Dec. 16, 1952 LE GRAND H. LULL 2,621,811

LOAD HANDLING AND TRANSPORTING MACHINE

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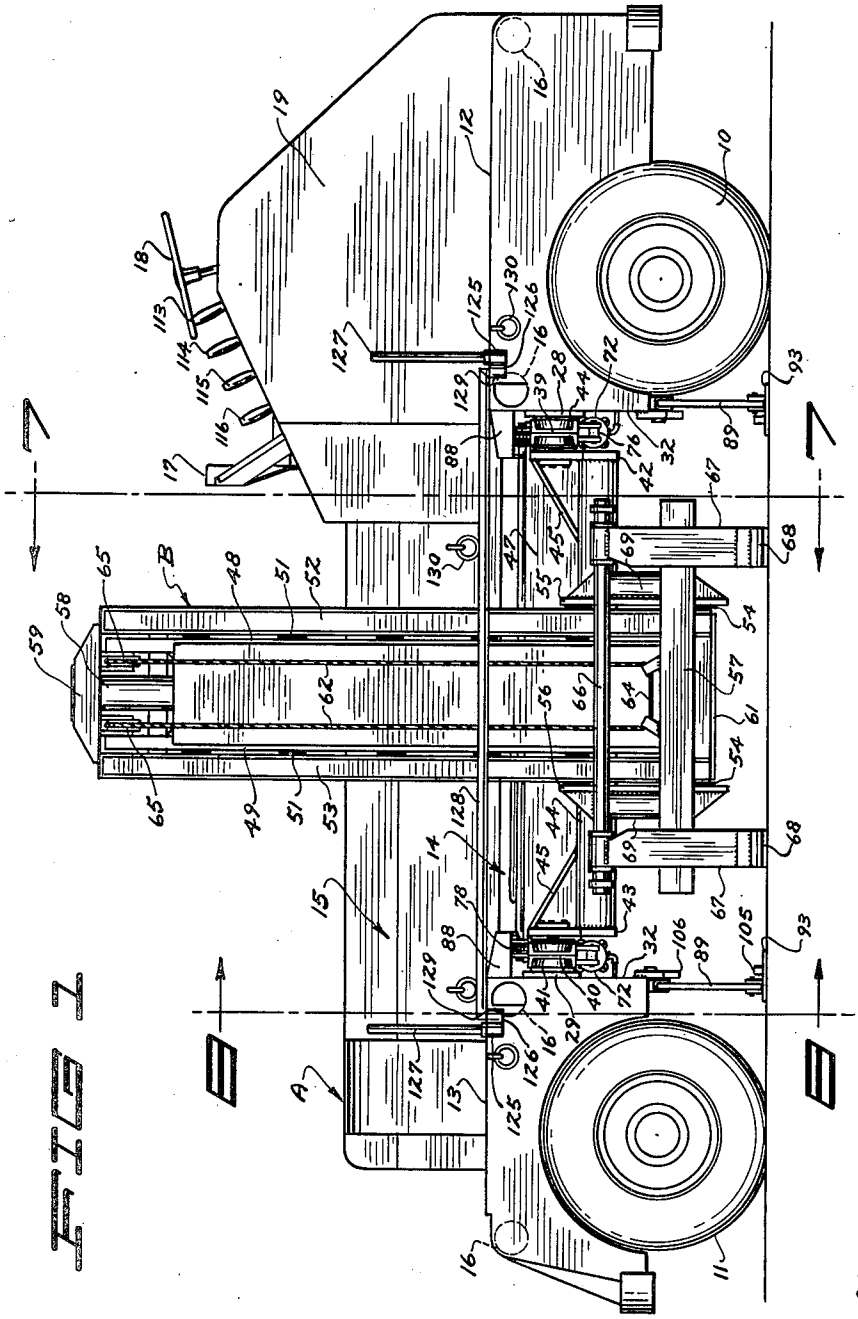


FIG. 7

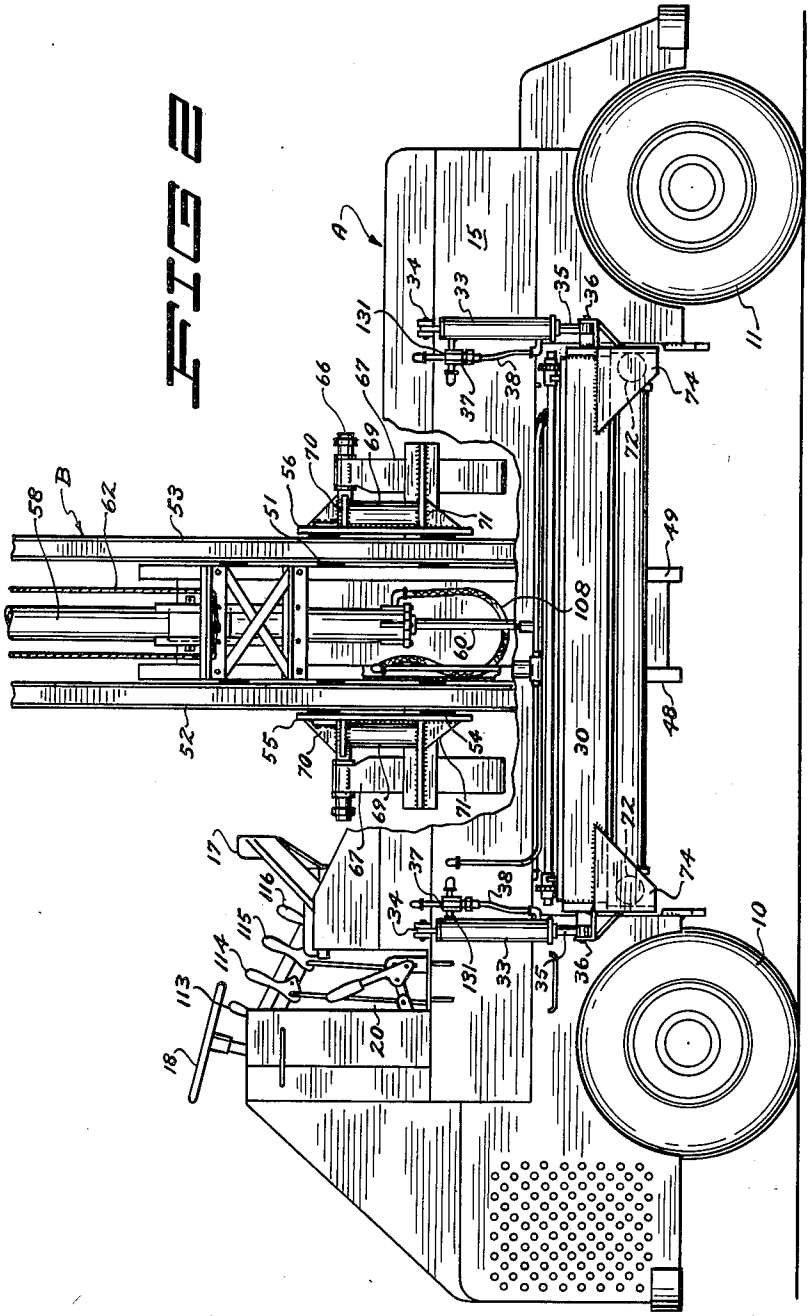
Inventor
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By Carlson & Hayes

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FIG. 2



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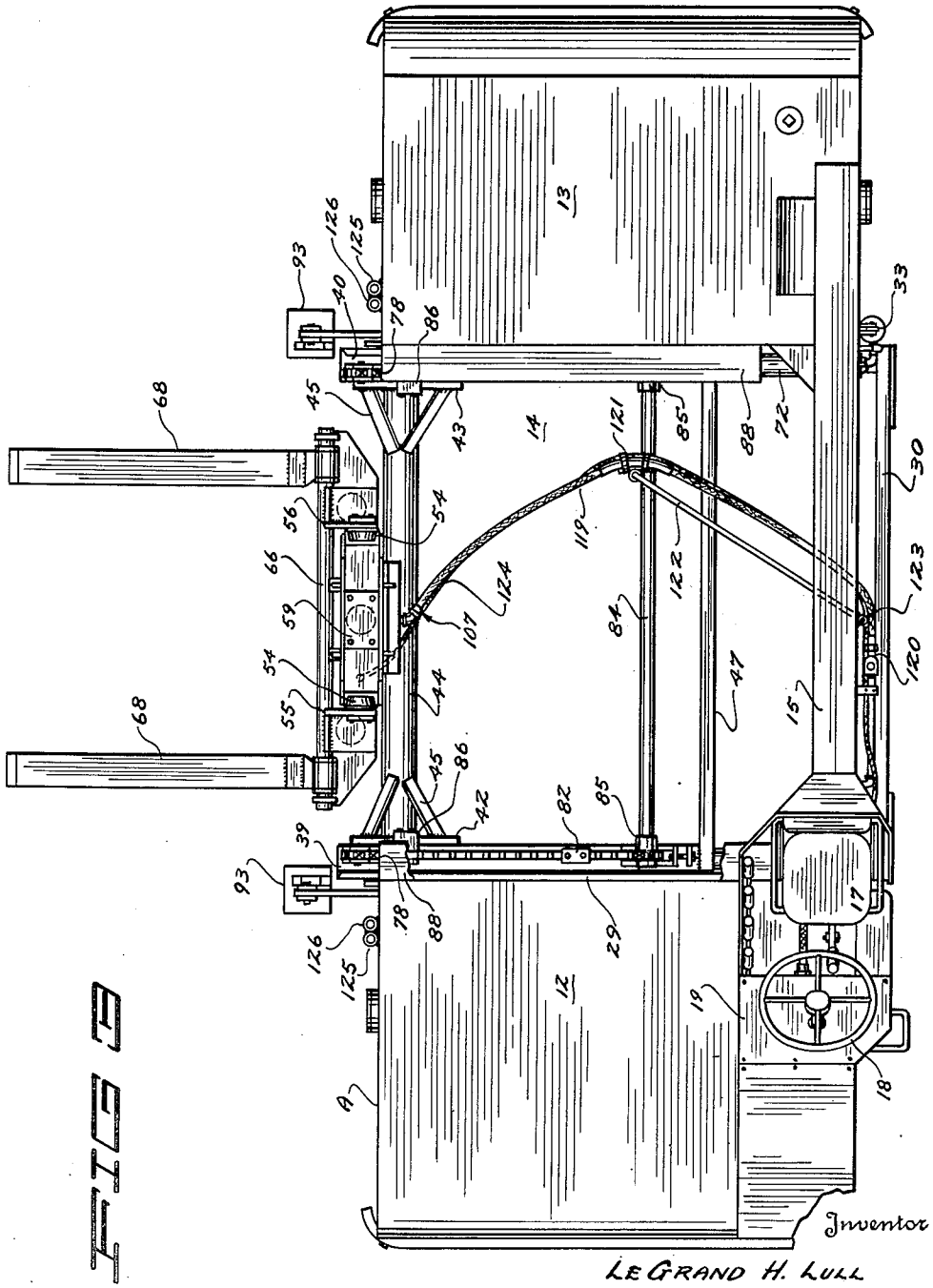


FIG. 3

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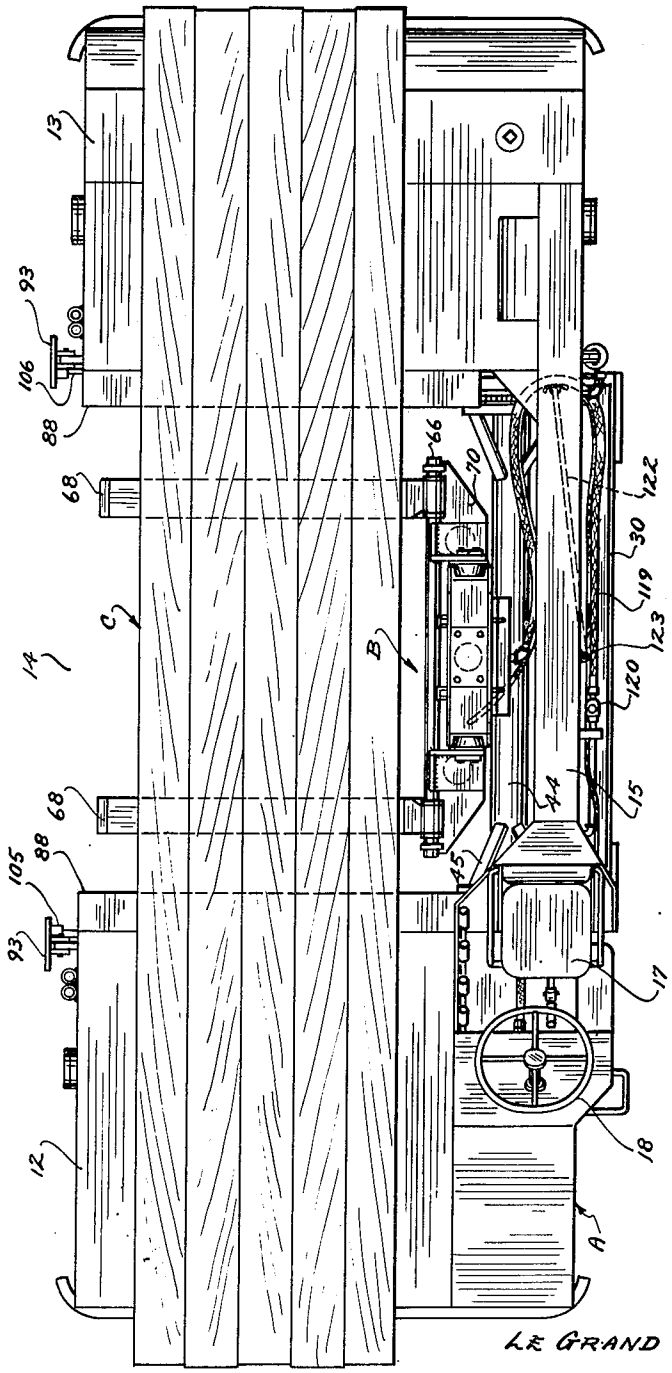


FIG 4

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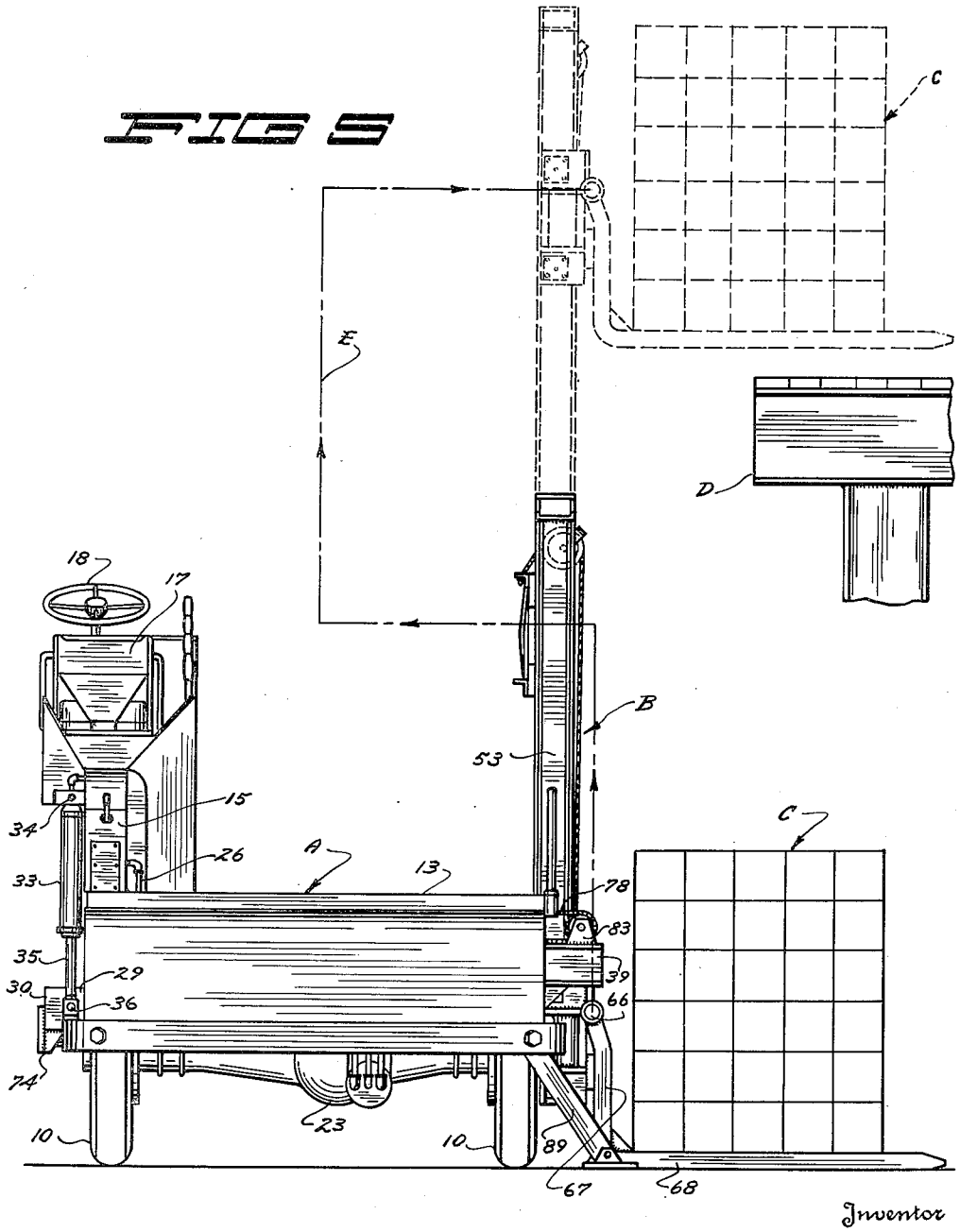
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FIG 5



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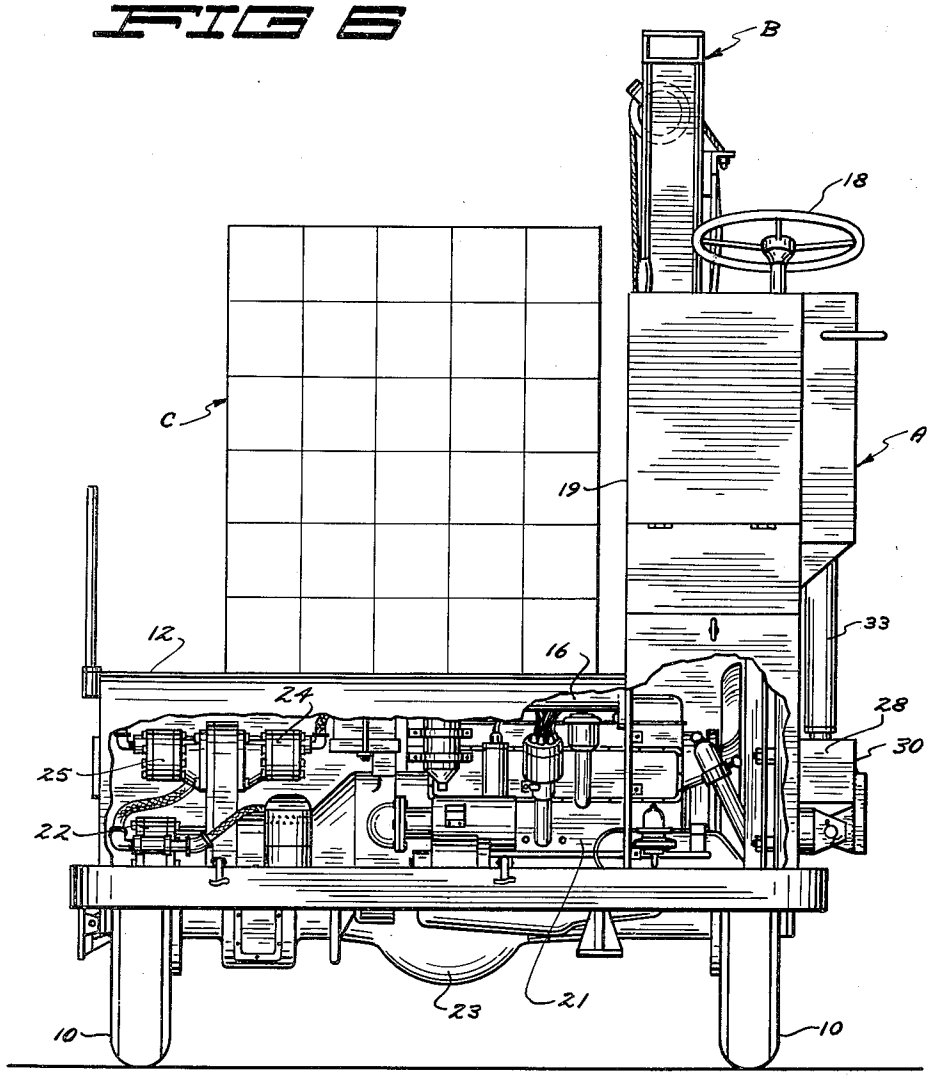
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FIG 6



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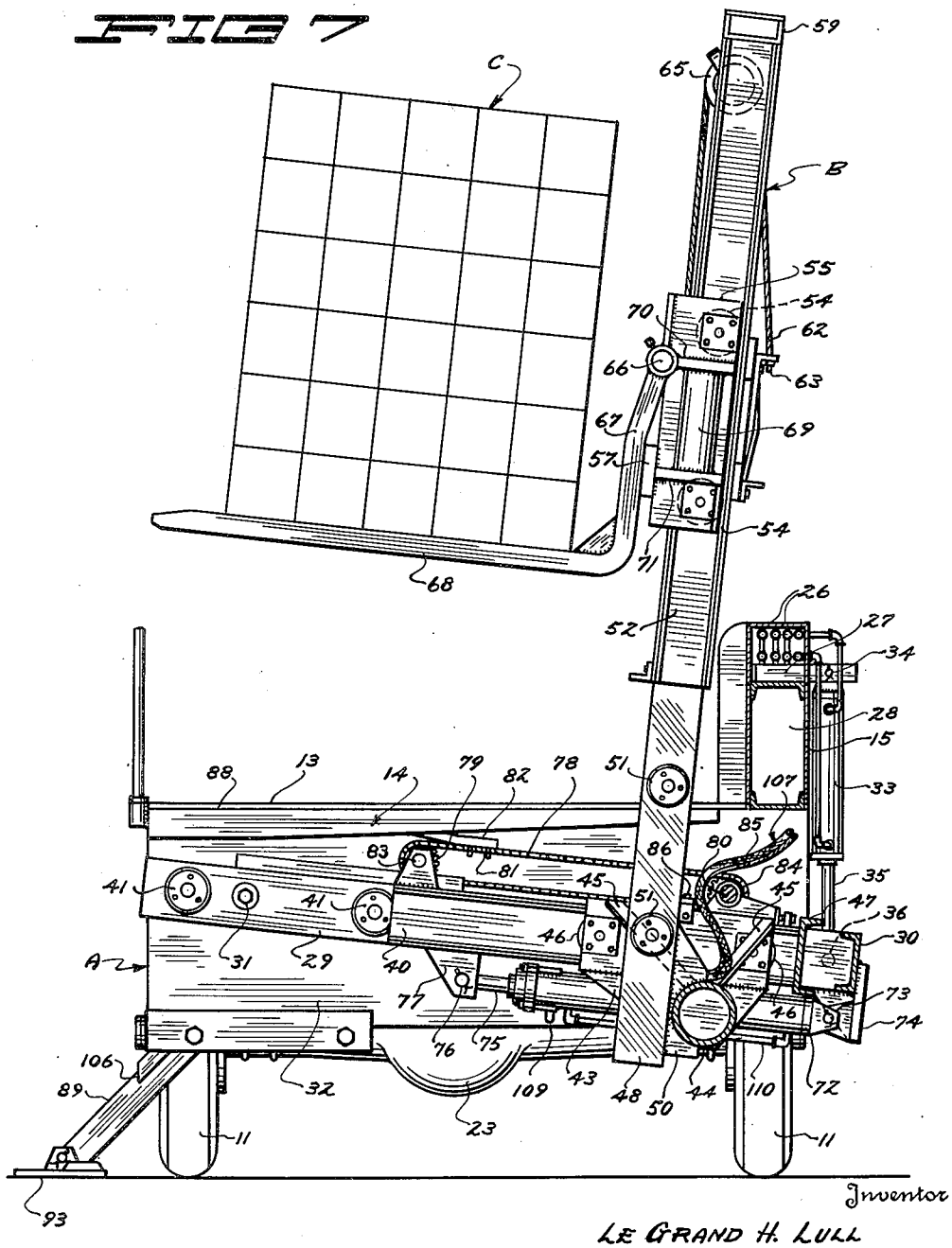
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FIG 7



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FIG 8

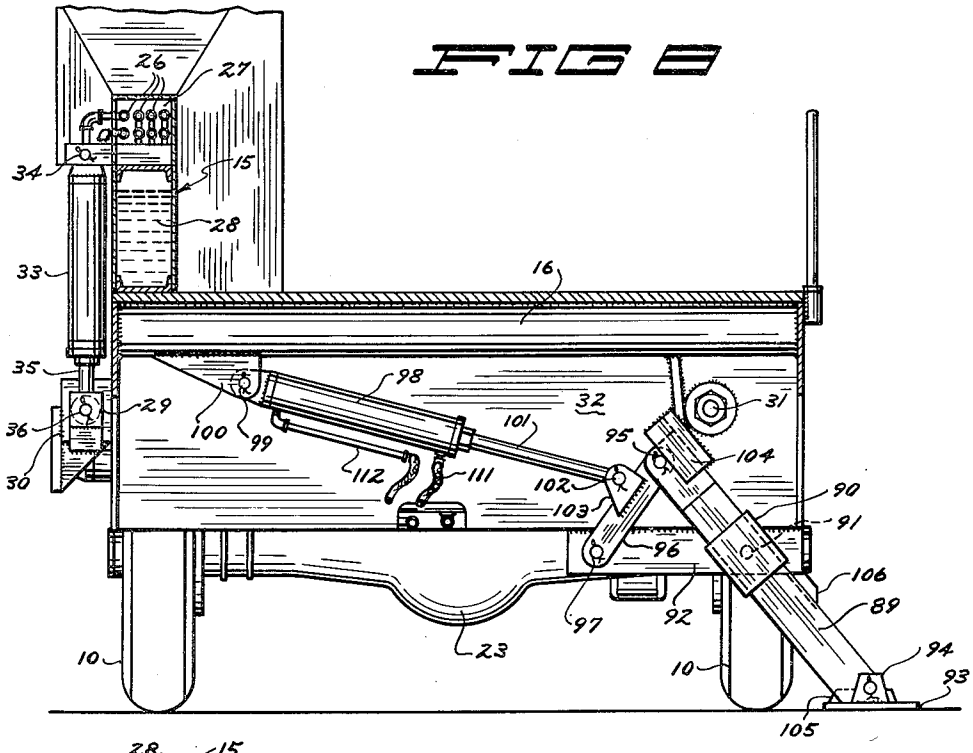
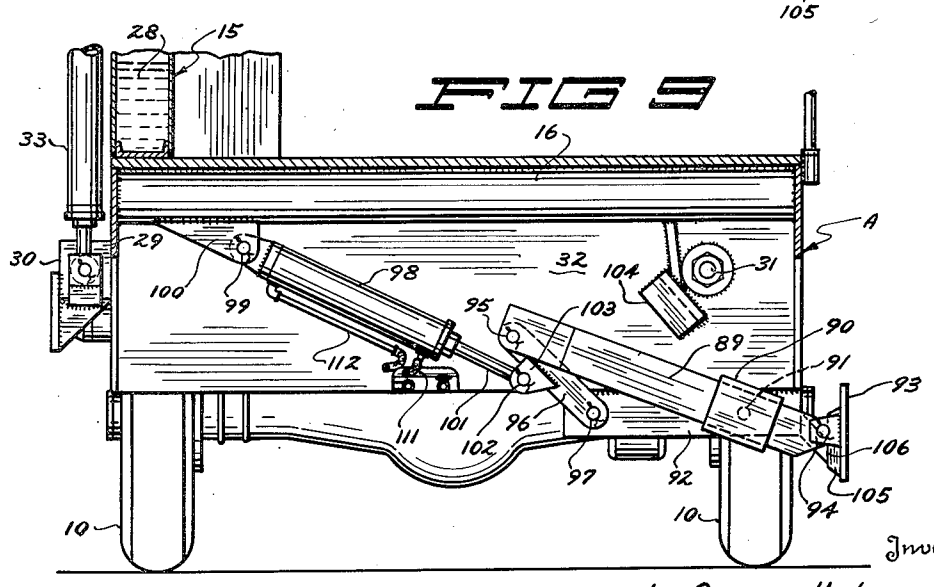


FIG 9



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Patented Dec. 16, 1952

2,621,811

UNITED STATES PATENT OFFICE

2,621,811

LOAD HANDLING AND TRANSPORTING MACHINE

Le Grand H. Lull, Minneapolis, Minn.

Application October 23, 1948, Serial No. 56,071

26 Claims. (Cl. 214—75)

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This invention relates to improvements in load handling and transporting machines, particularly adapted to lifting, loading, stacking and transporting lengthy and heavy loads and materials, such as timbers, lumber, rails, pipes and shafting, tanks, structural steels and many other materials and objects.

The now widely known and used industrial and tractor loaders are mounted at the front, or at least the end, of a wheeled power operated frame, either a commercially available tractor, or a special vehicle, and while they are very useful within their limitations, they are not at all suitable for a great many jobs. As just one example of a field in which the present machines are of little or no practical value, consider the usual storage yard for steels, timbers and the like. These materials are usually quite long and are arranged in stacks with aisles between rows of stacks. The end mounted loader of whatever kind cannot be maneuvered in these aisles to properly approach the stacks and even if they could, the materials being carried crosswise to the direction of travel, would in nearly every case be too long to pass along the aisles between the stacks. About all that can be done with present loaders is to rig a sling and carry one or at best a few pieces and this is obviously quite impractical and in many cases completely impossible. Many other instances will be found in all industries where similar problems are encountered and present day equipment is of little or no practical value. What is obviously needed, but what has never heretofore been provided to my knowledge, is what might be called an "aisle" loader, or a machine by which the materials may be loaded and unloaded from the side of the machine and transported lengthwise when on the machine. It is accordingly the primary object of my invention to provide a machine of this kind, which lends itself to application to the many fields not even touched by the prior loaders.

Another object is to provide a loading machine embodying a power operated, special vehicular frame having at least two supports or platforms spaced apart along the direction of travel and with at least one loading mechanism arranged in the space (or spaces) between the supports to move out to the side and engage a load, elevate the load, draw it inward and finally lower the load lengthwise onto said supports ready for transport. Obviously the load may be lifted from the supports and moved out to the side and then lowered back to the ground again, or even elevated further and deposited on an overhead support or rack if required. While in my present machine I use, and here disclose, only a pair of supports with a single load handling mechanism in the space between, it is to be understood that wherever the nature of the work permits I may extend the length of the machine and use more than two supports and more than one loader.

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Another object of my invention is to provide, in a machine of this character, a novel and practical frame and support arrangement embodying means for tilting the loader forks as they are raised and lowered to maintain the load in place, and retractable ground engaging means for supporting the side of the machine while the load is being taken on or unloaded.

Still a further object is to provide a loading machine adapted to travel along streets and other roadways, or along the aisles in storage yards and factories, and which is provided with all controls essential to such operation, in addition to controls for the loading mechanism and actions required in lifting, loading and unloading material under all conditions.

A further object is to provide a novel and practical frame structure for a loading machine of this nature, with adequate strength and rigidity for handling large loads, as well as adapted to comparatively high speed operations when transporting the loads.

These and other more detailed and specific objects will be disclosed in the course of the following specification reference being had to the accompanying drawings, in which—

Fig. 1 is a side view of the machine of my invention showing the loading mechanism and retractable jacks lowered to the ground.

Fig. 2 is a side view, looking at the machine from the opposite side, with the loader partially raised, and certain parts broken away to better show the construction.

Fig. 3 is a plan view of the machine, with the loader moved out to the side for picking up or depositing a load.

Fig. 4 is a similar plan view but with a load on the machine ready for transport.

Fig. 5 is a rear end view of the machine, showing the loader in position for picking up a load, and in dotted lines in a position for depositing the load on an overhead support or rack.

Fig. 6 is an enlarged front end view, with a load in transport position and certain housing or hood parts broken away to show the power plant and associated equipment.

Fig. 7 is an enlarged vertical cross section through the machine, along the line 7—7 in Fig. 1, but showing the loader elevated and tilted in the handling of a load.

Fig. 8 is an enlarged vertical cross section along the line 8—8 in Fig. 1 showing particularly the arrangement of the retractable jack, in its operative position. The loader, per se, is omitted for clarity.

Fig. 9 is a similar view but with the jack retracted to transport position.

Referring now more particularly and by reference characters to the drawing, my improved load handling and transporting machine comprises as its main elements a power operated, special vehicular frame designated generally at A and a

loading mechanism, per se, designated generally at B. The mechanism B, hereinafter for convenience called simply a loader, is basically of the same hydraulically operated, extensible tower type as that shown in my prior Patent No. 2,394,458, issued February 6, 1946, for Load Handling Mechanism. While reference to these prior disclosures is invited for comparative purposes the loader is shown and will be described herein in sufficient detail for understanding.

Turning now to the vehicular frame A, or the machine as it may be called, it comprises a heavy, rigidly braced frame supported by steerable front wheels 10 and rear wheels 11 which adapt it for street or highway travel. As a fundamental feature this frame has spaced front and rear supports or platforms 12 and 13 between which is a space or opening 14 the right side of which viewing the machine from the rear as usual, opens out through the side, as seen clearly in Fig. 4. The supports 12 and 13 have horizontal, properly braced and supported surfaces of substantial length and width. At the left side of the machine, the front and rear supports are joined by a longitudinally extending, tubular or hollow frame section or torque tube 15 which runs from a point over the rear wheel 11 to a point over the forward wheel 10 and is rigidly joined to the basic front and rear frame structure carrying the supports. Such basic frame structures include as important parts transverse torque tubes 16 at the ends of the supports 12 and 13 and these in combination with the torque resisting characteristics of the hollow frame section 15 ensures complete rigidity of the entire frame assembly, even with the opening 14 through its side. At the forward end of the machine, on the left side of the forward support 12 and in an elevated position there is a control position or operator's station whereat is located the operator's seat 17, steering wheel 18 and other controls later to be mentioned. While this left side control position is selected for maximum convenience it may, of course, be otherwise located if the nature of the intended work for the machine dictates and permits. On the side facing the support 12 the operator's position is sheeted in at 19 for protection but at the opposite side an access opening 20 is provided (Fig. 2).

As here shown the machine is powered by an internal combustion engine 21 which appears in Fig. 6 and is mounted beneath the front support 12 ahead of the axle for the front wheels 10. This engine operates a pump 22 which provides fluid under pressure to conventional fluid drive units 23 on front and rear axles, and also operates a pump 24 by which the front wheels are hydraulically steered. The engine further operates a third pump 25 which supplies fluid for the yet to be described loader elements. Since the machine is hydraulically driven and steered no propeller shaft is needed and instead the necessary fluid lines and piping indicated generally at 26 are run through a tubular upper part 27 (Fig. 7) of the frame section 15 and the lower, larger part of this section is used as a reservoir 28 for the comparatively large quantity of fluid necessary for all operations. Since the precise details of the drive, and steering (and braking) mechanisms are not important to an understanding of the main inventive concept involved in this application, they are not further described herein. It will be noted, however, that the main weight of the engine is placed as far as possible to the left and this along with the fluid reservoir provides an appreciable and valuable counterbalancing effect as will presently be obvious.

The loader B is carried upon a carriage frame movably supported in the space or opening 14 and this frame is U-shaped having front and rear ends 28 and 29 rigidly joined by a channel 30 at the side beneath and below the frame section 15. Below said frame section 15 the opening 14 extends from side to side of the machine as best shown in Fig. 7 and the closed side of the carriage frame thus has space for up and down movements in a vertical, transverse plane. The frame is supported for such movements upon pivots 31 at its opposite, open side which join the front and rear ends 28 and 20 to vertical properly braced panels 32 depending from the rear and front edges, respectively, of the supports 12 and 13. The swingable side of the carriage frame is supported and vertically adjusted by fluid motors or rams having cylinders 33 pivoted at upper ends at 34 to suitable brackets on the left side of the frame section 15 and having depending plungers 35 which are pivoted at 36 to the respective front and rear sides of the frame ends 28 and 29 near their junction with the channel 30. Fluid lines 37 and 38 supply fluid under pressure selectively to the upper and lower ends of the cylinders 33 to move the plungers and thus tilt the carriage frame as will be readily understood.

The tiltable carriage frame just described supports a transversely movable, or traversable loader carrier frame which has a U-shaped section comprising front and rear carrier members 39 and 40 rigidly joined by a channel 47. The carrier members 39 and 40 are I-shaped in cross section (Fig. 1) so that they each have forwardly and rearwardly opening channels. Rollers 41 are journaled in spaced locations upon the carriage frame ends 28 and 29 and run in the respective forwardly and rearwardly opening channels in the members 39 and 40 so that the carrier members are supported on and may move freely along the length of said ends 28 and 29, or transversely of the machine as a whole. The members 39 and 40 are shorter than the carriage frame ends as clearly shown. The loader carrier frame further includes front and rear end plates 42 and 43 which are joined by a heavy mounting or torque tube 44 extending forwardly and rearwardly and rigidly braced to the end plates as indicated at 45. Rollers 46 are journaled on the respective front and rear faces of the end plates 42 and 43 and run in the adjacent channels in the carrier members 39 and 40 so that this inner carrier assembly (42, 43 and 44) may move in the same plane as, but independently of, these members.

The loader B is supported directly upon the tube 44 and the loader comprises an upright tower having front and rear channels 48 and 49 which are rigidly supported by brackets 50 at lower ends upon the tube. Rollers 51 are journaled in vertically spaced relation on the front and rear faces of these channels. The loader further has a vertically movable frame made up of front and rear uprights 52 and 53 having channels in which the rollers 51 run and also channels to receive rollers 54 upon a fork carrier having front and rear end plates 55 and 56 joined by a heavy tie bar 57. An inverted hydraulic ram or fluid motor is mounted in the loader and has a cylinder 58 secured to a header 59 at the top of the movable frame and a depending plunger 60 secured at its lower end to a base bar 61 at the lower end of the tower. Thus the extension of the plunger will elevate

the movable frame on the tower, and vice versa. This movement is transmitted to the fork carrier by cables 62 which are anchored at 63 and 64, respectively, to the tower and carrier and run over pulleys 65 at the top of the movable frame. Thus as the movable frame travels upwardly and downwardly on the tower the fork carrier has a corresponding motion with respect to the movable frame. The result is a high maximum lift with minimum tower height, all as pointed out in my previous patent and application hereinbefore identified.

The fork carrier supports a rigidly mounted, forwardly and rearwardly extending shaft 66 upon the ends of which are pivoted heavy L-shaped load handling forks 67 having laterally directed arms 68. These forks bear back under load upon the tie bar 57, as clearly shown in Fig. 7 particularly, and any tendency of this force to twist the carrier plates 55 and 56 and so cause the rollers 54 to bind in the movable frame channels 52 and 53 is counteracted by heavy vertical torque tubes 69. These tubes are welded alongside the plates 55 and 56 and to brackets 70—71 (Fig. 2) on the shaft 66 and tie bar 57.

The loader and its carrier are moved transversely of the machine upon the tilting carriage frame by hydraulic rams of fluid motors at front and rear, having cylinders 72 attached at 73 to brackets 74 depending from the channel 30 and plungers 75 connected at 76 to brackets 77 depending from the carrier members 39 and 40. The extension of these plungers will thus move the carrier members laterally toward the open side of the carriage frame, and vice versa. This motion is transmitted to the carrier frame end plates 42 and 43 by sprocket chains 78 which run over sprockets 79—80. The sprocket chains are firmly anchored at 81 to brackets 82 secured on the panels 32 and the adjacent sprockets 79 are journaled in bearings 83 secured atop the carrier members 39 and 40 at their open ends, while the sprockets 80 are secured at the front and rear ends of a shaft 84 journaled in bearings 85 upon the opposite ends of the members. The chains are also firmly attached at 86 to the end plates 42 and 43. The arrangement is thus such that, as the members 39 and 40 are projected out toward the open side of the space 14, the chains 78 will be caused to travel over the sprockets 79 and 80 and by the attachments 86 the chains will move the loader carrier and loader out in the same direction, and vice versa. The outward motion may continue until the carrier members 39 and 40 reach the open end of the carriage frame. In this position the loader B is moved out in line with the right side of the machine while the fork arms 68 project well out beyond.

When fully retracted the loader is well over to the left of the machine, near the frame section 15 and the fork arms are wholly within the space 14. It will be noted (Fig. 7) that the carrier channel 47 is wider (vertically) than the carriage frame channel 30, and is oppositely faced, and when the loader is in its extreme position in this direction the channels will abut and overlie to act as a stop.

The shaft 84 connecting the sprocket chains 78 causes them to run in synchronism and overcomes any tendency of the front and rear ends of the carrier frame assembly to twist or bind as the loader is moved or traversed as will be readily understood.

Shields 88 extend along the edges of the supports 12 and 13 out over the chains 78, and adjacent parts, to protect them from falling material of any kind.

Retractable jacks are provided at front and rear, right corners of the space 14 and referring particularly to Figs. 3 and 9 these will now be described. The jacks are arranged inside the panels 32, or forwardly of the front panel and to the rear of the rear panel, and each jack comprises an arm 89 slidably mounted through a bearing sleeve 90 which is pivoted at 91 upon a hanger plate 92 secured to the panel near the right lower corner thereof. The outer lower end of the jack arm 89 carries a ground or foot plate 93 pivoted by an ear 94 to the arm, while the inner end of the arm is pivotally attached at 95 to one end of operating lever 96 the other lower end of which is pivoted, at 97, upon the hanger plate 92. A jack actuating hydraulic ram or fluid motor is provided and comprises a cylinder 98 pivoted at 99 upon a bracket 100 near the left side of the machine and a plunger 101 pivoted at 102 upon a bracket 103 secured to the lever 96. In the normal position of the parts (Fig. 9) the plunger 101 is retracted and the jack arm 89 is pulled inwardly to a jackknifed position with respect to the levers 96. Now as the plunger is extended the pivot centers are such that the lever 96 can be swung upward and outward to both elevate the inner end of the jack arm and at the same time slide it outwardly through the bearing 90. Thus the outer end of the jack arm is forced outwardly and downwardly to the angle shown in Fig. 8 and the ground plate 93 is pressed against the ground outwardly to the right of the machine. As the arm reaches this position its inner, upper end moves into a guide clip 104 upon the frame as seen in Fig. 8.

The weight of the ground plate 93 is so distributed that it will swing flat and properly contact the ground as the jack arm reaches its extended position but as the arm is retracted, and comes at its outer end up adjacent the side of the machine, a lug 105 on the plate contacts a stop 106 on the side of the machine to automatically fold the plate up to a vertical position as seen in Fig. 9. Thus the projection of the plate from the side of the machine is greatly reduced particularly if the plate itself is quite large as may be necessary.

While the loader cylinder 48 is single-acting all of the fluid motors or rams 33, 72, and 98 are double-acting and the fluid supply for the cylinders 33 is carried through the lines 37 and 38 previously mentioned, while for the cylinder 48 a single line 107 is provided. For cylinders 72 there are provided the lines 109—110, and for cylinders 98 the lines 111—112. Of material interest to the invention only is the lines 107 for the loader cylinder, which will be shortly described, but for controlling the flow to the various cylinders there are four control levers 113, 114, 115 and 116 all arranged at the operator's station convenient to the seat 17. The front lever 113 may then control the fluid admission to the cylinders 98 and thereby operate the jacks, while the lever 114 controls the cylinders 72 and the cross travel of the loader, the lever 115 controls the fluid supply to cylinders 33 and the tilting of the loader, and finally the rearmost lever 116 controls fluid supply to the loader cylinder 58 and the up and down movement of the forks 67.

A seepage return tube 124 from the lower end

of the loader cylinder 48 includes a vertical stand pipe section 117 secured to the tower and from the top of which pipe there loops down to the cylinder a flexible section 118 so that as the cylinder rises in the action of the loader flexibility and slack is provided for this purpose. To accommodate the cross travel of the loader the line 107 has a flexible section or conduit 119 which runs from the bottom of the ram plunger to a fitting 120 at the left side of the machine. Intermediate its ends this conduit 119 is supported by a clamp 121 at the free end of a swinging arm 122 pivoted at 123 on the frame section 15. As seen in Fig. 4 this arm will fold as the loader moves out to the right as seen in Fig. 3. The seepage return tube 124 parallels the line 107 and may be arranged to return any seepage fluid from the cylinder to the reservoir 28. Sockets or eyes 125 and 126 are provided at the right, adjacent corners of the supports 12 and 13 and removable stakes 127 may be mounted in the sockets 125 while a tie rod 128 is provided and has down turned ends 129 to fit the sockets 126 which serve as attachment means for this purpose. This tie rod 128 is used only during transport, to tie these corners of the supports together and is removed when loading or unloading. Rings 130 are provided at strategic locations for lashing or chaining a load in place in a well known manner.

Restrictors indicated generally at 131 are provided in certain of the fluid supply lines to the various rams in order to prevent "slamming" of the parts under load.

Operation

In describing the operation of the machine it will be assumed that at the outset the loader is in its normal or transport position with the forks 67 in the space 14 and below the supports 12 and 13 as seen in Figs. 4 and 6. Now to pick up a load of beams, shafting, lumber, steel or any other analogous material, such as indicated at C, the machine is run up alongside the material so that the open side of the space 14 faces and is about midway of the length thereof. The jacks are now lowered forcing the ground plates 93 firmly down on the ground, even slightly lifting the machine at this side. Next the loader is moved down by operating the loader cylinder and plunger until the fork arms 68 reach the ground and now by moving the loader out to the side. by actuating the rams controlling the cross travel of the loader carrier, the fork arms may be forced beneath the load to the position of Fig. 5. Ordinarily the material handled will be stacked on blocks or the like as that space is provided beneath the stack for entrance of the fork arms. Now the loader is operated to lift the load straight up in a plane parallel to and outside of the machine until the load reaches a height above the supports 12 and 13, or above the stakes 127 if they are left in place. As this elevation is reached the cross travel carrier is now actuated to pull the load in over the supports 12 and 13 and the load is then deposited in the supports lengthwise of the machine (Fig. 6) by lowering the forks until they clear. The jacks are then retracted and the load is on the machine ready for transport.

To unload, the reverse of these operations is carried out, the jacks being put down, the load lifted to clear the machine, moved out to the side, lowered and finally deposited as will be readily understood. It will be obvious that since the machine itself is narrow enough for highway or street travel and the loading action takes place at the side, that it may be maneuvered in the aisles of storage or supply yards, factories, lumber yards, etc., to run up alongside the material and pick it up, carry it away, or deposit it in a stack, without individual handling, at the desired location. Since the material is carried lengthwise on the machine very long pieces may be handled without difficulty and the wide spread, spaced supports provided permit the transport of long material with safety.

To hold the load in place while being loaded or unloaded the loader is tilted back by the cylinders 33 as shown in Fig. 7, the entire loader, carriage and carrier assembly tilting about the pivots 31 in so doing and as clearly shown. Conversely, where the nature of the work permits, the loader may be oppositely tilted to roll the load off the forks onto the ground if desired.

The high lift provided by the loader also permits one to load or unload from an overhead support such as shown at D in Fig. 5, the loader travel from ground to the support being indicated by the line E.

The jacks are very important since the raising and lowering of the load outside of the wheeled frame has a decided tendency to tip it to that side. The jacks however place the ground plates 93 well out below the load and are found to be very effective.

While further details as to the operation and advantages of the machine will be apparent to these skilled in the art, just one example of a fertile field for the machine is the lumber yard where many times large stacks of lumber are moved from the yard to the job. At present the lumber is loaded and unloaded by hand, piece by piece, but by the use of my machine and as proven by actual work, the lumber may be loaded in one operation, transported to the job and unloaded in the stack with but a fraction of the time and labor involved by present methods. One man may thus do the work of several in less time and with much less labor.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. In a loading machine, a frame having front and rear ground wheel pairs, a power plant and connections for driving the wheels, front and rear platforms over the respective front and rear wheel pairs, the said platforms being spaced apart and joined at one side by a longitudinal torque frame but open at the opposite side of the frame, a loader frame mounted in the space between the platforms and movable transversely of the machine in the said space, and a material loader mounted on the loader frame and movable upwardly and downwardly.

2. In a loading machine, a frame having front and rear ground wheel pairs, a power plant and connections for driving the wheels, front and rear platforms over the respective front and rear wheel pairs, the said platforms being spaced apart and joined at one side by a longitudinal torque frame member but open at the opposite side of the frame, a loader frame mounted in the space between the platform and movable outwardly to the side of the machine toward the open side of the said space, a material loader movable up and down on the loader frame, and means for tilting

the loader frame and loader in an upright transverse plane with respect to the machine.

3. In a loading machine of the character described, front and rear wheeled supports, a frame rigidly joining the supports at one side only of the machine and spacing the supports apart, and a loader supported on the machine and operative between the supports.

4. In a loading machine of the character described, front and rear vehicular supports, a frame rigidly joining the supports at one side only of the machine and spacing the supports apart, a loader supported on the frame and operative between the supports, and removable means for tying the supports together at the opposite side of the machine.

5. In a loading machine of the character described, a wheel borne frame having connected front and rear platforms, an operator's station alongside one platform, a carriage frame positioned in the space between the platforms and tiltable therein in an upright and transverse plane, a loader carrier frame supported for movement along the carriage frame transversely of the direction of travel of the machine, and a loading elevator mechanism carried by and movable with said carrier frame.

6. In a loading machine of the character described, a wheel borne frame having connected front and rear platforms, an operator's station alongside one platform, a carriage frame positioned in the space between the platforms and tiltable therein in an upright and transverse plane, a loader carrier frame supported for movement along the carriage frame transversely of the direction of travel of the machine, a loading elevator mechanism carried by and movable with said carrier frame, and separate fluid actuated means for operating the carriage frame, carrier frame and loading mechanism.

7. A loader of the character described, comprising in combination, a vehicular frame having supports spaced apart along the line of travel, a loading mechanism operative up and down and crosswise between the supports for lifting a load from alongside the frame, elevating the load and depositiing it on the supports, and retractable support jacks extensible from the side of the frame down against the ground to support the frame against tilting as the load is lifted, the said support jacks having foldable ground plates, and means for folding the plates to vertical positions alongside the frame as the jacks are retracted.

8. In a loading machine of the character described, a vehicular frame having front and rear wheels, a power plant and connections for driving the wheels, front and rear load supports carried by the respective front and rear wheels, the said supports being spaced apart and joined at one side by a longitudinally extending torque frame, a loader frame mounted in the space between the supports and movable transversely of the machine in said space, and a load elevator carried by said loader frame and movable upwardly and downwardly with respect thereto.

9. In a loading machine of the character described, a vehicular frame having front and rear wheels, a power plant and connections for driving the wheels, front and rear load supports carried by the respective front and rear wheels, the said supports being spaced apart and joined at one side by a longitudinally extending torque frame, a loader frame mounted in the space between the supports and movable transversely of the machine in said space, a load elevator carried by said loader frame and movable upwardly and downwardly with respect thereto, and means for tilting the load elevator in an upright transverse plane with respect to the machine.

10. In a load handling and transporting machine of the character described, front and rear wheeled supports, a frame rigidly joining the supports and spacing them apart, a loader frame supported between the supports, and a load elevator mounted on said loader frame and movable outward laterally from between said supports and in a plane below the level thereof for engaging a load at the side of the machine.

11. In a load handling and transporting machine of the character described, a wheel supported main frame having a recess opening through one side, a loader frame supported on said main frame and in said recess, a load elevator on the loader frame, and means for operating the loader frame and load elevator for moving the latter in transverse and upright planes for loading and unloading material at the side of the loader.

12. In a load handling and transporting machine of the character described, front and rear vehicular supports, a longitudinal frame member rigidly joining and spacing the supports in spaced relation to one side of the frame and thereby forming a space opening laterally at that side of the machine, and a loader supported on the machine and operative between the supports.

13. In a load handling and transporting machine of the character described, front and rear spaced vehicular supports, a frame member extending longitudinally between and rigidly connecting the supports at one side only of the machine, a loader supported on the machine and operative between the supports, attachment means on the supports at the opposite side of the machine, and a tie member detachably engageable with said attachment means for connecting the supports at this side of the machine.

14. In a load handling and transporting machine of the character described, spaced front and rear vehicular supports, a frame member rigidly joining the supports at one side only of the machine and at and above the level of the upper supporting surfaces of said supports, and a loader supported on the machine and operative between the supports.

15. In a load handling and transporting machine of the character described, spaced front and rear vehicular supports, a frame member rigidly joining the supports at one side only of the machine and at and above the level of the upper supporting surfaces of said supports, a loader supported on the machine and operative between the supports, the said machine having operating parts adjacent each support, and the said frame member being hollow to pass connecting and control members for said operating parts.

16. In a load handling and transporting machine of the character described, spaced front and rear vehicular supports, a frame member rigidly joining the supports at one side only of the machine and at and above the level of the upper supporting surfaces of said supports, a loader supported on the machine and operative between the supports, and an operator's station at the forward end of the said frame member and alongside the front support.

17. For a load handling and transporting ma-

chine of the character described, a vehicular loader carrying frame comprising spaced front and rear elevated loads supports, a longitudinally extending frame member rigidly connecting the supports at one side only thereof thereby forming an opening completely unobstructed from top to bottom between the supports at the opposite side of the machine and an elevating loader mounted in and movable vertically and laterally through the opening.

18. For a load handling and transporting machine of the character described, a vehicular loader carrying frame comprising spaced front and rear elevated load supports, a longitudinally extending frame member rigidly connecting the supports at one side only thereof thereby forming an opening completely unobstructed from top to bottom beween the supports at the opposite side of the machine and an elevating loader mounted in and movable vertically and laterally through the opening, and the supports including transversely extending frame members rigidly joined to the respective front and rear ends of the said longitudinal frame member.

19. In a load handling and transporting machine of the character described, front and rear spaced vehicular supports, a frame member extending longitudinally between and rigidly connecting the supports at one side only of the machine, upright panel members on the supports at the rear of the front support and front of the rear support, and a loader supported on and between the said panel members.

20. In a load handling and transporting machine of the character described, front and rear spaced vehicular supports, a frame member extending longitudinally between and rigidly connecting the supports at one side only of the machine, upright panel members on the supports at the rear of the front support and front of the rear support, a loader frame supported for transverse movement on and between the said panel members, and a load elevating mechanism carried by said loader frame.

21. In a load handling and transporting machine of the character described, front and rear spaced vehicular supports, a frame member extending longitudinally between and rigidly connecting the supports at one side only of the machnie, upright panel members on the supports at the rear of the front support and front of the rear support, a loader frame supported for transverse movements on and between the said panel members, a heavy tubular mounting member extending longitudinally of the machine and carried by said loader frame, and a load elevating mechanism carried by said tubular mounting member.

22. In a loader of the character described, a wheel borne main frame having spaced supports and means connecting the supports at one side of the frame, a loader structure positioned in the space between the supports and operative through the side of the main frame opposite said connecting means, the said loader structure comprising a carrier frame, means operatively and movably supporting the frame between said supports, end plates and means operatively and movably supporting the plates on the carrier frame, a torque tube connecting the end plates, and a load elevator carried on said torque tube.

23. In a loader of the character described, a wheel borne main frame having spaced supports and means connecting the supports at one side of the frame, a loader structure positioned in the space between the supports and operative through the side of the main frame opposite said connecting means, the said loader structure comprising a U-shaped carrier frame, means supporting the carrier frame on the supports for transverse movements with respect to the main frame, means for moving the carrier frame, end plates and means supporting the plates in the carrier frame for transverse movements therewith and with respect thereto, means for moving the plates, a torque tube connecting the plates, and a load elevating mechanism carried on the torque tube.

24. In a loader of the character described, a wheel borne main frame having spaced supports and means connecting the supports at one side of the frame, a loader structure positioned in the space between the supports and operative through the side of the main frame opposite said connecting means, the said loader structure comprising a U-shaped carrier frame, means supporting the carrier frame on the supports for transverse movements with respect to the main frame, means for moving the carrier frame, end plates and means supporting the plates in the carrier frame for transverse movements therewith and with respect thereto, means including sprockets and chains connecting the carrier frame and plates for moving the latter, a torque tube connecting the end plates, and a load elevating mechanism carrier on the torque tube.

25. In a loader, a rectilinear frame having elevated spaced load supports and wheels therefor, said frame having an opening out through one edge between said load supports and completely unobstructed from top to bottom, and a loading mechanism guided for movements in said opening and including load-engaging forks movable up and down in the opening as well as inward and outward through the open edge of the frame in planes above and below the level of the load supports.

26. In a loader, a traveling horizontal frame having rigidly connected elevated load supports spaced apart to form an opening completely unobstructed from top to bottom through the frame and out through one edge thereof, a loading mechanism guided for movements in said opening and including load handling forks in said opening for both vertical movements and horizontal movements in planes above and below the level of the load supports whereby the forks may be directly projected from the open edge of the frame close to the travel surface for engaging and lifting a load resting on that surface.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,294,212	Welch	Feb. 11, 1919
1,953,056	Olen	Mar. 27, 1934
2,413,355	Johnson	Dec. 31, 1946
2,428,223	Johnson	Sept. 30, 1947
2,437,806	Dempster	Mar. 16, 1948
2,499,442	Wright	Mar. 7, 1950

FOREIGN PATENTS

Number	Country	Date
318,330	Great Britain	Sept. 5, 1929
486,962	Great Britain	June 14, 1938