May 23, 1950 R. L. ALLEN ET AL 2,508,482

MATERIAL HANDLING TRUCK SCOOP WITH CHECK AND LATCH ASSEMBLY

Filed Sept. 8, 1947 2 Sheets-Sheet 1

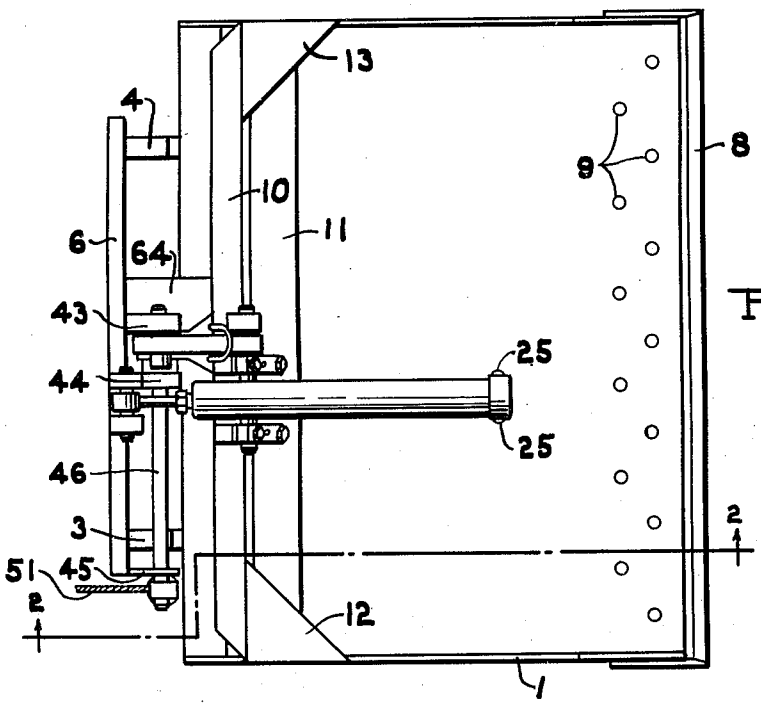

FIG-1

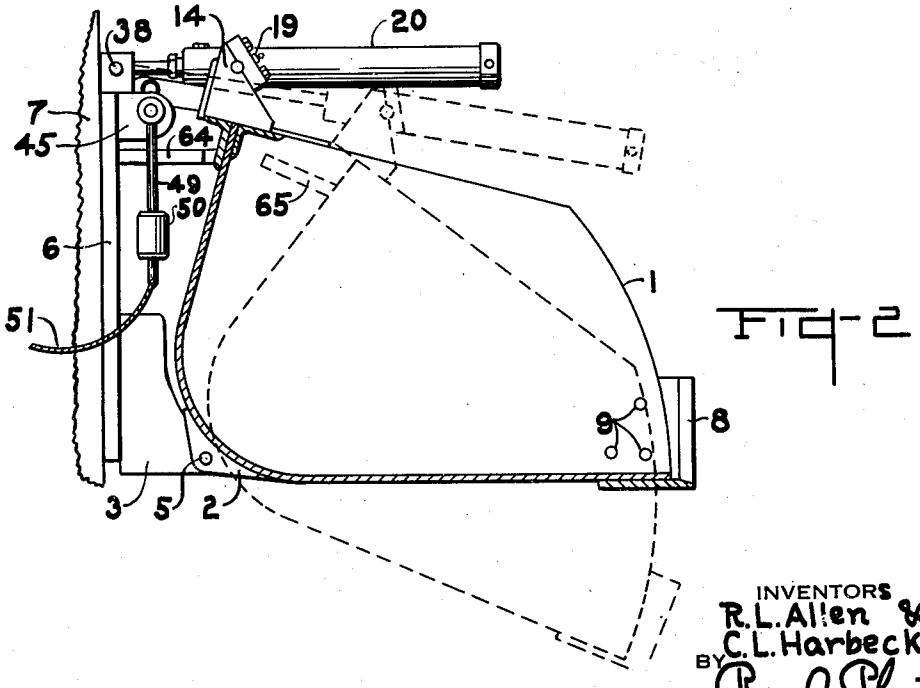

FIG-2

INVENTORS
R. L. Allen &
C. L. Harbeck
BY
Roy A. Plant
ATTORNEY

May 23, 1950 R. L. ALLEN ET AL 2,508,482

MATERIAL HANDLING TRUCK SCOOP WITH CHECK AND LATCH ASSEMBLY

Filed Sept. 8, 1947 2 Sheets-Sheet 2

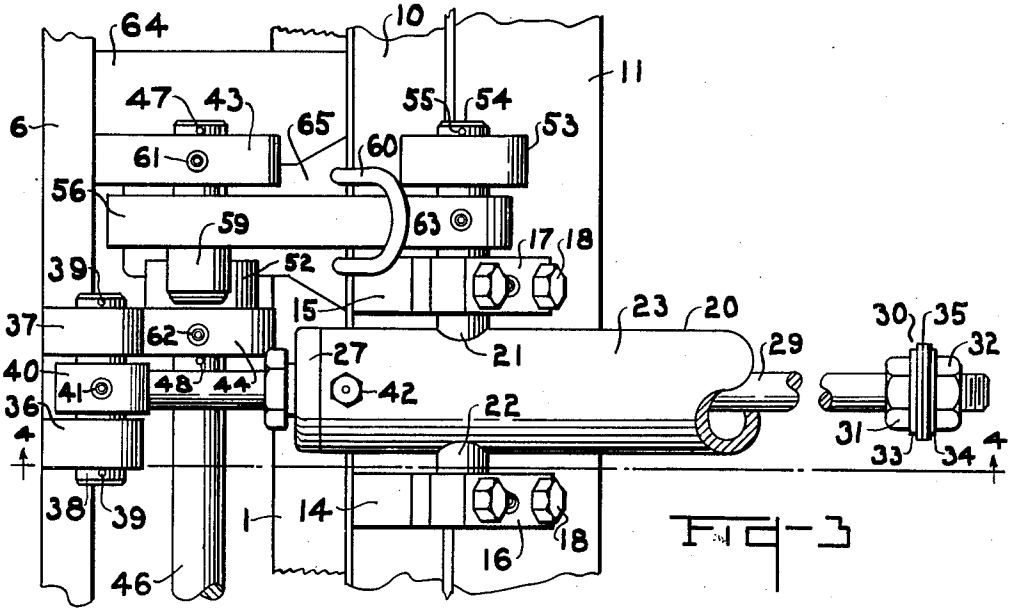

Fig-3

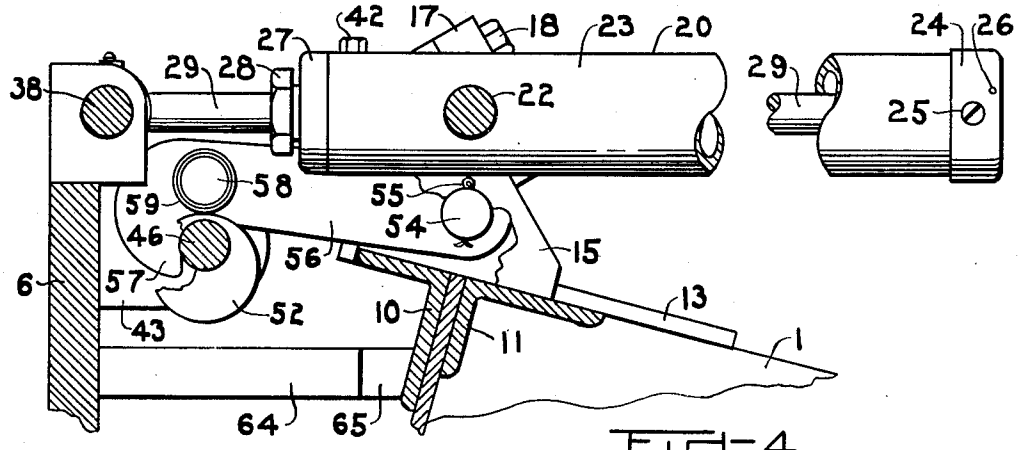

Fig-4

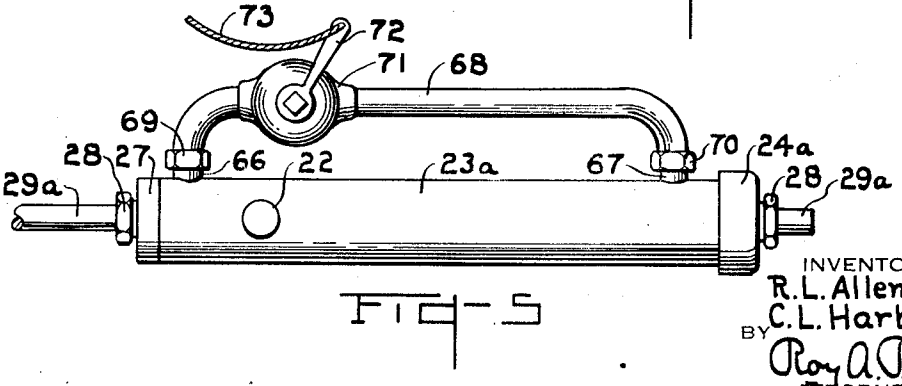

Fig-5

INVENTORS
R. L. Allen &
C. L. Harbeck
BY
Roy A. Plant
ATTORNEY

Patented May 23, 1950 2,508,482

UNITED STATES PATENT OFFICE

2,508,482

MATERIAL HANDLING TRUCK SCOOP WITH CHECK AND LATCH ASSEMBLY

Robert L. Allen and Charles L. Harbeck, Battle Creek, Mich., assignors to Allen Industrial Products, Incorporated, Battle Creek, Mich., a corporation of Michigan

Application September 8, 1947, Serial No. 772,766

11 Claims. (Cl. 214—146)

1

The present invention relates broadly to an apparatus having a member which is pivotally mounted and releasable for controlled movement about said pivot, and in its specific phases it relates to an apparatus having a pivotally mounted hopper normally held in loading position by a releasable latch means, and when elevated and such latch is released the hopper is checked throughout its pivotal unloading movement.

Vehicles having hoppers which are pivotally mounted and adapted for lowering to load and elevating to unload, are in common use. Most of these assemblies either have a complex track arrangement for guiding and tipping the hopper in its upper position to unload it, or else they have a latch which, when tripped, releases the hopper for free pivotal movement to the end of its travel. The latter causes a noisy severe jolt when the hopper reaches the end of its travel, a thing which not only wears out the pivot bearings of the hopper, but wracks the whole assembly with resultant shortened life of same. It was a recognition of this problem, and the shortcomings of the current procedures, which led to the discovery and development of the present invention.

Accordingly among the objects of the present invention is the provision of an apparatus for cushioning a pivotally mounted loadable member throughout its movement when released for unloading or the like.

Another object is to mount a fluid type cylinder, having coaxial trunnion bearings supported on the upper rear edge of a hopper or the like which is pivotally mounted at its lower rear edge on a suitable carrier frame, said hopper pivot being substantially parallel to the axis of said trunnions, such cylinder being of the movement retarding construction and having a piston and piston rod, one end of the latter being pivotally connected to said carrier frame so that the cylinder assembly will retard and cushion the movement of the hopper when the latter is released and tilts on its pivots.

Another object is to provide a pivotally mounted hopper or the like which has a latch pivotally mounted on its upper rear edge with the hook end of said latch engaging a latch operating mechanism mounted on the carrier frame of the hopper supporting assembly.

Another object is to provide means for limiting the unlatching movement of the latch, so that after unlatching, the latch will remain in position for relatching once more upon return of the hopper to the initial latch held position.

2

A further object is to provide a latch operating shaft mounted in operable position on the carrier frame of the hopper supporting assembly, the hook end of the latch being adapted to engage the shaft and hook thereover in manner holding the hopper in loading position, said shaft carrying a cam adjacent the latch and the latch carrying a roller adapted to be contacted by said cam so that when the shaft is rotated the cam will contact the roller and disengage the latch hook from the latch operating shaft.

A further object is to provide the latch operating shaft with a weighted depending arm so that the latch operating shaft and its cam will normally rest in a position permitting the latching of the hook end of the latch member over the latch operating shaft, said depending arm having means, such as a lanyard, connected thereto to facilitate rotation of the shaft, when desired, to unhook the latch.

A further object is to use either a pneumatic cylinder, or a hydraulic cylinder with control valve, for checking movement of a pivoted hopper or the like when same has been released for pivotal unloading movement.

A further object is to provide a pivotally mounted hopper or the like with a latching means, and means for checking the pivotal movement of said hopper when unlatched, said apparatus being simple, easy to construct, efficient in operation, long lived, and smooth operating.

Still further objects and advantages of the present invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain means for carrying out the invention, such disclosed means illustrating, however, but several of various ways in which the principle of the invention may be used.

In the annexed drawings:

Figure 1 is a top assembly view showing a preferred form of the present invention.

Figure 2 is a sectional elevation view taken substantially at line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is an enlarged fragmentary top view of the assembly illustrated in Figure 1.

Figure 4 is a sectional elevation view taken substantially at line 4—4 of Figure 3, looking in the direction of the arrows, and with bracket 44 omitted, and certain of the parts, including the

cam and trunnion, partially broken away for clarity of illustration.

Figure 5 is a side view of a hydraulic cylinder assembly adapted for optional use in the general assembly of Figure 1.

Referring more particularly to the drawings: It will be noted that hopper 1, Figure 2, is provided adjacent its lower rear edges with pivot brackets 2 which are respectively carried on shoes 3 and 4 by means of a suitable pivot pin 5. Shoes 3 and 4 are rigidly fastened on a carrier frame 6 in conventional manner, such as by welding. This carrier frame in turn is mountable on a lift assembly 7, the details of which are not shown. This lift assembly, which may be part of a hoist type tractor or the like (not shown) is usable in conventional manner for bodily lifting and lowering the hopper and its associated parts as required under conditions of use. The forward edge of the hopper is preferably provided in conventional manner with a hardened steel shoe 8 which may be fastened to the hopper by means of rivets 9 or the like. To facilitate use of the hopper, the leading edge of shoe 8 may be slightly tapered as shown.

For rigidity in the mounting of hopper operating members, the upper back edge of the hopper is provided with a pair of angle irons 10 and 11, Figure 4, which may be welded in place, and at the ends of these angle irons are preferably mounted a pair of gusset plates 12 and 13, Figure 1, which may be welded to angle iron 11 as well as the sides of hopper 1 to stiffen and strengthen the assembly.

Mounted on the upper face of angle irons 10 and 11 are a pair of trunnion bearing brackets 14 and 15, Figure 3, which, respectively, have trunnion bearing caps 16 and 17 which may be held in place by means of cap screws 18. These caps are preferably drilled and supplied with grease fittings 19, Figure 2, which if desired may be of the Alemite type. Cylinder assembly 20, Figure 3, has trunnions 21 and 22 mounted thereon in axial alignment and adapted to tightly but rotatably fit trunnion bearing brackets 14 and 15.

Cylinder assembly 20, Figure 4, includes a cylinder 23 which is closed at one end with a cap 24 which may be anchored in place by means of screws 25, and preferably includes a relief vent hole 26. The other end of the cylinder is provided with a tight fitting plug 27, which in preferred construction threadedly engages the end of cylinder 23. This plug in turn is provided with a packing gland assembly 28 through which piston rod 29 is adapted to slidably move in substantially fluidtight manner in accordance with standard practice. On the inner end of piston rod 29, Figure 3, is mounted a piston assembly 30. While this piston assembly may be of various constructions, a simple one which has been found to be very satisfactory, involves threading the end of piston rod 29 and mounting thereon a pair of nuts 31 and 32 which bear against a pair of washers 33 and 34 which are slightly smaller in diameter than the bore of cylinder 23. Between these two washers are placed two double-ply leather discs 35 which are of substantially the same outside diameter as the bore of cylinder 23. To tighten the fit of these discs in the cylinder, it is only necessary to tighten nut 32 a corresponding amount. While leather discs are a preferred material, other forms of standard piston construction may be utilized, and it is intended that the showing in the drawing be considered as diagrammatically illustrating these various equivalent constructions.

Carrier frame 6, Figure 3, in preferred construction is provided with a pair of brackets 36 and 37 which are bored in alignment for the reception of a pivot pin 38 which extends perpendicular to piston rod 29, and substantially parallel to hopper pivot pin 5. Cotter pins 39 may be used if desired to hold pivot pin 38 from endwise displacement. Piston rod 29 is provided on its outer end with a suitable enlargement or head 40 which is crossbored to closely but rotatably fit pivot pin 38. A suitable grease fitting 41 may be provided in head 40 for lubricating the latter in conventional manner. A relief vent member 42 is preferably placed in cylinder 23 adjacent plug 27. The size of the vent opening through this relief vent member is preferably $^3/_{64}$", but its actual size depends largely upon how rapidly it is desired to relieve the suction or pressure in the gland end of the cylinder under conditions of use.

Mounted on carrier frame 6, Figure 1, are three brackets 43, 44, and 45, all of which are bored in alignment for latch operating shaft 46. This shaft may be held against endwise displacement in any conventional manner, for instance, by means of cotter pins 47 and 48, Figure 3. Fastened on the end of shaft 46 adjacent bracket 45 is a depending operating arm 49, Figure 2, which preferably has a weight 50 mounted thereon for stabilizing the assembly. Connected to the lower end of operating arm 49 is a lanyard 51 which extends to a point convenient for pulling by the operator when the hopper 1 is to be released. Adjacent bracket 44, Figure 3, and between brackets 43 and 44 is a cam member 52 which is conventionally fastened on shaft 46 for rotation therewith, and for operation as will be hereinafter described.

Mounted on the upper edge of angle irons 10 and 11, Figure 3, and spaced from trunnion bearing bracket 15 is a bracket 53. This bracket, which is lower than trunnion bearing bracket 15, is bored in alignment with a second opening in trunnion bearing bracket 15 for the reception of a pivot pin 54 which may be anchored in place in conventional manner such as by means of cotter pins 55. Pivotally mounted on pivot pin 54 is a rounded end latch member 56 which has a hook end 57, Figure 4, on the lower face of its free end. Mounted on the side of latch member 56 is a headed stud 58 which rotatably carries a roller 59 preferably directly above latch operating shaft 46 and in contact with the upper face of cam member 52.

In order to prevent latch 56 from pivotally moving on pivot pin 54 too far when released, a loop member 60, Figure 3, is passed over latch member 56 and fastened to angle iron 10 in conventional manner such as by welding. This loop is sufficiently high to permit hook end 57 of latch 56 to be moved above and clear latch operating shaft 46 when the hopper is being unlatched for pivotal movement. In order to facilitate free rotary movement of latch operating shaft 46, brackets 43 and 44 are preferably provided with grease fittings 61 and 62, and latch member 56 with grease fitting 63.

The operation of the mechanism is as follows: Hopper 1, in latched position, is lowered for conventional loading such as by filling from a supply bin spout, by shoveling, or by running same shovel fashion under the material to be loaded. The hopper is then suitably elevated and moved

to the point of unloading, whereupon a pull on lanyard 51 moves operating arm 49 in clockwise direction as viewed in Figure 2. This rotates latch operating shaft 46 which in turn rotates cam 52 in contact with roller 59 on latch member 56 to elevate the latch member and disengage hook end 57 thereof from the latch operating shaft 46. With the latch released, the load in hopper 1 causes the latter to tilt in the direction shown in dotted lines in Figure 2 for unloading purposes. As this tilting takes place, piston assembly 30 in cylinder 23 moves to the left therein and compresses the air in the cylinder, thus cushioning and checking the tilting movement of hopper 1 in manner avoiding sharp jolts which are undesirable and not only tend to cause breakage but abnormal wear on the assembly. It should be noted in this connection that the further the hopper tilts quickly after release, the greater is the restraining force exerted by the increasing air pressure in the cylinder assembly, which gradually relieves itself, so that the unloading operation is handled very smoothly. During this movement part of the air pocketed in the cylinder passes through the small opening in relief vent member 42, and at the same time, some air is passed into the free end of the cylinder through relief vent hole 26 to reduce the vacuum formed therein due to movement of the piston to the left in the cylinder. With the hopper unloaded and in contact with the ground or the like, the carrier frame 6 is lowered by means of the lift assembly 7 until the hopper is returned to the solid line position shown in Figure 2 whereupon the rounded end of latch member 56, Figure 4, passes over latch operating shaft 46 and hook end 57 of the latch member 56 drops down and re-engages the latch operating shaft 46 as shown.

In order to stabilize hopper 1 in its latched position, and guide same during the latching operation, a substantially symmetrical female keeper member 64, Figure 3, is suitably mounted on carrier frame 6 and a male keeper member 65 is suitably mounted on the back of hopper 1, these keepers taking the position shown in Figures 3 and 4 when the assembly is in latched position. With the hopper thus returned to initial position and latched in place, the assembly is ready once more for the repeating of its operating cycle.

In some cases it may be desirable to hydraulically control the snubbing or checking of hopper 1 and one convenient assembly for this purpose is illustrated in Figure 5. In this case, cylinder 23*a* is provided with trunnions as before while cap 24*a* is made fluidtight and provided with a packing gland assembly 28 for the projecting end of piston rod 29*a* the same as is the case with plug 27 at the other end of the cylinder. Piston rod 29*a* carries a suitable piston conventionally mounted in the cylinder which is filled with hydraulic fluid such as oil or glycerin. On the top of cylinder 23*a*, at opposite ends thereof, are mounted a pair of threaded nipples 66 and 67 each of which communicates with the interior of the cylinder and is suitably joined to a conduit 68 which is sealed in fluidtight manner to nipples 66 and 67 by means of coupling members 69 and 70. Mounted in conduit 68 is a fluid flow controlling valve 71 which has an operating lever 72 with lanyard 73 fastened to the end of same for operating the valve. In preferred construction, this valve will be of the spring closing type so that the valve will normally be held in closed

position except when lanyard 73 is pulled to open the valve in varying amounts, the more open the valve is, the more rapidly the unlatched hopper will tilt on its pivot pin 5. To return the hopper to initial latched position, valve 71 will be held open to facilitate return flow of the hydraulic fluid to the opposite end of the cylinder as the hopper is pivotally raised.

While the invention has been described in terms of returning the hopper to initial position by dropping a carrier frame in suitable amount, the same result may be attained in equivalent manner by hydraulic or mechanical elevating means, the elements of which do not form any specific part of the present invention.

Other modes of applying the principle of our invention may be employed instead of those explained, change being made as regards the apparatus herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and distinctly claim as our invention:

1. A pivotally mounted hopper, a carrier frame on which said hopper is mounted, a latch for holding said hopper in loading position, means on said carrier frame for releasing said latch and permitting said hopper to unload, and a pivotally mounted continuous acting fluid type check cylinder and piston assembly connected to said hopper and said carrier frame for checking and cushioning the movement of said hopper when said latch has been released.

2. A pivotally mounted hopper, a carrier frame on which said hopper is mounted, a latch for holding said hopper in loading position, said latch having a roller on the side thereof, a cam including means on said carrier frame for contacting said roller and releasing said latch to permit said hopper to unload, and a pivotally mounted continuous acting fluid type check cylinder and piston assembly connected to said hopper and said carrier frame for checking and cushioning the movement of said hopper when said latch has been released.

3. An apparatus of the character described, which comprises the combination of a loadable member, a carrier frame, means for pivotally mounting said loadable member on said carrier frame, a pivoted and hook ended latch mounted on said loadable means, means on said carrier frame for engaging the hook end of said latch and holding said loadable member in loading position, means for releasing said latch, a check cylinder and piston assembly, trunnion bearings on said loadable member, trunnions on said cylinder, said trunnions being in axial alignment on opposite sides of said cylinder and mounted for rotation on said trunnion bearings substantially parallel to the pivot mounting of said loadable member, said cylinder having a piston and piston rod, and means for pivotally joining said piston rod to said carrier frame.

4. In an apparatus as set forth in claim 3, wherein said latch has a projecting member mounted on the side thereof, and said means for engaging the hook end of said latch is a shaft having a cam fixedly mounted thereon, said cam being adapted to engage said projecting member in manner such that the hook end of said latch may be disengaged by rotating said shaft.

5. In an apparatus as set forth in claim 3, wherein said latch has a roller mounted for rotation on the side thereof at its hook end, said means for engaging the hook end of said latch is

a shaft having a cam fixedly mounted thereon and adapted to contact the roller on said latch, and means for rotating said shaft, whereby said cam in contact with said roller will disengage said latch when said shaft is sufficiently rotated.

6. An apparatus of the character described, which comprises the combination of a loadable member, a carrier frame, means for pivotally mounting said loadable member at its rear edge adjacent the bottom thereof on said carrier frame, lift means for raising and lowering said carrier frame, a hook ended latch, pivot means for mounting said latch on the upper portion of said loadable means, means on said carrier frame for engaging the hook end of said latch, means for releasing said latch, a check cylinder and piston assembly, fluid relief vents at each end of said cylinder, trunnion bearings on said loadable member, trunnions on said cylinder, said trunnions being in axial alignment on opposite sides of said cylinder and mounted for rotation on said trunnion bearings substantially parallel to the pivot mounting of said loadable member, said cylinder having a piston and piston rod, and means for pivotally joining said piston rod to said carrier frame.

7. In an apparatus as set forth in claim 6, wherein said latch has a projecting member mounted on the side thereof, and said means for engaging the hook end of said latch is a shaft having a cam mounted thereon, said cam being adapted to engage said projecting member in manner such that the hook end of said latch may be disengaged by rotating said shaft.

8. In an apparatus as set forth in claim 6, wherein said latch has a roller mounted on the side thereof at its hook end, said means for engaging the hook end of said latch is a shaft having a cam fixedly mounted thereon and adapted to contact the roller on said latch, and means for rotating said shaft, whereby said cam in contact with said roller will disengage said latch when said shaft is sufficiently rotated.

9. An apparatus of the character described, which comprises the combination of a loadable member, a carrier frame, means for pivotally mounting said loadable member on said carrier frame at the lower rear edge of said loadable member, a hook ended latch, means for pivotally

mounting said latch on the upper portion of said loadable member with the hook end of said latch extending therefrom, means on said carrier frame for releasably anchoring the hook end of said latch, means for releasing the hook end of said latch, a hydraulic check cylinder assembly, fluid relief openings at each end of said cylinder, a conduit joining said openings, a fluid flow controlling valve in said conduit, means for controlling the operation of said valve, trunnion bearings on said loadable member, trunnions on said hydraulic cylinder, said trunnions being in axial alignment on opposite sides of said cylinder and mounted for rotation on said trunnion bearings substantially parallel to the pivot mounting of said loadable member, said cylinder having a piston with piston rod extending therethrough, and means for pivotally joining one end of said piston rod to said carrier frame.

10. In an apparatus as set forth in claim 9, wherein said latch has a projecting member mounted on the side thereof, and said means for engaging the hook end of said latch is a shaft having a cam mounted thereon, said cam being adapted to engage said projecting member in manner such that the hook end of said latch may be disengaged by rotating said shaft.

11. In an apparatus as set forth in claim 9, wherein said latch has a roller mounted on the side thereof at its hook end, said means for engaging the hook end of said latch is a shaft having a cam fixedly mounted thereon and adapted to contact the roller on said latch, and means for rotating said shaft, whereby said cam in contact with said roller will disengage said latch when said shaft is sufficiently rotated.

ROBERT L. ALLEN.
CHARLES L. HARBECK.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,386,519	Wagener et al.	Oct. 9, 1945
2,388,436	Onofrio	Nov. 6, 1945
2,396,287	Robb	Mar. 12, 1946
2,426,544	Wooldridge	Aug. 26, 1947