduce the cost.

[0020] According to one embodiment of the present teaching, the motorcycle crate further includes: one or a plurality of first vertical members connected to the first bottom frame member and the first top frame member; and one or a plurality of second vertical members connected to the second bottom frame member and the second top frame member.

[0021] According to this embodiment, it is possible to further improve the strength of the crate.

[0022] According to one embodiment of the present teaching, the motorcycle crate further includes: one or a plurality of first cross members connected to the first front frame member and the second front frame member; and one or a plurality of second cross members connected to the first rear frame member and the second rear frame member.

[0023] According to this embodiment, it is possible to further improve the strength of the crate.

[0024] According to one embodiment of the present teaching, the motorcycle crate further includes: a second skid member placed forward of the first skid member, connected to the first bottom frame member and the second bottom frame member, and extending in the left-right direction; a joist member connected to the first bottom frame member and the second bottom frame member, extending in the left-right direction, and having the same shape as the first front frame member, the second front frame member, the first rear frame member, and the second rear frame member; and a detachable front wheel support member connected to the third bottom frame member and the second skid member and configured to support a front wheel of the motorcycle. The rear wheel support member is connected to the joist member and the first skid member, and is detachable.

[0025] According to this embodiment, it is possible to switch between different front wheel support members and rear wheel support members, as necessary, depending on the specifications of the motorcycle, e.g., the tire diameter, the wheel base, which is the distance between the front wheel driving shaft and the rear wheel driving shaft, etc. Thus, it is possible to accommodate different types of motorcycles for transportation. There is no need to newly provide a crate depending on the specifications of the motorcycle. Thus, it is possible to reduce the cost of the crate. It is easy to reuse crates.

[0026] According to one embodiment of the present teaching, the motorcycle crate further includes: a middle bottom frame member placed between the first bottom frame member and the second bottom frame member, connected to the third bottom frame member and the fourth bottom frame member, and extending in the front-rear direction; and a middle top frame member placed between the first top frame member and the second top frame member, connected to the third top frame member and the fourth top frame member, and extending in the front-rear direction. A transverse cross section of the middle bottom frame member includes a downwardly- or upwardly-depressed first groove portion, a first straight portion extending straight from one end of the first groove portion, and a second straight portion extending straight from the other end of the first groove portion. An edge portion of the first straight portion and/or an edge portion of the second straight portion include a fifth curved portion having a curved shape. A transverse cross section of the middle top frame member includes a downwardly- or upwardly-depressed second groove portion, a third straight portion extending straight from one end of the second groove portion, and a fourth straight portion extending straight from the other end of the second groove portion. Opposite corner portions of the second groove portion have a curved shape.

[0027] According to this embodiment, two or more motorcycles can be transported while being lashed with securing

belts by utilizing the middle bottom frame member and/or the middle top frame member. When lashing a motorcycle, the securing belt can be passed around the fifth curved portion of the middle bottom frame member or the securing belt can be passed around the opposite corner portions of the second groove portion of the middle top frame member, thereby reducing the deterioration of the securing belt.

[0028] According to one embodiment of the present teaching, the motorcycle crate further includes: a securing belt to be passed around a portion of the motorcycle and the first bottom frame member; and another securing belt to be passed around another portion of the motorcycle and the second bottom frame member.

[0029] According to this embodiment, it is possible to reduce the deterioration of the securing belt, thereby realizing reliable transportation.

[0030] According to one embodiment of the present teaching, the securing belts are each a cam buckle belt whose length can be adjusted.

[0031] According to this embodiment, the operator can easily adjust the length of the securing belt. Since the length of the securing belt can be adjusted, and rigid securing, where a spacer is sandwiched between the motorcycle and components of the crate, is not used, it is possible to easily change the lashing position and to easily attach/detach the securing belt. Thus, it is possible to easily accommodate motorcycles of different specifications for transportation. Therefore, the reuse described above is also made easy.

[0032] According to one embodiment of the present teaching, the motorcycle includes left and right front forks, the motorcycle crate further including: a first securing belt to be passed around the left front fork of the motorcycle and a portion of the first curved portion that is forward of a central position of the first bottom frame member in the front-rear direction; and a second securing belt to be passed around the right front fork of the motorcycle and a portion of the first curved portion that is forward of a central position of the second bottom frame member in the front-rear direction.

[0033] According to this embodiment, when lashing a motorcycle to the crate, the first securing belt and the second securing belt are passed around the first curved portion. Thus, it is possible to reduce the deterioration of the first securing belt and the second securing belt, thereby realizing reliable transportation.

[0034] According to one embodiment of the present teaching, the motorcycle includes left and right rear arms, the motorcycle crate further including: a third securing belt to be passed around the left rear arm of the motorcycle and a portion of the first curved portion that is rearward of a central position of the first bottom frame member in the front-rear direction; and a fourth securing belt to be passed around the right rear arm of the motorcycle and a portion of the first curved portion that is rearward of a central position of the second bottom frame member in the front-rear direction.

[0035] According to this embodiment, when lashing a motorcycle to the crate, the third securing belt and the fourth securing belt are passed around the first curved portion. Thus, it is possible to reduce the deterioration of the third securing belt and the fourth securing belt, thereby realizing reliable transportation.

Advantageous Effects Of Invention

[0036] As described above, according to the present teaching, it is possible to provide a motorcycle crate, with which it is possible to realize reliable transportation while reducing the cost.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037]

FIG. 1 is a perspective view showing a configuration of a motorcycle crate according to one embodiment of the present teaching.

FIGS. 2A to 2G are cross-sectional views of various components of the crate.

FIG. 3 is a left side view showing the crate and a motorcycle crated in the crate.

FIG. 4 is a front view showing the crate and the motorcycle.

FIG. 5 is a plan view showing the crate and the motorcycle.

FIG. 6 is a perspective view showing a part of a securing belt.

FIG. 7A is a plan view showing a front wheel support member and a rear wheel support member, and FIG. 7B is a side view showing the front wheel support member and the rear wheel support member.

FIG. 8A is a plan view showing a front wheel support member and another rear wheel support member, and FIG. 8B is a side view showing the front wheel support member and the other rear wheel support member.

FIG. 9 is a perspective view showing a configuration of a motorcycle crate according to another embodiment of the present teaching.

FIG. 10 is a perspective view showing a configuration of a motorcycle crate according to another embodiment of the present teaching.

FIG. 11 is a transverse cross-sectional view showing curved portions of the crate according to the other embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0038] A motorcycle crate according to one embodiment of the present teaching will now be described. As shown in FIG. 1, a motorcycle crate 1 according to the present embodiment is for crating a motorcycle when transporting the motorcycle. The crate 1 is capable of transporting one or two or more motorcycles.

[0039] The terms front, rear, left, right, up and down as used in the description below, refer to directions as defined below, unless specified otherwise. That is, front, rear, left, right, up and down refer to these directions of a motorcycle when the motorcycle is held by the crate 1 in an upright position. Note that front, rear, left, right, up and down of a motorcycle mean these directions as seen from a passenger seated in a seat of the motorcycle while the motorcycle is stationary on a horizontal surface. The front-rear direction (hereinafter referred to also as the lengthwise direction) of the crate 1 is the same as the vehicle front-rear direction of the motorcycle, the left-right direction (hereinafter referred to also as the width direction) of the crate 1 is the same as the vehicle width direction of the motorcycle, and the up-down direction (hereinafter referred to also as the height direction) of the crate 1 is the same as the vehicle up-down direction of the motorcycle. The reference signs F, Re, L, R, U and D, as used in the figures, refer to front, rear, left, right, up and down, respectively. Note however that the definitions of these directions are for the sake of illustration, and they are only illustrative and not limiting of the present invention.

[0040] As shown in FIG. 1, the crate 1 includes a bottom frame 2 on which a motorcycle 40 (see FIG. 3) is supported, and a top frame 3 disposed so as to oppose the bottom frame 2. The bottom frame 2 and the top frame 3 are each formed by a plurality of members having different shapes, for example, and these members are each obtained by shaping a flat plate (the plate thickness is 1.4 mm, for example) using a roll, for example. This will be described in detail below.

[0041] The bottom frame 2 includes a first bottom frame member 2a, a second bottom frame member 2b, a third bottom frame member 2c, a fourth bottom frame member 2d, a plurality of (three in the present embodiment) skid members 2e, and a joist member 2f formed by bending a flat plate. The first bottom frame member 2a is disposed along the lengthwise direction of the crate 1. The second bottom frame member 2b is disposed rightward of the first bottom frame member 2a and in parallel to the first bottom frame member 2a. The third bottom frame member 2c is disposed along the width direction between the front end of the first bottom frame member 2a and the front end of the second bottom frame member 2b. The third bottom frame member 2c is connected to the first bottom frame member 2a and the second bottom frame member 2b by spot welding, for example. The fourth bottom frame member 2d is disposed along the width direction between the rear end of the first bottom frame member 2a and the rear end of the second bottom frame member 2b. The fourth bottom frame member 2d is connected to the first bottom frame member 2a and the second bottom frame member 2b by spot welding, for example. The plurality of skid members 2e are each connected to the first bottom frame member 2a and the second bottom frame member 2b by spot welding, for example. The plurality of skid members 2e are each disposed along the width direction of the crate 1, and are arranged in parallel to one another in the lengthwise direction of the crate 1. Between a skid member 2e and another skid member 2e, the joist member 2f is connected to the first bottom frame member 2a and the second bottom frame member 2b by spot welding, for example. Before the assembly (before the final assembly) of the crate 1, the bottom frame 2 is formed as an assembly (hereinafter referred to as the first assembly) disposed on a plane that is defined by an axis of the front-rear direction and an axis of the left-right direction.

[0042] The top frame 3 includes a first top frame member 3a, a second top frame member 3b, a third top frame member 3c, a fourth top frame member 3d, and a plurality of (three in the present embodiment) top cross members 3e. The first top frame member 3a is disposed along the lengthwise direction of the crate 1. The second top frame member 3b is disposed rightward of the first top frame member 3a and in parallel to the first top frame member 3a. The third top frame member 3c is disposed along the width direction between the front end of the first top frame member 3a and the front end of the second top frame member 3b. The third top frame member 3c is connected to the first top frame member 3a and the second top frame member 3b by spot welding, for example. The fourth top frame member 3d is disposed along the width direction between the rear end of the first top frame member 3a and the rear end of the second top frame member 3b. The fourth top frame member 3d is connected to the first top frame member 3a and the second top frame

member 3b by spot welding, for example. The plurality of top cross members 3e are each disposed between the first top frame member 3a and the second top frame member 3b. The top cross members 3e are connected to the first top frame member 3a and the second top frame member 3b by spot welding, for example. The plurality of top cross members 3e each extend in the width direction of the crate 1, and are arranged in parallel to one another in the lengthwise direction of the crate 1. Before the assembly of the crate 1, the top frame 3 is also formed as an assembly (hereinafter referred to as the second assembly) disposed on a plane that is defined by an axis of the front-rear direction and an axis of the left-right direction, as is the bottom frame 2.

[0043] A first front frame member 4a is disposed between the front end of the first bottom frame member 2a and the front end of the first top frame member 3a. The first front frame member 4a is connected to the first bottom frame member 2a and the first top frame member 3a. The first front frame member 4a is disposed along the height direction of the crate 1. A second front frame member 4b is disposed between the front end of the second bottom frame member 2b and the front end of the second top frame member 3b. The second front frame member 4b is connected to the second bottom frame member 2b and the second top frame member 3b. The second front frame member 4b is disposed along the height direction of the crate 1. The first front frame member 4a and the second front frame member 4b are formed by shaping a flat plate using a roll, for example.

[0044] A first rear frame member 5a is disposed between the rear end of the first bottom frame member 2a and the rear end of the first top frame member 3a. The first rear frame member 5a is connected to the first bottom frame member 2a and the first top frame member 3a. The first rear frame member 5a is disposed along the height direction of the crate 1. A second rear frame member 5b is disposed between the rear end of the second bottom frame member 2b and the rear end of the second top frame member 3b. The second rear frame member 5b is connected to the second bottom frame member 2b and the second top frame member 3b. The second rear frame member 5b is disposed along the height direction of the crate 1. The first rear frame member 5a and the second rear frame member 5b are each formed by shaping a flat plate using a roll, for example.

[0045] A plurality of (two in the present embodiment) first cross members 4c are disposed between the first front frame member 4a and the second front frame member 4b. The first cross member 4c is connected to the first front frame member 4a and the second front frame member 4b by spot welding, for example. The first cross members 4c are disposed so that the distance between the right end of one first cross member 4c and the right end of the other first cross member 4c is longer than the distance between the left end of the one first cross member 4c and the left end of the other first cross member 4c. The first cross members 4c are inclined from the horizontal line and inclined from the vertical line. Before the assembly of the crate 1, the first front frame member 4a, the second front frame member 4b and the first cross members 4c together form an assembly (hereinafter referred to as the third assembly).

[0046] A plurality of (two in the present embodiment) second cross members 5c are disposed between the first rear frame member 5a and the second rear frame member 5b. The second cross members 5c are connected to the first rear frame member 5a and the second rear frame member 5b by spot welding, for example. The second cross members 5c are disposed so that the distance between the left end of one second cross member 5c and the left end of the other second cross member 5c is longer than the distance between the right end of the one second cross member 5c and the right end of the other second cross member 5c. The second cross members 5c are inclined from the horizontal line and inclined from the vertical line. Before the assembly of the crate 1, the first rear frame member 5a, the second rear frame member 5b and the second cross members 5c together form an assembly (hereinafter referred to as the fourth assembly).

[0047] First vertical members 6a, 6b and 6c are disposed between the first bottom frame member 2a and the first top frame member 3a. The first vertical members 6a, 6b and 6c are connected to the first bottom frame member 2a and the first top frame member 3a by spot welding, for example. The first vertical member 6a and the first vertical member 6c are disposed so that the distance between the upper end of the first vertical member 6a and the upper end of the first vertical member 6c is longer than the distance between the lower end of the first vertical member 6a and the lower end of the first vertical member 6c. The first vertical member 6a and the first vertical member 6c are inclined from the horizontal line and inclined from the vertical line. The first vertical member 6b is connected to the center of the first bottom frame member 2a and the center of the first top frame member 3a. The first vertical member 6b is disposed along the height direction of the crate 1.

[0048] Second vertical members 7a, 7b and 7c are disposed between the second bottom frame member 2b and the second top frame member 3b. The second vertical members 7a, 7b and 7c are connected to the second bottom frame member 2b and the second top frame member 3b by spot welding, for example. The second vertical member 7a and the second vertical member 7c are disposed so that the distance between the upper end of the second vertical member 7a and the upper end of the second vertical member 7c is longer than the distance between the lower end of the second vertical member 7a and the lower end of the second vertical member 7c. The second vertical member 7a and the second vertical member 7c are inclined from the horizontal line and inclined from the vertical line. The second vertical member 7b is connected to the center of the second bottom frame member 2b and the center of the second top frame member 3b. The second vertical member 7b is disposed along the height direction of the crate 1.

[0049] A front wheel support member 10 for supporting the front wheel of the motorcycle is provided between the third

bottom frame member 2c and the foremost skid member 2e (hereinafter referred to as the second skid member). The front wheel support member 10 is detachable. The front wheel support member 10 can be attached/detached to/from the third bottom frame member 2c and the second skid member 2e. The front wheel support member 10 can be detached when, for example, removing the front wheel from the motorcycle and transporting the motorcycle with the front wheel secured to another position of the crate 1. A rear wheel support member 15 for supporting the rear wheel of the motorcycle is provided between the joist member 2f and the rearmost skid member 2e (hereinafter referred to as the first skid member). The rear wheel support member 15 is detachable. The rear wheel support member 15 can be attached/detached to/from the joist member 2f and the first skid member 2e. The rear wheel support member 15 can be detached when, for example, removing the rear wheel from the motorcycle and transporting the motorcycle with the rear wheel secured to another position of the crate 1. Note that the front wheel support member 10 is disposed while being inclined so that the front portion of the front wheel support member 10 is located rightward with respect to the rear portion thereof. The rear wheel support member 15 is disposed along the lengthwise direction of the crate 1.

[0050] In order to assemble the components of the crate 1 to complete the crate 1, one first makes the first assembly, the second assembly, the third assembly and the fourth assembly as described above. Then, the first vertical member 6a is assembled to the first assembly and the second assembly by bolts, for example, and the first vertical member 6c is assembled to the first assembly and the second assembly by bolts, for example. Then, the second vertical member 7a is assembled to the first assembly and the second assembly by bolts, for example, and the second vertical member 7c is assembled to the first assembly and the second assembly by bolts, for example. Then, the third assembly is assembled to the first assembly and the second assembly by bolts, for example. Similarly, the fourth assembly is assembled to the first assembly and the second assembly by bolts, for example. Then, the first vertical member 6b is assembled to the first assembly and the second assembly by bolts, for example, and the second vertical member 7b is assembled to the first assembly and the second assembly by bolts, for example. That is, the first front frame member 4a, the second front frame member 4b, the first rear frame member 5a, the second rear frame member 5b, the first vertical member 6b and the second vertical member 7b are each assembled at the final stage. Note that a bolt-fastening nut is welded, in advance, to each member to which these members are to be assembled. Note however that this method is merely an example, and there is no particular limitation on the method of assembling the crate 1.

[0051] The bottom frame 2, the top frame 3, the first front frame member 4a, the second front frame member 4b, the first rear frame member 5a, the second rear frame member 5b, the first vertical members 6a, 6b and 6c, and the second vertical members 7a, 7b and 7c are each formed by a plate material, and are each formed by a plate material, part of which is bent, for example. These members have an open section such that the first edge portion α and the second edge portion β are apart from each other in transverse cross section, as shown in FIGs. 2A to 2G. There is no closed space in the transverse cross section of these members. In the present embodiment, there is no branching part from the first edge portion α to the second edge portion β . Note however that the present invention is not limited to this. Note that a transverse cross section is a cross section that is perpendicular to the longitudinal direction of the member. A transverse cross section is not a surface to be seen from outside, but is a surface that would only be seen if the member were cut along a plane that is perpendicular to the longitudinal direction thereof. From the first edge portion α to the second edge portion β , these members each have a portion or portions bent or curved, as described above, obtained by being shaped using a roll.

[0052] Next, the shape of each of the components described above employed in the present embodiment will be described in detail. The first top frame member 3a and the second top frame member 3b are members that are referred to as top girth cleats, and have the same shape. As shown in FIG. 2A, the first top frame member 3a and the second top frame member 3b are each formed by a bent member that is generally L-shaped as seen in transverse cross section. That is, the first top frame member 3a and the second top frame member 3b have a horizontal portion 20 and a vertical portion 21 standing at one end of the horizontal portion 20. A curved portion (the second curved portion) 20a is formed at the other end of the horizontal portion 20 (the second edge portion β of the first top frame member 3a and the second top frame member 3b). The curved portion 20a is formed by folding back the other end of the horizontal portion 20. As shown in FIG. 2A, the transverse cross section of the curved portion 20a has a curved shape. More specifically, the surface of the curved portion 20a is curved. In other words, the transverse cross section of the curved portion 20a has an arc-shaped surface. Thus, by folding back an edge portion of the horizontal portion 20, the edge portion can be rounded. That is, the edge portion of the horizontal portion 20 can be given a rounded shape. The vertical portion 21 includes a first vertical member 21 a, a step portion 21 b connected with the first vertical member 21 a, and a second vertical member 21 c connected with the step portion 21 b. As shown in FIG. 1, the first top frame member 3a is placed so that the horizontal portion 20 is located diagonally upper right of the vertical portion 21, for example. As shown in FIG. 1, the second top frame member 3b is placed so that the horizontal portion 20 is located diagonally upper left of the vertical portion 21, for example. In a case where the securing belt is passed around the first top frame member 3a and the second top frame member 3b when lashing the motorcycle 40, the securing belt can be brought into contact with the curved portion 20a.

[0053] The third top frame member 3c and the fourth top frame member 3d are members that are referred to as top

end cleats, and have the same shape. As shown in FIG. 2B, the third top frame member 3c and the fourth top frame member 3d are each formed by a bent member that is generally L-shaped as seen in transverse cross section. That is, the third top frame member 3c and the fourth top frame member 3d have a horizontal portion 22 and a vertical portion 23 standing at one end of the horizontal portion 22. As shown in FIG. 1, the third top frame member 3c is placed so that the horizontal portion 22 is located diagonally upper rear of the vertical portion 23, for example. The fourth top frame member 3d is placed so that the horizontal portion 22 is located diagonally upper front of the vertical portion 23, for example.

[0054] As shown in the transverse cross-sectional view of FIG. 2C, the top cross member 3e includes a groove portion (the first groove portion) 24, a first straight portion 25 formed at one end of the groove portion 24, and a second straight portion 26 formed at the other end of the groove portion 24. A curved portion (the fifth curved portion) 25a bent downward is formed at the end of the first straight portion 25 (the first edge portion α of the top cross member 3e). A curved portion (the fifth curved portion) 26a bent downward is formed at the end of the second straight portion 26 (the second edge portion β of the top cross member 3e). As shown in FIG. 2C, the transverse cross section of the curved portions 25a and 26a has a curved shape. More specifically, the surface of the curved portions 25a and 26a is curved. In other words, the transverse cross section of the curved portions 25a and 26a has an arc-shaped surface. Thus, by folding back an edge portion of the first straight portion 25 and the second straight portion 26, the edge portion can be rounded. That is, the edge portion of each of the first straight portion 25 and the second straight portion 26 can be given a rounded shape. As shown in FIG. 1, the top cross member 3e is disposed so that the first straight portion 25 is located forward of the groove portion 24 and the second straight portion 26 is located rearward of the groove portion 24, for example. In a case where the securing belt is passed around the top cross member 3e when lashing the motorcycle 40, the securing belt can be brought into contact with the curved portions 25a and 26a.

[0055] The first bottom frame member 2a and the second bottom frame member 2b are members that are referred to as bottom girth cleats, and have the same shape. As shown in FIG. 2D, the transverse cross section of the first bottom frame member 2a and the second bottom frame member 2b is formed by a bent member that is generally L-shaped. That is, the first bottom frame member 2a and the second bottom frame member 2b include a horizontal portion 27, and a vertical portion 28 standing at one end of the horizontal portion 27. A curved portion (the first curved portion) 27a is formed at the other end of the horizontal portion 27 (the first edge portion α of the first bottom frame member 2a and the second bottom frame member 2b). As is the curved portion 20a of the first top frame member 3a and the second top frame member 3b, the curved portion 27a is formed by folding back the other end of the horizontal portion 27. Thus, by folding back an edge portion of the horizontal portion 27, the edge portion can be rounded. That is, the edge portion of the horizontal portion 27 can be given a rounded shape. The vertical portion 28 is formed by a straight portion 28a, a protruding portion 28b connected with the straight portion 28a, and a curved portion (the first curved portion) 28c that is connected with the protruding portion 28b and that is formed at the other end of the vertical portion 28 (the second edge portion β of the first bottom frame member 2a and the second bottom frame member 2b). As shown in FIG. 1, the first bottom frame member 2a is placed so that the horizontal portion 27 is located diagonally lower right of the vertical portion 28, for example. The second bottom frame member 2b is placed so that the horizontal portion 27 is located diagonally lower left of the vertical portion 28, for example. In a case where the securing belt is passed around the first bottom frame member 2a and the second bottom frame member 2b when lashing the motorcycle 40, the securing belt can be brought into contact with the curved portions 27a and 28c.

[0056] As shown in the transverse cross-sectional view of FIG. 2E, the third bottom frame member 2c, the fourth bottom frame member 2d and the skid member 2e include a groove portion (the second groove portion) 29, a third straight portion 30 formed at one end of the groove portion 29, and a fourth straight portion 31 formed at the other end of the groove portion 29. As shown in FIG. 1, the third bottom frame member 2c, the fourth bottom frame member 2d and the skid member 2e are disposed so that the third straight portion 30 is located forward of the groove portion 29 and the fourth straight portion 31 is located rearward of the groove portion 29, for example.

[0057] The first front frame member 4a, the second front frame member 4b, the first rear frame member 5a, the second rear frame member 5b, the joist member 2f, the first vertical members 6a, 6b and 6c, and the second vertical members 7a, 7b and 7c (hereinafter, they may be referred to generally as end post members) are members that are referred to as end posts or side posts, and have the same shape. As shown in FIG. 2F, the end post member is formed by a bent member whose transverse cross section is generally L-shaped. That is, the end post member includes a horizontal portion 32, and a vertical portion 33 standing at one end of the horizontal portion 32. A curved portion (the third curved portion) 32a is formed at the other end of the horizontal portion 32 (the second edge portion β). A curved portion (the fourth curved portion) 33a is also formed at one end of the vertical portion 33 (the first edge portion α). The curved portion 32a is formed by folding back the other end of the horizontal portion 32. The curved portion 33a is formed by folding back the one end of the vertical portion 33. Thus, as with the curved portions 27a and 28c described above, the edge portion of the horizontal portion 32 and the edge portion of the vertical portion 33 can be rounded by folding back the edge portions. That is, the edge portion of the horizontal portion 32 and the edge portion of the vertical portion 33 can be given a rounded shape. A rectangular contact piece 34 is provided on the horizontal portion 32. The contact

piece 34 contacts the first bottom frame member 2a or the second bottom frame member 2b, for example, at the time of assembly. The first front frame member 4a and the first vertical member 6a are placed so that the horizontal portion 32 is located diagonally rear left of the vertical portion 33, for example. The joist member 2f is placed so that the horizontal portion 32 is located diagonally upper rear of the vertical portion 33, for example. The first rear frame member 5a and the first vertical members 6b and 6c are placed so that the horizontal portion 32 is located diagonally front left of the vertical portion 33, for example. The second front frame member 4b and the second vertical members 7a, 7b and 7c are placed so that the horizontal portion 32 is located diagonally rear right of the vertical portion 33. The second rear frame member 5b is placed so that the horizontal portion 32 is located diagonally front right of the vertical portion 33, for example. In a case where the securing belt is passed around the end post member when lashing the motorcycle 40, the securing belt can be brought into contact with the curved portions 32a and 33a. Note that FIG. 2G will be discussed below.

[0058] Next, a method for lashing the motorcycle 40 onto the crate 1 will be described. As shown in FIG. 3, FIG. 4 and FIG. 5, the motorcycle 40 is supported in an upright position inside the crate 1. The motorcycle 40 includes a body portion 41 including an engine (not shown), or the like. A left front fork 42L and a right front fork 42R are disposed forward of the body portion 41 so that the left front fork 42L and the right front fork 42R can sway left and right. A front wheel 43 is rotatably supported at the lower end of the front fork 42L and the lower end of the front fork 42R. A rear arm 44 extending rearward is disposed in a lower portion of the body portion 41. The rear arm 44 includes a left rear arm 44L and a right rear arm 44R. A rear wheel 45 is rotatably supported at the rear end of the rear arm 44L and the rear end of the rear arm 44R. The front wheel 43 is supported by the front wheel support member 10. The rear wheel 45 is supported by the rear wheel support member 15. Note that the front wheel support member 10 and the rear wheel support member 15 will be described below.

[0059] In the present embodiment, a securing belt (the first securing belt) 50L is passed around an upper portion of the left front fork 42L and a front portion of the first bottom frame member 2a (a portion of the first bottom frame member 2a that is forward of the central position thereof in the front-rear direction). A securing belt (the second securing belt) 50R is passed around an upper portion of the right front fork 42R and a front portion of the second bottom frame member 2b (a portion of the second bottom frame member 2b that is forward of the central position thereof in the front-rear direction). The securing belts 50L and 50R are in contact with the curved portion 27a and the curved portion 28c (see FIG. 2D), and thus are unlikely to break.

[0060] A securing belt (the third securing belt) 51 L is passed around a rear portion of the left rear arm 44L and a rear portion of the first bottom frame member 2a (a portion of the first bottom frame member 2a that is rearward of the central position thereof in the front-rear direction). A securing belt (the fourth securing belt) 51 R is passed around a rear portion of the right rear arm 44R and a rear portion of the second bottom frame member 2b (a portion of the second bottom frame member 2b that is rearward of the central position thereof in the front-rear direction). The securing belts 51 L and 51 R are in contact with the curved portion 27a and the curved portion 28c (see FIG. 2D), and thus are unlikely to break.

[0061] In the present embodiment, securing belts 50 of the same specifications are used as the securing belts 50L and 50R, and securing belts 51 of the same specifications are used as the securing belts 51 L and 51 R (FIG. 6). Note however that the securing belt 50L and the securing belt 50R may be of different specifications, and the securing belt 51 L and the securing belt 51 R may be of different specifications. Next, a configuration of the securing belts 50 and 51 will be described. In the present embodiment, the securing belts 50 and 51 are each a cam buckle belt whose length can be adjusted. As shown in FIG. 6, the securing belts 50 and 51 include a body portion (the buckle portion) 52 formed by steel, for example, and a belt portion 53 formed by polyester, for example. The body portion 52 includes a first belt-passing bar 52a, a second belt-passing bar 52b, and a belt catch portion 52c having a wave-shaped portion 52d. One end portion 53a of the belt portion 53 is passed around and folded back around the first belt-passing bar 52a of the body portion 52. The one end portion 53a having been folded back is welded to the belt portion 53. On the other hand, the other end portion 53b of the belt portion 53 is passed around and folded back around the second belt-passing bar 52b of the body portion 52. The other end portion 53b having been folded back is secured by being stuck on the wave-shaped portion 52d of the belt catch portion 52c. Thus, it is possible to fix the length of the belt portion 53. The operator holds the other end portion 53b of the belt portion 53, removed from the body portion 52, and spans the belt portion 53 between one of members to be lashed together and the other member. Then, the operator fastens the other end portion 53b around the second belt-passing bar 52b of the body portion 52 and pulls the other end portion 53b, thereby allowing the other end portion 53b to be caught on the wave-shaped portion 52d of the belt catch portion 52c at an intended position. Thus, one of members to be lashed together and the other member can be lashed together by the securing belts 50 and 51. The lashing method using the securing belts 50 and 51 of FIG. 3, FIG. 4 and FIG. 5 is also performed as described above.

[0062] Next, the front wheel support member 10 and the rear wheel support member 15 will be described. FIG. 7A and FIG. 8A are plan views showing the front wheel support member 10 with the front wheel 43 supported thereon, and the rear wheel support member 15 with the rear wheel 45 supported thereon. FIG. 7B and FIG. 8B are left side views showing the front wheel support member 10 with the front wheel 43 supported thereon, and the rear wheel support

member 15 with the rear wheel 45 supported thereon. As shown in FIGS. 7A and 7B, the front wheel support member 10 includes a wall portion 10a extending along the front-rear direction of the crate 1, and a wall portion 10b extending along the front-rear direction and disposed rightward of the wall portion 10a. The distance between the wall portion 10a and the wall portion 10b is set to be greater than the width of the front wheel 43. The front wheel 43 is placed between the wall portion 10a and the wall portion 10b. The rear wheel support member 15 includes a wall portion 15a extending along the front-rear direction of the crate 1, and a wall portion 15b extending along the front-rear direction and disposed rightward of the wall portion 15a. The distance between the wall portion 15a and the wall portion 15b is set to be greater than the width of the rear wheel 45. The rear wheel 45 is placed between the wall portion 15a and the wall portion 15b.

[0063] Depending on the motorcycle 40, the position of the rear wheel 45 is set more rearward as shown in FIGS. 8A and 8B, as compared with the position shown in FIGS. 7A and 7B. In such a case, a rear wheel support member 15 having wall portions 15c and 15d are employed, which are longer in the front-rear direction than the wall portions 15a and 15b of FIGS. 7A and 7B. Since the rear wheel support member 15 is detachable in the present embodiment, it is possible to choose from various rear wheel support members 15 depending on the specifications (e.g., the tire diameter, the wheel base, etc.) of the rear wheel 45 of the motorcycle 40.

[0064] With the motorcycle crate 1 of the present embodiment, it is possible to reliably transport the motorcycle 40 even under an uneven road environment. When transporting the motorcycle 40 under an uneven road environment, the upper portion of the vehicle may undergo long-lasting significant shaking (low-frequency shaking). Such low-frequency shaking includes shaking in the up-down direction as well as shaking in the horizontal direction. In order to withstand such significant shaking, there has been a need for a rigid fixture having a great weight or size. According to the present embodiment, in contrast, the motorcycle 40 can be lashed to the crate 1 by using the securing belts 50 and 51, which are more flexible than conventional fixtures, and the significant shaking occurring due to the uneven road environment is therefore absorbed by the securing belts 50 and 51. Thus, it is possible to stably transport the motorcycle 40. It is also possible to prevent the lashing of the motorcycle 40 from loosening during transportation.

[0065] The components of the crate 1 are each formed by a plate material having an open section, such that the first edge portion and the second edge portion in the transverse cross section are apart from each other. Therefore, it is possible to reduce the total cross-sectional area of each component as compared with a square pipe, or the like, while ensuring a sufficient strength to withstand a load of 10 tons, for example, in a pressure test. Thus, it is possible to significantly reduce the material cost while ensuring a sufficient strength. In addition, the crate 1 also provides the following advantages. That is, under significant shaking lasting over a long period of time, if the flexible securing belts 50 and 51 remain in contact with a corner, a sharp edge, or the like, for a long period of time, there is significant friction between the securing belts 50 and 51 and the corner, or the like. Strong securing belts are needed so that they do not break due to significant friction. With the crate 1 of the present embodiment, however, a curved portion is provided at each position that can possibly come into contact with the securing belt 50, 51 depending on the belt-passing route used when lashing the motorcycle 40. Therefore, the contact area between the securing belt 50, 51 and the curved portion can be increased as compared with a case where the securing belt 50, 51 is in contact with a corner, or the like, as described above. Thus, it is possible to reduce the pressure per contact area. Therefore, it is possible to reduce the deterioration of the securing belt 50, 51.

[0066] With the crate 1, the various components are partly standardized, and it is therefore possible to significantly reduce the cost for dies and jigs for shaping.

[0067] With the crate 1, since each curved portion is extending in the longitudinal direction of the component, there is a high degree of freedom for the position at which the securing belt 50, 51 is passed around the curved portion. Therefore, the belt-passing position can be changed freely depending on the specifications of the motorcycle 40.

[0068] With the crate 1, there is no need for a front securing belt including a hook and a lock, and a fixture for securing the lock. That is, it is possible to lash the motorcycle 40 only with the securing belts 50 and 51, and the securing belts 50 and 51 can be passed directly around the components of the crate 1. Therefore, it is possible to significantly reduce the material cost.

[0069] With the crate 1, which includes the skid member 2e having the groove portion 29, the third straight portion 30 and the fourth straight portion 31, it is possible to reduce the total cross-sectional area of skid member 2e as compared with a square pipe, or the like, and to realize a high rigidity. Therefore, it is possible to reduce the material cost of the crate 1 and to ensure a sufficient strength of the crate 1.

[0070] With the crate 1, with the provision of the first vertical members 6a, 6b and 6c and the second vertical members 7a, 7b and 7c, it is possible to further improve the strength of the crate 1.

[0071] With the crate 1, with the provision of the first cross member 4c and the second cross member 5c, it is possible to further improve the strength of the crate 1.

[0072] With the crate 1, the front wheel support member 10 and the rear wheel support member 15 are each detachable. Therefore, it is possible to replace the front wheel support member 10 or the rear wheel support member 15 with another one, as necessary, depending on the specifications of the motorcycle 40. Therefore, it is possible to accommodate different types of motorcycles 40 for transportation. There is no need to newly provide a crate 1 depending on the

specifications of the motorcycle 40. Therefore, it is possible to reduce the cost of the crate 1.

[0073] With the crate 1, reusing is made easy.

[0074] With the crate 1, cam buckle belts whose length can be adjusted are used as the securing belts 50 and 51. The operator can easily adjust the length of the securing belts 50 and 51. Rigid securing, where a spacer is sandwiched between the motorcycle 40 and components of the crate 1, is not used. Therefore, it is easy to change the lashing position, and it is easy to attach/detach the securing belts 50 and 51. Thus, it is possible to accommodate motorcycles 40 of different specifications for transportation. Therefore, reusing as described above is made easy.

(Other embodiments)

[0075] The configuration of a motorcycle crate 1a shown in FIG. 9 is basically the same as the configuration of the motorcycle crate 1 of FIG. 1. The configuration of the crate 1a is different from the configuration of the crate 1 in that a left middle frame member 60L, a right middle frame member 60R, a left partition member 61 L, a right partition member 61 R and a support base 62 are provided. The crate 1 a does not include the joist member 2f, which the crate 1 includes. Note that in FIG. 9, like components to those of FIG. 1 are denoted by like reference numerals, and will not be described below.

[0076] The left middle frame member 60L is provided so as to extend in the front-rear direction between the first bottom frame member 2a and the second bottom frame member 2b. The right middle frame member 60R is provided so as to extend in the front-rear direction between the first bottom frame member 2a and the second bottom frame member 2b, and rightward of the left middle frame member 60L. The left middle frame member 60L is supported by the third bottom frame member 2c and two skid members 2e. The right middle frame member 60R is supported by the third bottom frame member 2c, two skid members 2e, and the fourth bottom frame member 2d. The left partition member 61 L is supported by the skid member 2e closest to the third bottom frame member 2c, and disposed between the left middle frame member 60L and the right middle frame member 60R. The right partition member 61 R is supported by the skid member 2e closest to the third bottom frame member 2c, and disposed between the left middle frame member 60L and the right middle frame member 60R, and rightward of the left partition member 61 L. The front wheel 43 of the motorcycle 40 is removed. The front wheel 43, having been removed from the motorcycle 40, is supported by a support member 70 provided on the fourth bottom frame member 2d. A rod-shaped connection member 46 is connected between the lower end of the left front fork 42L of the motorcycle 40 and the lower end of the right front fork 42R. The connection member 46 is supported by the support base 62 described above. A plurality of exhaust pipes 47 connected to the exhaust port of the engine (not shown) of the motorcycle 40 are supported by a flat plate member (not shown) provided on the skid member 2e between the left partition member 61 L and the right partition member 61 R.

[0077] With the crate 1 a, when transporting a motorcycle 40 having a greater body length in which the front forks 42L and 42R are projecting forward (e.g., those called "American type"), the motorcycle 40 can be transported with the front wheel 43 removed. Thus, the length of the crate 1 a (the length in the front-rear direction) can be made shorter. As a result, the crate 1 a can be made compact, and it is possible to increase the number of crates 1 a to be accommodated in a container (the number of items carried in a container) during transportation. Thus, it is possible to reduce the transportation cost. Note that FIG. 9 shows a motorcycle 40 of a so-called "naked type".

[0078] The configuration of a motorcycle crate 1 b shown in FIG. 10 is basically the same as the configuration of the motorcycle crate 1 of FIG. 1. The configuration of the crate 1 b is different from the configuration of the crate 1 in that a middle bottom frame member 2g, a middle top frame member 3f, a joist member 2h, two front wheel support members 10, and two rear wheel support members 15 are provided. The crate 1 b is for transporting two motorcycles 40 and 40a. Note that in FIG. 10, like components to those of FIG. 1 are denoted by like reference numerals, and will not be described below.

[0079] The joist member 2h is formed by folding a flat plate, and is connected between the first bottom frame member 2a and the second bottom frame member 2b. The joist member 2h is disposed between a skid member 2e that is closest to the third bottom frame member 2c, and another skid member 2e that is next to this skid member 2e. The middle bottom frame member 2g is provided so as to extend in the front-rear direction between the first bottom frame member 2a and the second bottom frame member 2b. The middle bottom frame member 2g is connected to the center of the third bottom frame member 2c and the center of the fourth bottom frame member 2d. The middle bottom frame member 2g is supported by the third bottom frame member 2c, three skid members 2e, the joist members 2h and 2f, and the fourth bottom frame member 2d. As shown in FIG. 2E, the middle top frame member 3f has the same transverse cross-sectional shape as the transverse cross-sectional shape of a skid member 2e. The opposite corner portions of the bottom portion of the groove portion 29 are each given a rounded shape. The middle top frame member 3f is placed so that the third straight portion 30 and the fourth straight portion 31 are located below the groove portion 29. The middle top frame member 3f is disposed so as to extend in the front-rear direction between the first top frame member 3a and the second top frame member 3b. The middle top frame member 3f is connected to the center of the third top frame member 3c and the center of the fourth top frame member 3d. The middle top frame member 3f is supported by the third top frame

member 3c, the three top cross members 3e and the fourth top frame member 3d.

[0080] The front wheel support member 10 supporting the front wheel 43 of the motorcycle 40 and the rear wheel support member 15 (FIG. 3) supporting the rear wheel 45 (FIG. 3) are disposed rightward of the middle bottom frame member 2g. The front wheel support member 10 used for the motorcycle 40 is disposed between the third bottom frame member 2c and the foremost skid member 2e. The rear wheel support member 15 used for the motorcycle 40 is disposed between the joist member 2f and the rearmost skid member 2e. The front wheel support member 10 supporting a front wheel 43a of the motorcycle 40a and the rear wheel support member 15 supporting a rear wheel 45a are disposed leftward of the middle bottom frame member 2g. The front wheel support member 10 used for the motorcycle 40a is disposed between the fourth bottom frame member 2d and the rearmost skid member 2e. The rear wheel support member 15 used for the motorcycle 40a is disposed between the foremost skid member 2e and the joist member 2h. In the crate 1 b, the motorcycle 40 and the motorcycle 40a are placed in opposite directions. That is, the motorcycle 40 and the motorcycle 40a are supported so that the front wheel 43 of the motorcycle 40 and the rear wheel 45a of the motorcycle 40a are next to each other in the width direction of the crate 1b while the rear wheel 45 of the motorcycle 40 and the front wheel 43a of the motorcycle 40a are next to each other in this direction.

[0081] FIG. 2G is a transverse cross-sectional view showing the middle bottom frame member 2g. As can be seen from a comparison between FIG. 2C and FIG. 2G, the transverse cross-sectional shape of the middle bottom frame member 2g is a 180°-rotated version of the transverse cross-sectional shape of the top cross member 3e. The description of the shape of the middle bottom frame member 2g will be omitted herein. The method for lashing the motorcycles 40 and 40a onto the crate 1 b using the securing belts 50 and 51 of FIG. 6 is similar to the method described above with reference to FIG. 3 to FIG. 5. In such a case, the securing belts 50 and 51 of the motorcycle 40 contact the curved portion 25a (FIG. 2G) whereas the securing belts 50 and 51 of the motorcycle 40a are in contact with the curved portion 26a, and they are thus unlikely to break. Moreover, the amount of lashing using securing belts may be increased as follows. That is, a securing belt (not shown) may be passed around an upper portion of the motorcycle 40 (e.g., the left handle) and the first top frame member 3a, and a securing belt (not shown) may be passed around an upper portion of the motorcycle 40 (e.g., the right handle) and the second top frame member 3b. A securing belt (not shown) may be passed around an upper portion of the motorcycle 40a (e.g., the left handle) and the second top frame member 3b, and a securing belt (not shown) may be passed around an upper portion of the motorcycle 40a (e.g., the right handle) and the first top frame member 3a. Note that the securing belts 50 and 51 are not shown in FIG. 10.

[0082] Note that while a curved portion is formed at an edge portion of each member that is formed from a flat plate in the embodiment described above, the present invention is not limited thereto. A round rod, or the like, may be provided instead of a curved portion. For example, a first bottom frame member 2a' and a second bottom frame member 2b', of which the curved portion 28d is formed by fixing a round rod to the second edge portion β by welding or a fastener, as shown in FIG. 11, may be employed instead of the curved portion 28c formed at the second edge portion β of the first bottom frame member 2a and the second bottom frame member 2b. The curved portion 28d has a curved shape in transverse cross section. More specifically, the surface of the curved portion 28d is curved. In other words, the curved portion 28d has an arc-shaped surface in transverse cross section. Thus, using a round rod, the edge portion can be rounded. That is, the edge portion of the vertical portion 28 can be given a rounded shape. As used in the present specification, the phrase "formed by a plate material" also includes "configurations where another component is added to a plate material".

[0083] While each curved portion is formed across the entire length of the component in the embodiment described above, it may be formed only over a portion where the securing belt will be passed around.

[0084] In the embodiment described above, the curved portion 27b obtained by bending an edge portion of the member (which is also a curved portion corresponding to reference sign 25a and reference sign 26a of FIG. 2C) may be employed, as shown in FIG. 11, instead of the curved portion 27a obtained by folding back an edge portion of the member (reference sign 27a of FIG. 2D). Conversely, the curved portion 27a may be employed instead of the curved portion 25a, 26a or 27b.

[0085] Rigid securing, where a spacer is sandwiched between the motorcycle 40 and components of the crate 1, 1 a or 1 b, is not used, but the motorcycle 40 is secured by using only the securing belts 50 and 51 in the embodiment described above. However, the present invention is not limited thereto. Spacers may be used partly when lashing the motorcycle 40.

[0086] Although no curved portion is provided in the vertical portion 21 of the first top frame member 3a and the second top frame member 3b in the embodiment described above, curved portions may be provided taking into consideration the cost needed for dies and jigs.

[0087] The terms and expressions used herein are used for explanation purposes and should not be construed as being restrictive. It should be appreciated that the terms and expressions used herein do not eliminate any equivalents of features illustrated and mentioned herein, but include various modifications falling within the claimed scope of the present invention. The present invention may be embodied in many different forms. The present disclosure is to be considered as providing examples of the principles of the invention. These examples are described herein with the understanding that such examples are not intended to limit the present invention to preferred embodiments described

herein and/or illustrated herein. Hence, the present invention is not limited to the preferred embodiments described herein. The present invention includes any and all preferred embodiments including equivalent elements, modifications, omissions, combinations, adaptations and/or alterations as would be appreciated by those skilled in the art on the basis of the present disclosure. The limitations in the claims are to be interpreted broadly based on the language included in the claims and not limited to examples described in the present specification or during the prosecution of the application.

Reference Signs List

[0088]

10	1, 1a, 1b	Motorcycle crate
	2a, 2a'	First bottom frame member
	2b, 2b'	Second bottom frame member
	2c	Third bottom frame member
15	2d	Fourth bottom frame member
	2e	Skid member
	2f, 2h	Joist member
	2g	Middle bottom frame member
	3a	First top frame member
20	3b	Second top frame member
	3c	Third top frame member
	3d	Fourth top frame member
	3e	Top cross member
	3f	Middle top frame member
25	4a	First front frame member
	4b	Second front frame member
	4c	First cross member
	5a	First rear frame member
	5b	Second rear frame member
30	5c	Second cross member
	6a, 6b, 6c	First vertical member
	7a, 7b, 7c	Second vertical member
	10	Front wheel support member
	15	Rear wheel support member
35	20a, 25a, 26a, 27a, 27b, 28c, 28d, 32a, 33a	Curved portion
	24, 29	Groove portion
	25	First straight portion
	26	Second straight portion
	30	Third straight portion
40	31	Fourth straight portion
	40, 40a	Motorcycle
	50, 51	Securing belt
	α	First edge portion
45	β	Second edge portion

Claims

1. A motorcycle crate (1; 1 a; 1 b) for crating a motorcycle (40; 40a) comprising:

a first bottom frame member (2a; 2a') extending in a front-rear direction;
 a second bottom frame (2b; 2b') member placed rightward of the first bottom frame member (2a; 2a'), and extending in the front-rear direction;
 a third bottom frame member (2c) connected to a front end portion of the first bottom frame member (2a; 2a') and a front end portion of the second bottom frame member (2b; 2b'), and extending in a left-right direction;
 a fourth bottom frame member (2d) connected to a rear end portion of the first bottom frame member (2a; 2a') and a rear end portion of the second bottom frame member (2b; 2b'), and extending in the left-right direction;
 a first top frame member (3a) placed above the first bottom frame member (2a; 2a'), and extending in the front-

rear direction;

a second top frame member (3b) placed above the second bottom frame member (2b; 2b') and rightward of the first top frame member (3a), and extending in the front-rear direction;

a third top frame member (3c) placed above the third bottom frame member (2c), connected to a front end portion of the first top frame member (3a) and a front end portion of the second top frame member (3b), and extending in the left-right direction;

a fourth top frame member (3d) placed above the fourth bottom frame member (2d), connected to a rear end portion of the first top frame member (3a) and a rear end portion of the second top frame member (3b), and extending in the left-right direction;

a first front frame member (4a) connected to the front end portion of the first bottom frame member (2a; 2a') and the front end portion of the first top frame member (3a), and extending in an up-down direction;

a second front frame member (4b) placed rightward of the first front frame member (4a), connected to the front end portion of the second bottom frame member (2b; 2b') and the front end portion of the second top frame member (3b), and extending in the up-down direction;

a first rear frame member (5a) placed rearward of the first front frame member (4a), connected to the rear end portion of the first bottom frame member (2a; 2a') and the rear end portion of the first top frame member (3a), and extending in the up-down direction;

a second rear frame member (5b) placed rearward of the second front frame member (4b) and rightward of the first rear frame member (5a), connected to the rear end portion of the second bottom frame member (2b; 2b') and the rear end portion of the second top frame member (3b), and extending in the up-down direction;

a first skid member (2e) placed rearward of the third bottom frame member (2c) and forward of the fourth bottom frame member (2d), connected to the first bottom frame member (2a; 2a') and the second bottom frame member (2b; 2b'), and extending in the left-right direction; and

a rear wheel support member (15) supported by the first skid member and configured to support a rear wheel (45) of the motorcycle (40; 40a), wherein:

the first bottom frame member (2a; 2a'), the second bottom frame member (2b; 2b'), the third bottom frame member (2c), the fourth bottom frame member (2d), the first top frame member (3a), the second top frame member (3b), the third top frame member (3c), the fourth top frame member (3d), the first front frame member (4a), the second front frame member (4b), the first rear frame member (5a), and the second rear frame member (5b) are each formed by a partly-bent plate material;

a transverse cross section of the plate material includes a first edge portion (α), and a second edge portion (β) apart from the first edge portion (α); and

a transverse cross section of at least a portion of the first bottom frame member (2a; 2a') and/or a transverse cross section of at least a portion of the second bottom frame member (2b; 2b') includes a first curved portion (27a; 27b; 28c; 28d) having a curved shape, the first curved portion (27a; 27b; 28c; 28d) provided at at least one of the first edge portion (α) and the second edge portion (β).

2. The motorcycle crate (1; 1 a; 1 b) according to claim 1, wherein at least one of the first bottom frame member (2a; 2a'), the second bottom frame member (2b; 2b'), the first top frame member (3a), the second top frame member (3b), the third top frame member (3c), and the fourth top frame member (3d) is formed so that a transverse cross section thereof is L-shaped.

3. The motorcycle crate (1; 1 a; 1 b) according to claim 1 or 2, wherein a transverse cross section of at least a portion of the first top frame member (3a) and/or a transverse cross section of at least a portion of the second top frame member (3b) includes a second curved portion (20a) having a curved shape, the second curved portion (20a) provided at at least one of the first edge portion (α) and the second edge portion (β).

4. The motorcycle crate (1; 1 a; 1 b) according to any one of claims 1 to 3, wherein:

the first front frame member (4a), the second front frame member (4b), the first rear frame member (5a), and the second rear frame member (5b) are each formed so that a transverse cross section thereof is L-shaped; and a transverse cross section of at least one of the first front frame member (4a), the second front frame member (4b), the first rear frame member (5a), and the second rear frame member (5b) includes a third curved portion (33a) having a curved shape provided at the first edge portion (α) and/or a fourth curved portion (32a) having a curved shape provided at the second edge portion (β).

5. The motorcycle crate (1; 1 a; 1 b) according to claim 3, wherein:

the first front frame member (4a), the second front frame member (4b), the first rear frame member (5a), and the second rear frame member (5b) are each formed so that a transverse cross section thereof is L-shaped; a transverse cross section of at least one of the first front frame member (4a), the second front frame member (4b), the first rear frame member (5a), and the second rear frame member (5b) includes a third curved portion (33a) having a curved shape provided at the first edge portion (α) and a fourth curved portion (32a) having a curved shape provided at the second edge portion (β); and at least one of the first curved portion (27a; 27b; 28c), the second curved portion (20a), the third curved portion (33a), and the fourth curved portion (32a) is a folded-back portion formed by folding back the plate material.

6. The motorcycle crate (1; 1 a; 1 b) according to any one of claims 1 to 5, further comprising one or a plurality of top cross members (3e) connected to the first top frame member (3a) and the second top frame member (3b), and extending in the left-right direction, wherein:

a transverse cross section of the top cross member (3e) includes a downwardly- or upwardly-depressed first groove portion (24), a first straight portion (25) extending straight from one end of the first groove portion (24), and a second straight portion (26) extending straight from the other end of the first groove portion (24); and an edge portion (α) of the first straight portion (25) and/or an edge portion (β) of the second straight portion (26) include a fifth curved portion (25a; 26a) having a curved shape.

7. The motorcycle crate (1; 1a; 1b) according to any one of claims 1 to 6, wherein a transverse cross section of the first skid member (2e) includes a downwardly- or upwardly-depressed second groove portion (29), a third straight portion (30) extending straight from one end of the second groove portion (29), and a fourth straight portion (31) extending straight from the other end of the second groove portion (29).

8. The motorcycle crate (1; 1 a; 1 b) according to any one of claims 1 to 7, further comprising:

one or a plurality of first vertical members (6a; 6b; 6c) connected to the first bottom frame member (2a; 2a') and the first top frame member (3a); and

one or a plurality of second vertical members (7a; 7b; 7c) connected to the second bottom frame member (2b; 2b') and the second top frame member (3b).

9. The motorcycle crate (1; 1 a; 1 b) according to any one of claims 1 to 8, further comprising:

one or a plurality of first cross members (4c) connected to the first front frame member (4a) and the second front frame member (4b); and

one or a plurality of second cross members (5c) connected to the first rear frame member (5a) and the second rear frame member (5b).

10. The motorcycle crate (1; 1 b) according to any one of claims 1 to 9, further comprising:

a second skid member (2e) placed forward of the first skid member (2e), connected to the first bottom frame member (2a; 2a') and the second bottom frame member (2b; 2b'), and extending in the left-right direction;

a joist member (2f) connected to the first bottom frame member (2a; 2a') and the second bottom frame member (2b; 2b'), extending in the left-right direction, and having the same cross section shape as the first front frame member (4a), the second front frame member (4b), the first rear frame member (5a), and the second rear frame member (5b); and

a detachable front wheel support member (10) connected to the third bottom frame member (2c) and the second skid member (2e) and configured to support a front wheel (43) of the motorcycle (40),

wherein the rear wheel support member (15) is connected to the joist member (2f) and the first skid member (2e), and is detachable.

11. The motorcycle crate (1 b) according to any one of claims 1 to 10, further comprising:

a middle bottom frame member (2g) placed between the first bottom frame member (2a; 2a') and the second bottom frame member (2b; 2b'), connected to the third bottom frame member (2c) and the fourth bottom frame member (2d), and extending in the front-rear direction; and

a middle top frame member (3f) placed between the first top frame member (3a) and the second top frame member (3b), connected to the third top frame member (3c) and the fourth top frame member (3d), and extending

in the front-rear direction, wherein:

a transverse cross section of the middle bottom frame member (2g) includes a downwardly- or upwardly-depressed first groove portion (24), a first straight portion (26) extending straight from one end of the first groove portion (24), and a second straight portion (25) extending straight from the other end of the first groove portion (24);

an edge portion (α) of the first straight portion (26) and/or an edge portion (β) of the second straight portion (25) include a fifth curved portion (26a; 25a) having a curved shape;

a transverse cross section of the middle top frame member (3f) includes a downwardly- or upwardly-depressed second groove portion (29), a third straight portion (30) extending straight from one end of the second groove portion (29), and a fourth straight portion (31) extending straight from the other end of the second groove portion (29); and

opposite corner portions of the second groove portion (29) have a curved shape.

12. The motorcycle crate (1; 1 a; 1 b) according to any one of claims 1 to 11, further comprising:

a securing belt (50; 51) to be passed around a portion of the motorcycle (40) and the first bottom frame member (2a; 2a'); and

another securing belt (50; 51) to be passed around another portion of the motorcycle (40) and the second bottom frame member (2b; 2b').

13. The motorcycle crate (1; 1 a; 1 b) according to claim 12, wherein the securing belts (50; 51) are each a cam buckle belt whose length can be adjusted.

14. The motorcycle crate (1; 1a) according to any one of claims 1 to 11, wherein the motorcycle (40) includes left and right front forks (42L; 42R), the motorcycle crate (1) further comprising:

a first securing belt (50L) to be passed around the left front fork (42L) of the motorcycle (40) and a portion of the first curved portion (27a; 27b) that is forward of a central position of the first bottom frame member (2a; 2a') in the front-rear direction; and

a second securing (50R) belt to be passed around the right front fork (42R) of the motorcycle (40) and a portion of the first curved portion (27a; 27b) that is forward of a central position of the second bottom frame member (2b; 2b') in the front-rear direction.

15. The motorcycle crate (1; 1a) according to claim 14, wherein the motorcycle (40) includes left and right rear arms (44L; 44R), the motorcycle crate (1) further comprising:

a third securing belt (51 L) to be passed around the left rear arm (44L) of the motorcycle (40) and a portion of the first curved portion (27a; 27b) that is rearward of a central position of the first bottom frame member (2a; 2a') in the front-rear direction; and

a fourth securing belt (51 R) to be passed around the right rear arm (44R) of the motorcycle (40) and a portion of the first curved portion (27a; 27b) that is rearward of a central position of the second bottom frame member (2b; 2b') in the front-rear direction.

FIG.1

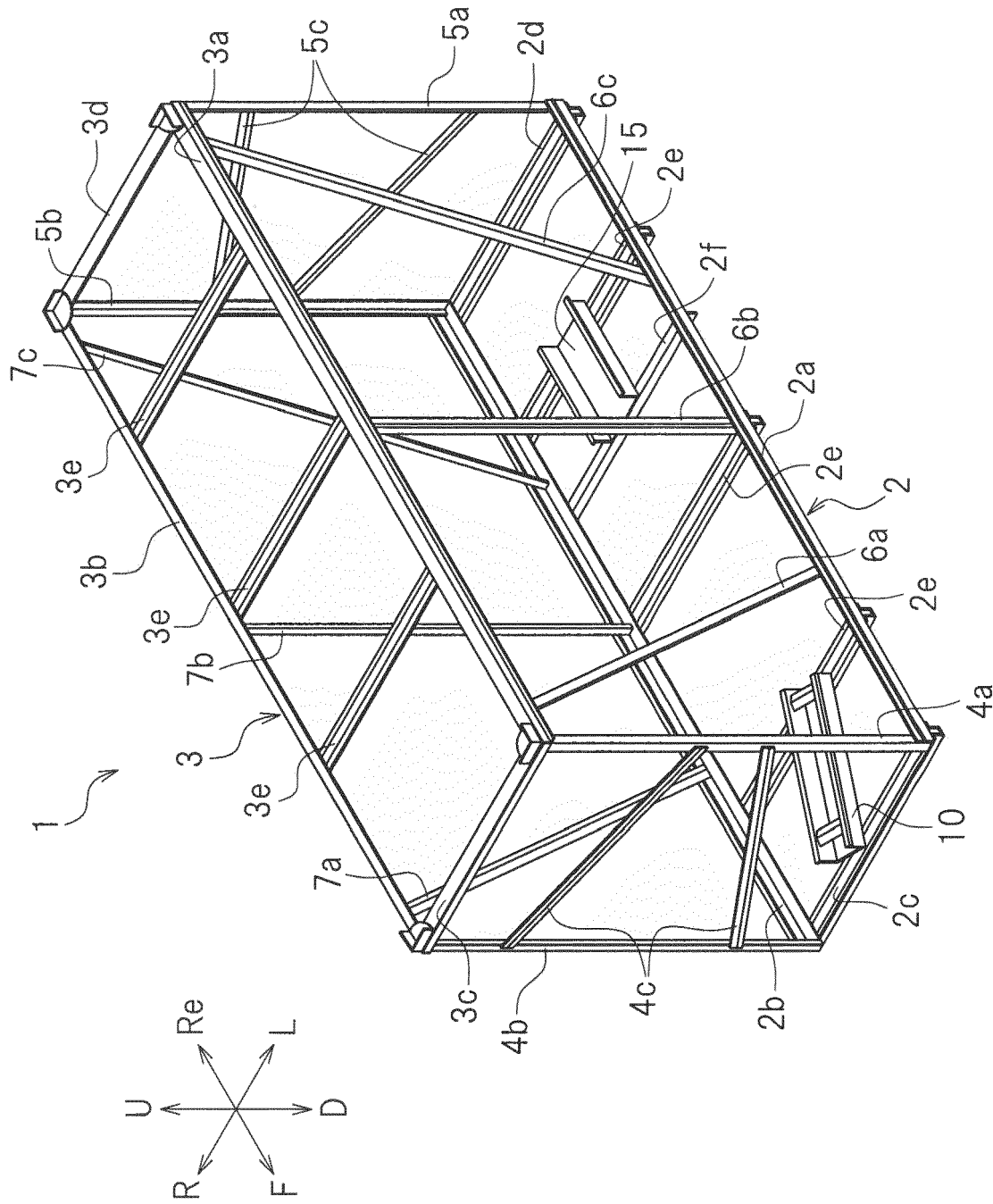


FIG.2A

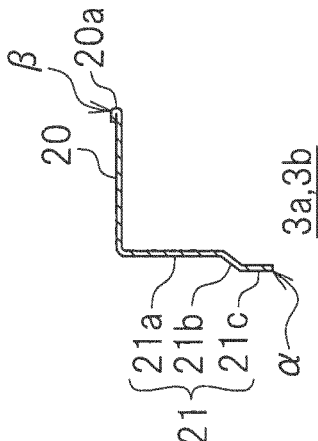


FIG.2B

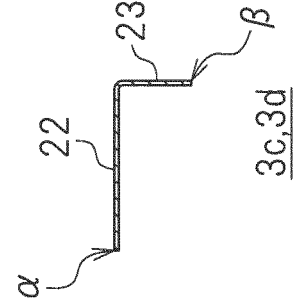


FIG.2C

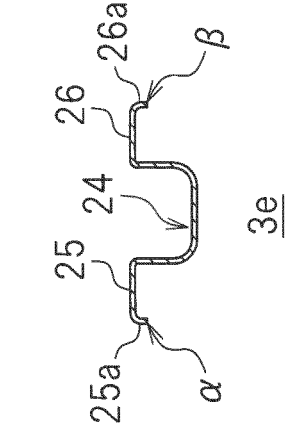


FIG.2D

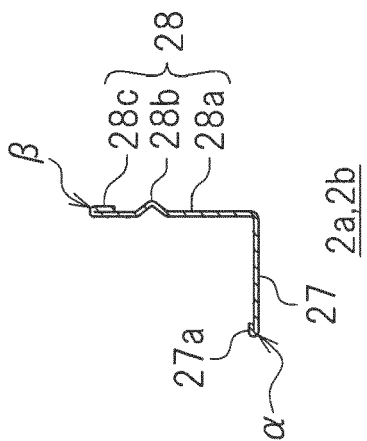


FIG.2E

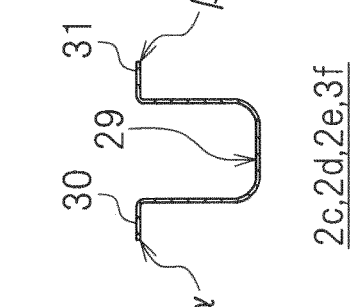


FIG.2F

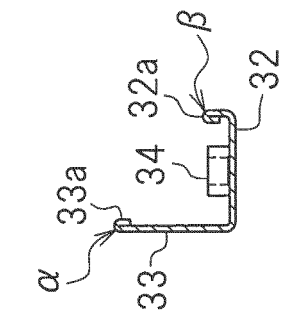


FIG.2G

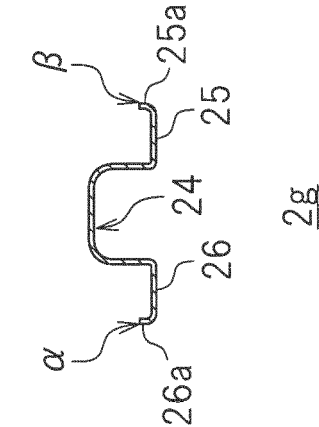


FIG.3

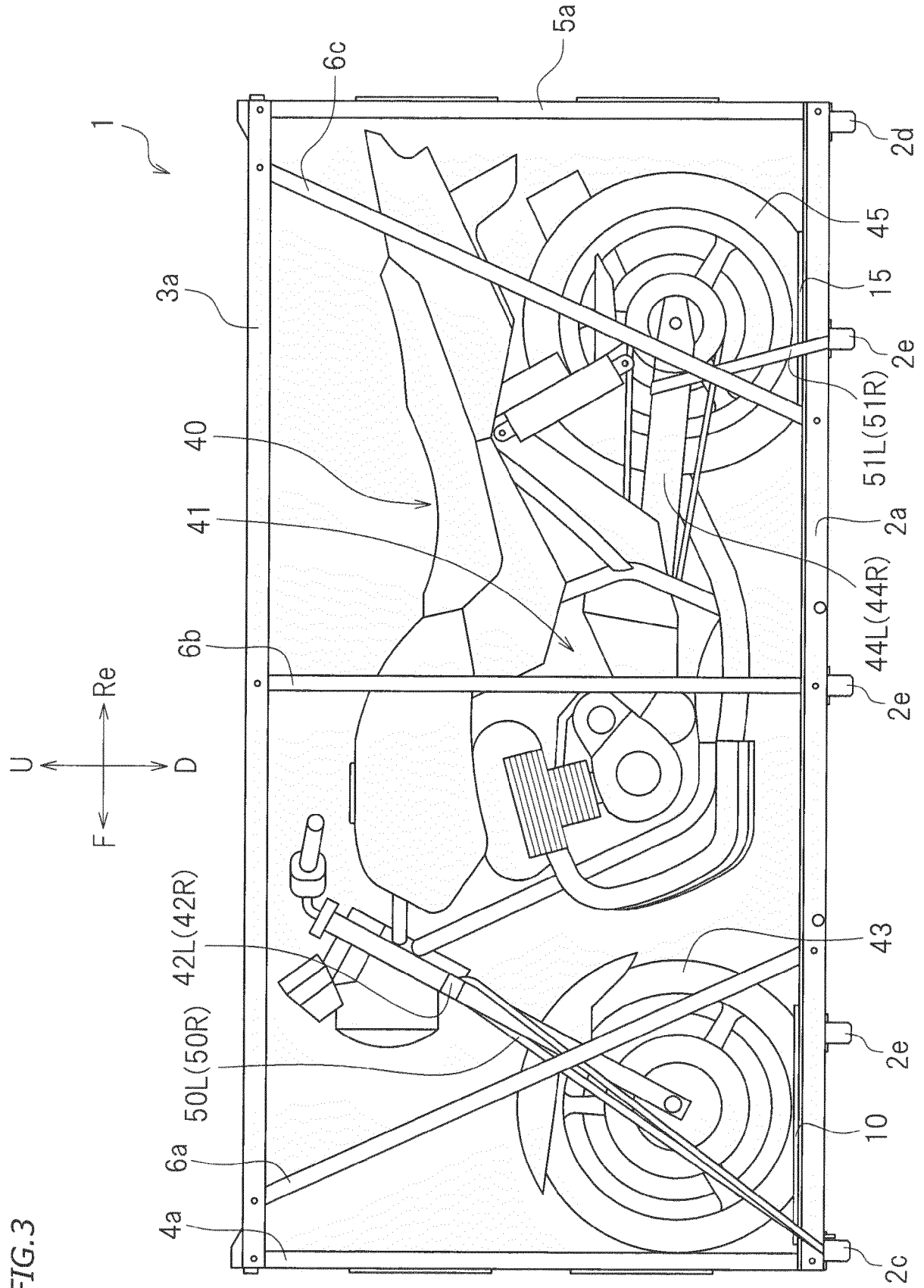


FIG. 4

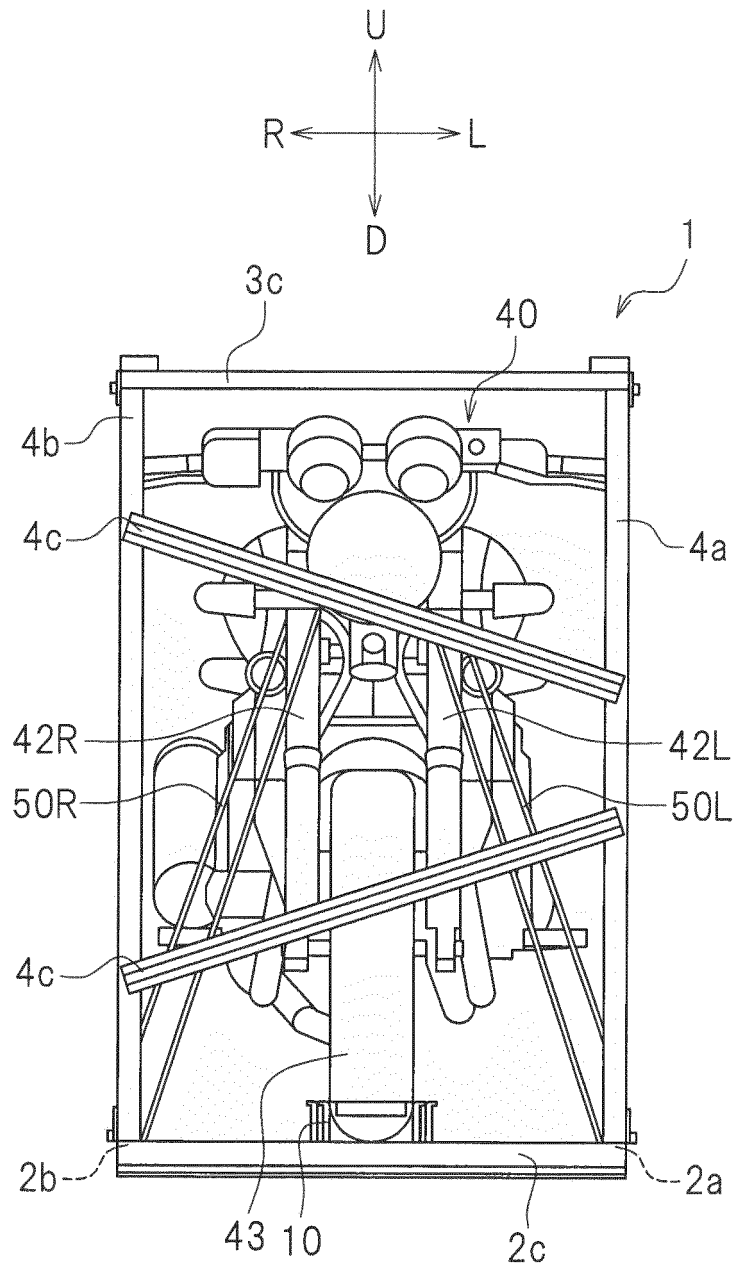


FIG.5

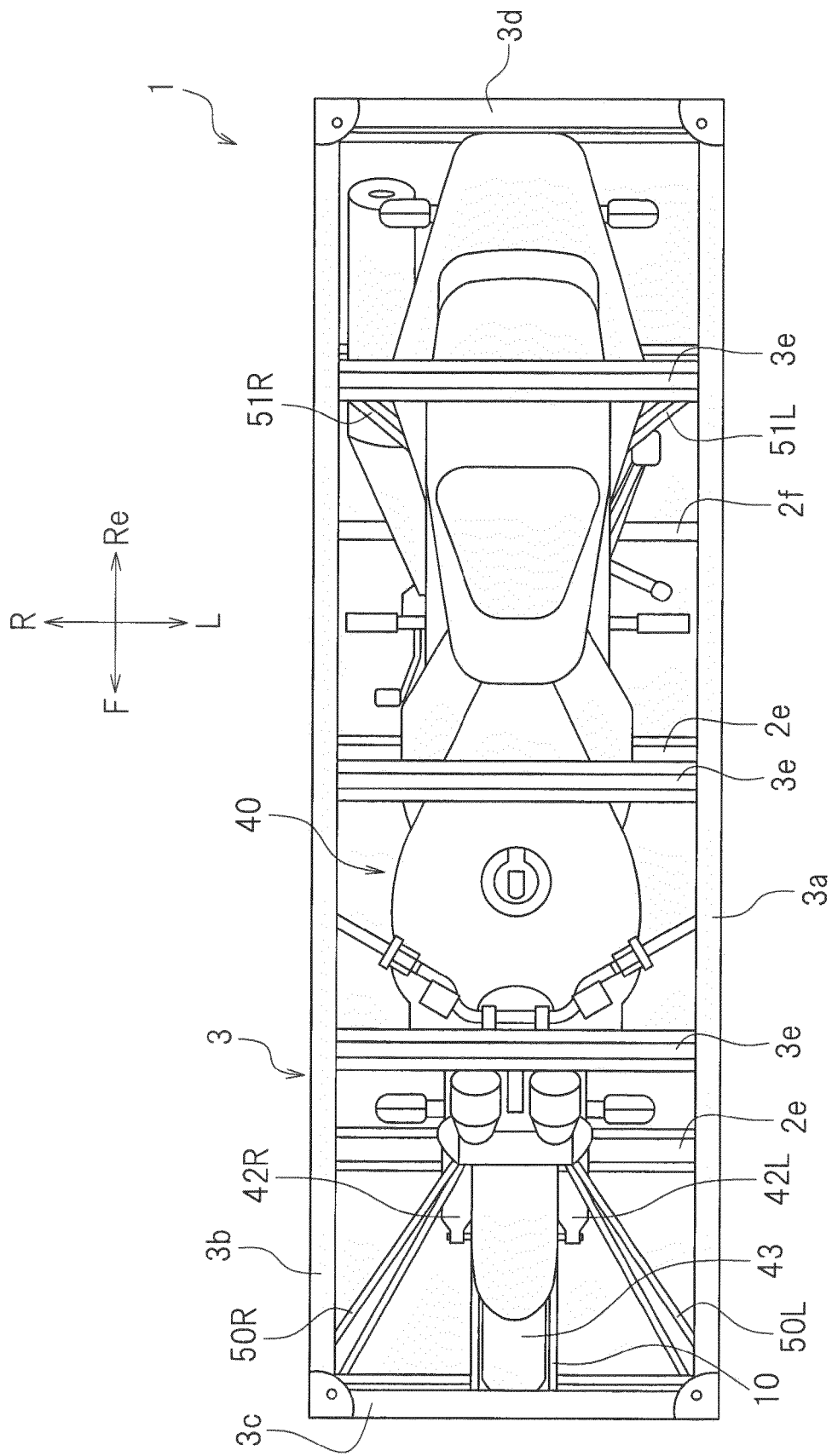


FIG.6

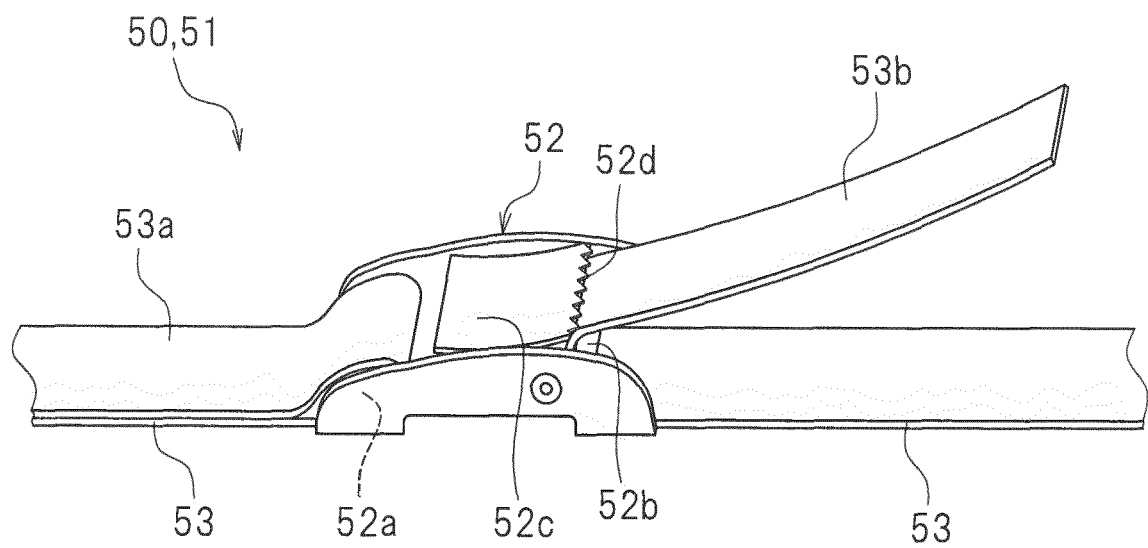


FIG. 7A

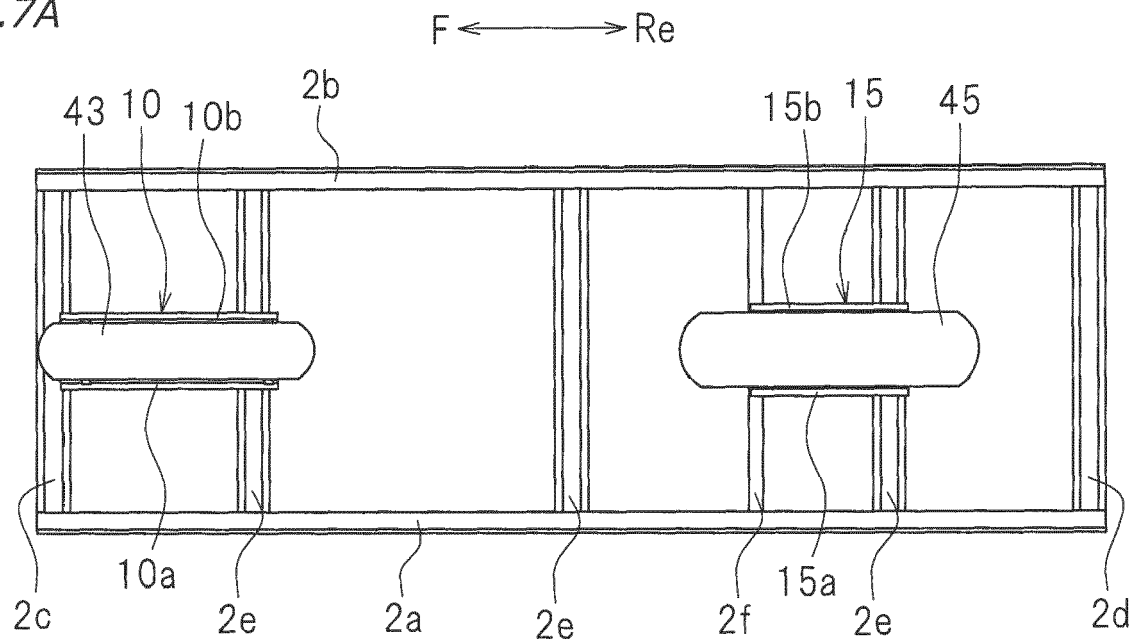


FIG. 7B

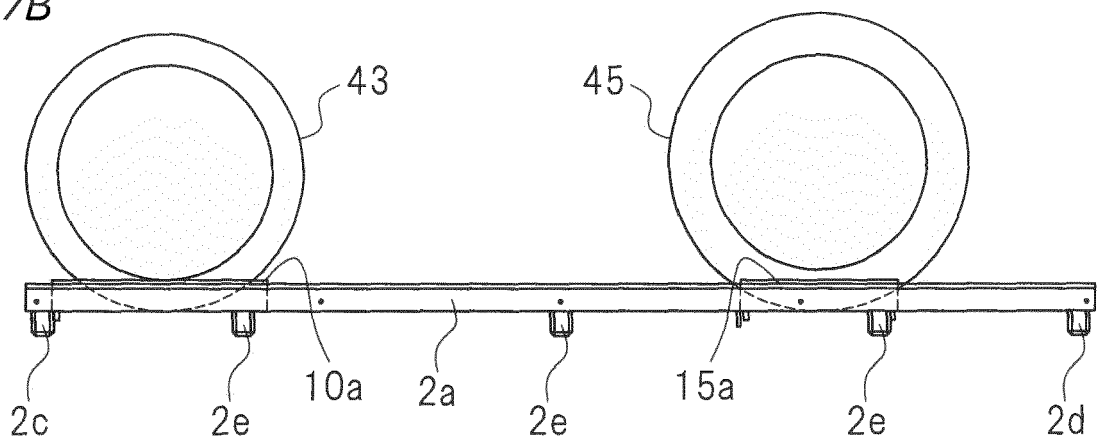


FIG. 8A

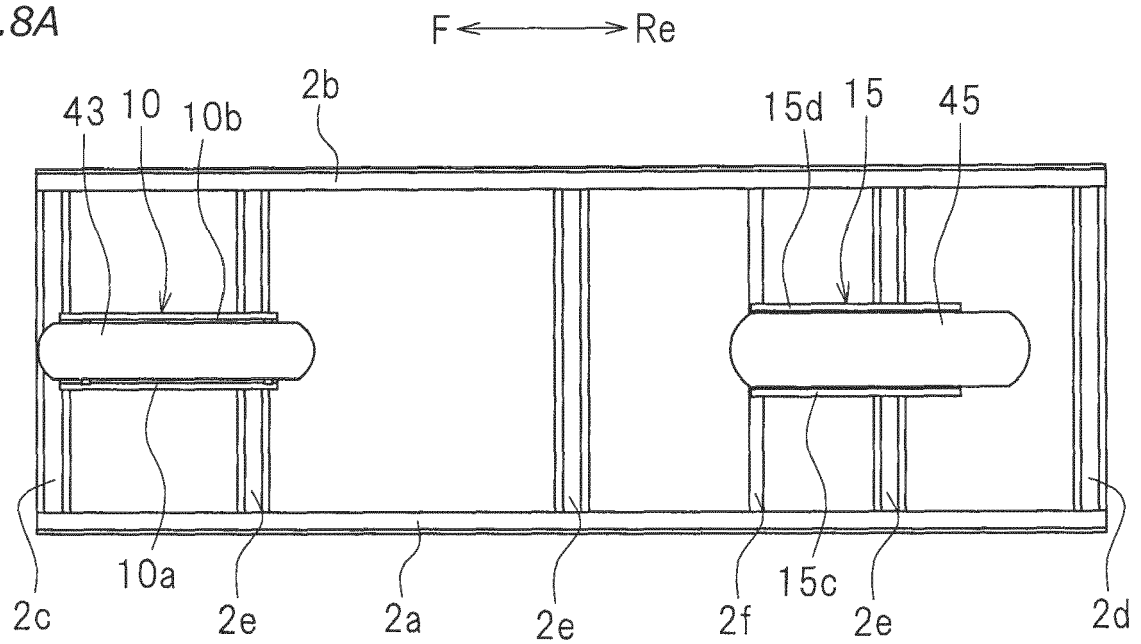


FIG. 8B

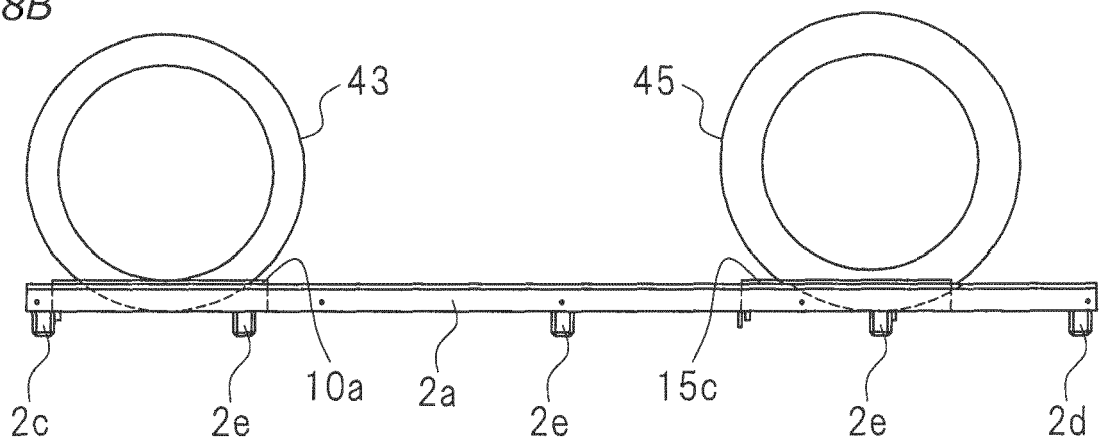


FIG.9

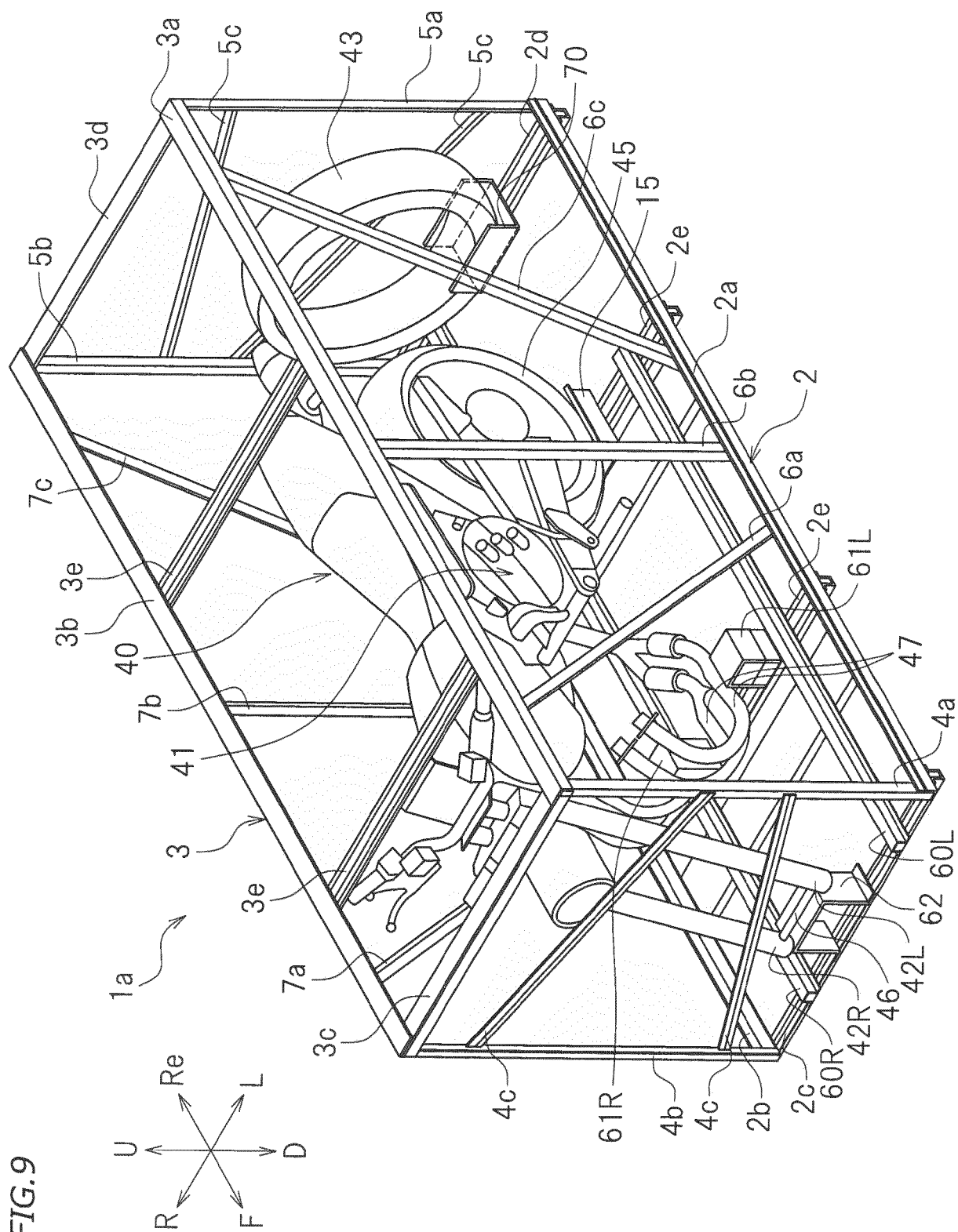


FIG.10

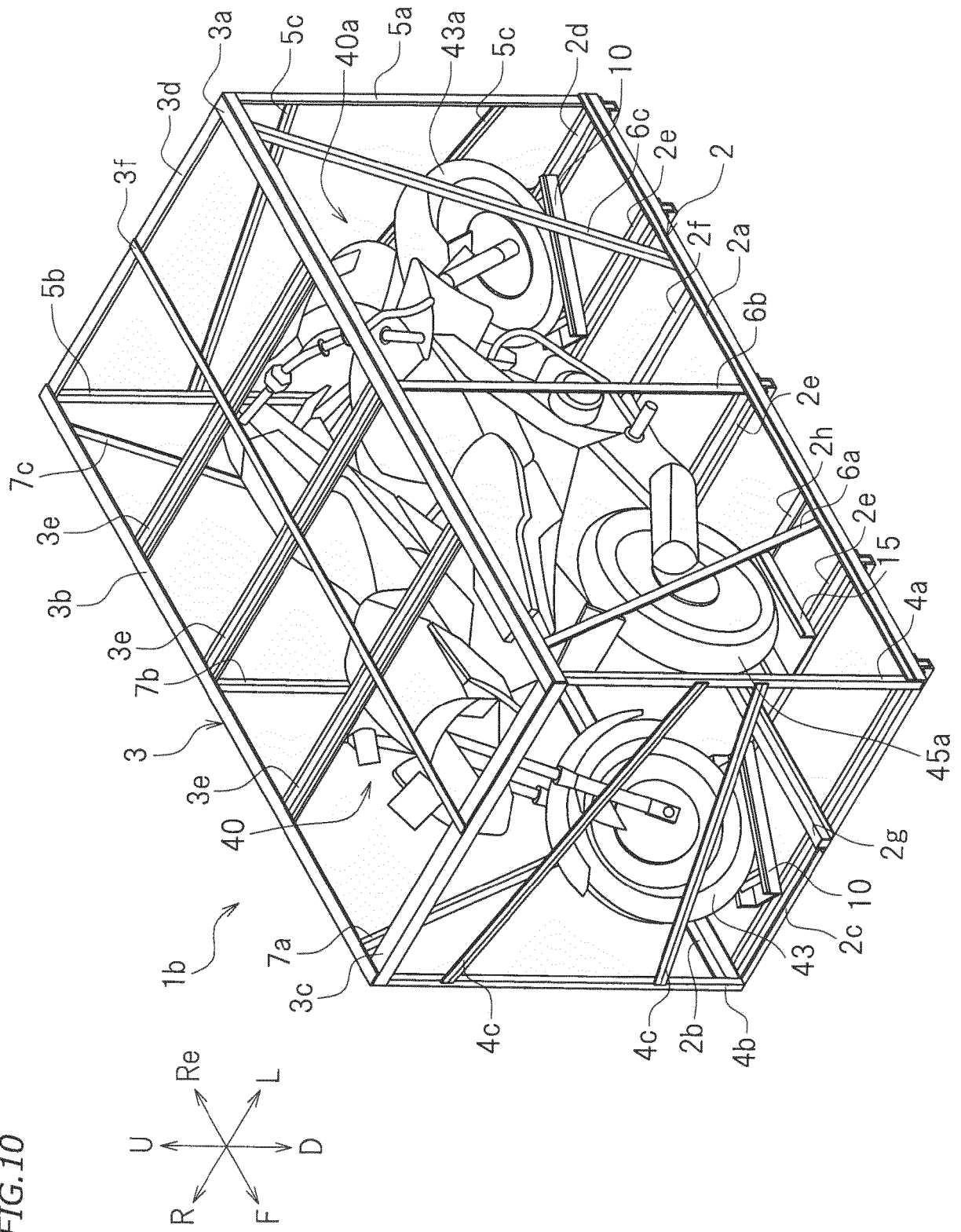
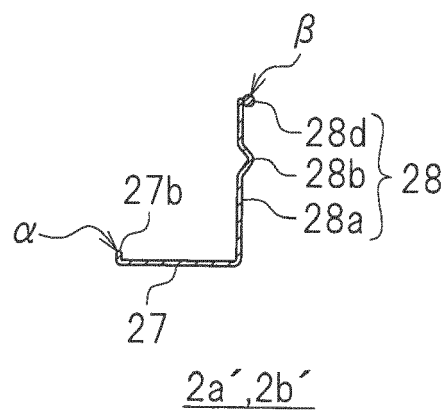


FIG.11





EUROPEAN SEARCH REPORT

Application Number
EP 15 19 4846

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	US 2006/081630 A1 (WILLIAMS MARTY [US]) 20 April 2006 (2006-04-20) * abstract; figures 1-8 *	1	
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A	US 6 006 676 A (CREEK THOMAS JOSEPH [US] ET AL) 28 December 1999 (1999-12-28) * the whole document *	1-15	
A	US 2009/057182 A1 (KAMITANI KIYOSHI [JP] ET AL) 5 March 2009 (2009-03-05) * figure 34 *	1	TECHNICAL FIELDS SEARCHED (IPC) B65D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 March 2016	Examiner Leijten, René
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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