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## (54) MODULAR TRUCK BODY

(71) We, CATERPILLAR TRACTOR CO., a corporation organised and existing under the laws of the State of California, United States of America, of 100 N.E. Adams Street, Peoria, State of Illinois 61602, United States of America, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The ever increasing size of on and off-highway trucks has given rise to shipping problems; namely, various regulations which dictate the maximum size of a truck and components thereof which may be shipped on commercial carriers. Therefore, truck bodies and the like are normally broken-down into their component parts to comply with such regulations and to also substantially decrease composite shipping volumes and shipping costs. In conventional practice, the truck body is normally completed at a manufacturing facility by securing the various plates and beam members thereof together by standard welding processes.

The completed truck body is then cut into several sections at the various welds for shipping purposes. The re-assembly and fabrication of the component parts at a customer's job site requires complex fixtures and methods for applying high quality welds over the welded joints which have been severed previously. In addition to the laborious and time-consuming nature of such a procedure, the resulting welds are sometimes found defective to thus impair the structural integrity of the completed truck body.

An object of this invention is to overcome the above, briefly described problems by providing an economical and non-complex modular truck body which exhibits a high degree of structural integrity. According to the invention we provide a modular truck body comprising

a pair of upstanding and laterally spaced side modules, each having an L-shaped cross section to comprise a generally vertical side section and a generally horizontal bottom section,

a generally horizontal floor module having outer edges thereof secured to respective inner edges of said side modules, and

an upstanding front module having outer edges thereof secured between forward ends of said side modules and a lower edge thereof secured to said floor module, said floor and side modules being secured together by means of a plurality of combined alignment and releasable fastening means. Co-pending Application No. 43114/77 (Serial No. 1503535) describes and claims a method for making a truck body comprising the steps of prefabricating a plurality of individual truck body modules, pre-assembling said modules together with combined alignment and releasable fastening means to form a truck body, releasing said fastening means to disassemble said truck body into said modules, shipping said modules to a remote location, re-assembling said modules together with said combined alignment and releasable fastening means to re-form said truck body and securing said modules together to form a structurally integrated truck body.

Other features of this invention will become apparent from the following description and accompanying drawings wherein:

FIG. 1 is a side elevational view of an off-highway truck employing the modular truck body of this invention thereon;

FIG. 2 is an exploded, side elevational view of the truck body;

FIG. 3 is an isometric view of the truck body, showing it in an inverted position

during pre-assembly thereof;

FIG. 4 is a front elevational view of the FIG. 3 truck body;

FIG. 5 is an enlarged sectional view of a front portion of the truck body, taken in the direction of arrows V-V in FIG. 3;

FIG. 6 is an enlarged sectional view, taken in the direction of arrows VI-VI in FIG. 3; and

FIG. 7 is an enlarged sectional view of a front portion of the completed truck body of FIG. 1.

FIG. 1 discloses an off-highway truck 10 comprising an operator's station or cab 11, a main frame 12 and a plurality of road-wheels 13 rotatably mounted on the frame in a conventional manner. A modular truck body 14 of this invention is pivotally mounted at its rearward end on the frame by a pair of laterally spaced pivot means 15 (one shown). A pair of double-acting hydraulic cylinders 16 (one shown) are pivotally interconnected between the frame and the truck body to selectively tilt the truck body rearwardly about pivot means 15 for dumping purposes.

Referring to FIG. 2, the truck body essentially comprises a pair of laterally spaced side modules 17, a generally horizontal floor module 18 and an upstanding front module 19. In addition, a canopy module 20 is preferably secured on a forward end of the truck body to overlie and protect operator's station 11 (FIG. 1). As will be hereinafter more fully described, the FIG. 2 truck body is adapted to undergo a pre-assembly operation at a manufacturing facility and subsequent disassembly and shipment to a customer's job site whereat the final assembly thereof is effected.

Referring to FIGS. 3-6, such pre-assembly is preferably conducted when the truck body is inverted. The prefabricated modules are positioned as shown in FIG. 3 by suitably arranged jigs and fixtures. Each side module has an L-shaped cross section to comprise a generally vertical side plate or section 21 and a generally horizontal bottom plate or section 22 terminating at an inner edge 23 thereof (FIG. 5).

Each side module terminates at its upper edge at an elongated rail 24 secured at one side to an upper edge of plate 21 and at its other side to one leg of an L-shaped bracing plate 25. A plurality of longitudinally spaced L-shaped ribs 26, having a decreasingly shorter vertical height towards a rearward end of the truck body, are secured to side and bottom plates 21 and 22 and beneath bracing plate 25. The inner ends of the ribs have a U-shaped recess 27 formed thereon and outwardly from end 23 for purposes hereinafter explained.

As shown in FIGS. 2 and 6, a flange 28 is formed at the inner, forward edge of plate 22 to overlap a plate 29 of floor module 18. The floor module further comprises a pair of parallel beams 30 and a plurality of longitudinally spaced and transversely disposed beams 31 of U-shaped cross section, all secured on plate 29. Beams 31 are interrupted by beams 30 and are each aligned with an end of a respective pair of ribs 26.

Referring to FIG. 5, the inner end of each beam 31 has a U-shaped recess 32 formed thereon. The recess substantially conforms to the shape of recess 27 and is longitudinally aligned therewith. In addition, recess 32 terminates short of an outer edge 33 of bottom plate 29.

Referring to FIGS. 4 and 7, prefabricated front module 19 comprises an inclined plate 34 having an upper rail 35 secured thereon. A laterally extending intermediate rail 36 is also secured thereon along with a plurality of vertically disposed bracing beams 37 of U-shaped cross section. The front module further comprises a pair of laterally spaced and inclined box-like support structures 38 secured between plate 34, rail 36 and a respective beam 37.

The front module 19 has its outer edges secured between the forward edges of the side module 17 and its lower edge secured to the floor module 18.

Canopy module 20 (FIGS. 2 and 7) comprises a pair of overlapping main plates 39 and 40 having a plurality of transversely disposed beams 41 secured in underlying relationship thereon. A plurality of beams 42 are secured to beams 41 in transverse relationship therewith. A pair of laterally spaced L-shaped plates 43 are secured to the outer edges of a conforming outer wall 44 to provide a box-like sidewall at the forward, upper end of each side of the truck body.

FIG. 3 illustrates the truck body after it has undergone a pre-assembly operation, prior to disassembly and shipping thereof to a customer's job site. In particular, the side, bottom and front modules are pre-aligned at a manufacturing facility to facilitate expeditious final assembly thereof at such job site.

Suitable jigs and fixtures are employed to retain the modules in their FIG. 3 position wherein they may be tack welded together, as indicated by tack welds 45, for example. A plurality of combined alignment and releasable fastening means 46 are employed between adjacent pairs of modules to assure precise attachment of the modules together. Such means may comprise a pair of first and second L-shaped brackets 47 (FIG. 5) having their lower legs welded or otherwise suitably

secured to plates 22 and 29, respectively, subsequent to the application of tack welds 45.

The upstanding legs of the brackets will thus abut each other in back-to-back relationship to align respective apertures 48 thereof. Each pair of aligned apertures are adapted to receive a fastener 49, such as a releasable nut and bolt. After the side, bottom and front modules have been attached together by fastening means 46, such fastening means, along with tack welds 45, are released and the truck body is disassembled into its modular units.

Upon such disassembly, the truck body is shipped to a customer's job site or the like, along with canopy module 20, four tie rod assemblies 50 and other miscellaneous hardware. At such job site, the modules are again positioned as shown in FIG. 3 and fastening means 46 are re-installed to fix the side, bottom and front modules in their precise positions. Simultaneously therewith, tie rod assemblies 50 are connected between side plates 21 of the side modules to further rigidify the assembled truck body during the subsequent welding operation.

Referring to FIG. 5, each end of each tie rod assembly has a threaded extension 51 secured thereon which extends through an opening 52, formed through a respective side plate, and receives a nut 53 thereon. An outer face 54 of the tie rod will abut an inner surface of the side plate to precisely set the predesigned distance between the inner surfaces of the side plates. Welds *W*, shown in dotted lines in FIGS. 5 and 6, are then applied between the seams defined between the outer edges of the bottom plate and the inner edges of the side plates.

As previously suggested in reference to FIGS. 2 and 6, the seam at a forward end of a truck body includes an overlapping of the adjacent edges of plates 22 and 29 at flange 28 to increase the structural integrity thereat. The ends of U-shaped connecting members 55 and 56 are each locked mechanically in like-shaped recesses 27 and 32 (FIGS. 5 and 6) and welded to straddled rib 26 and beam 31. Members 56 each have a pair of cut-outs 57 (one shown in FIG. 6) formed on lower edges thereof to accommodate raised flange portion 28 of bottom plate 22.

The front module is then welded in place in a manner similar to that described above. The integrated side, bottom and front modules are then inverted and the canopy module is suitably welded in place. The completed truck body is then mounted and attached in frame 12 by pivot means 15 (FIG. 1) and cylinders 16 are pivotally interconnected therebetween.

Although fastening means 46 preferably remain secured to the truck body during installation thereof on frame 12 of the truck (FIG. 1), tie rod assemblies 50 are preferably removed therefrom. Such removal may be accomplished by first removing nuts 53 from the ends of each tie rod assembly and by then cutting the tie rod assembly in half. Openings 52 may be suitably plugged subsequent to such removal, as indicated by the non-appearance of such openings in FIG. 1.

WHAT WE CLAIM IS:—

1. A modular truck body comprising

a pair of upstanding and laterally spaced side modules, each having an L-shaped cross section to comprise a generally vertical side section and a generally horizontal bottom section,

a generally horizontal floor module having outer edges thereof secured to respective inner edges of said side modules, and

an upstanding front module having outer edges thereof secured between forward ends of said side modules and a lower edge thereof secured to said floor module, said floor and side modules being secured together by means of a plurality of combined alignment and releasable fastening means.

2. A truck body as claimed in claim 1 wherein a rearward end of said truck body has means for pivotally mounting it on a frame of a vehicle and means for pivotally connecting at least one hydraulic cylinder to said body for selectively tilting said truck body rearwardly about said pivot means.

3. A truck body as claimed in claim 1 or 2 including a canopy module secured on a forward end of said truck body to overlie and protect an operator's station on a vehicle.

4. A truck body as claimed in any preceding claim wherein said floor and front modules are secured together by welds at respective seams therebetween.

5. A truck body as claimed in any preceding claim, wherein each of said fastening means comprises a first bracket secured to said floor module and a second bracket secured to a respective side module and positioned closely adjacent to said first bracket.

6. A truck body as claimed in claim 5, wherein each of said fastening means further comprises a pair of aligned apertures formed through said first and second brackets and a releasable fastener disposed in said apertures.

7. A truck body as claimed in any preceding claim further comprising a plurality of longitudinally spaced L-shaped ribs conforming to and secured to an outside of

secured to plates 22 and 29, respectively, subsequent to the application of tack welds 45.

The upstanding legs of the brackets will thus abut each other in back-to-back relationship to align respective apertures 48 thereof. Each pair of aligned apertures are adapted to receive a fastener 49, such as a releasable nut and bolt. After the side, bottom and front modules have been attached together by fastening means 46, such fastening means, along with tack welds 45, are released and the truck body is disassembled into its modular units.

Upon such disassembly, the truck body is shipped to a customer's job site or the like, along with canopy module 20, four tie rod assemblies 50 and other miscellaneous hardware. At such job site, the modules are again positioned as shown in FIG. 3 and fastening means 46 are re-installed to fix the side, bottom and front modules in their precise positions. Simultaneously therewith, tie rod assemblies 50 are connected between side plates 21 of the side modules to further rigidify the assembled truck body during the subsequent welding operation.

Referring to FIG. 5, each end of each tie rod assembly has a threaded extension 51 secured thereon which extends through an opening 52, formed through a respective side plate, and receives a nut 53 thereon. An outer face 54 of the tie rod will abut an inner surface of the side plate to precisely set the predesigned distance between the inner surfaces of the side plates. Welds *W*, shown in dotted lines in FIGS. 5 and 6, are then applied between the seams defined between the outer edges of the bottom plate and the inner edges of the side plates.

As previously suggested in reference to FIGS. 2 and 6, the seam at a forward end of a truck body includes an overlapping of the adjacent edges of plates 22 and 29 at flange 28 to increase the structural integrity thereat. The ends of U-shaped connecting members 55 and 56 are each locked mechanically in like-shaped recesses 27 and 32 (FIGS. 5 and 6) and welded to straddled rib 26 and beam 31. Members 56 each have a pair of cut-outs 57 (one shown in FIG. 6) formed on lower edges thereof to accommodate raised flange portion 28 of bottom plate 22.

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an upstanding front module having outer edges thereof secured between forward ends of said side modules and a lower edge thereof secured to said floor module, said floor and side modules being secured together by means of a plurality of combined alignment and releasable fastening means.

2. A truck body as claimed in claim 1 wherein a rearward end of said truck body has means for pivotally mounting it on a frame of a vehicle and means for pivotally connecting at least one hydraulic cylinder to said body for selectively tilting said truck body rearwardly about said pivot means.

3. A truck body as claimed in claim 1 or 2 including a canopy module secured on a forward end of said truck body to overlie and protect an operator's station on a vehicle.

4. A truck body as claimed in any preceding claim wherein said floor and front modules are secured together by welds at respective seams therebetween.

5. A truck body as claimed in any preceding claim, wherein each of said fastening means comprises a first bracket secured to said floor module and a second bracket secured to a respective side module and positioned closely adjacent to said first bracket.

6. A truck body as claimed in claim 5, wherein each of said fastening means further comprises a pair of aligned apertures formed through said first and second brackets and a releasable fastener disposed in said apertures.

7. A truck body as claimed in any preceding claim further comprising a plurality of longitudinally spaced L-shaped ribs conforming to and secured to an outside of

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each of said side modules, each rib terminating at an inner end short of the inner edge of such side module, a plurality of transversely disposed and longitudinally spaced beams secured to an outside of said floor module, each beam extending between the inner ends of a pair of said ribs and terminating at outer ends thereof short of the outer edges of said floor module, and a U-shaped connecting member secured between each outer end of each of said beams and the inner end of a respective rib.

8. A truck body as claimed in claim 7, wherein the inner end of each of said ribs and the outer end of each of said beams has a U-shaped recess formed thereon receiving an end of a respective connecting member therein.

9. A truck body as claimed in claim 7, wherein only forward ends of the inner edges of each of said side modules has a flange formed thereon, said flange overlapping said floor module.

10. A modular truck body substantially as described with reference to the accompanying drawings.

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