Sept. 28, 1954 H. J. WOOLSLAYER ET AL 2,690,268

METHOD OF LOADING OIL WELL DERRICKS ON VEHICLES

Filed Dec. 3, 1948 4 Sheets-Sheet 1

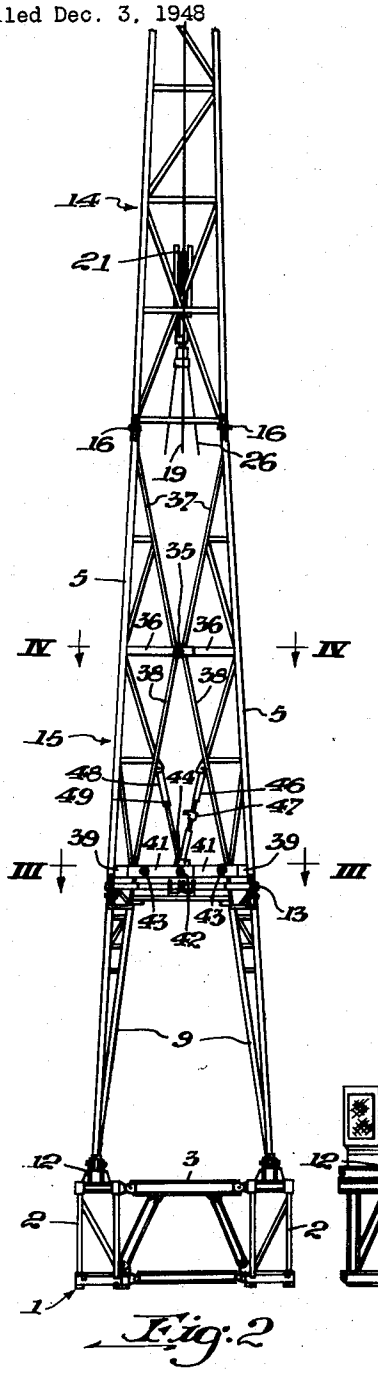


Fig. 2

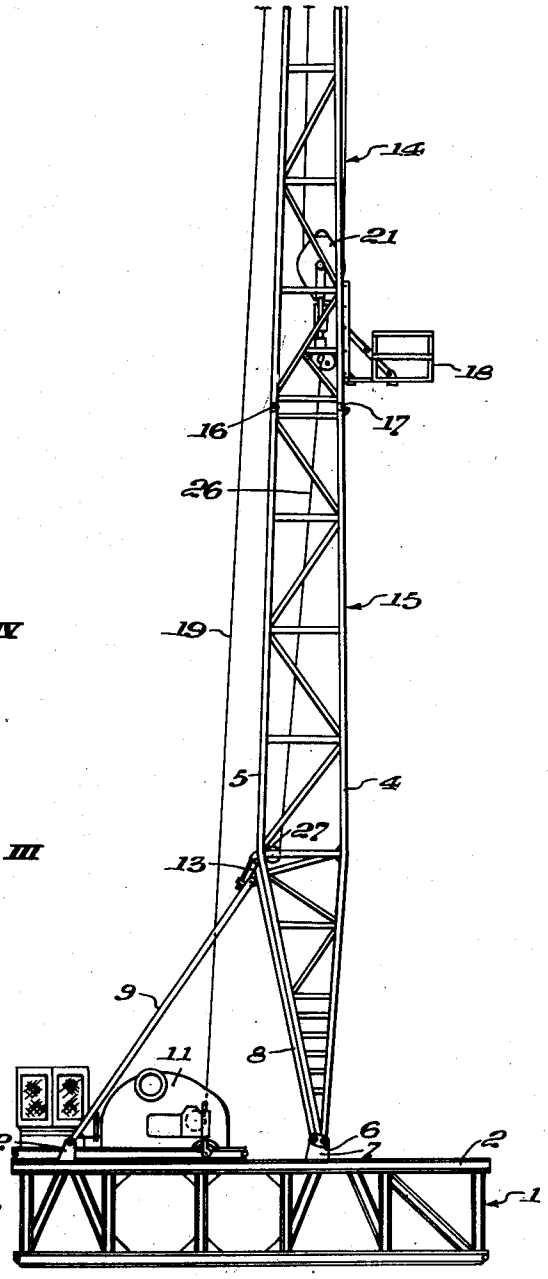


Fig. 1.

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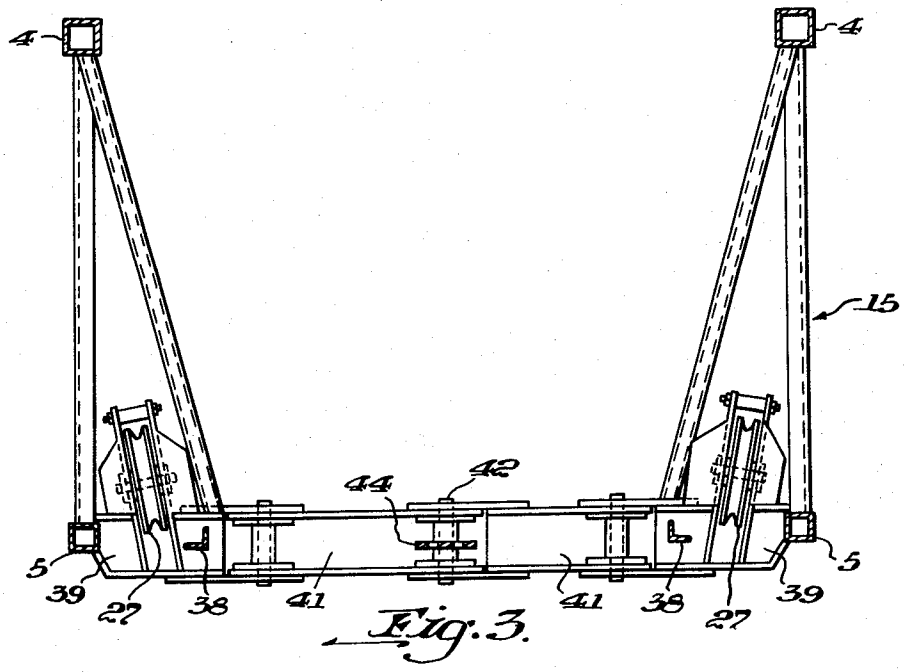


Fig. 3.

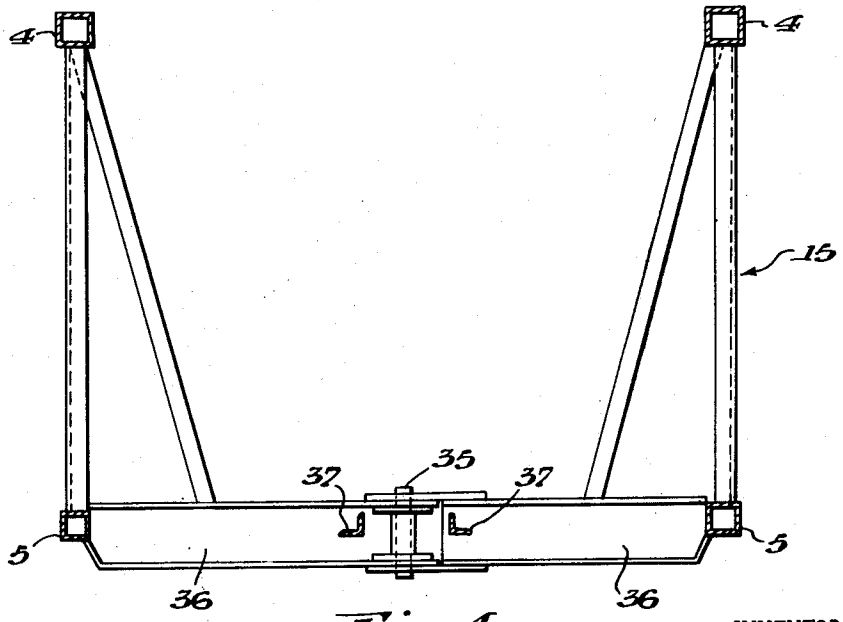


Fig. 4.

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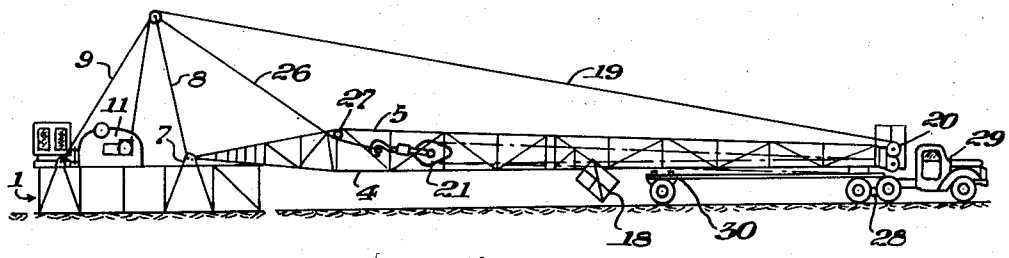


Fig. 5.

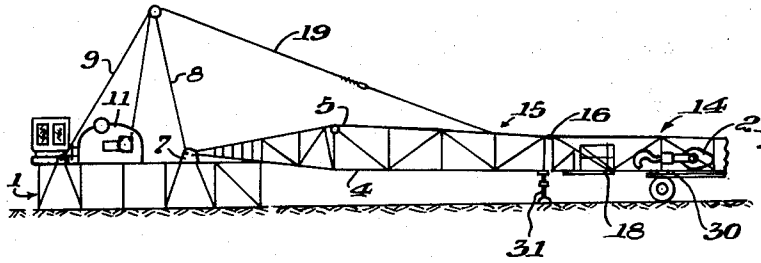


Fig. 6.

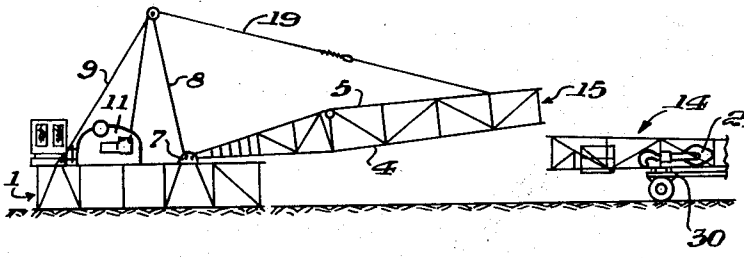


Fig. 7.

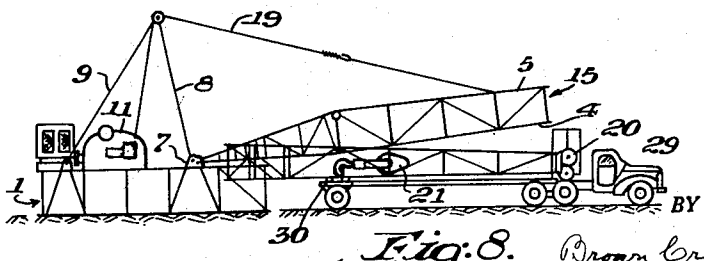


Fig. 8.

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METHOD OF LOADING OIL WELL DERRICKS ON VEHICLES

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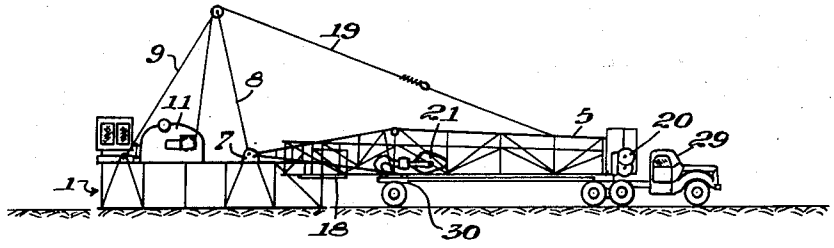


Fig. 9.

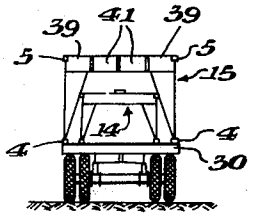


Fig. 11.

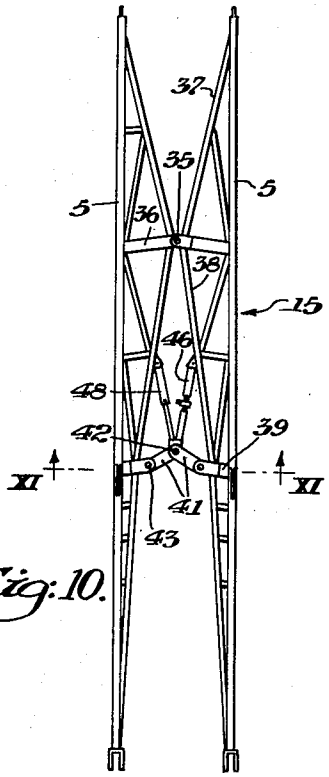


Fig. 10.

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2,690,268

METHOD OF LOADING OIL WELL DERRICKS ON VEHICLES

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Application December 3, 1948, Serial No. 63,346

2 Claims. (Cl. 214—152)

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This invention relates to portable oil well derrick structures, and more particularly to those which include masts that can be divided transversely into long sections for transportation on trucks and the like.

When such masts are taken down and loaded upon trucks or are unloaded and assembled, they have required, in addition to the trucks that transport them, the services of other trucks equipped with gin poles and winches. Furthermore, some masts are too wide at the bottom for highway transportation, and therefore have to have their lower sections divided lengthwise. This requires a considerable amount of extra time and labor.

It is an object of this invention to provide portable oil well derrick equipment including a mast which can be transported from one location to another by a single truck and can be loaded thereon and unloaded without the services of a gin pole truck. Another object is to provide a new method of loading such a mast on a vehicle and unloading it therefrom. A further object is to provide such a mast, the width of the lower portion of which can be quickly and easily reduced for highway transportation without separating the opposite sides of the mast from each other.

In accordance with this invention an oil well mast has an upper section detachably connected to an upwardly tapered lower section. The upper section may be further subdivided if desired. At least the lower section has an open front. Means are provided for pivotally connecting the lower end of the mast to a substructure so that the mast can be swung forward and downward from an upright position to a prone position to permit its upper section to rest on a vehicle that is to transport it to another location. The outer end of the prone lower section of the mast is adapted to be lifted after it has been disconnected from the upper section, so that the vehicle can be moved back toward the substructure to nest the upper section into the lower section. After the elevated lower section has been lowered onto the vehicle astraddle of the upper section, the inner end of the lower section is disconnected from the substructure so that the vehicle can be driven away with the nested mast sections on it. When the foot of the mast is too wide for highway load limits, the lower portions of the sides of the mast are hinged in such a way that their lower ends can be swung laterally toward each other to reduce the width of the foot while it is on the vehicle. Preferably, this is accomplished by means of a toggle connecting the opposite sides of the mast and operated by a jack connected to it and to one side of the mast.

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The invention is illustrated in the accompanying drawings, in which Fig. 1 is a side view of the substructure and most of the mast; Fig. 2 is a rear view thereof with the drawworks removed; Figs. 3 and 4 are enlarged horizontal sections taken on the lines III—III and IV—IV, respectively, of Fig. 2; Figs. 5 to 9 are line drawings of the side of the derrick showing the mast in several successive positions as it is loaded on a truck; Fig. 10 is a plan view of the prone lower section of the mast with its width reduced for transportation; and Fig. 11 is a vertical section, taken on line XI—XI of Fig. 10, showing the mast being transported over a highway.

Referring to Figs. 1 and 2 of the drawings, the substructure 1 is a strong framework formed from structural steel members suitably connected together, and has vertical side frames 2 connected at longitudinally spaced points by cross members 3. The lower portions of the front and rear legs 4 and 5, respectively, of the mast converge downward at each side of the mast and are pivotally connected or hinged by means of fastening members 6 to shoes 7 mounted on the substructure. Also pivotally mounted in these shoes are the front legs 8 of an upwardly tapered gin pole which supports the mast in upright position. The rear legs 9 of the gin pole straddle the drawworks 11 mounted on the rear half of the substructure, and are connected to shoes 12 mounted on the rear end of the substructure. The mast is detachably connected to the gin pole by means of bolts 13.

The sides of the mast converge upward as shown in Fig. 2, so that the lower end or foot of the mast is much wider than its upper end. As shown in Figs. 3 and 4, the front of the mast is open from its bottom all, or most, of the way to its top, to permit stands of pipe to be swung in and out of the front. The mast is formed from upper and lower sections 14 and 15 which are detachably connected together by removable fasteners 16 through its rear legs 5 and similar fasteners 17 through its front legs 4. The upper section may be formed from shorter sections connected together, if desired, and is provided with a folding pipe racking platform 18 normally projecting from its open front. The usual fast line 19 extends from the drawworks up behind the mast, over the crown block 20 (Fig. 5) and down

into the mast where it supports the traveling block 21.

When it is desired to transport the mast to another location, the traveling block 21 is hooked onto a sling line 26 that extends down and around under sheaves 27 in the mast and has its free ends anchored to the top of the gin pole. Bolts 13 then are disconnected from the gin pole to release the mast from it, and the fast line 19 is payed out by the drawworks to permit the traveling block to descend in the mast. This allows the mast to swing forward and down toward the ground in a manner now well known in this art. When necessary, any cross braces 3 that may be located between the front ends of side frames 2 of the substructure may be removed to form a bay for receiving a portion of the mast. As shown in Fig. 5, the mast is swung down until its upper or outer end rests on a support 28 above the rear wheels of a truck tractor 29. Thereafter, the racking platform 18 is swung up against the mast and lashed in place, and the traveling block is drawn forward until it rests on the rear end of the truck trailer 30, as shown in Fig. 6.

The fast line 19 then is unstrung from the traveling block and crown block and is connected to the prone lower section 15 of the mast near its outer end, as shown in Fig. 6. The line may be tightened by the drawworks to support the lower section when the splices between the lower legs 4 of the upper and lower sections of the mast are broken by removing fasteners 17, or a jack 31 may be placed under the outer end of the lower section to support it. After the lower splices are broken, the jack is lowered, thereby causing the two sections of the mast to pivot around fasteners 16 until the upper section 14 rests on the rear end of the trailer. The splices between the upper legs of the two sections of the mast then are broken by removing fasteners 16, following which the drawworks is operated to cause line 19 to lift the outer end of the lower section 15 of the mast until it is above the adjacent end of the disconnected upper section 14, as shown in Fig. 7. The lower section will not have to be lifted so far if the sides of the mast diverge toward its open front. As shown in Fig. 8, the truck then can be backed toward the substructure until the elevated outer end of section 15 of the mast is above the outer end of section 14 resting on the truck trailer. In this way one section is telescoped or nested in the other to a certain extent, whereupon the drawworks pays out the fast line 19 again to lower section 15 of the mast onto the truck astraddle of the other section, as shown in Fig. 9. The foot of the mast can be blocked up on the substructure while the lower ends of the mast legs are disconnected from shoes 7 by removing fastening members 6, and then the truck can be driven away from the substructure with the nested mast sections on the truck, as shown in Fig. 11. In erecting the mast this procedure is just reversed.

It will be seen that this invention enables a mast to be mounted in sections on a single truck, or to be unloaded therefrom, without the use of a gin pole truck or any winch additional to the drawworks.

Another feature of this invention is that in cases where the foot of the mast is too wide to allow the mast to be transported over a highway by a truck, the width of the foot can be reduced without separating the opposite sides of the mast from each other or removing any projecting members. Accordingly, as shown in Figs. 2 and 4, the opposite sides of the upright lower section 15 of the mast are hinged together at a point at or above the level at which the width of the mast does not exceed highway load limitations, which specify that a load must not be wider than eight feet. Although this pivotal connection may be accomplished in different ways as long as it permits the lower ends of the mast's sides to be swung toward each other, it is preferred that a substantially horizontal hinge pin 35 be used to connect the overlapping inner ends of heavy horizontal members 36 forming a girt which is secured at its outer ends to the rear legs 5 of the mast at about the eight foot wide level, which is a considerable distance below fasteners 16 and 17 that splice the upper and lower sections of the tapered mast together. As shown in Fig. 2, the inner ends of these girt members 36 are braced from above by upwardly diverging braces 37 connected at their upper ends to the rear legs just below the leg splices. The inner ends of these girt members are braced from below by means of downwardly diverging braces 38 connected to the inner ends of short horizontal members 39 projecting toward each other from the rear legs of the mast. This arrangement of braces and hinge allows the lower ends of the opposite sides of the mast to be swung toward each other after the lower section 15 of the mast has been disconnected from the prone upper section 14 and from the substructure.

Although there are several ways in which the sides of the disconnected prone lower section can be rocked around hinge pin 35, the preferred way is by means of a toggle operated by a jack permanently connected to it. As shown in Figs. 2 and 3, the toggle may be formed from a pair of links 41 pivotally connected together by a pin 42 midway between the sides of the mast. When the mast is upright, this pin is substantially horizontal. When the mast is prone, the pin is vertical. The outer ends of the links are connected by pivot pins 43 to the inner ends of the short horizontal members 39. When the toggle links are in line with each other and those members, a horizontal girt is formed which helps hold the sides of the lower section of the mast the proper distance apart while the mast is in use. The center pin 42 of the toggle supports an upright plate 44, to which the lower end of a jack 46 is pivotally connected. The upper end of the jack is pivotally connected to one of the diagonal braces 38 so that, when the jack screw is turned in the right direction by its turning ratchet 47, the center of the toggle will be pulled upward. This pulls the mast sides below hinge pin 35 toward each other and simultaneously swings their upper ends away from each other, as shown in Fig. 10. The action can be improved by pivotally connecting the opposite ends of a telescoping brace 48 to upright plate 44 and to the other diagonal brace 38. The telescoping brace may be locked in extended position by inserting a radial pin 49 in aligned holes through the telescoping parts of the brace.

After the mast has been loaded onto a truck and moved away from the substructure as described previously herein, the pivoted jack 46 is manipulated to break the toggle joint as just mentioned and thereby to swing the opposite sides of the lower section 15 of the mast around the hinge pin 35 until they are substantially parallel. With the mast no more than eight feet wide

at the hinge, the lower section will be no more than eight feet wide at any point. When the truck reaches its destination, the jack **46** can be extended to straighten the toggle and thereby return the foot of the mast to its original width so that it can be connected to the shoes **7** of a substructure in readiness for raising to upright position by means of the fast line and sling. This feature of the invention makes it possible to quickly and easily reduce the width of the mast for transportation without having to break it down into smaller sub-assemblies. The result is a saving in time, labor and space.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. The method of loading onto a vehicle a portable four legged oil well mast having an upper section supporting a fast line and detachably connected to an upwardly tapered open front lower section that is hinged to a substructure, comprising swinging the mast forward and down with the aid of the mast's fast line to a prone position with its outer end resting on the front portion of the vehicle, unstringing the fast line from the mast and connecting it to the outer end of the prone lower section of the mast, disconnecting the prone lower section of the mast from the prone upper section to leave the latter supported only by the vehicle, pulling on said line to lift the outer end of the disconnected lower section, moving said vehicle under said lower section toward the substructure to nest the upper section into the lower section, releasing the fast line to lower onto the vehicle the outer end of the lower section so that it straddles the outer end of the upper section, disconnecting the inner end of said lower section from the substructure to leave the lower section supported only by the vehicle, and swinging the opposite sides of the inner end portion of said prone lower section toward each other to reduce the width of said portion on the vehicle.

2. The method of loading onto a vehicle a portable oil well mast having an upper section detachably connected to an upwardly tapered open front lower section that is hinged to a substructure, comprising swinging the mast forward and down to a prone position with its upper section resting on the vehicle, separating the prone lower section of the mast from said upper section to leave the latter supported only by the vehicle, lifting the outer end of the disconnected lower section, moving said vehicle toward the substructure to nest the upper section into the lower section, lowering onto the vehicle the outer end of the lower section so that it straddles the outer end of the upper section, and disconnecting the inner end of said lower section from the substructure to leave the lower section supported only by the vehicle.

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