

Sept. 17, 1957

C. J. COOK

2,806,618

OVERHEAD GUARD FOR INDUSTRIAL LIFT TRUCKS

Filed Feb. 25, 1955

FIG. 1

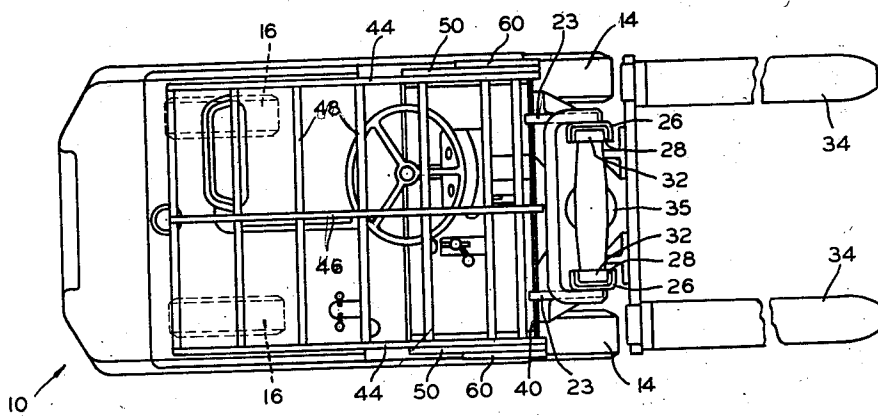
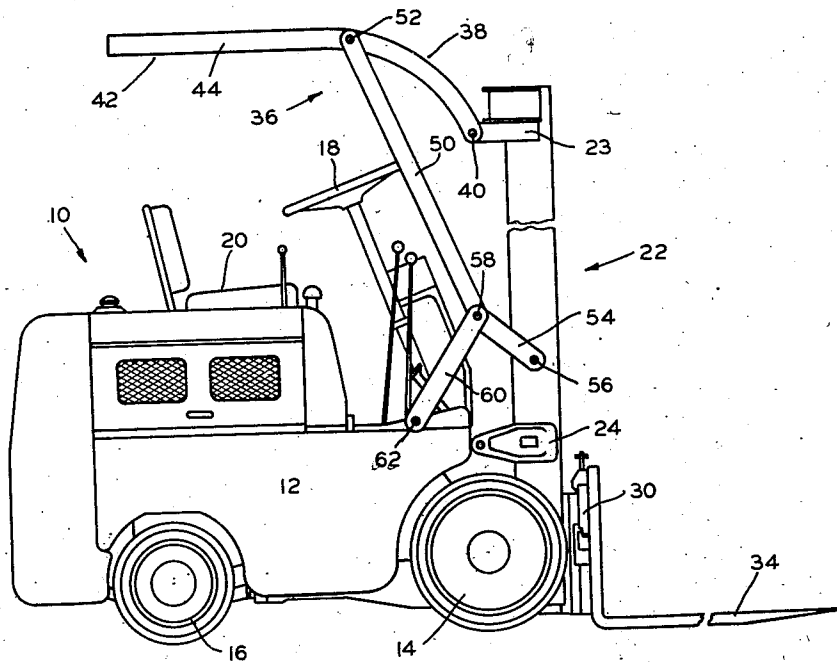


FIG. 2



INVENTOR.
CHARLES J. COOK
BY *J. Frederick Bechtel*
ATTY.

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2,806,618

OVERHEAD GUARD FOR INDUSTRIAL LIFT TRUCKS

Charles J. Cook, Hickory Corners, Mich., assignor to Clark Equipment Company, a corporation of Michigan

Application February 25, 1955, Serial No. 490,559

9 Claims. (Cl. 214—672)

This invention relates to overhead guards for protecting the operators of industrial lift trucks from objects falling from above.

Industrial lift trucks are in wide use for the handling of materials in factories and elsewhere. These trucks ordinarily have a tiltable mast structure ahead of the operator's station which is provided with elevatable forwardly projecting load engaging means for stacking a load on top of other material. In manipulation of the truck when a load is being elevated, careless handling, rough floors or the like may cause a load shift which results in objects falling from the load engaging means.

Overhead guards have been provided heretofore to prevent the operator of the truck from being struck by such falling objects. One such guard is mounted entirely on the body portion of the industrial truck at four locations and arranged to form a canopy over the operator of the truck.

Another type of guard previously known is connected between an upper portion of the mast structure and the body portion of the truck, extending over the operator's station.

Another type of overhead guard previously known is connected rigidly to the mast structure so that it extends rearwardly over the operator's station. A disadvantage of this type of guard is that the rear portion of it moves up and down through a considerable arc as the mast structure is tilted forwardly and rearwardly. It should be understood that it is necessary to tilt the mast of an industrial lift truck to the rear of vertical to aid in maintaining a load on the forks or other load engaging means when the load is being transported, and forwardly of vertical to aid in discharging the load from the forks or other load engaging means. A mast may, for example, be arranged to tilt 10° to the rear of vertical and 3° forward of vertical.

Such tilting of the mast means that an overhead guard which is secured rigidly to the mast will move through the same angle, and if the guard is long, extending several feet to the rear of the mast, it will be readily understood that the rear end of the guard will move a considerable distance vertically. Such a movement of the rear end of the guard is undesirable because there is danger that it will strike the operator in the lowermost position, while in the uppermost position it may increase the overall height of the lift truck and this is undesirable because of the increased overhead clearance which is required to accommodate it.

I have conceived an overhead guard which is connected to the mast and extends rearwardly over the operator's station, but which is provided with means which maintains the guard at substantially the same position with respect to the ground regardless of the pivotal position of the mast. In my structure, I provide linkage means connected between the overhead guard and a lower portion of the mast which includes a pair of links. One of these links is considerably longer than the other with the longer one being connected to the overhead guard and the short link to the mast. A third link is connected be-

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tween the junction of these first two links and the body portion of the truck. The three links are proportioned so that the overhead guard is maintained approximately horizontal regardless of the position of the mast.

For a clearer and more complete understanding of my invention reference should be had to the accompanying drawing in which:

Figure 1 is a top plan view of an industrial lift truck embodying my invention, and

Figure 2 is a side elevation view of the machine of Figure 1.

Referring to the drawing, the numeral 10 indicates generally an industrial lift truck provided with a body portion 12. The body portion houses a prime mover for the truck such as an internal combustion engine together with other devices and mechanisms as are usually provided in a vehicle of this kind. The vehicle is mounted on four wheels, including a pair of front wheels 14 and a pair of rear wheels 16. As illustrated, the front wheels 14 are the drive wheels while the rear wheels 16 are dirigible and are connected by a conventional steering linkage to an operator's steering wheel 18. The steering wheel 18 together with a seat 20 and the usual pedals and levers for operating the vehicle form the operator's station on the body of the vehicle.

At the forward end of the body portion of the machine is mounted a vertically disposed mast structure 22 which is pivoted at its lower end on the body portion of the vehicle. Suitable means such as hydraulic motors which are connected to the mast by means of fittings 24 are provided for tilting the mast forwardly and rearwardly under the control of the operator.

The mast structure illustrated is of the sliding telescopic type, and as may be seen in Figure 1 it includes an outer fixed upright guide portion formed by the pair of channels 26 and an inner telescopic portion formed of a pair of channels 28 which are secured together in a suitable manner to form a unitary sliding structure. It will be understood, of course, that the inner telescopic member may be provided with rollers or other anti-friction means instead of sliding on the fixed mast structure 26, 26. A load supporting carriage 30 operates up and down within the mast structure by means of rollers 32 which engage the inner member 28, 28. As shown, the load supporting carriage 30 carries a pair of fork members or tines 34 which may engage under a load for lifting it for transport and stacking. As discussed previously the mast 22 is arranged to be tilted rearwardly to facilitate carrying material on the fork tines and forwardly to facilitate discharging it from them.

The fork tines 34 are raised and lowered in a conventional manner by an hydraulic motor 35 or other equivalent means.

The overhead guard structure embodying my invention is indicated generally by the numeral 36. This structure includes a curved canopy portion 38 which is pivotally connected to the relatively fixed portion of the mast structure at 40 and a horizontally disposed canopy portion 42 extending over the operator's station. As shown, canopy 38, 42 comprises a pair of side frame members 44 and a center frame member 46 which are connected by a plurality of lateral members 48 to form a lattice structure which prevents objects falling from above from striking the operator of the truck. It will be understood, of course, that wire mesh or other equivalent means may be used on canopy 38, 42 if desired in place of or in addition to the lattice structure illustrated.

A pair of relatively long links 50, one on each side of the guard, are pivotally connected at 52 to the side frame members 44. Another pair of links 54, which are relatively short, are pivotally connected at 56 on the sides of mast structure 22, and these links are joined to

links 50 at common junctions 58. A third pair of links 60 are connected between junctions 58 and pivot points 62 on the body portion 12 of the truck.

In connection with the preceding two paragraphs, it should be noted that pivot points 40 and 58 actually are formed by shafts which extend transversely of the lift truck. The mast 22 is not as wide as the canopy structure 38, 42. Therefore, a pair of brackets 23 are secured on the opposite sides of the mast extending rearwardly and a shaft 40 is connected in fixed relation to the rear ends of these brackets. The side frame members 44 of the canopy are pivoted on rod 40 adjacent the outer ends thereof while center frame member 46 of the canopy is pivoted near the center of this shaft or rod. Similarly, pivot points 58 are provided by a laterally extending rod with the links 50 and 60 pivoted near the outer ends of rod 58 while the links 54 are pivoted inwardly from the outer ends so that they may be pivoted also on the sides of the mast 22. I have found it desirable to employ rubber bushings at pivot points 52, 56, 58 and 62, to minimize rattles, although such bushings are not essential to my invention.

The links 50, 54 and 60 are proportioned in a manner such that as the mast 22 is tilted forward and rearwardly, the horizontally disposed portion 42 of the overhead guard remains approximately horizontal. For a mast height as illustrated on the drawing, the proportions shown will produce these results. If the mast 22 extends to a greater elevation and the overhead guard is located higher on the mast, the distance between pivot points 40 and 52 should be increased a corresponding amount and the links 50 should be increased in length so that the canopy 38, 42 is in approximately the position illustrated.

While I have shown in the drawing an overhead guard 36 having an upwardly curved portion 38 between pivot points 40 and 52, it will be understood that if the mast of the machine is sufficiently high, it is possible to eliminate this curved portion and extend the overhead guard horizontally to the rear from pivot points 40 over the operator. In such a case, the links 50 are made correspondingly shorter.

Thus, while I have described and illustrated a preferred embodiment of my invention, it will be understood by those skilled in the art that modifications may be made. Accordingly, it should be understood that I intend to cover by the appended claims all such modifications which fall within the true spirit and scope of my invention.

I claim:

1. An overhead guard for a lift truck having a body portion and a vertically disposed mast pivotally connected adjacent the bottom thereof to the front of the body portion, comprising a structure pivotally connected to an upper portion of the mast and having a horizontally disposed portion extending rearwardly, linkage means connected between the said structure and a lower portion of the mast including two links joined together, and a third link connected between the junction of the said two links and the body portion of the truck.

2. An overhead guard for an industrial lift truck having a body portion, a vertically disposed mast pivotally connected adjacent the bottom thereof to the front of the body portion, and an operator's station on the body portion to the rear of the mast, the overhead guard comprising a structure pivotally connected to an upper portion of the mast and having a horizontally disposed portion extended rearwardly over the operator's station, a first relatively long link pivotally connected to the said guard structure, a second relatively short link connected to a lower portion of the mast, means connecting the two said links together, and a third link connected between the junction of the first two links and the body portion of the truck.

3. An overhead guard for an industrial lift truck which includes a body portion, a vertically disposed mast pivotally connected adjacent the bottom thereof to the

front of the body portion for fore and aft tilting movement, and an operator's station on the body portion to the rear of the mast; the overhead guard comprising a canopy structure pivotally connected to an upper portion of the mast and including an upwardly disposed curved portion adjacent the mast and a horizontally disposed portion extending rearwardly over the operator's station, a first pair of relatively long links pivotally connected to the said canopy structure respectively adjacent the two sides thereof, a second pair of relatively short links connected to a lower portion of the said mast adjacent the respective sides thereof, means connecting the long and short links on each side of the truck together, and a third pair of links connected between the junctions of the long and short links and the body portion of the truck, and the said links being proportioned so that the said horizontally disposed portion of the canopy structure maintains approximately the same position with respect to the supporting surface for the lift truck as the mast is tilted forwardly and rearwardly.

4. In an operator-driven industrial lift truck having a mast pivoted at its lower end to the front of the truck for fore and aft swinging movement of the mast upper end, an overhead operator-protection guard arranged to follow the fore and aft swinging movement of the mast, linkage means connected between the said guard and the mast including a pair of links connected together, and a third link connected between the junction of the said two links and the truck, said linkage means being so constructed and arranged that as the mast swings fore and aft the protection guard maintains approximately a constant relation with respect to the ground.

5. In an operator-driven industrial lift truck having a mast pivoted at its lower end to the front of the truck for fore and aft swinging movement of the mast upper end, an overhead operator-protection guard pivotally mounted on an upper portion of the mast and extending rearwardly therefrom, linkage means connected between the said guard and the lower portion of the said mast including a long link connected to the guard and a short link connected to the mast and means connecting these two links together, a third link connected between junction of the first two said links and the truck, and the said three links being proportioned so that as the mast swings fore and aft the overhead protection guard maintains approximately a constant relation with respect to the ground.

6. An industrial lift truck comprising a body portion, a vertically disposed mast structure pivotally mounted on the said body portion adjacent the lower end of the mast, load engaging means mounted for vertical movement on the said mast structure, an operator's station on the said body portion, an overhead guard pivotally connected to the said mast structure and extending over the said operator's station providing protection for an operator from objects falling from above, a linkage connected between the said overhead guard and a lower portion of the mast including two links joined together, and a third link connected between the junction of the said two links and the body portion of the truck.

7. An industrial lift truck comprising a body portion, a vertically disposed mast structure pivotally mounted on the front of the said body portion adjacent the lower end of the mast for fore and aft tilting movement, load engaging and elevating means mounted for vertical movement on the said mast structure, an operator's station on the said body portion to the rear of the said mast structure, an overhead guard pivotally connected to an upper portion of the said mast structure and extending rearwardly over the said operator's station for providing protection for an operator from objects falling from the said load engaging and elevating means, a pair of relatively long links connected to the said overhead guard, a pair of relatively short links connected between the said pair of relatively long links and a lower portion of the mast, and a third pair of links connected between the junctions of

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the said long and short links and the said body portion of the truck.

8. An overhead guard for a lift truck having a body portion and a vertically disposed mast pivotally connected on the front of body portion adjacent the bottom thereof for fore and aft tilting movement, comprising a canopy structure pivotally connected to an upper portion of the mast and extending rearwardly, and linkage means connected between the said canopy structure and the lower portion of the mast and the body portion of the truck and arranged in a manner such that the said canopy structure maintains approximately a predetermined position relative to the support on which the lift truck rests as the mast is tilted forwardly and rearwardly.

9. An overhead guard for a lift truck having a body portion and a vertically disposed mast pivotally connected

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on the front of the body portion adjacent the bottom thereof for fore and aft tilting movement, comprising a canopy structure pivotally connected to an upper portion of the mast and extending rearwardly, and linkage means connected between the said canopy structure and the lower portion of the mast and the forward body portion of the truck, said canopy structure having connection with said truck only at the forward body portion thereof.

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