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(54) **SMALL-SIZED PASSENGER WORK VEHICLE**

KLEINES ARBEITSFAHRZEUG MIT EINEM FAHRER

VEHICULE DE TRAVAIL DE PETITE DIMENSION A UN SEUL PASSAGER

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Description

TECHNINCAL FIELD

[0001] The present invention relates to a small-sized passenger work vehicle that can ensure safety of an operator.

BACKGROUND TECHNOLOGY

[0002] Hitherto, there is known a small-sized passenger work vehicle of a type wherein front wheels in a left and right pair are mounted on main frames in a left and right pair extending in a front and rear direction through a front wheel transmission case, wherein rear wheels in a left and right pair are mounted on main frames in a left and right pair extending in a front and rear direction through a rear wheel transmission case, and wherein an operation section, an engine and a suspension case are supported by the main frames.

[0003] The operation section is provided with a variety of operating levers on left and right sides of a seat.

[0004] The small-sized passenger work vehicle of the type as described above, however, still has the problems that remain unsolved yet.

(1) For instance, when agricultural work is carried out at an agricultural field in a mountainous area, there are many occasions that the small-sized passenger work vehicle has to be operated on a narrow road having the ups and downs in order to transfer a one agricultural field to another. When the small-sized passenger work vehicle runs on a descent road, on the one hand, the operator cannot brace its legs if the step surface would be disposed parallel to the road surface and the operator feels frightened as if fallen off from the seat of the vehicle. When the small-sized passenger work vehicle runs on an ascent road, on the other hand, the operator feels frightened if there would be a protective member at the back.

(2) When the small-sized passenger work vehicle is operated to carry out work in an orchard or other agricultural fields, a plowing machine is connected to the small-sized passenger work vehicle at its back and the small-sized passenger work vehicle runs among trees or the like in order to cultivate the field or to weed out the field. There may be the occasion that the outer side edge portion of the small-sized passenger work vehicle is caused to come into contact with the trees and damage them.

(3) For instance, when agricultural work is carried out with the small-sized passenger work vehicle on terraced fields in a mountainous region, the work often has to be conducted on a sloping field while the operator holds the steering wheel of the operation section in one hand and the operating lever in the other. During the agricultural operation, the vehicle body of the small-sized passenger work vehicle may be shaken and inclined greatly and the operator may be caused to fall off the operator's seat.

At this time, there may be the occasion that the operator cannot afford to let go its hold of the operating lever and hold the steering wheel, whereby the operator may feel frightened.

(4) A heavy member such as an engine portion and a transmission portion is disposed at the rear of the vehicle body of the small-sized passenger work vehicle, so that the position of gravity of the vehicle body is somewhat deviated toward the rear portion of the vehicle body and as a result balance between the front and rear portions of the vehicle body is not so good that operability of the vehicle body and stability in running the vehicle may be impaired.

[0005] In particular, when a variety of work is to be carried out by connecting a plowing machine or other working machines to the rear portion of the vehicle body of the small-sized passenger work vehicle, the position of gravity of the vehicle body is further deviated farther toward the rear portion of the vehicle. As a consequence, there may be the risk that the front portion of the vehicle body may be caused to be lifted up so that work cannot be done in a smooth way and workability of various work can be reduced.

[0006] The present invention has the object to provide a small-sized passenger work vehicle that can solve the various problems as described above.

[0007] An example of a small works vehicle is shown in JP4166476.

[0008] An example of a work vehicle comprising frame members and a subframe is shown in US4266629.

[0009] A small work vehicle is also shown in colliding document EP0858727.

DISCLOSURE OF THE INVENTION

[0010] The present invention relates to a small-sized passenger work vehicle which is characterized as per Claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Figure 1 is a side view showing a small-sized passenger work vehicle according to a first embodiment of the present invention.

Figure 2 is a plan view showing the small-sized passenger work vehicle according to the first embodiment of the present invention.

Figure 3 is a front view showing the small-sized passenger work vehicle according to the first embodiment thereof.

Figure 4 is a partially cut-away side view showing a frame of the vehicle body of the small-sized passen-

ger work vehicle according to the first embodiment thereof

Figure 5 is a plan view showing the frame of the vehicle body thereof.

Figure 6 is a side view in section showing a reflector.

Figure 7 is a side view showing a bonnet.

BEST MODES OF CARRYING OUT THE INVENTION

[0012] The present invention will be described in more detail with reference to the accompanying drawings.

[0013] As shown in Figures 1 to 3, reference symbol "A" stands for a small-sized passenger work vehicle according to the first embodiment of the present invention. The small-sized passenger work vehicle A comprises a vehicle body frame 1, a suspension case 2 disposed in a nearly central portion on the vehicle body frame 1, front wheel transmission cases 3 and 3 coupled to the left and right sides of the suspension case 2, respectively, front wheels 4 and 4 mounted on the respective front wheel transmission cases 3 and 3 through front wheel shafts 4a and 4a, a rear wheel center transmission case 5 disposed at the rear portion on the vehicle body frame 1, rear wheel transmission cases 6 and 6 coupled to the left and right side portions of the rear wheel center transmission case 5, respectively, and rear wheels 7 and 7 mounted on the respective rear wheel transmission cases 6 and 6 through rear wheel shafts 7a and 7a. These elements constitute a vehicle body support structuring member 8.

[0014] As shown in Figures 4 and 5, the vehicle body support structuring member 8 has an operation section 9 disposed at the front portion thereof and with an engine 10 and a muffler 11 interposed between the suspension case 2 and the rear wheel center transmission case 5. Further, the suspension case 2 is coupled to and associated with the engine 10 through a first transmission mechanism 12, and the rear wheel center transmission case 5 is coupled to and associated with the suspension case 2 through a second transmission mechanism 13. Reference numeral 18 stands for a battery.

[0015] From the rear end of the rear wheel center transmission case 5, a left and right pair of work machine connecting members 14 and 14 are disposed extending in a rearward direction. A transmission shaft 15 is interposed between the work machine connecting members 14 and 14, and the transmission shaft 15 is coupled to and associated with the engine 10 through a third transmission mechanism 16. At the rear end portion of the vehicle body frame 1 is disposed a lift mechanism 17.

[0016] With the configuration as described above, a variety of work machines, although not shown herein, are connected to the rear end of the vehicle body support structuring member 8 through the work machine connecting members 14 and 14 and the transmission shaft 15 so as to be lifted or lowered, thereby enabling a power force to be transmitted to each of the work machines through the third transmission mechanism 16.

[0017] As shown in Figures 4 and 5, the vehicle body frame 1 comprises main frames 20 and 20 in a left and right pair each extending in a front and rear direction, a sub-frame 21 in a rectangular frame form, when viewed on the plane, a roll bar 22 in a gate form, when viewed from front, and a guard frame 23 in a rectangular form, when viewed on the plane. The sub-frame 21 is disposed extending from the rear end portion of the one main frame 20 to the front end portion thereof along the one main frame 20 and further extending around the front end thereof toward the front end of the other main frame 20, followed by curving around the front end of the other main frame 20 and extending to the rear end portion thereof along the other main frame 20. The roll bar 22 is disposed so as to be lifted up over the sub-frame 21 or lowered down to its original position, and the guard frame 23 is interposed between the roll bar 22 and the front end portion of the sub-frame 21.

[0018] As shown in Figures 4 and 5, the main frames 20 and 20 in the left and right pair, respectively, comprise main body frame forming members 20a and 20a, inner forward extension frame forming members 20b and 20b, rearward inclination frame forming members 20c and 20c, and rear rise frame forming members 20d and 20d. The main body frame forming members 20a and 20a are disposed in a spaced arrangement somewhat wider in a left and right direction than the width of the suspension case 2 and each of them extends linearly in a front and rear direction. Each of the inner forward extension frame forming members 20b and 20b is disposed to extend in a forward and inner direction from the front end of each of the main body frame forming members 20a and 20a. Each of the rearward inclination frame forming members 20c and 20c is disposed to extend in a rearward and upward direction from the rear end of each of the main body frame forming members 20a and 20a. Each of the rear rise frame forming members 20d and 20d is arranged so as to arise and stand upright from the rear end of each of the rearward inclination frame forming members 20c and 20c.

[0019] The inner forward extension frame forming members 20b and 20b in the left and right pair are located in the positions in front of the front wheel shafts 4a and 4a and inside the left and right front wheels 4 and 4, respectively. The width in a left and right direction between the main body frame forming members 20a and 20a is tapered so as to become gradually narrower at their front end portions, when viewed on the plane, so that this configuration ensures a wider clearance for steering the front wheels 4 and 4 on the left and right sides.

[0020] Between the front portions of the inner forward extension frame forming members 20b and 20b in the left and right pair is interposed a sub-frame connecting member 30 extending in a lateral widthwise direction through a mounting bracket 31. In the drawings, reference numeral 32 stands for a mounting bolt.

[0021] A front connection member 33 is interposed be-

tween the front portions of the main body frame forming members 20a and 20a in the left and right pair. Each of upper portions of the main body frame forming members 20a and 20a located immediately behind the front connection member 33 is provided with each of front wheel transmission case stays 34 and 34, respectively. At a central portion on the top of each of the front wheel transmission case stays 34 and 34 is provided a depressed engagement portion 34a, and the engagement portions 34a and 34a of the respective front wheel transmission case stays 34 and 34 are engaged with intermediate portions of the front wheel transmission cases 3 and 3 on the left and right sides each extending in a lateral widthwise direction. Further, each of the front wheel transmission case stays 34 and 34 is connected to a connecting bracket 3a mounted on the front wheel transmission cases 3 and 3 through connecting bolts 3b and 3b, respectively. This construction supports the suspension case 2 from bottom.

[0022] Between the rear portions of the main body frame forming members 20a and 20a in the left and right pair is interposed a rear connecting member 35, and engine support columns 36 and 36 in a left and right pair are disposed standing upright from the left and right side portions of the rear connecting member 35, respectively.

[0023] At the intermediate portions of the rearward inclination frame forming members 20c and 20c in the left and right pair are disposed rear wheel transmission case stays 37 and 37, respectively, projecting therefrom. The rear wheel transmission case stays 37 and 37 are provided with depressed engagement portions 37a and 37a at the central portions of the respective tops thereof. Further, the depressed engagement portions 37a and 37a are engaged with the respectively intermediate portions of the rear wheel transmission cases 6 and 6 on the left and right sides, which extend each in a lateral widthwise direction. Further, each of the rear wheel transmission case stays 37 and 37 is connected to each of connecting brackets 6a and 6a mounted on the rear wheel transmission cases 6 and 6 through connecting bolts 6b and 6b, respectively This construction supports the rear wheel center transmission case 5 from bottom.

[0024] Moreover, a link connecting bracket 37b is disposed extending downward each from the bottom end of the rear wheel transmission case stay 37, and the link connecting bracket 37b is connected to a base end portion of a lower link 38 constituting a portion of the lift mechanism 17 through a connecting pin 39.

[0025] It is to be noted herein that the angle of inclination of the rearward inclination frame forming member 20c is set so as to become substantially equal to the steepest angle of inclination of the lower link 38 and so as for the lower link 38 to cause no interference with each of the rearward inclination frame forming member 20c.

[0026] The rear rise frame forming members 20d and 20d in the left and right pair are located behind the rear wheel shafts 7a and'7a and disposed in a rising form. On the upper portions of the rear rise frame forming members 20d and 20d are mounted lift arm stays 40 and 40. Between the lift arm stays 40 and 40 is interposed an arm support shaft 41. On the arm support shaft 41 are mounted a base end of each of lift arms 42 and 42 in a left and right pair and a base end of a working arm 43. Further, a lift cylinder 44 is interposed between the top end portion of the working arm 43 and the work machine connecting member 14. Moreover, each of lift links 45 are interposed between the top end portion of each of the lift arms 42 and 42 and the top end portion of each of the lower links 38 and 38. These elements and a top link 17a connected to the work machine connecting member 14 constitutes the lift mechanism 17.

[0027] On top of the rear rise frame forming members 20d and 20d are mounted fixing brackets 46 and 46, respectively, each fixing a rear side frame forming member 26, as will be described hereinafter.

[0028] Moreover, as shown in Figures 4 and 5, the sub-frame 21 comprises a front side frame forming member 24 extending in a lateral widthwise direction, left and right side frame forming members 25 and 25 each extending rearward from the left and right side ends of the left and right side frame forming members 25 and 25, and the rear side frame forming member 26 extending between the rear end portions of left and right side frame forming members 25 and 25. The front portions of the left and right side frame forming members 25 and 25 are fixed to the left and right side ends of the sub-frame connecting member 30 extending between the front ends of the main frames 20 and 20, and the rear side frame forming member 26 is fixed to the top ends of the rear rise frame forming members 20d and 20d of the main frames 20 and 20, respectively.

[0029] The left and right side frame forming members 25 and 25 are disposed in the positions immediately above the front wheel 4 and rear wheel 7 on the left side and above the front wheel 4 and rear wheel 7 on the right side, respectively. The left and right side frame forming members 25 and 25 comprise left and right side leg-bracing surface forming sections 25a and 25a disposed so as to incline in a downward and rearward direction from the front ends thereof, side inclination sections 25b and 25b disposed so as to incline in a rearward and upward direction and extend from the rear ends of the left and right side leg-bracing surface forming sections 25a and 25a to the side positions next to a seat 74 of the operation section 9, as will be described hereinafter, and rearward extension sections 25c and 25c each extending in a nearly horizontal direction from the rear end of each of the left and right side inclination sections 25b and 25b to the position above each of the rear rise frame forming members 20d and 20d of the main frames 20 and 20, respectively.

[0030] A curved portion is formed at a connection of each of the left and right side inclination sections 25b and 25b with each of the rearward extension sections 25c and 25c, respectively, each as a gripping section 27, and the gripping sections 27 and 27 are disposed on the left

and right sides of the seat 74 of the operation section 9.

[0031] Further, as shown in Figures 1 to 6, the rearward extension sections 25c and 25 have a lateral connecting frame 49 interposed between the front portions thereof, and reflectors 50 and 50 mounted on the respective rear ends thereof through mounting members 51 and 51 so as to be detachable. Each of the mounting member 51 comprises a cylindrical engagement section 51a disposed so as to be engaged with a rear end opening of the rearward extension section 25c, and a support section 51b in a disc-shaped form molded integrally at a head portion of the cylindrical engagement section 51a. Further, the mounting member 51 supports the reflector 50 by the rear surface of the support section 51b.

[0032] Moreover, as shown in Figures 4 and 5, the rear side frame forming member 26 is disposed extending in the lateral widthwise direction between the rear end portions of the left and right rearward extension sections 25c and 25c in the left and right pair. In order to allow an intermediate portion 26a of the rear side frame forming member 26 disposed immediately above a portion between the rear rise frame forming members 20d and 20d of the main frame 20 to be located in front of the left and right side end sections 26b and 26b, left and right side inclination sections 26c and 26c are disposed at a portion located between each of the left and right side end sections 26b and 26b and the left and right side end portions of the intermediate portion 26a, respectively.

[0033] The bottom surface of the left side inclination section 26c and the bottom surface at the right side end portion of the intermediate portion 26a are provided with fixing brackets 47 and 47, respectively, and each of the fixing brackets 47 and 47 is superimposed on the respective fixing brackets 46 and 46 mounted on the top ends of the rear rise frame forming members 20d and 20d, and the fixing brackets 47 and 47 are fixed to the respective fixing brackets 46 and 46 through fixing bolts 48 and 48, respectively.

[0034] With the construction as described above, the rear side frame forming member 26 provides a rear space clearance S1 in a forwardly depressed form at the back of the intermediate portion 26a, and the rear space clearance S1 can ensure a pivoting angle of lifting the lift arms 42 and 42. At the same time, the rear clearance S1 can locate the support point of pivoting the lift arms 42 and 42 toward the central portion of the vehicle body at the closest possible position.

[0035] This construction can locate the lift mechanism 17 in the position close to the central portion of the vehicle body, thereby allowing a variety of the work machines to be located closer to the vehicle body and assisting in sustaining a good balance between the forward and rearward weights of the vehicle body.

[0036] The roll bar 22 is disposed astride between the rearward extension sections 25c and 25c of the subframe 21, and comprises support column sections 22a and 22a in a left and right pair and a lateral frame section 22b extending between the top ends of the support column sections 22a and 22a.

[0037] The support column sections 22a and 22a in the left and right pair are mounted at the bottom end portions thereof on the rearward extension sections 25c and 25c through supporting brackets 28 and 28 so as to rise or fall with lateral axles 29 and 29. Further, the support column sections 22a and 22a positioned above the lateral shafts 29 and 29 are provided at their lower portions with pin insertion holes 22c and 22c, respectively, each for allowing an insertion of a pin. On the other hand, the supporting brackets 28 and 28 are provided immediately above the lateral shafts 29 and 29 with raised-position fixing pin holes 28a and 28a, each for inserting a pin to fix the raised position of each of the support column sections 22a and 22a, respectively. Moreover, the supporting brackets 28 and 28 are provided in the positions behind the lateral shafts 29 and 29 with rearward inclined-position fixing pin holes 28b and 28b, each for inserting a pin to fix the rearward inclined position of each of the support column sections 22a and 22a. Each of the pin insertion holes 22c and 22c is aligned with either one of the raised-position fixing pin holes 28a and 28a and the rearward inclined-position fixing pin holes 28b and 28b, and a fixing pin 63 is inserted through the pin holes aligned with each other to allow postures of the roll bar 22 to vary from the raised position to the rearward inclined position or vice versa. Reference symbol 28c stands for a rearward inclined position stopper.

[0038] Further, the top of the roll bar 22 in the rearward inclined position is set so as to be nearly as high as the height of a steering wheel 68 of the operation section 9 from the ground, as described hereinafter, thereby permitting a space required for parking in a parking lot or the like to be reduced.

[0039] In addition, as shown in Figures 1 to 5 and 7, the supporting brackets 28 and 28 have winkers 61 and 61 mounted thereon through mounting brackets 62 and 62, respectively.

[0040] With the construction as described above, the small-sized passenger work vehicle according to the present invention can ensure safety during running on a road.

[0041] As shown in Figures 1 to 5, the guard frame 23 comprises a front lower frame forming member 23a, left and right side rising frame forming members 23b and 23b, left and right side longitudinal extension frame forming members 23c and 23c, left and right rear upper frame forming members 23d and 23d, and an engagement connecting member 23e. The front lower frame forming member 23a is disposed to extend in a lateral widthwise direction, and shaped in a form somewhat narrower than the width of the front side frame forming member 24. The left and right side rising frame forming members 23b and 23b are disposed so as to rise from the left and right side ends of the front lower frame forming member 23a upwardly to the heights nearly equal to the height of the lateral frame section 22b of the roll bar 22. Further, the left and right side longitudinal extension frame forming

members 23c and 23c are disposed to extend from the top end portions of the left and right side rising frame forming members 23b and 23b to the positions in the vicinity of the lateral frame section 22b of the roll bar 22 located in the rear portion, and the left and right rear upper frame forming members 23d and 23d are disposed to extend inside from the rear ends of the left and right side longitudinal extension frame forming members 23c and 23c so as to face each other. The engagement connecting member 23e is disposed to extend between the left and right rear upper frame forming members 23d and 23d.

[0042] At the left and right side portions of the front lower frame forming member 23a are mounted connecting brackets 55 and 55, each being arranged in an inverted L-shaped form. The connecting brackets 55 and 55 are connected to connecting pieces 56 and 56 through connecting bolts 57 and 57, respectively, each of the connecting pieces 56 and 56 being disposed so as to extend downward from the left and right side portions of the front side frame forming member 24.

[0043] With the construction as described above, the connecting bracket 55 is connected to the connecting piece 56 through the connecting bolt 57 in the position below a leg-bracing surface section 80a as described hereinafter, and it is covered with a front weight 96 at its front portion and left and right side portions in order to avoid the connection structure from being viewed from the outside and to improve an outlook of the vehicle body.

[0044] The engagement connecting member 23e is disposed to extend in a lateral widthwise direction and shaped in a semi-arc form in section so as to be engaged with the lateral frame section 22b of the roll bar 22. Further, it is provided with a connecting bolt hole 58 at its central portion. The lateral frame section 22b of the roll bar 22 is also provided with a connecting bolt insertion hole 59 at its central portion so as to allow a connecting bolt to insert over the entire length from the top and the bottom, so that a connecting bolt 60 is inserted into a hole in which the connecting bolt hole 58 is aligned with the connecting bolt insertion hole 59, thereby connecting the engagement connecting member 23e to the lateral frame section 22b of the roll bar 22.

[0045] With the construction as described above, the guard frame 23 is mounted between the front side frame forming member 24 and the lateral frame section 22b of the roll bar 22 so as to be detachable, thereby allowing a protection of the operator seated in the operation section 9.

[0046] Moreover, if the guard frame 23 would become an obstacle upon parking in a garage or otherwise, it can be detached. At this time, it is also possible to change the posture of the roll bar 22 to the rearward inclined position, as needed, in the manner as described above.

[0047] It is to be noted herein that each of the main frames 20 and 20, the sub-frame 21, the roll bar 22 and the guard frame 23, each constituting a structuring member of the vehicle body frame 1, is made from a round pipe.

[0048] As shown in Figures 1 to 5, the operation section 9 has a steering wheel post support member 65 disposed to extend between a central portion of the front side frame forming member 24 of the sub-frame 21 and a central portion of the sub-frame connecting member 30 in a rearward inclined posture at an angle substantially equal to the angle of inclination of the left and right side leg-bracing surface forming sections25a and 25a. Further, a steering wheel post 66 is disposed on the steering wheel post support member 65 in such a state in which it stands upward in a rearward inclined posture nearly crossing at a normal angle the steering wheel post support member 65 disposed in its rearward inclined posture. A steering wheel support shaft 67 is disposed inside the steering wheel post 66, and a steering wheel 68 is mounted on the top of the steering wheel support shaft 67. Moreover, a wheel steering mechanism 69 is interposed between the bottom end of the steering wheel support shaft 67 extending up to below the steering wheel post support member 65 and the lower portion of the suspension case 2, and the steering wheel post 66 is enveloped with a steering wheel column 70. A forward-rearward shift lever 71 is mounted on the left side wall of the steering wheel column 70, and an accelerator lever 72 is mounted on the right side wall of the steering wheel column 70.

[0049] On the suspension case 2 is disposed the seat 74 through a seat support frame 73. A main suspension operating lever 75 and a secondary suspension operating lever 76 are disposed on the left side of the seat 74. Further, a lift operating lever 77 as well as an operating lever 78 8 for turning on or off a work machine transmission clutch and a plowing-depth adjustment operating lever 79 are disposed on the right side of the seat 74.

[0050] Moreover, each of the various operating levers 75, 76, 77, 78 and 79 is disposed inside and in the vicinity of the gripping sections 27 and 27 of the sub-frame 21.

[0051] With the construction as described above, the operator can easily ride the operation section 9 and get off from the operation section 9 by gripping the gripping section 27. Moreover, the small-sized passenger work vehicle can ensure safety because the operator can support itself with high certainty by gripping the gripping section 27 immediately upon feeling it dangerous during the operation the vehicle for working on an inclining agricultural field.

[0052] Further, as shown in Figures 1 and 2, the operation section 9 is provided with a floor forming member 80 over the front portion of the vehicle body frame 1, and a seat support frame covering body 81 is disposed continuing with a rear end edge of the floor forming member 80.

[0053] The floor forming member 80 comprises a leg-bracing surface section 80a disposed at an inclination surface position formed by the front side frame forming member 24 and the left and right side leg-bracing surface forming sections 25a and 25a, and a horizontal surface section 80b formed extending in a nearly horizontal di-

rection from the leg-bracing surface section 80a to the position in the vicinity of the suspension case 2 disposed behind the leg-bracing surface section 80a. In the drawings, reference numeral 88 stands for a braking pedal and reference numeral 99 stands for a back mirror.

[0054] With the construction as described above, the operator can operate the steering wheel at a comfortable posture while placing the legs on the leg-bracing surface section 80a or the horizontal surface section 80b. Moreover, upon running on a downward inclining road surface, the operator can brace its legs on the leg-bracing surface section 80a, thereby preventing the operator from sliding down from the seat.

[0055] The seat support frame covering body 81 comprises a front wall forming section 81a, left and right side wall forming sections 81b and 81b, and a ceiling wall forming section 81c. The front wall forming section 81a is disposed to rise in a generally vertical direction from the rear edge at the central portion of the horizontal surface section 80b toward the position of the front end portion of the seat 74 in the operation section 9. The left and right side wall forming sections 81b and 81b are disposed to rise upwardly from the left and right side edge portions of the horizontal surface section 80b. The ceiling wall forming section 81c is disposed to extend rearward from the top edge of the front wall forming section 81a and each of the left and right side wall forming sections 81b and 81b and enclose the peripheral edge portion at the upper portion of the seat support frame 73.

[0056] As shown in Figure 2, the front wall forming section 81a and the left and right side wall forming sections 81b and 81b are disposed in a generally squared C-shaped form, when viewed on the plane, and form a depressed section 82 in a forward opening form for accommodating heel portions of the feet of the operator.

[0057] With the construction as described above, the operator seated on the seat 74 can operate the small-sized passenger work vehicle at a comfortable posture by ensuring the freedom of the feet placed on the floor forming member 80 in a wider area extending up to the position immediately below the front end portion of the seat 74, thereby reducing tiredness during driving.

[0058] Moreover, the ceiling wall forming section 81c is provided with lever guide grooves 83, 84, 85, 86 and 87 for guiding a variety of the operating levers.

[0059] Between the side inclination section 25b and the rearward extension section 25c of the sub-frame 21 on each side is disposed a side covering member 90, and the side covering member 90 is disposed to cover the side portion of the vehicle body, the upper portion of the front wheel 4 and the upper front portion of the rear wheel 7 on the same side.

[0060] Further, an intermediate portion 90a of the side covering member 90 is curved in a downwardly depressed form to provide a clearance space 91 for the gripping portion between the intermediate portion 90a and the gripping section 27, thereby allowing the operator to readily grip the gripping section 27 through the clearance space 91.

[0061] As shown in Figures 1 and 2, the portion over the engine 10 is covered with a bonnet 92 disposed so as to open or close, and the upper surface of the bonnet 92 is made flat so as to form a table 93 for placing tools, belongings and so on.

[0062] As shown in Figure 7, the table 93 is corrugated in section such that it comprises ridge sections 93a and furrow sections 93b, both of which extend in a front and rear direction and are formed alternately in a lateral widthwise direction. This construction can provide rigidity for the table 93. In the drawing, reference numeral 98 stands for a support bracket for opening or closing.

[0063] Moreover, the rearward extension sections 25c and 25c are provided on the rear bottom surfaces thereof with engaging hooks 94 and 94 as engaging pieces, each projecting downward, and a belt 95 for fixing the tools, belongings and other things is fastened between the engaging hooks 94 and 94 disposed on the left and right sides to fix the tools, belongings N placed on the table 93.

[0064] As shown in Figures 1 to 4, the front lower frame forming member 23a has a front weight portion 96 mounted thereon with the mounting bolt 97 through the connecting pieces 56 and 56.

[0065] The front weight portion 96 comprises a front side forming section 96a disposed extending in a lateral widthwise direction along the front lower frame forming member 23a, and left and right side forming sections 96b and 96b disposed extending in a rearward direction along the left and right side leg-bracing surface forming sections25a and 25a from the left and right side ends of the front side forming section 96a. The front weight portion 96 is in a generally squared C-shaped form and can also function as a bumper.

[0066] Furthermore, the front weight portion 96 is disposed to cover a lower clearance S2 in the form of a right-angled triangle, when viewed from the side, formed immediately below the leg-bracing surface section 80a, from the front side and the left and right sides.

[0067] In the clearance S2 disposed immediately below the leg-bracing surface section 80a, there is disposed a portion of the wheel steering mechanism 69, that is, a pinion gear 69a mounted on the bottom end of the steering wheel support shaft 67, a sector gear 69b disposed so as to engage with the pinion gear 69a, and a steering arm 69c connected to the sector gear 69b and supported by the steering wheel post support member 65. In the drawings, reference symbol 69d stands for a drag rod.

[0068] With the construction as described above, the disposition of a portion of the wheel steering mechanism 69 in the clearance S2 can provide a large height clearance above the ground for disposing a portion of the wheel steering mechanism 69, thereby protecting the wheel steering mechanism 69 from being damaged by impact with scattering stones, projections from the ground or otherwise.

[0069] Further, the front side portion and the left and right side portions of the wheel steering mechanism 69

are covered with the front weight portion 96, so that the wheel steering mechanism 69 can be protected from damages for sure.

[0070] In addition, the front weight portion 96 can ensure a good balance between the front and rear portions of the vehicle body, thereby ensuring stability in driving performance and workability in an agricultural field.

INDUSTRIAL UTILIZABILITY

[0071] The present invention can offer the features and advantages as will be described hereinafter.

(1) The small-sized passenger work vehicle according to the present invention is configured such that the sub-frame mounted on the main frame comprises the front side frame forming member extending in a lateral widthwise direction, and the left and right side frame forming members each extending in a rearward direction from the left and right sides of the front side frame forming member, respectively, so that the sub-frame constitutes an outer body framework of the vehicle body and functions as a guard frame or a partition frame.

Further, each of the leg-bracing surface forming sections is provided with the leg-bracing surface section, so that the operator can brace its legs by placing the leg-bracing surface sections while running the vehicle on a road or a field inclining downwardly. Therefore, the operator does not feel any fear of falling down from the vehicle even while running in a downwardly inclining field or road.

(2) For the small-sized passenger work vehicle according to the present invention, the left and right side frame forming members are disposed in the positions immediately above the front wheels and the rear wheels, so that the vehicle does not damage trees such as fruit trees or otherwise while running among such trees, even if the pipes forming the left and right side frames would come into contact with the trees. Therefore, the vehicle can protect the trees from being damaged by impact or otherwise during agricultural work, and it can protect the operator, too, because the left and right side frame forming members can work as guard frames.

(3) The small-sized passenger work vehicle according to the present invention is configured such that a connection portion between side inclination section and the rearward extension inclination section of each of the left and right side frame forming members is formed as a curved portion that can work as a gripping portion, and that the gripping portion is disposed on the side next to the seat of the operation section. Therefore, when the operator rides or get off the vehicle, the operator can grip the gripping portion and ride or get off the operation section easily.

(4) For the small-sized passenger work vehicle according to the present invention, the various operating levers are disposed inside the gripping portion, so that the operator can hold the gripping portion immediately and support the body for certainty if the operator would feel danger during operating the levers. This configuration of the vehicle can ensure safety from sliding down from the seat and falling off from the vehicle.

(5) As the small-sized passenger work vehicle according to the present invention is configured such that the side cover member is disposed to extend between the side inclination section and the rearward extension section of the sub-frame and the intermediate portion of the sub-frame is curved in a downwardly depressed form to form a clearance for the gripping portion between the intermediate portion thereof and the gripping portion, the operator can grip the gripping portion easily by the aid of the clearance.

Claims

1. A small-sized passenger work vehicle **characterized in that** :

front wheels (4,4) in a left and right pair and rear wheels (7,7) in a left and right pair are mounted on main frames (20, 20) in a left and right pair each extending in a front and rear direction, respectively, and a seat (74) is disposed in an operation section (9) so as to be located between the front wheels (4, 4) and the rear wheels (7, 7) ; a sub-frame (21) is mounted on the main frames (20, 20), and the subframe (21) comprises a front side frame forming member (24) extending in a lateral widthwise direction, and left and right side frames forming members (25, 25) each extending in a rearward direction from the left and right side ends of the front side frame forming member (24), respectively ; and

the left and right side frame forming members (25, 25) comprises, respectively, left and right side leg-bracing surface forming sections (25a, 25a) disposed each inclining in a rearward and downward direction from the front ends thereof, side inclination sections (25b, 25b) disposed each inclining upwardly in a rearward from the respective left and right side leg-bracing surface forming sections (25a, 25a) to the sides of the seat (74), and rearward extension sections (25c, 25c) each extending rearward in a generally horizontal direction from the top ends of the side inclination sections (25b, 25b), wherein gripping portions (27, 27) are disposed in the vicinity of connection portions between the side inclination sections (25b, 25b) and the rearward extension sections (25c, 25c), respectively, and each of

the gripping portions (27, 27) is disposed on the side next to the seat (74) in the operation section (9), and wherein a side cover member (90) is disposed over an entire length between the side extension section (25b) and the rearward extension section (25c) of the sub-frame (21) ; and an intermediate portion (90a) of the side cover member (90) is shaped in a downwardly depressed form so as to constitute a clearance (91) for a gripping portion between the intermediate portion (90a) and the gripping portion (27).

2. The small-sized passenger work vehicle as claimed in claim 1, wherein each of operating levers is disposed inside the gripping portions (27, 27).

Patentansprüche

1. Kleines Arbeitsfahrzeug mit einem Fahrer, **dadurch gekennzeichnet, daß**:

vordere Räder (4, 4) in einem linken und rechten Paar und rückwärtige Räder (7, 7) in einem linken und rechten Paar auf Hauptrahmen (20, 20) in einem linken und
rechten Paar montiert sind, das sich jeweils in einer vorderen bzw. rückwärtigen Richtung erstreckt, und ein Sitz (74) in einem Betätigungsabschnitt (9) so angeordnet ist, um zwischen den Vorderrädern (4, 4) und den rückwärtigen Rädern (7, 7) angeordnet zu sein;
einen Hilfs- bzw. Sub-Rahmen (21) an den Hauptrahmen (20, 20) festgelegt bzw. montiert ist, und der Sub-Rahmen (21) ein einen Vorderseitenrahmen bildendes Glied (24), das sich in einer seitlichen Breitenrichtung erstreckt, und linke und rechte Seitenrahmen ausbildende Glieder (25, 25) umfaßt, die sich jeweils in einer rückwärts gerichteten Richtung von dem linken und rechten Seitenende des einen vorderen Seitenrahmen ausbildenden Glieds (24) erstrecken; und
die linken und rechten Seitenrahmen bildenden Glieder (25, 25) jeweils linke und rechte Seitenschenkel versteifende Oberflächen bildende Abschnitte (25a, 25a), die sich jeweils in einer nach rückwärts und nach unten verlaufenden Richtung von den vorderen Enden derselben neigend angeordnet sind, Seitenneigeabschnitte (25b, 25b), die sich jeweils nach oben neigend in einer Rückwärtsrichtung von den entsprechenden, die linken und rechten Seitenschenkel versteifenden Oberflächen ausbildenden Abschnitten (25a, 25a) zu den Seiten des Sitzes (74) angeordnet sind, und rückwärtige Erstrekkungsabschnitte (25c, 25c) umfassen, die sich jeweils nach rückwärts in einer allgemein horizontalen Richtung von den oberen Enden der Seitenneigeabschnitte (25b, 25b) erstrecken, wobei ergreifende bzw. Greifabschnitte (27, 27) jeweils in der Nachbarschaft von Verbindungsabschnitten zwischen den Seitenneigeabschnitten (25b, 25b) und den rückwärtigen Erstrekkungsabschnitten (25c, 25c) angeordnet sind, und jeder der Greifabschnitte (27, 27) an der Seite nahe dem Sitz (74) in dem Betätigungsabschnitt (9) angeordnet ist, und wobei ein Seitenabdeckungsglied (90) über eine gesamte Länge zwischen dem Seitenerstreckungsabschnitt (25b) und dem rückwärtigen Erstrekkungsabschnitt (25c) des Sub-Rahmens (21) angeordnet ist; und ein zwischenliegender Abschnitt (90a) des Seitenabdeckungsglieds (90) in einer nach unten vertieften Form geformt ist, um ein Spiel (91) für einen Greifabschnitt zwischen dem zwischenliegenden Abschnitt (90a) und dem Greifabschnitt (27) auszubilden.

2. Kleines Arbeitsfahrzeug mit einem Fahrer nach Anspruch 1, wobei jeder der Betätigungshebel im Inneren der Greifabschnitte (27, 27) angeordnet ist.

Revendications

1. Véhicule de travail de petite dimension à un seul passager **caractérisé en ce que** :

des roues avant (4, 4) dans une paire gauche et droite et des roues arrière (7, 7) dans une paire gauche et droite sont montées sur des châssis principaux (20, 20) dans une paire gauche et droite chacune s'étendant suivant une direction avant et arrière, respectivement, et un siège (74) est disposé dans une section fonctionnelle (9) de façon à être situé entre les roues avant (4, 4) et les roues arrière (7, 7) ;
un sous-châssis (21) est monté sur les châssis principaux (20, 20) et le sous-châssis (21) comprend un élément formant un châssis latéral avant (24) s'étendant dans le sens de la largeur latérale et des éléments gauche et droit formant des châssis latéraux (25, 25) s'étendant chacun suivant une direction vers l'arrière à partir des extrémités latérales gauche et droite de l'élément formant un châssis latéral avant (24), respectivement ; et
les éléments gauche et droit formant des châssis latéraux (25, 25) comprennent, respectivement, des sections de formation de surface de renfort de pattes latérales gauche et droite (25a, 25a) disposée chacune de manière inclinée suivant une direction vers l'avant et vers l'arrière à partir de leurs extrémités avant, des sections d'inclinaison latérales (25b, 25b) disposée cha-

cune de manière à s'incliner vers le haut et vers l'arrière, des sections de formation de surface de renfort de pattes latérales gauche et droite respectives (25a, 25a) jusqu'au côtés du siège (74) et des sections d'extension vers l'arrière (25c, 25c) s'étendant chacune vers l'arrière suivant une direction généralement horizontale à partir des extrémités supérieures des sections d'inclinaison latérales (25b, 25b), dans lequel des parties de prise (27, 27) sont disposées à proximité des parties de connexion entre les sections d'inclinaison latérales (25b, 25b) et les sections d'extension vers l'arrière (25c, 25c), respectivement, et chacune des parties de prise (27, 27) est disposée sur le côté à côté du siège (74) dans la section fonctionnelle (9), et dans lequel un élément de couverture latéral (90) est disposé sur toute la longueur entre la section d'extension latérale (25b) et la section d'extension vers l'arrière (25c) du sous-châssis (21) ; et une partie intermédiaire (90a) de l'élément de couverture latéral (90) est formée dans une forme diminuant vers le bas de façon à constituer un espace (91) pour une partie de prise entre la partie intermédiaire (90a) et la partie de prise (27).

2. Véhicule de travail de petite dimension à un seul passager selon la revendication 1, dans lequel chacun des leviers de fonctionnement est disposé à l'intérieur des parties de prise (27, 27).

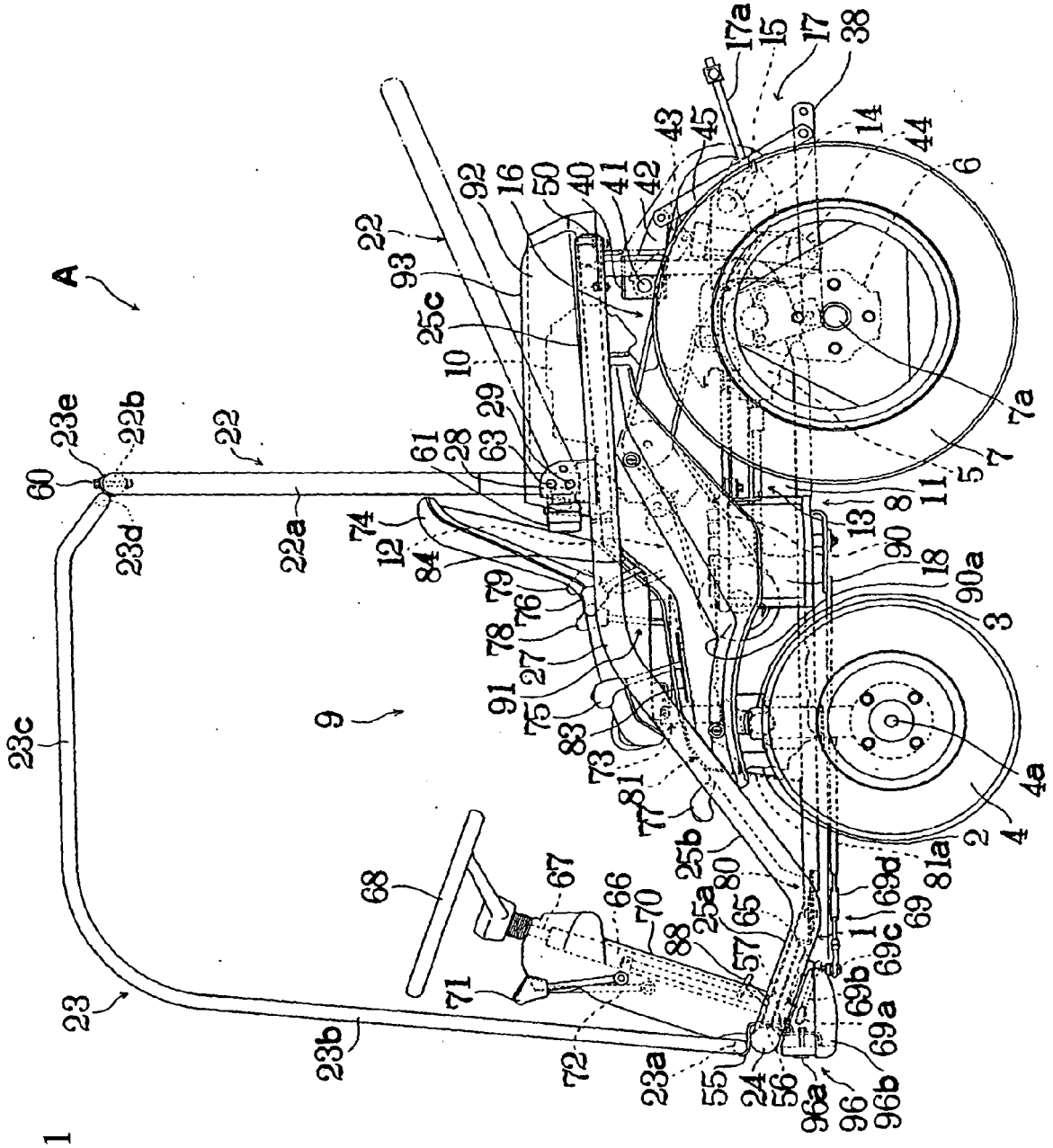
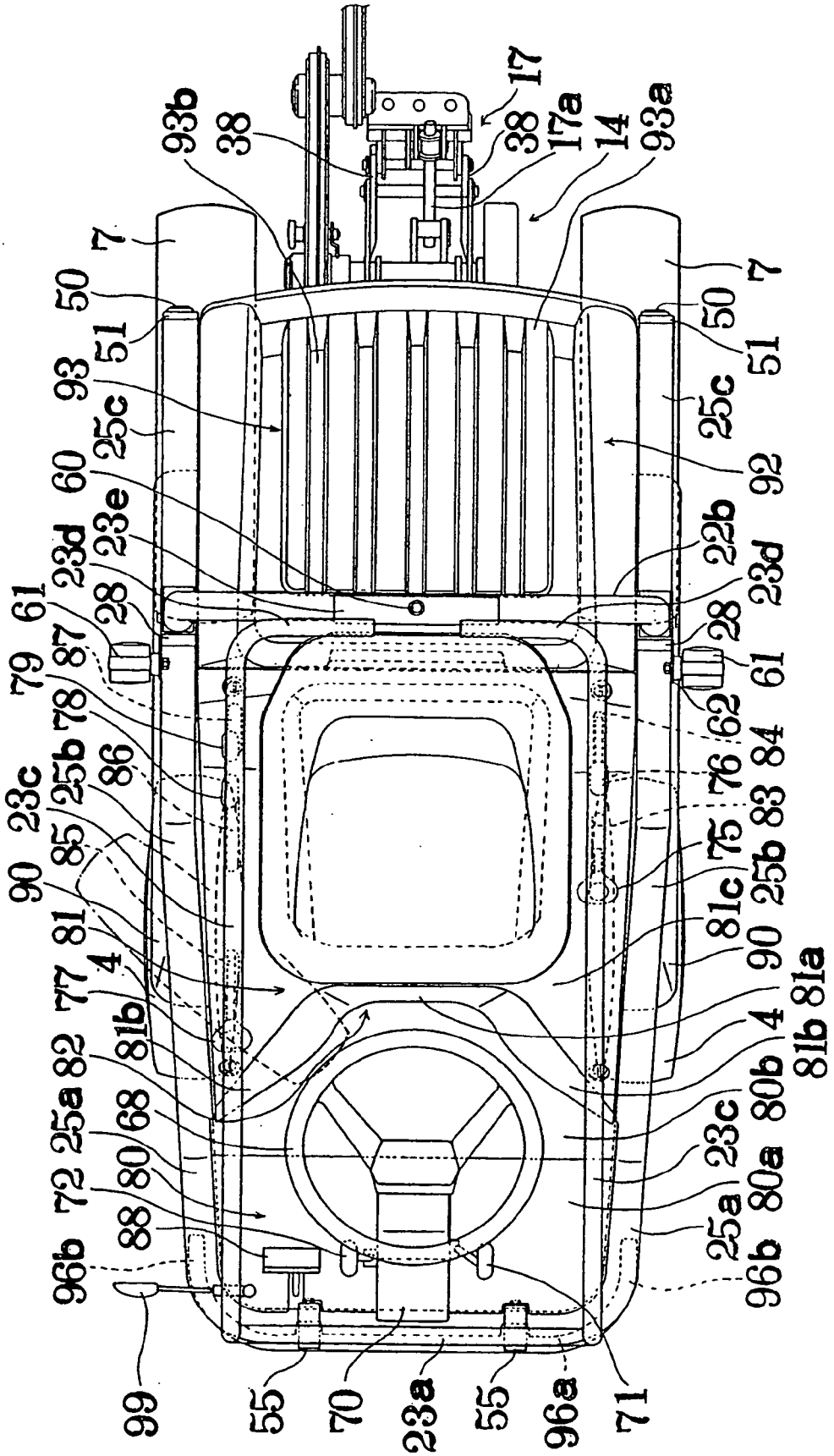

A
23
23a
23b
23c
23d
23e
22
22a
22b
9
1
2
3
4
4a
5
6
7
7a
8
10
11
12
13
14
15
16
17
17a
18
24
25a
25b
25c
27
28
29
38
40
41
42
43
44
45
50
55
56
57
60
61
63
65
66
67
68
69
69a
69b
69c
69d
70
71
72
73
74
75
76
77
78
79
80
81
81a
83
84
88
90
90a
91
92
93
96
96a
96b

FIG. 1

FIG. 2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38
17
38
17a
14
93a
7
50
51
93
25c
60
23e
23d
28
61
79
87
78
25b
86
85
90
23c
81
4
77
81b
82
25a
68
80
72
88
96b
99
55
70
23a
55
96a
71
7
50
51
25c
92
22b
23d
28
61
62
84
76
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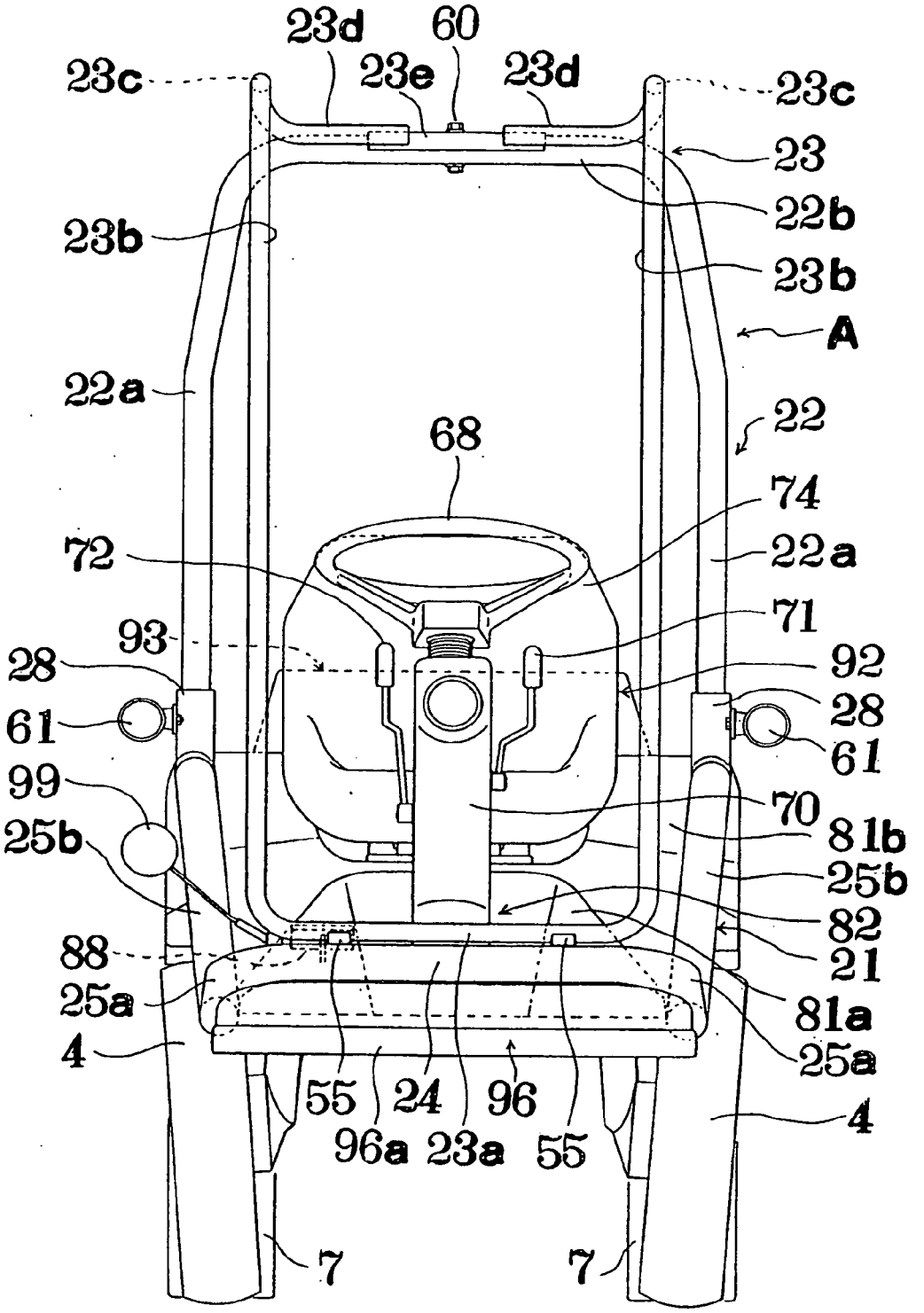
81c
90
4
81b
81a
80b
23c
80a
25a
96b

FIG. 3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60
23c
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23d
23c
23
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23b
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A
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22
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74
72
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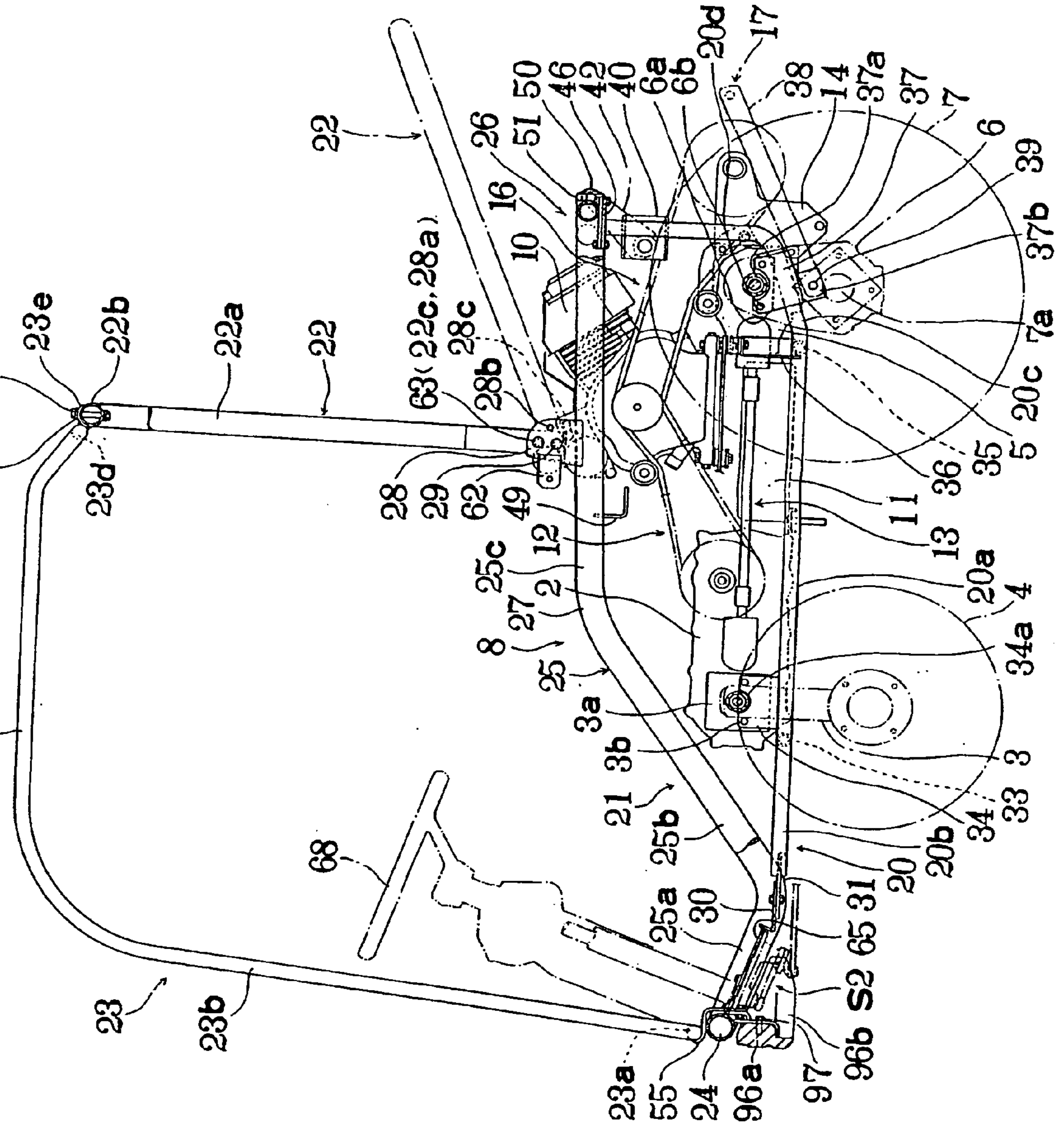
93
92
28
28
61
61
99
70
81b
25b
25b
82
88
21
25a
81a
4
25a
55
24
96
4
96a
23a
55
7
7

FIG. 4


22
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22b
23
23a
23b
23c
23d
23e
24
25
25a
25b
25c
26
27
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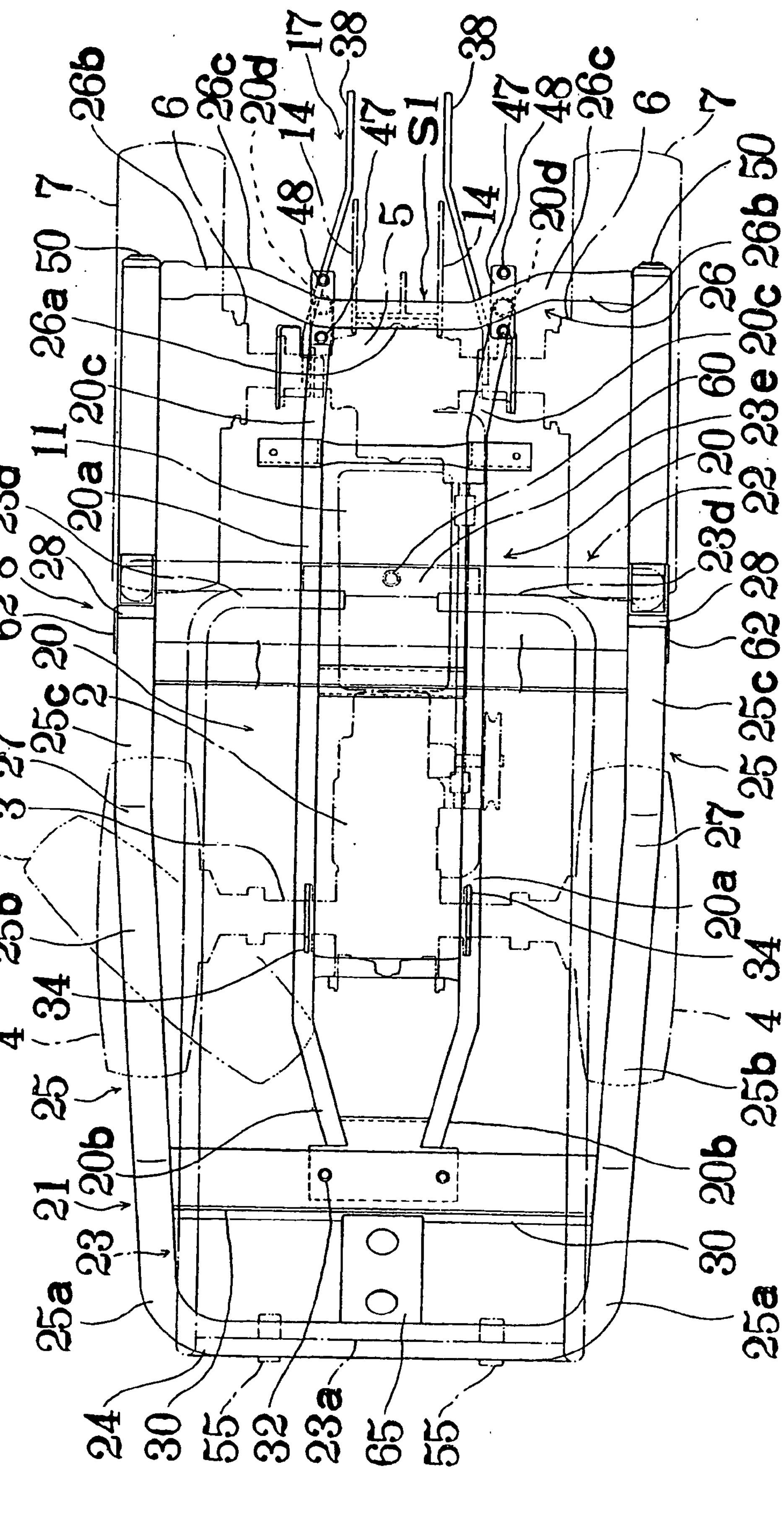
28c
29
2
3
3a
3b
4
5
6
6a
6b
7
7a
8
10
11
12
13
14
16
17
20
20a
20b
20c
20d
21
30
31
33
34
34a
35
36
37
37a
37b
38
39
40
42
46
49
50
51
55
58(59)
60
62
63(22c,28a)
65
68
96a
96b
97
S2

FIG. 5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50
26a
20c
11
20a
23d
8
62
28
20
2
25c
27
3
4
25b
34
25
20b
21
23
25a
24
30
55
32
23a
65
6
26c
20d
17
38
14
48
47
5
S1
26
60
23e
22

FIG. 6

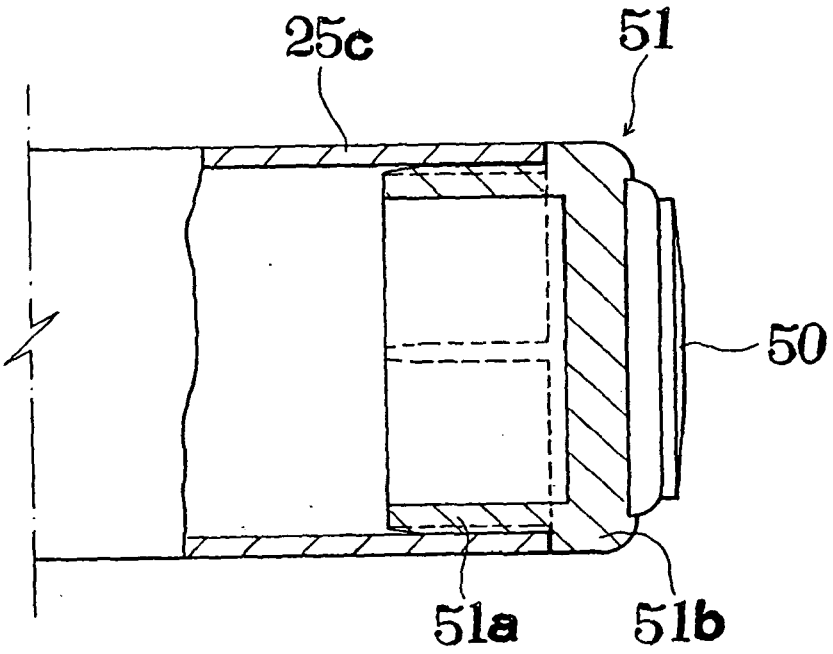

FIG. 7