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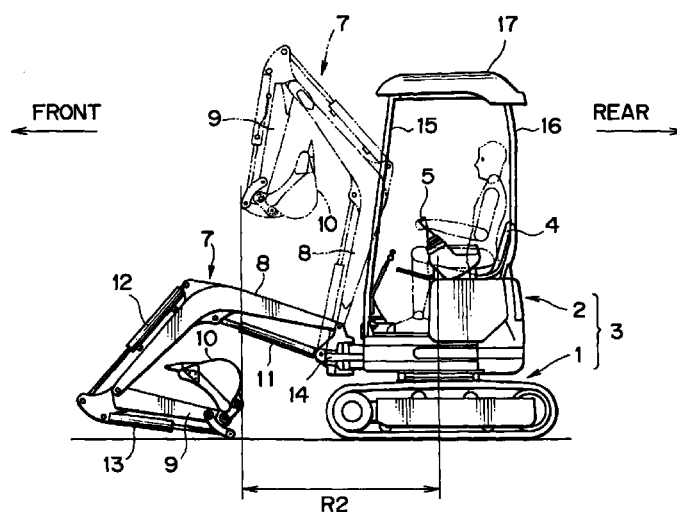
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(54) **Hydraulic excavator**

(57) There are provided a excavator body, a cabin provided on the upper surface, a work attachment mounted on the front part of said excavator body, and railings and roof supports forward of the cabin and rearward of a boom constituting the work attachment, the boom being arranged not to interfere with the roof supports in the whole rising and falling operating range over

the whole swing operating range. Thereby, the maximum stand-up angle of the boom is enlarged to a specification angle, and the minimum rotating radius of the upper construction body including the work attachment is reduced to secure necessary railing function, enabling installation of a roof naturally in a minimum space.

FIG. 1



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Description**BACKGROUND OF THE INVENTION****(FIELD OF THE INVENTION)**

[0001] The present invention relates to a compact hydraulic excavator.

(DESCRIPTION OF THE RELATED ART)

[0002] In the past, in the compact hydraulic excavator, an upper rotating body 2 is mounted on a crawler type traveling body 1 rotatably about a longitudinal axis, as shown in FIGS. 4 and 5.

[0003] In an excavator body (a base machine) 3, a cabin 4 is provided in a central portion of the upper surface of the upper rotating body 2. The cabin 4 is provided downward of a seat with an engine and other machineries (not shown) and on both left and right sides with lever type operating devices 5, 5.

[0004] Further, a handrail 6 is mounted forward of the cabin 4. A work attachment 7 is mounted directly forward of the handrail 6.

[0005] The work attachment 7 is provided with a rising and falling boom 8. In the standard specification (excavation specification), an arm 9 is mounted at the extreme end of the boom 8, and a bucket 10 is mounted at the extreme end of the arm 9. Reference numeral 11 denotes a boom rising and falling cylinder for rising and falling the boom 8. Numeral 12 denotes an arm cylinder for operating the arm 9. Numeral 13 denotes a bucket cylinder for operating the bucket 10.

[0006] The boom 8 is mounted to be swung in a lateral direction about a longitudinal axis so that groove excavation work can be done easily. The boom 8 is driven by a swing cylinder 14.

[0007] In the handrail 6, a lateral rail 6b is mounted horizontally and formed in an inverted U shape between longitudinal rails 6a, 6a on both left and right sides. The handrail 6 is used as a railing for supporting the body by hands when an operator leans forward to confirm the excavating part or when the operator gets on and off.

[0008] However, according to the conventional hydraulic excavator of this kind, the lateral rail 6b of the handrail 6 interferes with the boom 8 in a stood upright state of the boom 8, as shown by the phantom outline in FIG. 4. Therefore, the maximum upright angle of the boom 8 is limited to an angle smaller than an original angle of the excavator (hereinafter referred to as a specification angle). This poses a problem that the minimum rotating radius R1 of the upper construction body including the work attachment 7 increases.

[0009] It is contemplated that the whole height of the handrail 6 be set to be low so as not to interfere with the boom 8. However, if so, the longitudinal rails 6a, 6a particularly often used are lowered, and the function as an original railing materially lowers.

[0010] On the other hand, the compact excavator of this kind is normally not provided with a roof. However, it is desirable to install a room from a viewpoint of securing safety at the work site.

[0011] However, in this case, since there is no room for a space forward of the cabin, the longitudinal rails 6a, 6a of the handrail 6 are in the way so that it is difficult to install supports for a roof forward of the cabin. This is one of obstacles in installing a roof.

SUMMARY OF THE INVENTION

[0012] It is an object of the present invention to provide a hydraulic excavator capable of increasing the maximum stand-up angle of a boom to reduce the minimum rotating radius of an upper construction body without lowering the function of a railing, and capable of installing a roof naturally in a minimum space.

[0013] The hydraulic excavator according to the present invention comprises the following constitution. That is, it comprises a excavator body (a base machine) provided with a traveling body, a cabin provided on the upper surface of the excavator body, and a work attachment mounted forward of the excavator body, the work attachment comprising a boom that can be risen and fallen and can be swung on left and right about a longitudinal axis, roof supports provided forward of the cabin and on both sides at the rear of the boom, in which the boom is arranged so as not to interfere with the roof supports in a whole rising and falling range over a whole swing operating range, and so as to be projected rearward of the roof supports in a maximum stand-up state, and a roof provided above the roof supports to cover the cabin from a top of the cabin. The roof supports is used to be as railing too.

[0014] In this case, the roof supports on which a roof is mounted serve as a longitudinal railing also and are arranged so as not to interfere with the boom in the whole rising and falling range over the whole swing operating range of the boom, thus taking effect as follows:

- 1) The maximum stand-up angle of the boom can be enlarged to a specification angle (a state of being projected rearward of both roof supports) to reduce the minimum rotating radius of an upper construction body.
- 2) Necessary railing function can be secured.
- 3) The roof can be installed naturally in a minimum space.

[0015] Further, the hydraulic excavator according to the present invention has the following constitution: a lateral railing and connecting bar provided at an arrangement not to interfere with the boom between the roof supports.

[0016] In this case, since a lateral railing and connecting bar provided at an arrangement not to interfere

with the boom between the roof supports, both the railing function and the strength of the roof supports can be enhanced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

FIG. 1 is a side view of a hydraulic excavator according to an embodiment of the present invention;

FIG. 2 is a front view of the same;

FIG. 3 is a sectional view taken on A-A of FIG. 2;

FIG. 4 is a side view of a conventional hydraulic excavator; and

FIG. 5 is a plain view of the same.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] The embodiment of the present invention will be described with reference to FIGS. 1 to 3.

[0019] Only differences from the conventional hydraulic excavator shown in FIGS. 4 and 5 will be described.

[0020] Longitudinal railings and left and right front roof supports 15, 15, and left and right rear roof supports 16, 16 are stood upright on both left and right sides forward of a cabin 4 in an upper rotating body 2 of an excavator body 3, and on both left and right sides rearward of the cabin 4, respectively. A roof 17 for covering the cabin 4 from the top to protect an operator from falling things are mounted over the upper ends of the supports 15, 15, 16, 16.

[0021] A boom 8 constituting a work attachment 7 swings on left and right in the center forward of the upper rotating body 2. The both roof supports 15, 15 are mounted at an arrangement not to interfere with the boom 8 in the whole rising and falling range at any swing position of the boom 8.

[0022] A lateral railing and connecting bar 18 is mounted horizontally between both the front roof supports 15, 15. A handrail serving as a railing when one peeps into a forward excavating part and gets in and out is constituted by both the front roof supports 15, 15.

[0023] The connecting bar 18 is mounted at a height position (a position closer to an intermediate lower part) not to interfere with the boom 8 in the whole swing range and the whole rising and falling range of the boom 8.

[0024] According to this excavator constitution, the minimum rotating radius R2 of the upper construction body including the work attachment 7 is reduced as compared with the minimum rotating radius R1 of the conventional excavator shown in FIGS. 4 and 5. Because the boom 8 is stood upright to a specification angle in a state not to interfere with the handrail (front roof supports 15, 15 and connecting bar 18) and being

projected on the maximum and rearward (cabin 4 side) of both the roof supports 15, 15.

[0025] Moreover, since both the roof supports 15, 15 can be used as a longitudinal railing also which is high in necessity particularly at the time of work and at the time of getting on and off, the railing function is not possibly lowered as in the conventional case where the height of the whole handrail is lowered. Further, it is not necessary to secure separate spaces for the roof supports and the longitudinal railing. Because of this, both of them can be installed naturally in the minimum space.

[0026] Furthermore, a lateral railing and connecting bar 18 is provided at an arrangement not to interfere with the boom 8 between both the roof supports 15, 15. Because of this, the railing function can be strengthened, and the strength of the roof supports 15, 15 can be increased.

[0027] Preferably, the connecting bar 18 is provided between both the roof supports 15, 15 as in the above-described embodiment in order to enhance the railing function and the strength of the front roof supports 15, 15. However, the connecting bar 18 need not be provided, depending on the necessity.

[0028] Further, needless to say, an arrangement falls under the scope of the present invention, in which a railing is separately mounted to a degree not to impair the desired function of the present invention.

[0029] There are provided an excavator body, a cabin provided on the upper surface, a work attachment mounted on the front part of said excavator body, and railings and roof supports forward of the cabin and rearward of a boom constituting the work attachment, the boom being arranged not to interfere with the roof supports in the whole rising and falling operating range over the whole swing operating range. Thereby, the maximum stand-up angle of the boom is enlarged to a specification angle, and the minimum rotating radius of the upper construction body including the work attachment is reduced to secure necessary railing function, enabling installation of a roof naturally in a minimum space.

Claims

1. A hydraulic excavator, comprising:

an excavator body provided with a traveling body;

a cabin provided on an upper surface of said excavator body;

a work attachment mounted on a front part of said excavator body, said work attachment being provided with a boom capable of being risen and fallen and capable of being swung on both left and right sides about a longitudinal axis;

roof supports forward of said cabin and on both left and right sides rearward of said boom, said boom being arranged not to interfere with said

roof supports in a whole rising and falling operating range over a whole swing operating range, and to project rearward of said roof supports in a maximum stand-up state of said boom; and

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a roof provided above said roof supports to cover said cabin.

2. The hydraulic excavator according to claim 1, further comprising:

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a lateral railing and connecting bar provided at an arrangement not to interfere with said boom between said roof supports.

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FIG. 1

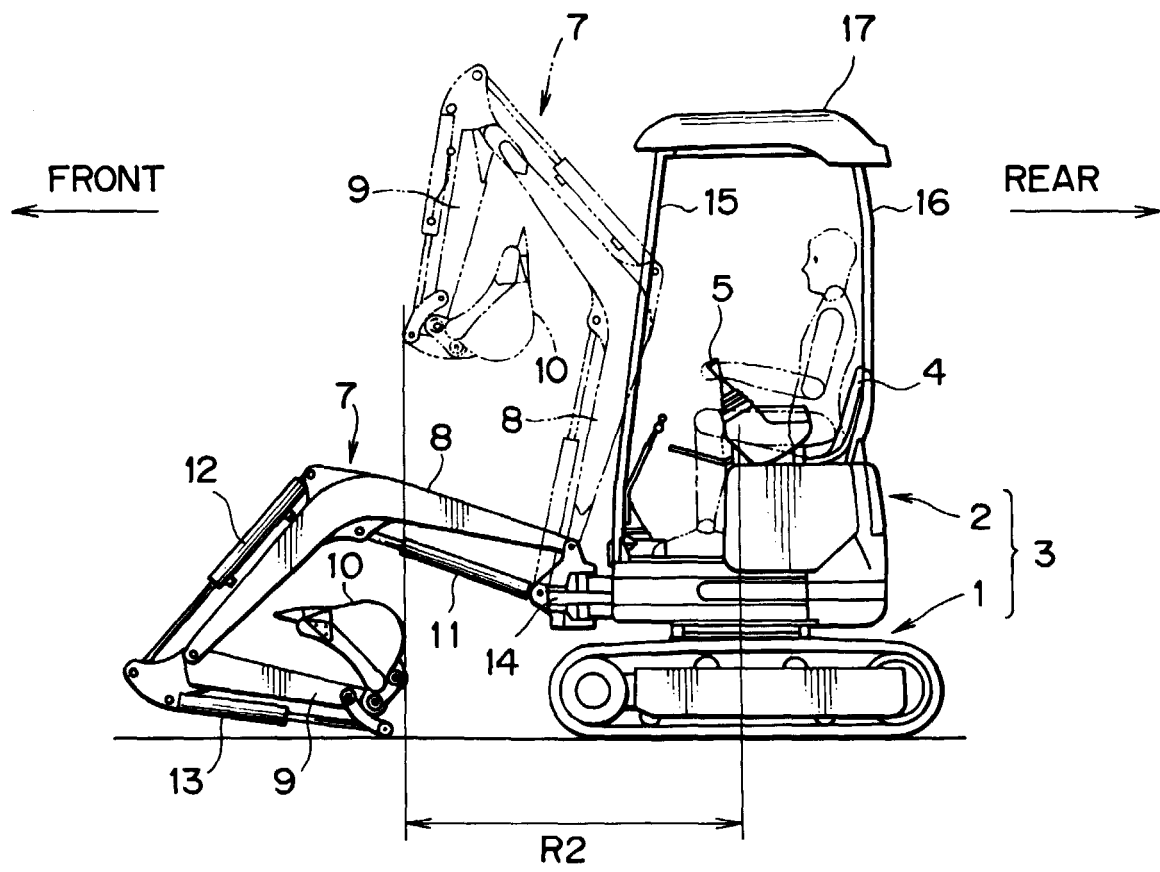


FIG. 2

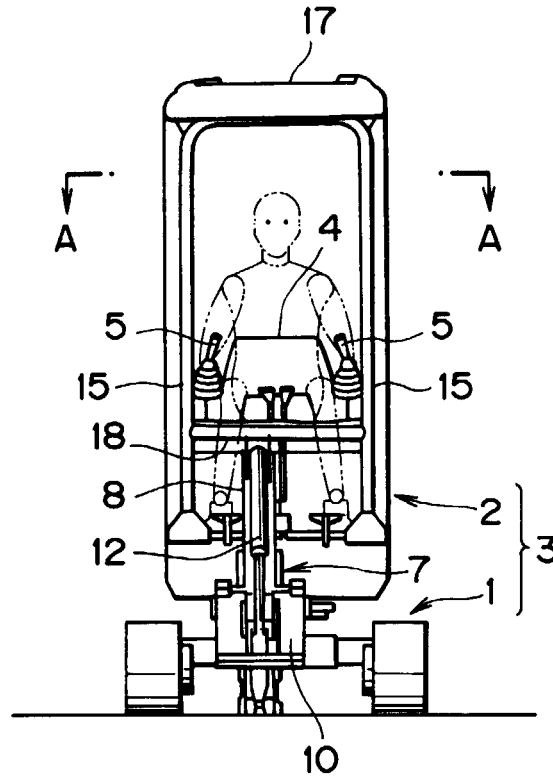


FIG. 3

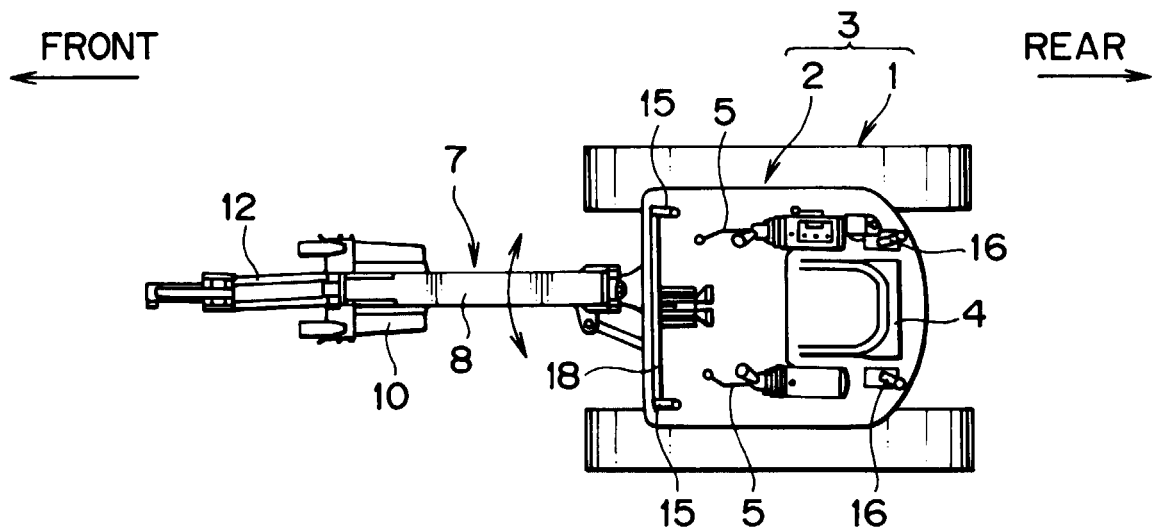


FIG. 4

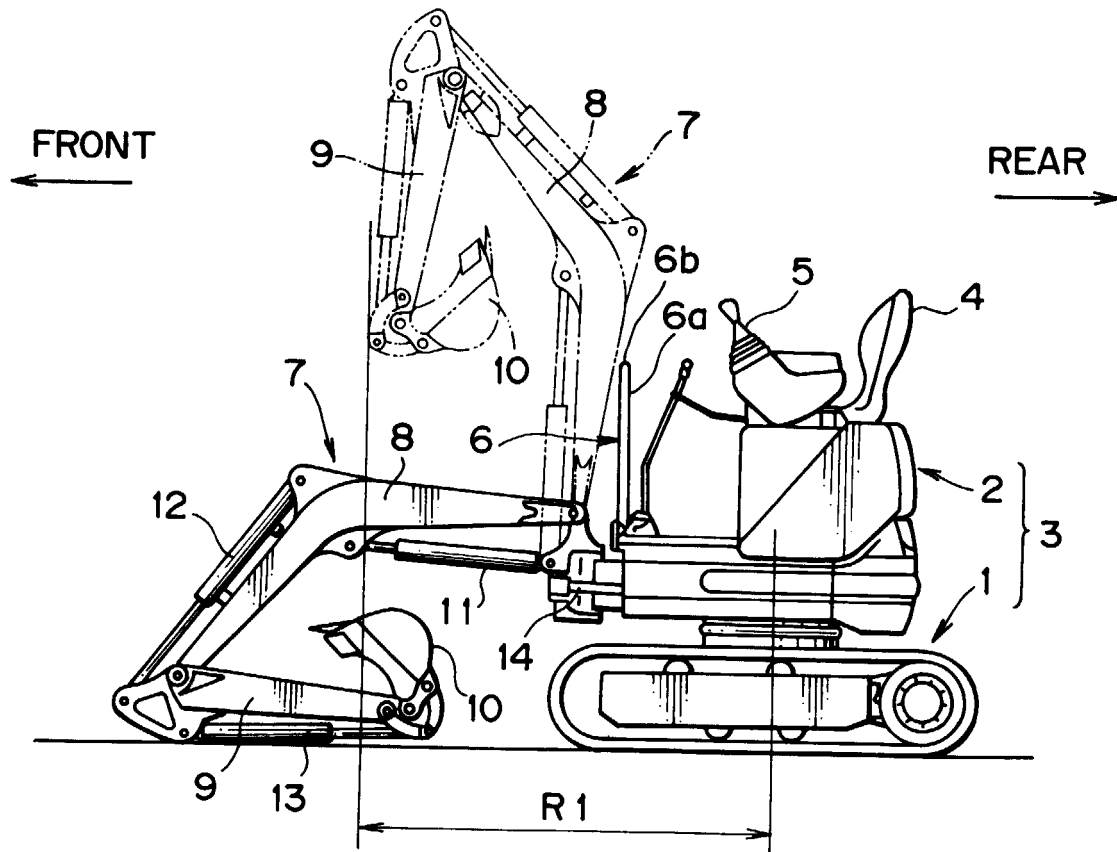


FIG. 5

