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(54) OIL PAN DEVICE

ÖLWANNE

ENSEMBLE BAC À HUILE

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Description

TECHNICAL FIELD

[0001] This disclosure relates to an oil pan device and particularly relates to oil pan device used in an engine of a vehicle.

BACKGROUND ART

[0002] In an engine of a vehicle, an oil pan for storing engine oil is attached to a lower end of a crankcase. Generally, a bolt hole for discharging engine oil is provided in the bottom portion of the oil pan, and a drain bolt for closing the bolt hole is detachably attached to this bolt hole. WO 2014/079591 discloses a combined oil pan and filter, in particular for an engine oil circuit of an internal combustion engine, in particular of a motor vehicle. The oil pan has an oil drain opening which is closeable with a closure element.

Citation List

Patent Literature

[0003] [Patent Literature 1]: Japanese Unexamined Patent Application Publication No. H5-306653

SUMMARY

Technical Problem

[0004] In a vehicle, from the viewpoint of improving steering stability and the like, there is a demand for lowering the mounting position of an engine. On the other hand, in a case where the height position of a bottom portion of an oil pan is lowered, for example, the height position may be lower than a predetermined lower limit height such as minimum ground clearance of a vehicle, and thus it has been considered to employ a thin (shallow plate) oil pan.

[0005] In a case where a thin oil pan is used, the head portion of a drain bolt protrudes downwardly from the lowermost end position of the oil pan bottom portion, which is disadvantageous in securing a predetermined lower limit height. Thus, a method of recessing the bottom portion of the oil pan upward to form a recessed portion and uprightly attaching the drain bolt in the recessed portion is considered.

[0006] However, in the method, when engine oil is discharged, a relatively large amount of engine oil remains in the oil pan around the bolt hole.

[0007] This disclosure is made in consideration of the above circumstances and provides an oil pan device capable of reducing the amount of oil remaining in an oil pan when engine oil is discharged.

Solution to Problem

[0008] An oil pan device according to an aspect of the present invention is set out in claim 1.

[0009] In the oil pan device, the recessed portion may be formed in a reversed V shape in a cross-sectional view.

Advantageous Effects

[0010] According to the oil pan device of this disclosure, it is possible to reduce the amount of oil remaining in the oil pan when engine oil is discharged.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

FIG. 1 is a schematic view illustrating a bottom surface side of an oil pan device according to an embodiment of this disclosure.
FIG. 2 is a cross-sectional view taken along line II-II of FIG. 1.
FIG. 3 is a cross-sectional view taken along line III-III of FIG. 1.
FIG. 4A is a view illustrating a level of oil remaining in the embodiment of this disclosure.
FIG. 4B is a view illustrating a level of oil remaining in a case where a drain bolt is uprightly attached in a recessed portion without an inclined portion.

DESCRIPTION OF EMBODIMENTS

[0012] Hereinafter, an oil pan device according to an embodiment of this disclosure will be described based on the accompanying drawings. In the embodiment described below, the oil pan device is in a state in which the oil pan device is mounted on an engine of a vehicle (not illustrated), and the up-and-down direction is determined based on the up-and-down direction of the vehicle.

[0013] FIG. 1 is a schematic view illustrating a bottom surface side of an oil pan device 1 according to an embodiment of this disclosure. FIG. 2 is a cross-sectional view taken along line II-II of FIG. 1.

[0014] In FIG. 2, a reference numeral R indicates a road surface. In FIG. 3, a dashed line L indicates the lowermost end position of a head portion 52 of a drain bolt 50, and a two-dot chain line X indicates the minimum ground clearance of a vehicle. In the embodiment, the engine is arranged inclined to a cylinder axis so as to be slightly inclined in the vertical direction. Therefore, in FIGS. 2 and 3, in appearance, the oil surface of engine oil O seems to be inclined to a road surface R in the left-and-right direction.

[0015] In these drawings, the front-and-rear and left-and-right directions of the oil pan device 1 are not related with the front-and-rear and left-and-right directions of a vehicle and are merely determined for convenience of

explanation. In the embodiment, the front direction of an oil pan 10 coincides with the front direction of a vehicle.

[0016] As illustrated in FIGS. 1 to 3, the oil pan device 1 includes the oil pan 10 that is attached to a lower end 5a of a crankcase 5 and a drain bolt 50.

[0017] The oil pan 10 is formed of a metal material or a heat resistant resin material and includes a side wall 20 forming a side surface and a bottom plate 30 forming a bottom surface. Inside the oil pan 10, engine oil O for lubricating a lubrication target member such as a crank shaft (not illustrated) is stored. In the embodiment, the oil pan 10 is formed of a thin (shallow plate) oil pan in which the length of the side wall 20 in the up-and-down direction is short.

[0018] In the upper end portion of the side wall 20, a flange portion 21 which is attached to the lower end 5a of the crankcase 5 via a gasket (not illustrated) is provided. The flange portion 21 is detachably attached to the lower end 5a of the crankcase 5 by a bolt 22 or the like.

[0019] The bottom plate 30 includes a flat plate portion 31 formed in a flat plate shape, and the recessed portion 33 by recessing the bottom surface portion 32 (lower surface) upward. This recessed portion 33 is formed at a portion ahead of the left half of the bottom plate 30.

[0020] In the embodiment, particularly, the recessed portion 33 has a top portion 33T at a position higher than a position of an attachment surface F (the upper surface of the flange portion 21) of the oil pan 10 with the crankcase 5 (lower end 5a). As illustrated in FIG. 3, the recessed portion 33 is formed in a reversed V shape in a cross-sectional view.

[0021] More specifically, the recessed portion 33 is formed by partially recessing the bottom surface portion 32 in a cylindrical shape. The portion 33 having a recessed partially cylindrical shape has a first inclined portion 34 formed in a cylindrical circumferential surface shape and a second inclined portion 35 formed in a cylindrical end surface shape. In the embodiment, a bolt hole 36 is vertically provided in the second inclined portion 35.

[0022] The bolt hole 36 has a through-hole 36a passing through the second inclined portion 35, and a nut portion 36b arranged in the oil pan 10 and coaxially provided with the through-hole 36a. A flange 36c is formed at the end portion of the nut portion 36b on the second inclined portion 35 side and is fixed to the second included portion 35 by wielding or the like.

[0023] In the bolt hole 36, a lateral hole 36d is formed at the interfacial position between the nut portion 36b and the flange 36c. The lateral hole 36d is inclined to the axis of the bolt hole 36 and passes through the interface substantially horizontally from the lowermost end position of the through-hole 36a to the interfacial position.

[0024] The drain bolt 50 is detachably attached to the bolt hole 36 from the outside of the oil pan 10. Specifically, the drain bolt 50 has a screw portion 51 and a head portion 52, and the screw portion 51 is engaged with the bolt hole 36 by screwing. An O ring 53 for sealing a gap between the screw portion and the inner circumferential surface of the through-hole 36a is attached to the root portion of the screw portion 51.

[0025] The oil pan device 1 of the embodiment is configured such that when the drain bolt 50 is attached to the bolt hole 36, the head portion 52 is accommodated in the recessed portion 33. A height position L of the lowermost end of the oil pan device 1 (here, the head portion 52 of the drain bolt 50) is positioned above a predetermined lower limit height of a vehicle and in the embodiment, a minimum ground clearance X.

[0026] Next, the action effect of the oil pan device 1 of the embodiment will be described base on FIGS. 3, 4A and 4B. FIG. 4A illustrates a level of oil remaining when the engine oil O is discharged by detaching the drain bolt 50 from the bolt hole 36 in the oil pan device 1 of the embodiment illustrated in FIG. 3. FIG. 4B illustrates a level of oil remaining in a configuration in which a drain bolt is uprightly attached in a recessed portion in an oil pan device 1' of Comparative Example without an inclined portion.

[0027] In the embodiment, as illustrated in FIG. 4A, when the drain bolt 50 is detached from the bolt hole 36, the engine oil O is discharged to the outside from the horizontal hole 36d. Thus, the lower end position (the height position indicated by the dashed line Z1) of the horizontal hole 36d of the bolt hole 36 is a level of oil remaining.

[0028] On the other hand, as illustrated in FIG. 4B, in the oil pan device 1' of Comparative Example, the lower end portion (the height position indicated by the dashed line Z2) of an opening of a horizontal hole 36d' of a bolt hole 36' in the oil pan 10' is a level of oil remaining. In Comparative Example, the level of oil remaining (Z2) is positioned higher than the level of oil remaining (Z1) of the embodiment.

[0029] Accordingly, in the embodiment, by providing the bolt hole 36 in the second inclined portion 35, the amount of oil remaining can be reduced by the amount corresponding to (Z2 - Z1).

[0030] In the embodiment, as illustrated in FIG. 3, the recessed portion 33 formed by recessing the bottom surface portion 32 upward is provided and the head portion 52 of the drain bolt 50 is accommodated in the recessed portion 33. As a result, it is possible to prevent the head portion 52 from protruding from the bottom surface portion 32 to the road surface R side, which is advantageous in lowering the engine mounting position.

[0031] The top portion 33T of the recessed portion 33 of the embodiment is arranged oil pan 10 at a position higher than the position of the attachment surface F with the crankcase 5. Therefore, even in a case of using a thin oil pan to meet the minimum ground clearance X as a lower limit level, a space for accommodating the head portion 52 can be sufficiently secured.

[0032] In the embodiment, by providing the bolt hole 36 in the second inclined portion 35, an operation of attachment (detachment) of the drain bolt 50 can be easily

performed using a longer spanner or wrench to which force is more easily applicable.

[0033] This disclosure is not intended to be limited to the embodiments described above and may be appropriately modified present disclosure within the range not departing from the scope of this disclosure.

[0034] For example, in the embodiment, the recessed portion is partially recessed in a cylindrical shape, but the shape of the recessed portion may have other shapes. For example, the recessed portion may be formed in a substantially hemispherical shape.

Industrial Applicability

[0035] According to the oil pan device of this disclosure, it is possible to reduce the amount of oil remaining in an oil pan when engine oil is discharged.

Reference Signs List

[0036]

1: oil pan device
5: crankcase of engine
10: oil pan
32: bottom surface portion
33: recessed portion
35: (second) inclined portion
36: bolt hole
50: drain bolt
52: head portion

Claims

1. An oil pan device (1) comprising:

an oil pan (10) that is attached to a lower end of a crankcase of an engine (5); and
a drain bolt (50),
wherein the oil pan includes:

a recessed portion (33) formed by recessing upwardly a bottom surface portion (32);
an inclined portion (35) that sections the recessed portion (33); and
a bolt hole (36) that is provided in the inclined portion (35), **characterised in that**:

when the drain bolt (50) is attached to the bolt hole (36), a head portion (52) of the drain bolt (50) is accommodated in the recessed portion (33), and wherein
a top portion of the recessed portion (33) is arranged at a position higher than an attachment surface of the oil pan (10) with the crankcase (5).

2. The oil pan device (1) according to claim 1, wherein the recessed portion (33) is formed in a reversed V shape in a cross-sectional view.

Patentansprüche

1. Ölwannenvorrichtung (1), umfassend:

eine Ölwanne (10), die an einem unteren Ende eines Kurbelgehäuses eines Motors (5) befestigt ist; und
eine Ablassschraube (50),
wobei die Ölwanne umfasst:

einen ausgebuchteten Abschnitt (33), der durch Ausbuchten nach oben eines Bodenflächenabschnitts (32) gebildet ist;
einen geneigten Abschnitt (35), der den ausgebuchteten Abschnitt (33) unterteilt; und
ein Schraubenloch (36), das in dem geneigten Abschnitt (35) vorgesehen ist, **dadurch gekennzeichnet, dass**:

wenn die Ablassschraube (50) an dem Schraubenloch (36) angebracht ist, ein Kopfabschnitt (52) der Ablassschraube (50) in dem ausgebuchteten Abschnitt (33) untergebracht ist, und wobei
ein oberer Abschnitt des ausgebuchteten Abschnitts (33) an einer Position angeordnet ist, die höher als eine Befestigungsfläche der Ölwanne (10) mit dem Kurbelgehäuse (5) ist.

2. Ölwannenvorrichtung (1) nach Anspruch 1, wobei der ausgebuchtete Abschnitt (33) in einer Querschnittsansicht in einer umgekehrten V-Form ausgebildet ist.

Revendications

1. Ensemble de bac à huile (1) comprenant :

un bac à huile (10) qui est attaché à une extrémité inférieure d'un carter d'un moteur (5) ; et
un boulon de drainage (50),
le bac à huile comprenant :

une section en retrait (33) formée par la mise en retrait vers le haut d'une section de surface de partie inférieure (32) ;
une section inclinée (35) qui sectionne la section en retrait (33) ; et
un trou de boulon (36) qui est disposé dans la section inclinée (35), **caractérisé en ce**

que :

quand le boulon de drainage (50) est attaché au trou de boulon (36), une section de tête (52) du boulon de drainage (50) est logée dans la section en retrait (33), et
une section de partie supérieure de la section en retrait (33) est disposée à une position supérieure à une surface d'attachement du bac à huile (10) avec le carter (5).

2. Ensemble de bac à huile (1) selon la revendication 1, dans lequel
la section en retrait (33) est formée en une forme en V inversé dans une vue transversale.

FIG.1

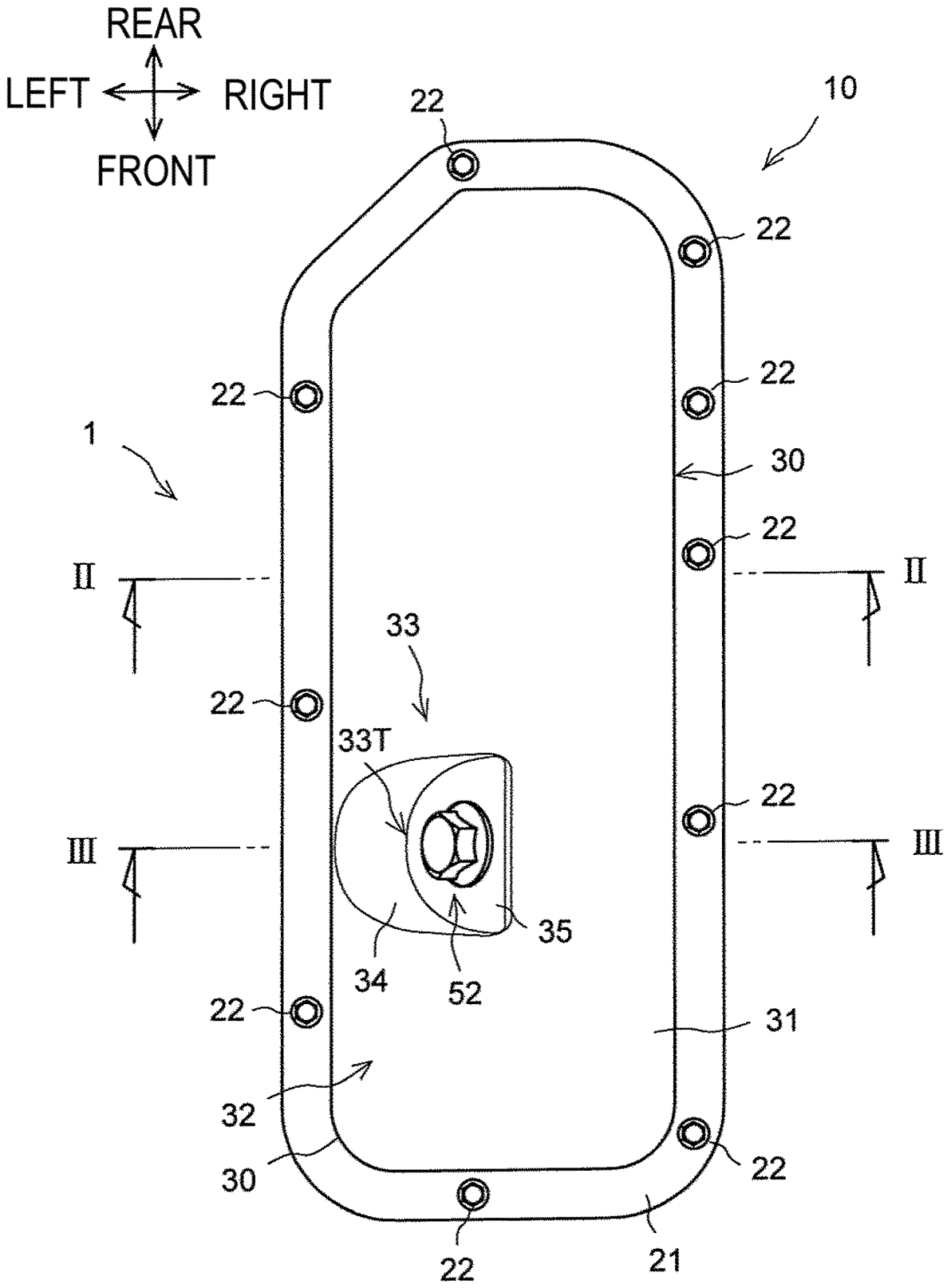


FIG.2

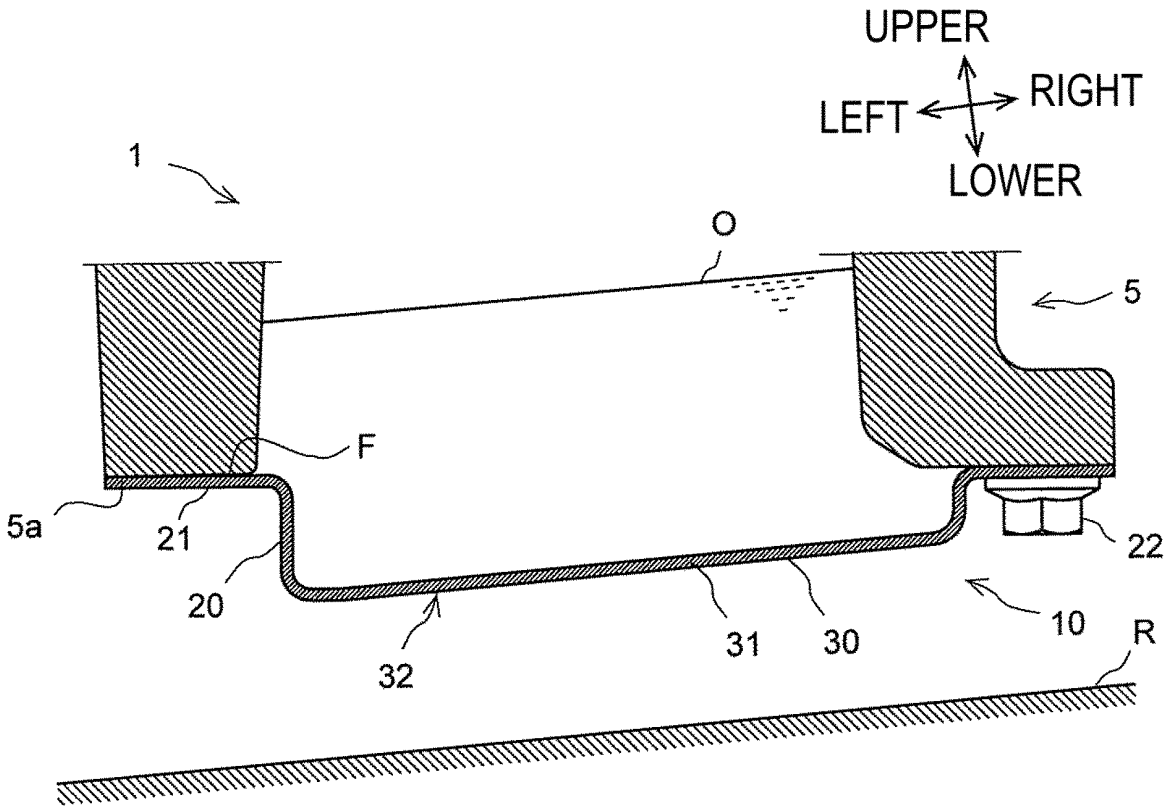

UPPER
LEFT
RIGHT
LOWER
1
O
5
F
5a
21
22
20
10
31
30
R
32

FIG.3

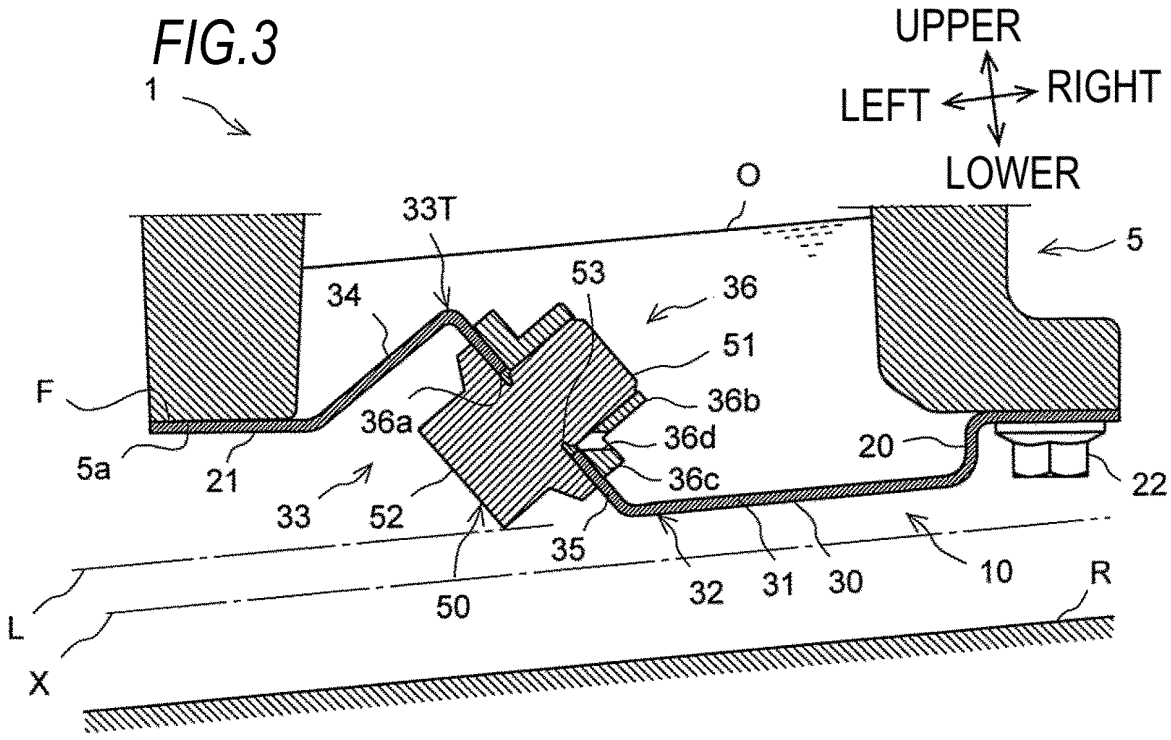

UPPER
LEFT
RIGHT
LOWER
1
O
33T
5
53
34
36
51
F
36b
36a
36d
20
5a
21
36c
22
33
52
35
L
50
32
31
30
10
R
X

FIG.4A

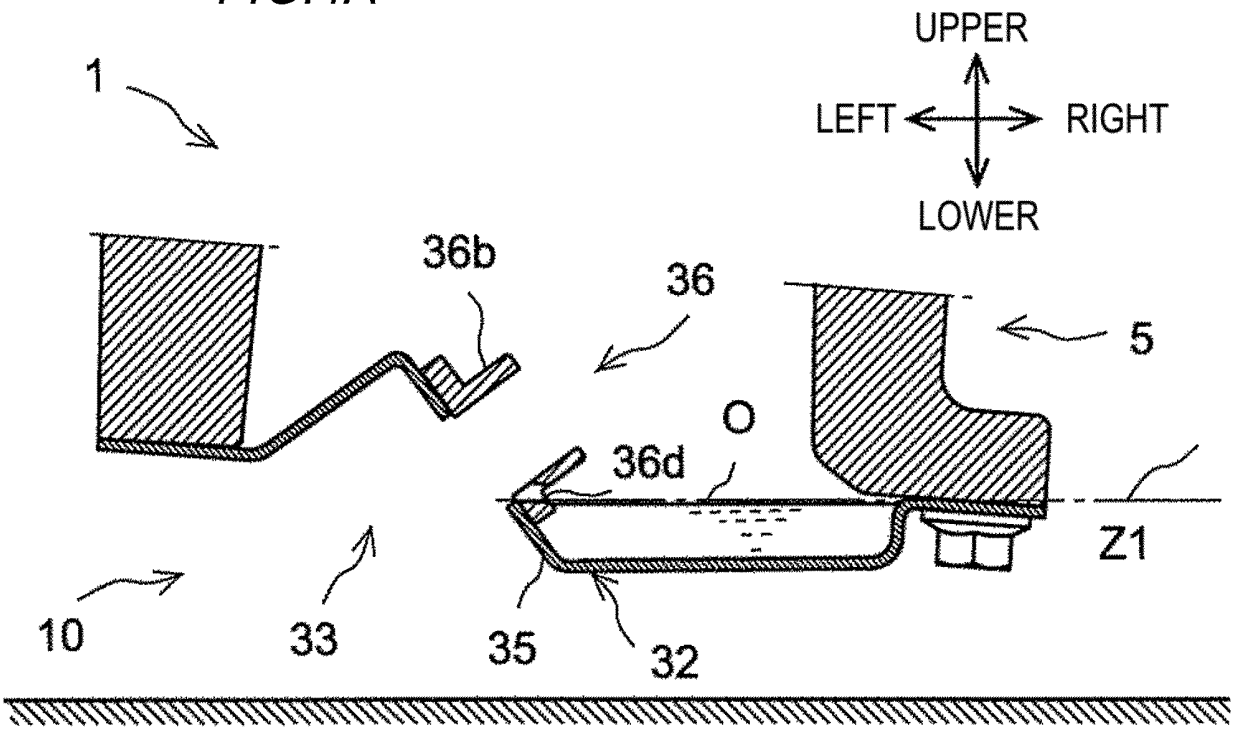
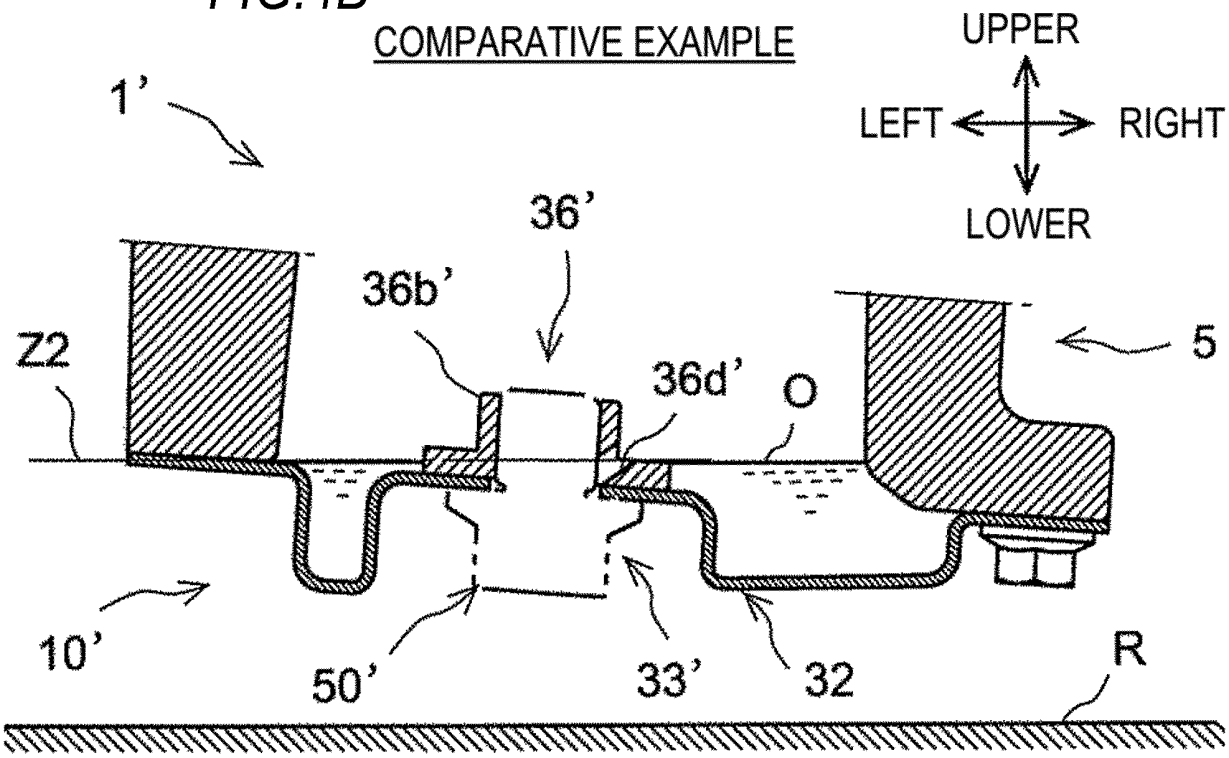

UPPER
LEFT
RIGHT
LOWER
1
36b
36
5
O
36d
Z1
10
33
35
32

FIG.4B


COMPARATIVE EXAMPLE
UPPER
LEFT
RIGHT
LOWER
1'
36'
36b'
Z2
5
36d'
O
10'
50'
33'
32
R

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2014079591 A **[0002]**
- JP H5306653 B **[0003]**