Nov. 22, 1955 D. W. SQUIRES 2,724,521

LOADING DEVICE FOR STANDARD FORK LIFT TRUCK

Filed June 16, 1953 3 Sheets-Sheet 1

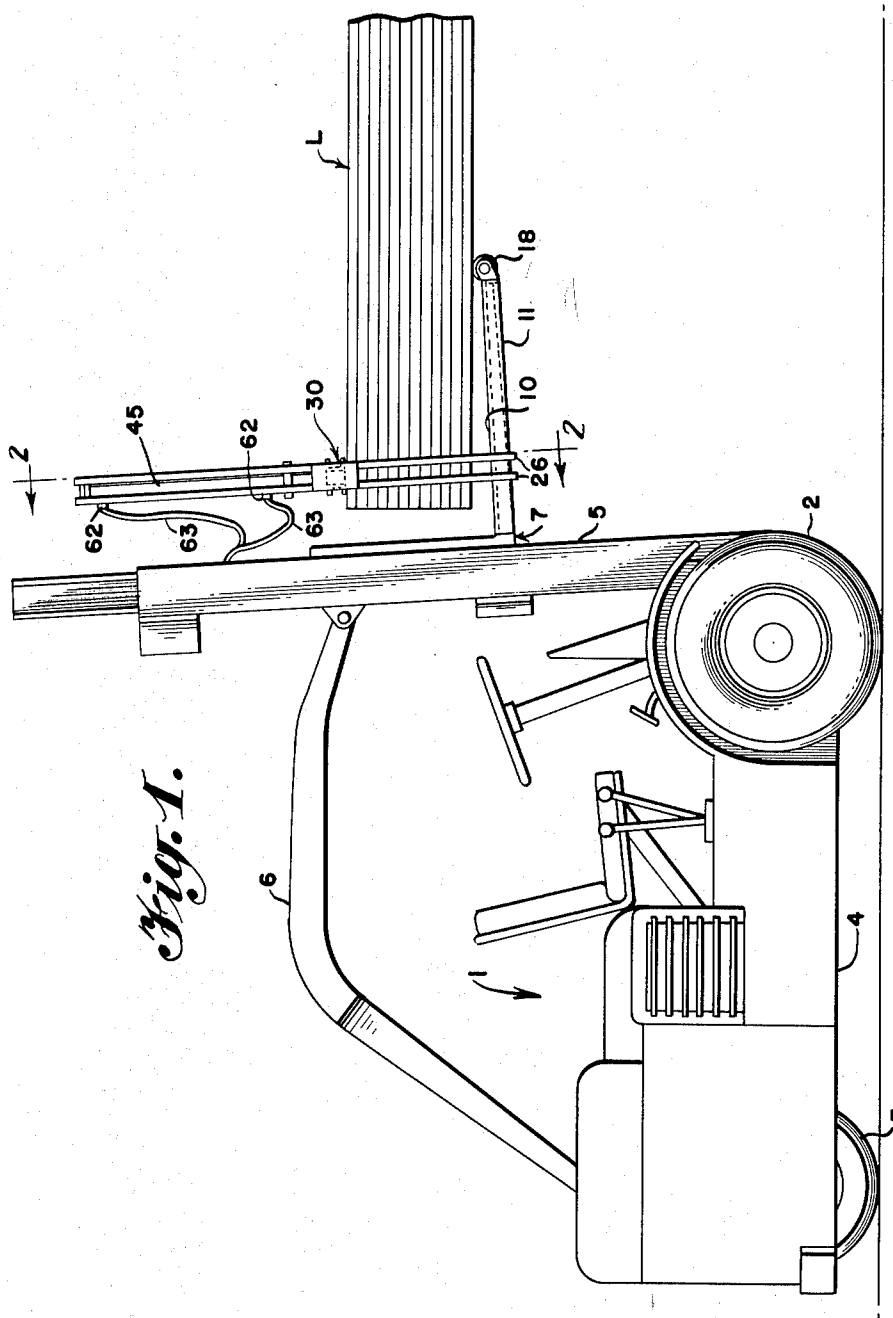

Fig. 1.

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Fig. 3.

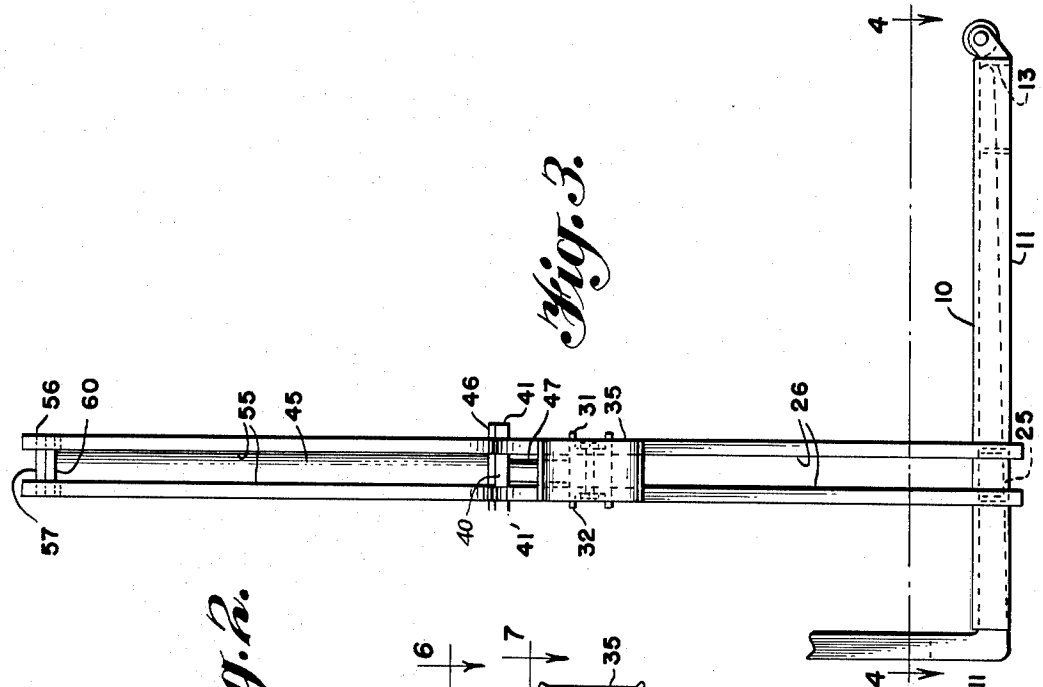

Fig. 2.

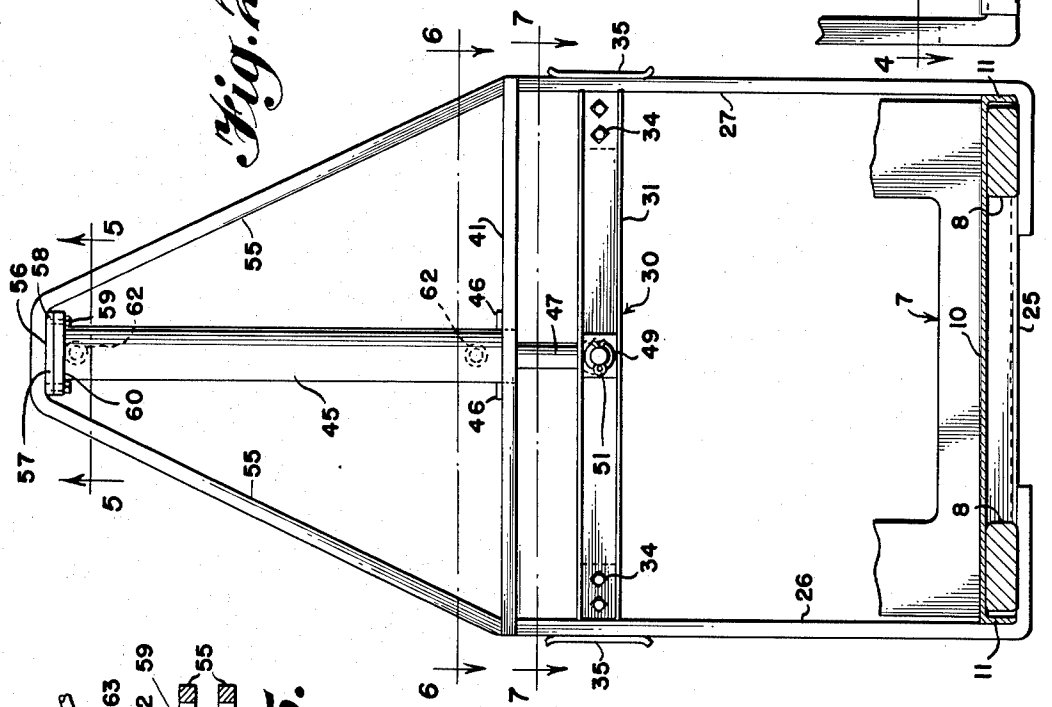

Fig. 5.

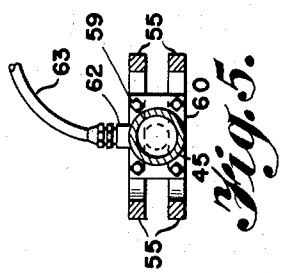

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Fig. 4.

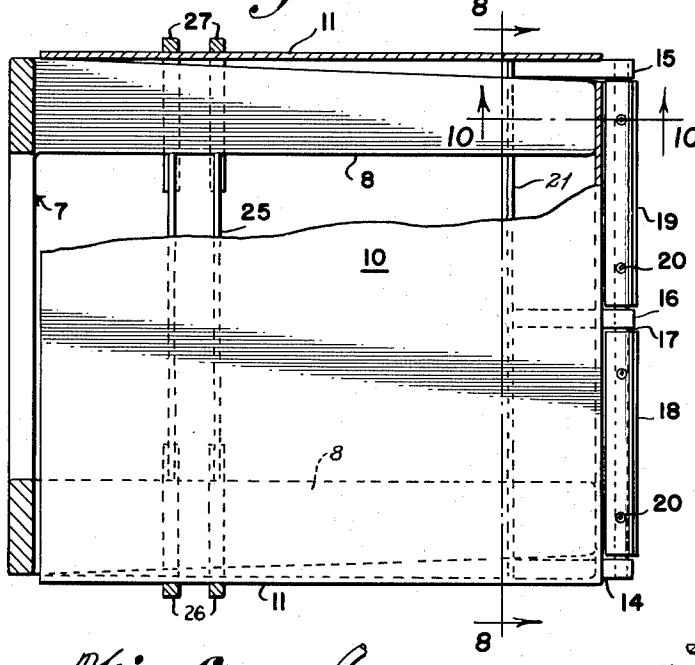


Fig. 9.

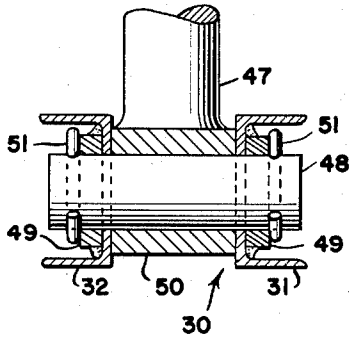


Fig. 6.

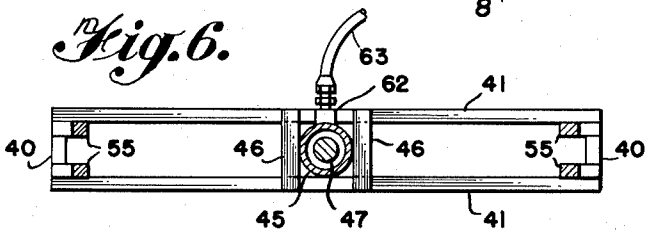


Fig. 7.

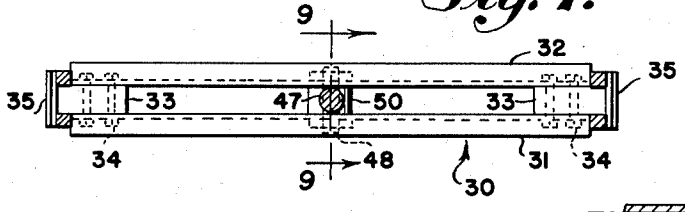
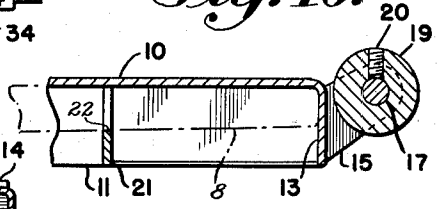


Fig. 10.



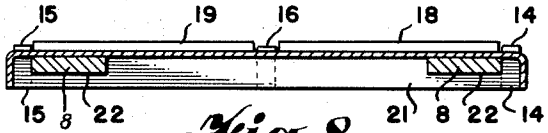


Fig. 8.

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LOADING DEVICE FOR STANDARD FORK LIFT TRUCK

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Application June 16, 1953, Serial No. 362,013

4 Claims. (Cl. 214—654)

This invention relates generally to an industrial truck structure of the fork lift variety which is capable of the end handling of elongated articles by a cantilever supporting thereof. The invention further relates to an attachment to be used with standard fork lift trucks to enable such trucks to be used in the end loading of lumber and loads of other similar elongated articles.

The type of industrial truck known as a fork lift truck has found extensive use in material handling operations in warehouses, manufacturing plants, lumber yards, and numerous other industries. This type of truck conventionally has an L-shaped fork, the horizontal tines of which are moved beneath the load to be lifted, and the fork moved vertically by appropriate power-driven means incorporated into the truck structure to lift the load.

In the use of fork lift trucks the power-driven vehicle is moved to the load to be transported and the fork pushed beneath the load so that the vertical movement of the fork will effect lifting of the load. To provide space beneath the load to accommodate the tines of the lifting fork it is common practice to use pallets or spacing boards beneath the load so that the fork may have free access to slide under such loads. With the conventional fork lift truck the center of gravity of the load must be above the lifting fork so that vertical movement of such fork will effect load lifting. A long load, or one wherein the center of gravity is beyond the end of the lifting fork, would obviously tilt off of the fork upon vertical lifting of the fork.

Accordingly, in using fork lift trucks for transporting elongated articles, such as, for example, unit piles of lumber, it is necessary that the fork be pushed under the side of the elongated pile substantially at the middle thereof. This obviously necessitates spacing of the piles of elongated articles to a sufficient distance to allow access thereto by the fork lift truck. Accordingly, an unreasonably large area is required for stacking of the elongated articles and the large area required becomes a serious drawback to the present use of fork lift trucks for moving piles of elongated articles such as lumber by side engagement with the pile.

Accordingly, it is the principal object of this invention to provide an industrial truck of the fork lift variety embodying a structure to be capable of handling an elongated load from the end thereof by cantilever support of such elongated load.

It is a further object of this invention to provide an apparatus for use with conventional fork lift trucks which may be applied to such trucks with a minimum modification of the existing truck, and which will enable end loading of piles of elongated articles by cantilever support thereof instead of side handling of such articles as is necessary with the conventional fork lift truck.

It is an additional object of this invention to provide a fork lift truck apparatus which may be readily controlled to engage and disengage the end of an elongated load in end handling of the material.

It is a further object of this invention to provide a

fork lift truck structure having a vertically movable horizontal lifting platform with a transverse bar mounted horizontally above the rear of said platform whereby said platform may be moved by the power means of the truck to engage the underside of the load to be transported, and said transverse bar will engage the upper end surface of the load upon lifting of said platform so as to form a cantilever support in carrying the load.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed may be made within the scope of the appended claims without departing from the spirit of the invention.

Referring to the drawings:

Figure 1 is a side elevation of an industrial truck of the fork lift variety incorporating the structure of this invention and showing the manner in which an elongated load is supported thereon.

Figure 2 is a sectional view taken on line 2—2 of Figure 1 with the elongated load omitted.

Figure 3 is a side elevation illustrating the cantilever load support structure of this invention applied to the fork of an industrial truck.

Figure 4 is a sectional view taken on line 4—4 of Figure 3 with portions of the load platform shown in section.

Figure 5 is a sectional view taken on line 5—5 of Figure 2.

Figure 6 is a sectional view taken on line 6—6 of Figure 2.

Figure 7 is a sectional view taken on line 7—7 of Figure 2.

Figure 8 is a sectional view taken on line 8—8 of Figure 4.

Figure 9 is a detailed sectional view taken on line 9—9 of Figure 7.

Figure 10 is a detailed sectional view taken on line 10—10 of Figure 4.

In Figure 1 a conventional type of industrial truck 1 of the fork lift variety is illustrated. This truck has a pair of spaced driving wheels 2, cooperating with a single guiding wheel 3, to support the body 4, which carries the driving engine, operator-seat, controls for actuating the lifting fork, etc. An upright trackway 5 is pivotally mounted at the lower end thereof, intermediate the front pair of wheels 2. A bracing strut 6 is connected to the rear side of the trackway and extends over the main portion of the truck body to an actuating means within the body 4 so as to be movable to control the angular position of the trackway 5 with respect to the truck body.

The trackway 5 has mounted therein a conventional fork 7, which is vertically slidable within the trackway by suitable hydraulic or cable actuating means. The fork of the truck has a pair of horizontally extending tines 8 which in use are moved beneath the load to be transported and then lifted to raise the load. The type of fork lifting truck described above is merely illustrative of a form of conventional type of industrial truck with which this invention may be used. It will be understood that any fork lift truck may be used within the spirit of this invention.

A sheet metal platform 10, having flanges 11 along either edge thereof, is positioned on the tines 8 with the flanges 11 extending downwardly along the outside edges of the tines 8. The outer end of the platform 10 is provided with a flange 13 which extends downwardly over the outer ends of the tines 8 when the platform is positioned on the lifting fork 7.

The flange 13 has openings along the face thereof which receive bearing blocks 14, 15 and 16. The bearing blocks 14 and 15 extend outwardly through the flange 13, adjacent the side flanges 11 of the platform 10, and are suitably secured as by welding to such flanges and to the underside of the platform 10. The third bearing block 16 extends outwardly through the center of the flange 13, and is secured, as by welding, to the underside of the platform 10.

A shaft 17 extends through the bearing blocks 14, 15 and 16, and is provided intermediate the bearing blocks with a pair of rollers 18 and 19 secured to the shaft 17 by a plurality of set screws 20. The size of the rollers 18 and 19 is so selected that the upper surface thereof will be above or level with the plane of the platform 10. Thus the two rollers journaled in the bearing blocks 14, 15 and 16 on shaft 17 will enable the fork carrying the platform 10 to be rolled into position beneath the elongated load to be carried by the truck, and the upper surface of such rollers will serve as part of the cantilever support for the load being moved.

Although it is preferred to have rollers at the outer end of the platform 10 to roll under the load to be moved, such a structure is not necessary to the proper functioning of the apparatus. Thus the outer edge of the platform 10 might serve as the lower support edge for cantilever supporting of the load or a bridging member might be secured across the outer ends of the tines 8 to transversely engage the underside of the end of the load to be moved. All of these alternatives are within the contemplation of the instant invention.

To position the ends of the tines 8 of the fork 7 beneath the platform 10, a transverse partition 21 is secured as by welding to the underside of the platform 10 and flanges 11 adjacent the outer end of the platform. This partition has apertures 22 to receive the outer ends of the tines 8, so as to guide and retain the ends of the tines when the device is slid on to the lifting fork. In the embodiment illustrated in the drawings the partition 21 extends across the underside of platform 10 adjacent the rear end of the bearing blocks 14, 15 and 16, and accordingly, may be suitably secured thereto as by welding.

Toward the rear of the platform 10 a channel 25 is secured as by welding to the underside of such platform. This channel is of such a length as to span the space between the inner edges of the tines 8 when the tines are positioned within the pockets in platform 10, and thus serves in cooperation with the flanges 11 to center the platform 10 with respect to the tines 8 of the lifting fork.

In addition to centering the platform 10, the channel 25 acts as a support for the side members 26 and 27, the lower ends of which are bent at right angles as shown in Figures 2 and 4, to extend beneath the pockets for the tines 8 inwardly to be welded to the web of the channel 25. These side members consist of a pair of spaced square rods which extend parallel to each other and upwardly from the plane of the platform 10. These side members are additionally secured as by welding to the outer surface of the flanges 11 on platform 10 to rigidly retain them normal to the plane of the platform.

Alternatively the side members 26 and 27 could be secured directly to the side edges of the lifting fork tines 8 and a bridging member secured across the outer ends of the tines. With such a construction built as an integral part of the fork lift truck the platform could be dispensed with since in the illustrated embodiment its main function is to hold the elements properly positioned with respect to the lifting fork of a conventional industrial truck when the tines of such fork are positioned within the pockets in the platform.

The spaced parallel rods which make up the side members 26 and 27 provide a guiding track for the transverse bar 30 which, as will be described hereinafter, engages the upper end surface of the elongated load to serve as part of the cantilever support in moving the load.

The transverse bar 30 consists of a pair of channels 31 and 32 bolted in spaced relation with a pair of guiding blocks 33, between the adjacent ends thereof. Suitable threaded connectors 34 serve to retain the guiding blocks 33 between the ends of the channels 31 and 32, with the outer end of such blocks extending outwardly between the spaced parallel rods which make up the side members 26 and 27. A guide plate 35 is secured to the outer end of each block 33, outwardly of the side member 26 or 27, to retain the transverse bar 30 in the trackway provided by the side members.

Between the upper ends of the rods which make up the side members 26 and 27, stub spacers 40 are welded to retain the rods in parallel relation so that the blocks 33 on the transverse bar 30 may be freely slidable within the side members. A pair of horizontal rods 41 are welded to the edges of the upper ends of the side members to retain the side members parallel to each other.

In many load handling situations it is desirable to be able to adjust the position of the transverse bar 30 so as to accommodate loads of different heights and also to enable the transverse bar to be moved down firmly against the upper end surface of the load to rigidly clamp such load. However, where a particular size load is to be handled, the adjustable characteristic of the transverse bar 30 may not be necessary. Accordingly, for such use the transverse bar 30 may be rigidly connected to the side members 26 and 27 at the desired height above the surface of the fork tines to cooperate with the transverse support means across the outer end of the tines in forming a cantilever load support. Further, within the scope of this invention the side members 26 and 27 could be provided with attaching means at a plurality of spaced points along their length so that the transverse bar 30 might be attached to the side members at any one of a number of different horizontal positions above the surface of the fork tines.

To actuate the transverse bar 30 a hydraulic cylinder 45 is mounted on the horizontal rods 41 at the mid-point thereof and normal thereto. On each side of the cylinder 45, bars 46 are welded to the parallel rods 41 to span the space therebetween and centrally position the cylinder. The operating rod 47 of the hydraulic cylinder 45 is connected to the transverse bar 30 through a stub shaft 48.

To support the stub shaft 48 a pair of bearing washers 49 are welded to the webs of the channels 31 and 32. A bore is formed through the webs of these channels to accommodate the stub shaft 48 and such shaft is inserted therethrough and through a journal 50, formed on the end of the operating rod 47. The stub shaft 48 is retained in position on the transverse bar 30 by cotter pins 51, as shown in Figure 9, which are inserted through openings in the ends of the shaft to cooperate with washers 49 in maintaining the shaft centered. Thus the transverse bar 30 is coupled to the operating rod 47 of the hydraulic cylinder 45.

Above the upper end of the side members 26 and 27 the square rods which make up these members are bent inwardly toward each other to form diagonal braces 55. The uppermost ends of these braces are further bent so as to lie horizontal and are joined at their abutting ends as by welding to form a supporting base 56 to receive the upper end of the hydraulic cylinder 45. A plate 57 is welded to the base 56 and is provided with suitably spaced tapped apertures 58 to threadably receive bolts 59, extending through the base plate 60 on the hydraulic cylinder 45. Thus the hydraulic cylinder 45 is positioned so as to be parallel with the side members 26 and 27 of the apparatus so that the operating rod 47 may actuate the transverse bar 30 guided by the side members.

The cylinder 45 is provided at the upper and lower ends thereof with pressure connections 62 which may be connected by flexible tubes 63 to any suitable source

of hydraulic pressure and control valves therefore (not shown). Such suitable control valves are mounted on the body of the truck to be accessible to the operator for controlling the application of hydraulic pressure to the cylinder **45**, through the upper and lower connections **62**. Operating rod **47** of the hydraulic cylinder will transmit movement to the transverse bar **30** in the guide provided by the side members **26** and **27** to position the bar at the desired location for handling the load.

In the illustrated embodiment a specific power means in the form of hydraulic cylinder **45** is shown for positioning the transverse bar **30**. However, it will readily be recognized that any suitable power means to actuate the bar may be utilized within the scope of the instant invention.

In operating the apparatus for end handling of an elongated load L, such as shown in Figure 1 with the fork in its lowermost position, the tines **8** having platform **10** positioned thereon will be moved underneath the end of the elongated load. The end of the load will extend rearwardly towards the body of the truck above the platform **10** and beneath the transverse bar **30**. Under these circumstances the fork **7** may be raised by proper manipulation of the truck controls so that the transverse bar **30** will engage the upper end surface of the load L and form a cantilever support for such load between the transverse bar **30** and the rollers **18** and **19** at the outer end of the platform **10**.

It will readily be appreciated that the adjustability of the transverse bar **30**, by means of the hydraulic cylinder **45** together with the adjustability of the lifting fork **7** and angle of trackway **5**, which are characteristics of the fork lift truck construction, will enable a variety of load sizes to be handled with a fork lift truck incorporating this invention. Thus the transverse bar **30** may be raised or lowered to accommodate elongated loads of different heights and also may be raised or lowered with the same load to vary the angle of the load being transported.

In disengaging the load L from the industrial truck, the rollers **18** and **19** at the front end of the platform **10** assist in permitting withdrawal of the truck fork from beneath the load after the outer end of the load has been lowered to rest on the ground or other supporting area where the load is to be deposited.

I have illustrated and described what I now consider to be the preferred form of my invention. It will be understood, however, that various modifications and equivalents may be resorted to without departing from the broader scope of the invention as defined by the following claims.

What I claim is:

1. In a fork lift truck having a power actuated lifting fork, a platform adapted to be positioned on the tines of the lifting fork, roller means mounted across the outer end of said platform, upright members secured to the sides of said platform adjacent to but spaced from the end of said platform opposite said roller means, a transverse bar connected between the upper ends of said members and extending horizontally above the inner portion of said platform, said roller means and said transverse bar cooperating with the end of an elongated load to be moved to provide a cantilever support for the load when said platform is lifted by vertical movement of the lifting fork of the truck.

2. In a fork lift truck as recited in claim 1 wherein said transverse bar is adjustable so as to vary the spacing between said bar and the upper surface of said platform.

3. In a fork lift truck as recited in claim 1 wherein said transverse bar is slidably mounted in said members and hydraulically actuated means are coupled to said bar to move said bar with respect to the upper surface of said platform.

4. A fork lift truck having a vertically movable horizontal lifting platform, power means for driving said truck and vertically lifting said platform, a transverse load engaging bar mounted above said platform adjacent to but spaced from the innermost end of said platform and spaced above said platform to receive the end of an elongated load between said bar and said platform, actuating means connected to said bar to enable movement of said bar relative to said platform to vary the space between said bar and said platform to accommodate different height loads, the outermost end of said platform engaging the underside of the load at a point longitudinally spaced from the load end and said transverse bar engaging the upper surface of the load at a point immediately adjacent the load end upon upward movement of said platform to lift the load.

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