

April 10, 1951

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POWER-OPERATED DRUM CARRIER FOR INDUSTRIAL TRUCKS

Filed Nov. 24, 1947

3 Sheets-Sheet 1

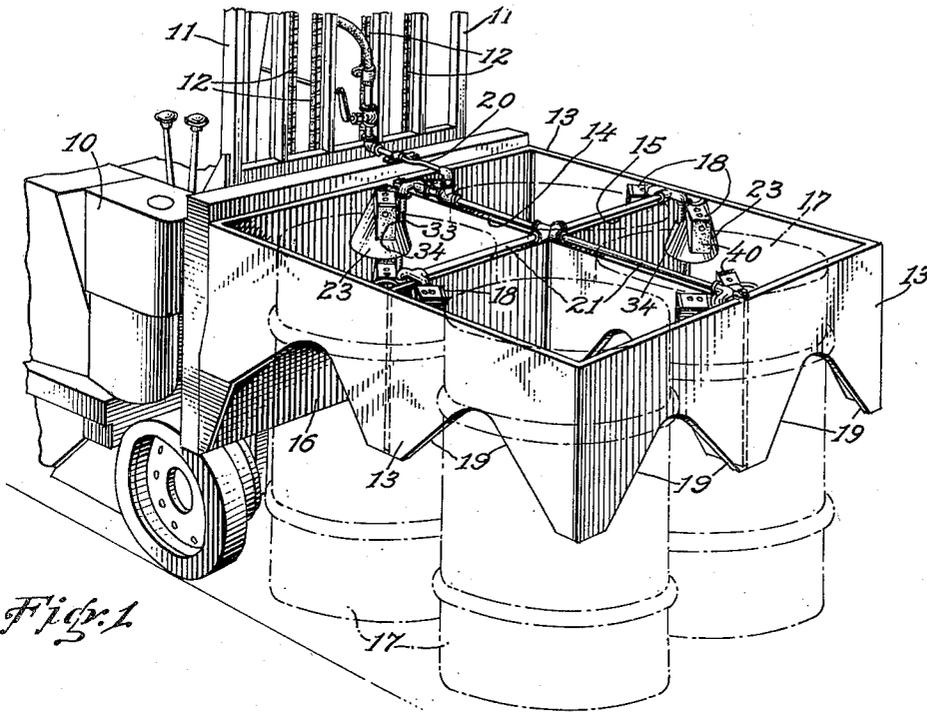


Fig. 1

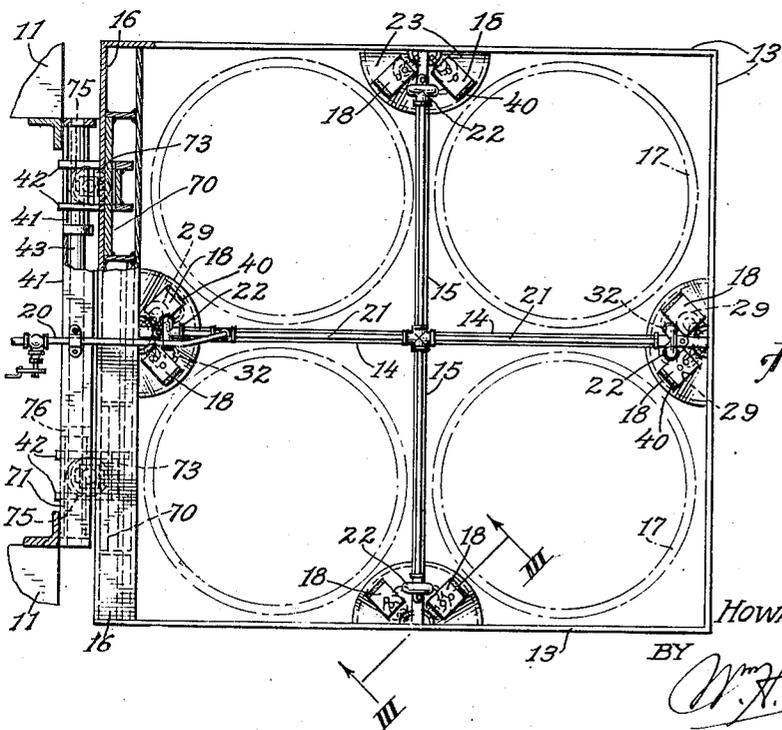


Fig. 2.

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3 Sheets-Sheet 2

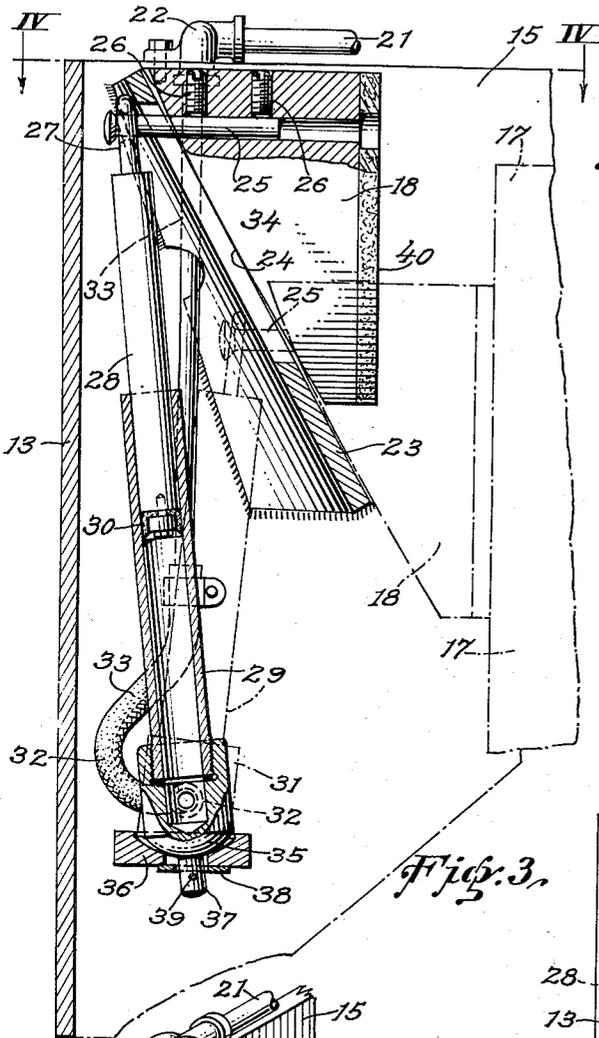


Fig. 5.

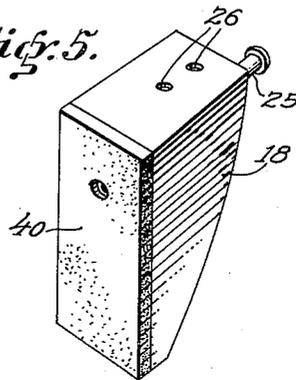


Fig. 4.

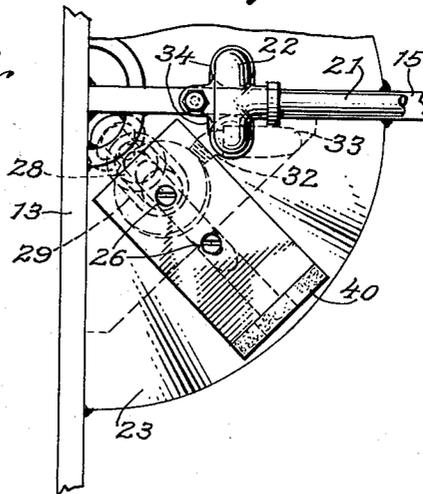


Fig. 3.

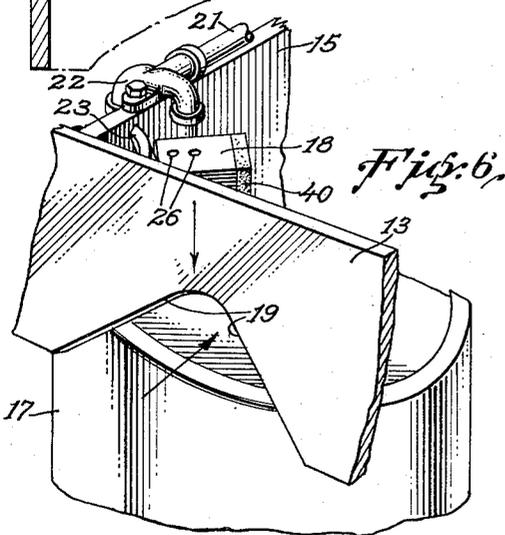


Fig. 6.

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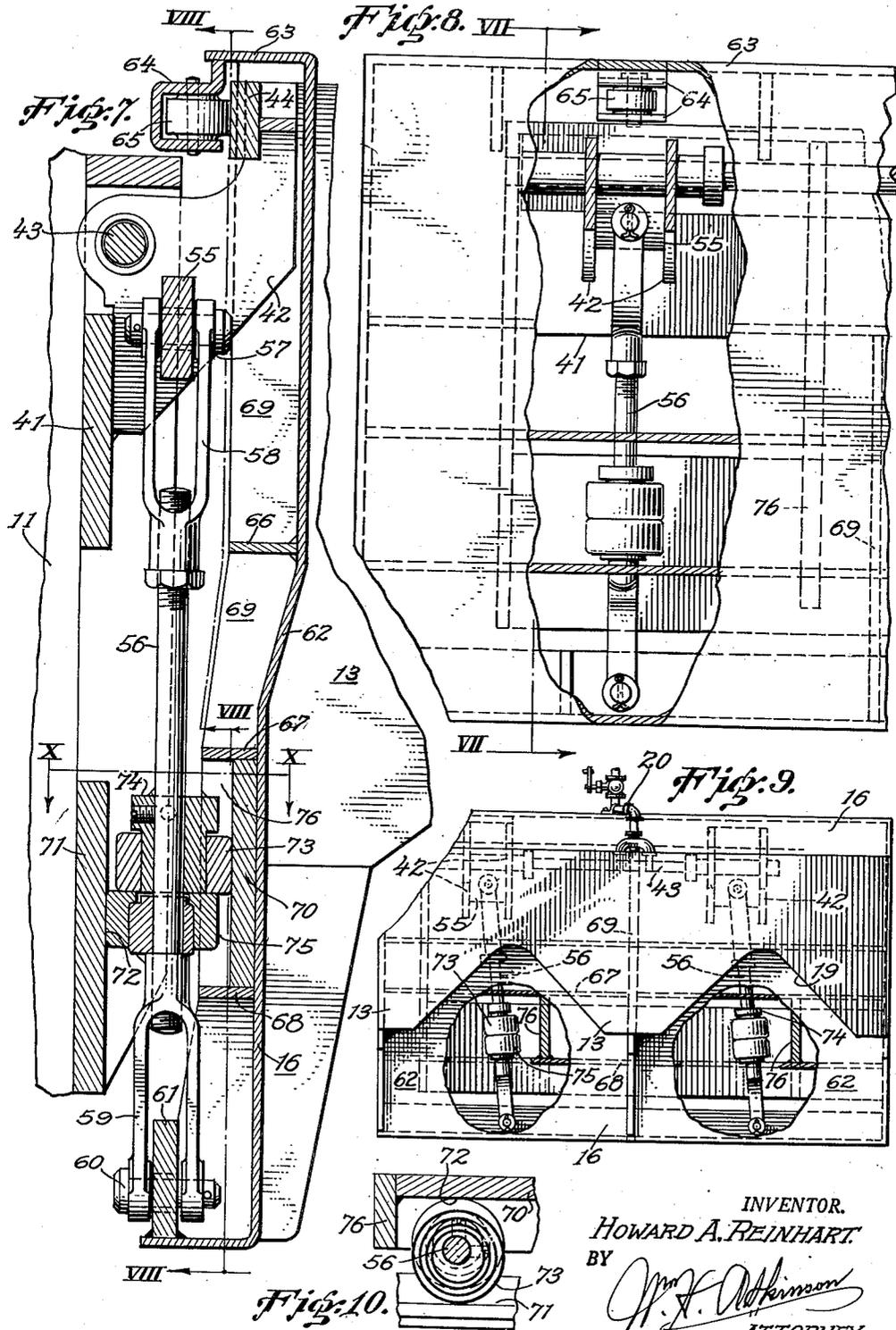
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POWER-OPERATED DRUM CARRIER FOR INDUSTRIAL TRUCKS

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3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,548,064

## POWER-OPERATED DRUM CARRIER FOR INDUSTRIAL TRUCKS

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Application November 24, 1947, Serial No. 787,702

9 Claims. (Cl. 214-65)

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My present invention relates to article handling apparatus and more particularly to an improved attachment for power driven vehicles of the so-called lift type by which the plurality of liquid carrying drums or other similar articles may be picked up individually or in nested groups and transported from one location to another in a convenient and efficient manner.

An object of the invention is to provide an apparatus or attachment to a power driven vehicle for transporting cylindrical drums and the like which is an improvement upon the apparatus for transporting cylindrical containers and the like disclosed and claimed broadly in my co-pending application for patent, Serial No. 775,497, filed September 22, 1947.

Another object of the invention is to provide an apparatus for handling a plurality of liquid transporting drums or like cylindrical containers, which may be mounted upon a conventional lift truck and in which the drums or cylindrical containers are handled in nested groups for transportation from one point to another where they are subsequently unloaded in the same nested relation.

Another object of the invention is to provide a novel form of vertically movable frame having a compartment or compartments into which several articles to be transported are held by a novel wedging means which is inherently adjustable to insure a firm gripping and release of the articles disposed therein for transportation.

Another object of the invention is to provide a means for transporting a plurality of metal drums from one position to another in which a horizontally disposed frame having a compartment or a plurality of compartments with gravity responsive gripping means, is mounted to extend outwardly at the front of a lift truck so that it may be lowered over a nested group of drums which upon a subsequent upward movement of the frame will become operative to pick up a group of drums for transportation to a distant point.

A further object of the invention is to provide a means for transporting a plurality of cylindrical drums from one position to another in which a reticulated horizontally disposed frame having a plurality of compartments and gravity responsive gripping means, is mounted to extend outwardly at the front of a lift truck so that it may be lowered over a nested group of articles and which is adapted and arranged to shift transversely of the lift truck center to thus align itself with a nest of drums without requiring an

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accurate spotting thereof by a maneuvering of the lift truck.

Other objects and advantages of the invention will be in part evident to those skilled in the art and in part pointed out in the following description taken in connection with the accompanying drawings wherein there is shown by way of illustration and not of limitation a preferred embodiment of the invention.

10 In the drawings;

Figure 1 is a perspective view showing a portion of a conventional lift truck with my improved drum lifting device mounted thereupon,

15 Figure 2 is a plan view of the device as shown in Figure 1 of the drawings,

Figure 3 is an enlarged sectional view taken along line III-III of Figure 2 looking in direction of arrows,

20 Figure 4 is a fragmentary plan view of the detail shown in Figure 3 of the drawings,

Figure 5 is a perspective view showing a preferred form of wedge,

Figure 6 is a fragmentary perspective view illustrating a functional aspect of the invention,

25 Figure 7 is a vertical sectional view showing further details of construction,

Figure 8 is a reduced fragmentary elevation taken along line VIII-VIII of Figure 7 looking in direction of arrows,

30 Figure 9 is a further reduced front view of the device as shown in Figure 1 with parts broken away to reveal details of construction, and

Figure 10 is a fragmentary sectional view taken along line XX of Figure 7 looking in direction of arrows.

35 As depicted in Figure 1 of the drawings, the device of my present invention is primarily intended for use in transporting from one point to another liquid containing drums such as are used for the bulk shipment of paint, oil, lacquer and other similar industrial materials. Like the devices illustrated in my hereinbefore identified co-pending application and an earlier filed application filed jointly by me and Arthur M. Selvey on October 19, 1946 and identified by Serial No. 704,518 and now Patent No. 2,528,783 granted November 7, 1950, the present device is here shown as associated with an industrial truck of the type commonly equipped with fork lifts for use with a load supporting platform or pallet.

40 While the device here illustrated does embody some of the features broadly claimed in the aforesaid co-pending applications, it will be found as the description thereof proceeds that it also embodies many other novel features which are nec-

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essarily required because of the nature and character of the articles or drums for the transportation of which it is primarily designed. In this figure of the drawings the numeral 10 designates the forward portion of an industrial truck of the so-called lift type having an elevator suspending column 11 and a chain mechanism 12 with which an elevator unit not here visible is associated. Projecting outwardly and carried by the elevator unit upon the column 11 of the industrial truck 10, there is a rectangular frame 13 that is divided up into compartments by transversely extending partitions 14 and 15 which intersect at right angles to each other between the sides of the frame 13. At its truck engaging end the frame 13 has a relatively shallow housing 16 within which a novel suspension mechanism to be hereinafter described is enclosed. As indicated in this showing the frame 13 has four symmetrically arranged compartments which will accommodate an equal number of drums 17, here indicated by dot and dash lines. Each of the compartments of the rectangular frame 13 are also here shown as having two wedging members 18 that are disposed in diagonally opposite corners thereof and between which the upper portion of a drum 17 is adapted to project when the rectangular frame 13 is lowered thereover as here shown. These wedges are also of novel construction and will be described in greater detail hereinafter. At this point it is important to note that the bottom edges at the outer sides of the rectangular frame 13 and the partitions 14 and 15 are scalloped or cut away, as at 19, to provide oppositely inclined and angularly disposed surfaces which will serve to guide the rectangular frame 13 downwardly over the drums 17 in the event that the frame 13 should not be accurately spotted thereover prior to a lowering of the frame thereupon. To assist in this telescoping of the compartments of the rectangular frame 13 over the upper ends of a plurality of drums 17, as here shown, the invention also contemplates a novel suspension between the frame 13 and the elevator unit which, as noted above, will be described later in detail.

With respect to the novel suspension of the rectangular frame 13 it may be here stated that this feature is designed to permit a limited free transverse movement of the frame 13 with respect to the center line of the truck 10. Therefore, with this freedom of transverse movement and the scalloped or inclined edges 19 at the sides of each of the compartments of the frame 13, it will be seen that an operator of the truck will not be required to so accurately spot the rectangular frame 13 over any group of drums as would be required were the bottom edges of the rectangular frame 13 unscalloped or disposed in a horizontal plane. In other words, with these scallops 19 it will be seen that should a drum be positioned slightly outwardly beyond the outer walls of the frame at any point these scallops will have a tendency to either swing the frame over or draw the upper end of the drum into register with its particular compartment and at the same time with similar scallops in the partitions 14 and 15 it will be readily seen that these partitions will readily knife themselves downwardly between any two drums which may be in contact with each other. Under extreme conditions the operator may then by joggling his truck thus properly group any four drums for a final pick up and transportation to some distant point.

Upon now referring to Figure 2 of the drawings it will be seen that the compartments of the rec-

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tangular frame 13 are of a dimension only slightly larger than the diameter of the drums 17. The wedges 18 are also here shown as grouped in pairs at the diagonally opposite corners of the compartment so that a single pressure fluid conducting pipe may be employed to furnish fluid to two of these wedges at each of its four extending ends. As in the case of my prior devices, each of the wedges 18 are adapted to be raised against the action of gravity by suitable means, which in the present instance is a fluid under pressure which is admitted through a fluid pressure pipe 20 that connects with a pressure fluid reservoir carried by the truck 10. With this arrangement the fluid under pressure admitted through the pipe 20 is conducted to the several wedges by means of branch pipe lines 21 which extend along the partitions 14 and 15. At their ends these pipe lines 21 branch out through connections 22 that communicate with a fluid pressure cylinder to be presently described. As a support for the wedges 18 it will be here noted that at the point of intersection between the partitions 14 and 15 and the side walls of the rectangular frame 13 there are provided semi-conical webs 23 which are inclined outwardly toward their bottoms and form a curved diagonally disposed supporting surface upon which the wedges 18 may freely slide.

Reference is now made to Figures 3, 4 and 5 of the drawings for a more detailed description of the drum gripping or wedging means employed in this particular embodiment of my invention. As will be here seen the wedges 18 are of rectangular cross section and are disposed to extend diagonally from each of the corners of the particular compartment in which it is disposed. The curved or semi-conic wedge supporting plates 23 are also illustrated as extending between the adjacent meeting walls of the compartment. Each of these wedges are also shown as having a central downwardly extending slot 24 through which a pin 25 is extended from the underside and into the upper part of the wedge 18 where it is secured by set screws 26. At its projecting end and behind the wedge supporting plate 23 the pin 25 engages an eyelet 27 which is formed at the upper end of a vertically operating piston 28 that is carried by a cylinder 29. At its lower end the piston 28 has a sealing gasket 30 and at the lower end of the cylinder 29 there is a cylinder head 31 which carries a nipple for a flexible hose connection 32 that forms a continuation of a fluid pressure conducting pipe 33 which extends downwardly along the side of the partition 15 from one of the pipe lines 21. To accommodate the pipe 33 there is a notch 34 which is cut in one side of the wedge supporting plate 23. In order that the cylinder 29 may oscillate or rock as the piston 28 operates the cylinder head 31 is provided with a spherical end 35 which is seated in a recessed bracket 36 that extends diagonally between the two walls of the compartment at this point. The cylinder head 31 is also here shown as having an extension 37 that extends through an aperture in the bracket 36 where it is held against accidental displacement by a washer 38 and a pin 39. With this arrangement it will be seen that when fluid under pressure is admitted to the cylinder 29 the piston 28 will be raised into the position here shown and carry the wedge 18 upwardly and into an inoperative position. By the same token when fluid under pressure is withdrawn from the cylinder 29 the wedge 18 will be free to slide downwardly along its sup-

porting plate 23 where after coming into contact with the upper end of a drum 17 it will become operative to grip a drum whenever the rectangular frame 13 is raised relative thereto.

In order to provide a good frictional engagement between the wedges 18 and an engaged drum 17, the vertical surfaces of the wedges are provided with a frictional facing 40 of leather, neoprene or soft rubber and to further facilitate a good gripping engagement with the side of a drum the wedges 18 may be provided with a slightly curved back surface where they engage with the supporting plates 23. With these two curved surfaces in abutting relation it will be readily seen that the wedges 18 will be free to rock about a substantially vertical and/or horizontal axis and thus a maximum area of the facing 40 will be brought into engagement with the engaged surface of the drum. This adjustability will also assure a firm gripping of a drum 17 even though its engaged surface may be bent or dented out of cylindrical form. During the time the frame 13 is being lowered downwardly over a nest of drums 17 it will be understood that the wedges 18 will be retracted and held in their elevated position, as shown in Figure 3 of the drawings, and only after the frame 13 has come to a stop in its lowermost position will the fluid pressure be released from the cylinder 29 and thus permit the piston 28 and the wedges 18 to move downwardly along their supporting plates 23 and into engagement with the wall of a drum 17, as here indicated by dot and dash lines.

In Figure 6 of the drawings there is illustrated by a fragmentary view the condition which might be encountered with my invention in the event that the drum carrying frame 13 is not spotted accurately over any one of the drums 17 upon which it is being lowered. In this particular view the drum 17 is illustrated as positioned outwardly beyond the inner surface of one of the compartments. Under these conditions, as the frame 13 is lowered, the inclined or angularly disposed edges formed by the scallops or cut away portions 19 of the frame 13 will engage with the upper rim of the drum 17. Then it will be readily seen that as the frame 13 moves downwardly with the inclined edges of its outer wall in engagement with the rim of the drum the frame 13 will tend to swing over so as to bring this particular drum accommodating compartment into register with the drum 17 disposed thereunder.

In Figures 7, 8, 9 and 10 of the drawings there is illustrated a preferred construction for securing the rectangular drum transporting frame 13 to the elevator unit upon which it is to be mounted. In Figure 7 of the drawings the elevator unit carried by the elevator supporting column 11, is shown in part and designated by the numeral 41. This unit 41 carries a plurality of spaced bracket-like members 42 that engage with a transversely extending shaft 43 to which the elevator controlling chains 12 of the elevator column 11 are attached. These spaced brackets 42 extend outwardly and upwardly at the upper part of the elevator unit 41 and at their upper ends they carry transversely extending surface plates 44, the purpose of which will be hereinafter made clear. Associated with these surface plates 42 and at spaced points at the upper part of the elevator unit 41 there are two transversely extending beams 55 from which two spaced downwardly depending links 56 are suspended by means of a pin 57 and clevis 58. At their lower

ends these spaced links 56 each carry a second clevis 59 which is secured by means of a pin 60 to a beam 61 that is formed as a part of the suspension enclosing housing 16 previously referred to as formed at the truck engaging end of the rectangular frame 13. In this particular arrangement the outwardly extending compartment forming portions of the rectangular frame 13 are welded to a solid plate of sheet metal 62 which is the outside wall of the housing 16. At its upper end this plate 62 is bent over at two spaced points as at 63 and formed to provide mountings 64 for anti-friction rollers 65 which will engage with the surface plates 44 provided at the upper ends of the spaced brackets 42. Within the housing 16 thus formed there are several reinforcing beams 66, 67 and 68 and also various arranged vertical webs 69 which impart stiffness to this part of the rectangular frame 13. With this arrangement it will be seen that when the vertical extending links 56 are secured as here indicated between the beams 55 carried by the elevator unit 41 and the beam 61 at the bottom of the rectangular frame 13, the anti-friction roller 65 at the upper end of the frame 13 will engage with the surface plate 44 and thus support the frame 13 in its horizontal and normal operating position. At the same time because of the parallel link motion provided by the two links 56 it will also be seen that the frame 13 will be free to swing transversely with respect to the elevator 41 whenever a force is exerted thereupon sufficient to displace the links 56 to either side of their normally vertical position. In this event the anti-friction roller 65 will track along with this transverse movement of the frame 13. In order to maintain the spaced vertically extending links 56 in proper operating condition between the rectangular frame 13 and the elevator 41 the frame 13 is likewise provided with a surface plate 70 that is located outwardly and opposite a similar surface plate 71 which is carried by the elevator unit 41. These surface plates 70 and 71 when disposed oppositely as hereinabove indicated will provide two opposed parallel surfaces between which a roller means carried by the links 56 may operate and in this way the lower part of the rectangular frame 13 will be held outwardly and free of the elevator unit. While it is conceivable that a single roller or other form of anti-friction means might be interposed between these surface plates 70 and 71 to retain a proper operating space for the links 56, there is here shown an anti-friction means in the form of two off-center anti-friction rollers 72 and 73 which are offset in a plane transverse to the plane of the surface plates 70 and 71. The roller 72 is carried by an eccentric sleeve 74 which is secured to the link 56 by a set screw or welding and the anti-friction roller 73 is similarly secured upon the link 56 by an eccentric bushing 75. In this manner the roller 72 will roll upon the surface plate 70 while the anti-friction roller 73 will roll along the surface plate 71. In order to prevent an abnormal transverse swinging of the rectangular frame 13 the housing 16 is here shown as also having a vertical flange 76 at each end of its surface plate 70. As illustrated in Figure 8 of the drawings, when the rectangular frame 13 is in its normal or centered position with respect to the lift truck, the suspension links 56 will assume parallel vertical positions and when the rectangular frame 13 is caused to shift to one side or the other off center these suspension links 56 will swing in a corre-

sponding direction and in parallel relation to each other as illustrated in Figure 9 of the drawings. Under these latter conditions, except for a slight lifting, the rectangular frame 13 will in effect shift in a substantially horizontal line to either side of the truck center. By such a shifting it will be readily seen that while the rectangular frame 13 will be lifted slightly in this swinging action of the parallel links 56, this will not prove a disadvantage but rather an advantage for under these conditions the frame 13 will be in engagement with and partially supported by one or more of the off-center position drums which may have necessitated this particular side shifting of the frame 13. As shown in Figure 10 of the drawings the rollers 72 and 73 carried by the suspension links 56 are shown as approaching the limit in one of its directions of travel where the roller 72 will be stopped by engagement with the flange 76 at this end of the surface plate 70.

While I have, for the sake of clearness and in order to disclose the invention so that the same can be readily understood, described and illustrated specific devices and arrangements, I desire to have it understood that this invention is not limited to the specific means disclosed, but may be embodied in other ways that will suggest themselves to persons skilled in the art. It is believed that this invention is new and all such changes as come within the scope of the appended claims are to be considered as part of this invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a drum carrier of the character described, the combination of a frame having partitions forming a plurality of rectangular compartments with open bottoms into each of which the upper end of a liquid transporting drum may extend, said frame being adapted for mounting upon the elevating mechanism of a lift truck, whereby it may be raised and lowered over a number of vertically standing drums, a drum gripping means operatively mounted in each compartment of said frame, said frame being further characterized by the fact that its outer walls are scalloped to provide angularly disposed edges that will serve to guide the frame with its compartment forming partitions into telescoping relation over the upper ends of any drums upon which it may be lowered, and a movable support for securing said frame with limited freedom of lateral movement upon the elevating mechanism to a lift truck.

2. In a drum carrier of the character described, the combination of a rectangular frame having transversely extending partitions forming a plurality of compartments with an open bottom through which the upper end of a liquid transporting drum may extend, means for attaching said frame to the elevating mechanism of a lift truck with limited freedom of lateral movement, whereby said frame may move sidewise with respect to the center of the lift truck as it is lowered over a nest of vertically disposed drums, a gravity actuated wedging means operatively mounted in each compartment of said frame adapted to engage with a drum disposed therein when said frame is moved upwardly relative thereto, said frame being characterized by the fact that its outer walls are provided with a single scallop within the limits of each of its compartments to provide oppositely inclined edges along the under sides of each of said compartments which will

serve to guide the compartment forming partitions of said frame into telescoping relation over the ends of any drums upon which said frame is lowered.

3. In a drum carrier of the character described, the combination of a lift truck having a conventional load lifting mechanism, a frame having partitions forming a plurality of rectangular compartments with open bottoms carried by and extending horizontally outward from the load lifting mechanism of said lift truck, whereby said frame may be raised and lowered over a number of vertically disposed drums, and a wedging means in each of said compartments adapted to engage with a drum disposed therein and grip said drum when said frame is elevated relative thereto, said frame being characterized by the fact that its outer walls are scalloped to provide oppositely inclined edges at the sides of each of said compartments which will serve to guide the frame and the wedging means in each of its compartments into engaging relation with the ends of any drums upon which said frame may be lowered, and means for securing said frame to the elevating mechanism of said lift truck with freedom of lateral movement, whereby the scalloped portions in the forward and rear sides of said frame will operate to shift said frame laterally while the lift truck is maneuvered along its normal line of movement to align said frame with said drums.

4. In a drum lifting and transporting mechanism for use upon a lift truck, the combination of a horizontally extending rectangular frame having intersecting vertically disposed partitions extending thereacross and forming open bottom compartments into each of which the upper end of a liquid transporting drum may extend, a fixed wedge supporting plate of semi-conic configuration secured in a corner of each of the compartments of said frame and providing an external semi-conic surface with its smaller diameter uppermost, a wedge having a curved surface generated about an axis extending at a right angle to the axis of the semi-conic surface of said wedge supporting plate and mounted for sliding movement upon each of said wedge supporting plates, said wedge being also adapted to move freely downward along said semi-conic surface under the influence of gravity to engage with the end of a liquid carrying drum when said frame is lowered thereover, and means for moving and retaining said wedge in an elevated position and out of engagement with such a drum when it is desired to raise said frame out of engaging relation with said drums.

5. In a drum lifting and transporting mechanism for use with the elevating mechanism of a conventional lift truck, the combination of a horizontally extending rectangular frame having an open bottom compartment into which the upper end of a liquid carrying drum may extend as said frame is lowered thereover, a fixed wedge supporting plate of conic configuration secured in two diagonally opposite corners of said compartment, a wedge having a slightly curved rocker-like surface generated about an axis at a right angle to the axis of said conic supporting plate, said wedges being adapted to slide downwardly along their respective supporting plates under the influence of gravity and rock both vertically and horizontally to insure a full engagement and gripping of the side of a liquid carrying drum, and means disposed below said wedge supporting plates for raising and retaining said wedge in an elevated position, whereby

said frame may be raised out of lifting relation with said drum.

6. An improved wedge type gripping means for a drum lifting and transporting device of the character described, comprising a rectangular frame having an open bottom compartment of a dimension which will accommodate a vertically disposed cylindrical drum therein, an angularly disposed web secured in diagonally opposite corners of said compartment and providing a wedge supporting surface of conic configuration, said web having a centrally located slot extending downwardly therealong, a wedge-like member having a curved web engaging surface the curvature of which is generated at a right angle at the curvature of the conic surface of said wedge supporting web and a drum engaging surface extending vertically within said compartment, a means carried by said wedge and extending through the slot in said wedge supporting web for securing said wedge thereupon, and a fluid pressure responsive means operating through said last means for raising and retaining said wedge in an elevated position to release a drum previously held in said compartment by said wedge.

7. An improved wedge type gripping means for a drum lifting and transporting device of the character described, comprising a rectangular frame having an open bottom and dimensions which will accommodate the upper portion of a vertically disposed cylindrical drum, a diagonally disposed wedge supporting plate secured in a corner of said compartment, said plate being formed to provide a wedge supporting surface of curved configuration, a wedge-like member having a curved plate engaging surface the curvature of which is generated at a right angle to the curvature of the surface of said wedge supporting plate and a drum engaging surface extending vertically within said compartment, means for slidably securing said wedge upon said supporting plate, and a fluid pressure means for moving said wedge upwardly along said supporting plate to release a drum previously held in said compartment by said wedge.

8. In a drum carrier of the character described, the combination of a lift truck having a vertical elevator supporting column at the forward end thereof, an elevator unit mounted for vertical movement upon said elevator supporting column, a rectangular frame having partitions forming a plurality of compartments with open bottoms into each of which the upper end of a liquid transporting drum may extend, said frame being disposed to extend outwardly in front of said lift truck and characterized by the fact that the outer walls of said frame are cut away to provide downwardly inclined edges at the sides and terminating at the corners of each of said compart-

ments that will serve to guide the compartments of said frame into telescoping relation over the ends of a nested group of drums upon which said frame may be lowered, an individually operating drum gripping means in each of said compartments, and means for attaching said frame to the elevator unit of the lift truck permitting a limited lateral movement of said frame independently of said elevator unit, whereby an alignment of the compartments of said frame into telescoping relation with said drums will be facilitated.

9. In a drum carrier of the character described, the combination of a lift truck having a vertical elevator supporting column at the forward end thereof, an elevator unit mounted for vertical movement upon said elevator supporting column having an outwardly disposed transversely extending guide rail at its upper edge, a rectangular frame having partitions forming a plurality of compartments with open bottoms into each of which the upper end of a liquid transporting drum may extend, said frame being disposed to extend outwardly in front of said lift truck and characterized by the fact that the outer walls of said frame are cut away to provide oppositely inclined edges at the sides of each of said compartments which will serve to guide the compartments of said frame into telescoping relation over the ends of a nested group of drums upon which said frame may be lowered, an individually responsive gravity actuated drum gripping means mounted within each of said compartments, an overhanging bracket at the upper edge of said frame adapted to engage with the guide rail carried by said elevator unit, and a pair of vertically extending links connected in spaced relation at their upper ends to said elevator unit and to said frame at their lower ends, whereby said frame may swing transversely with respect to said elevator unit to bring its compartments into telescoping relation with a nested group of drums as the elevator unit operates to lower said frame thereover.

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