Oct. 13, 1953 L. C. DANIELS 2,655,278

BARREL TOP GRAB MECHANISM

Filed Dec. 21, 1950 2 Sheets-Sheet 1

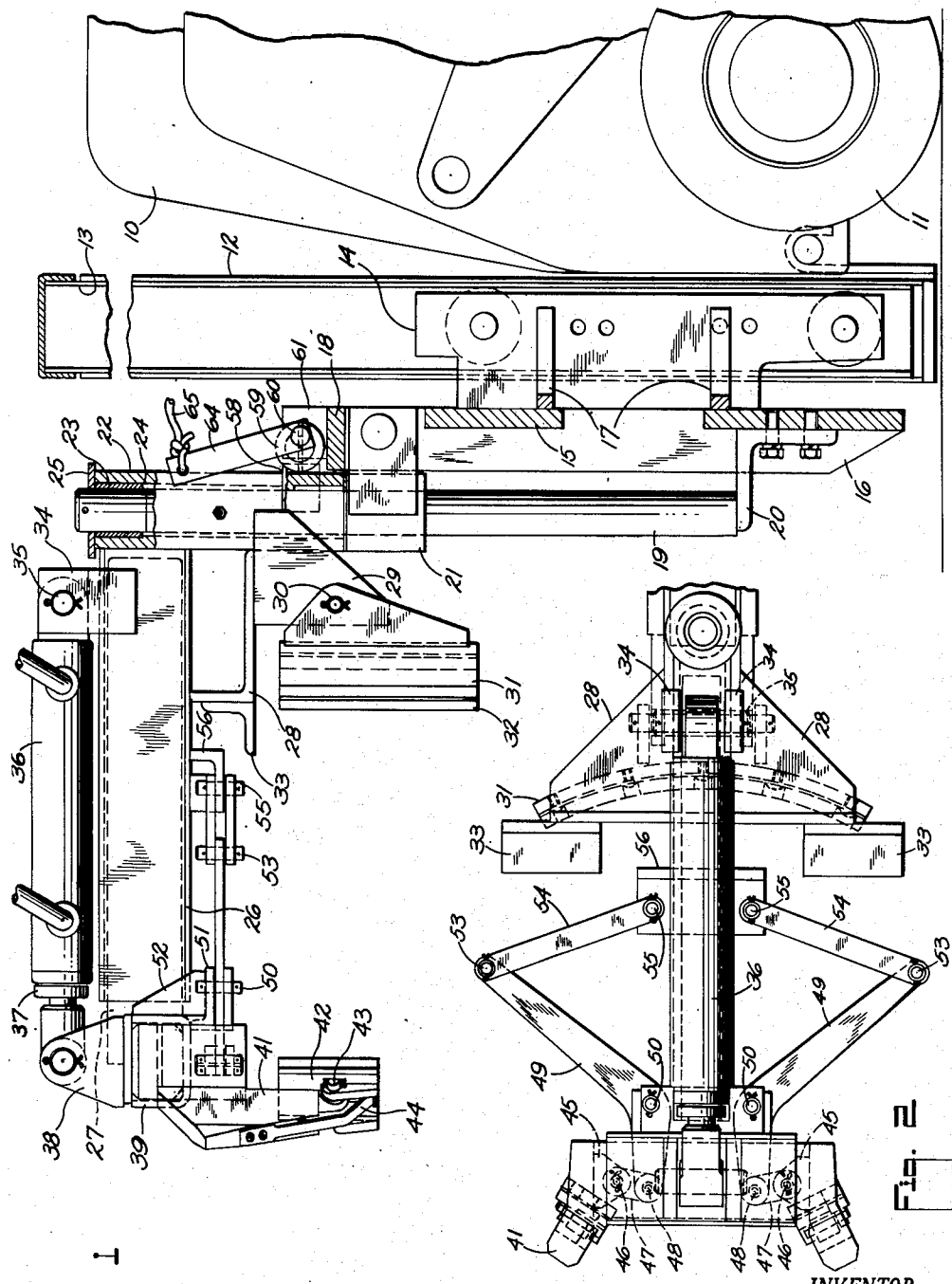


Fig. 1

Fig. 2

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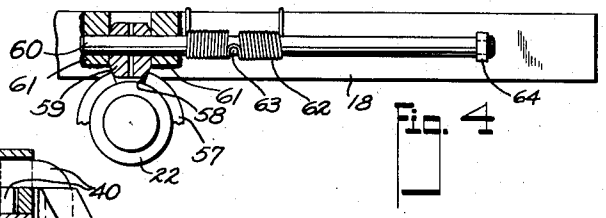


Fig. 4

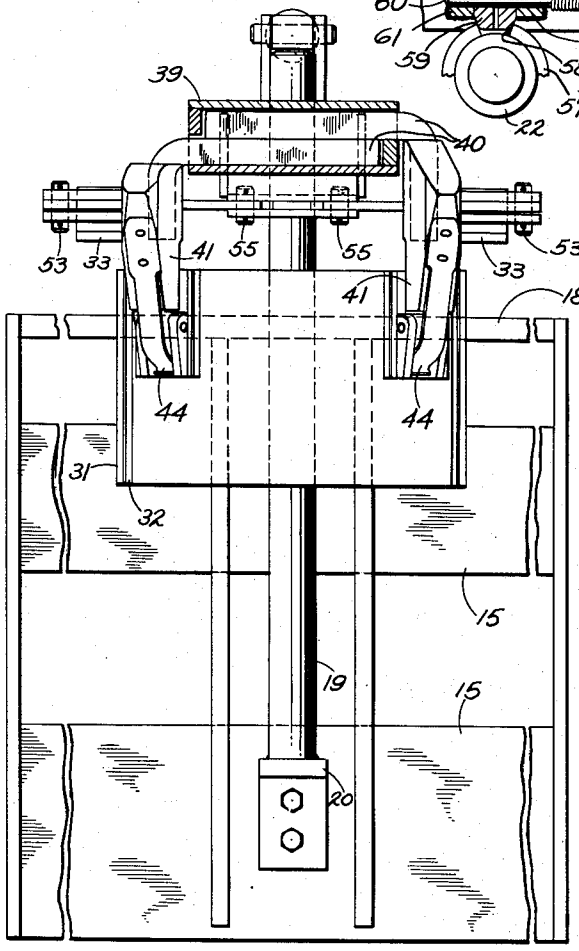


Fig. 3

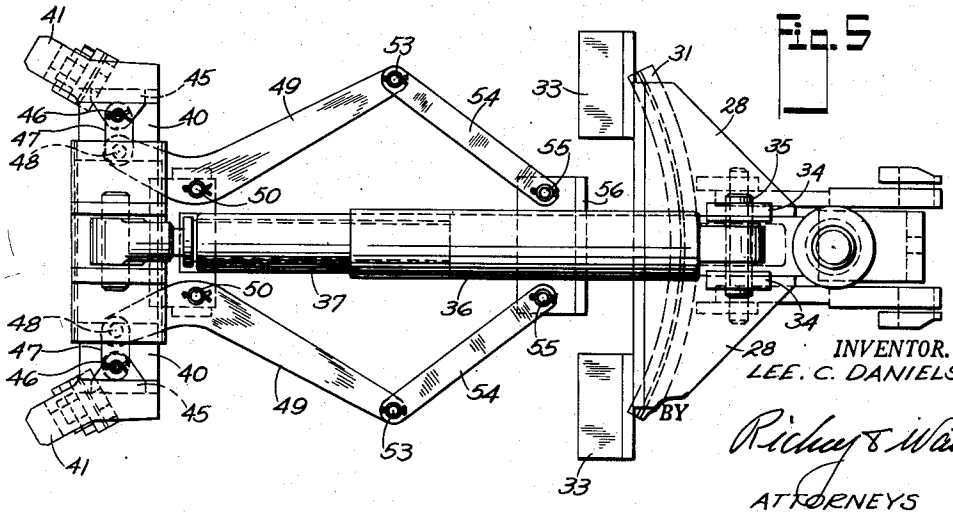


Fig. 5

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BARREL TOP GRAB MECHANISM

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6 Claims. (Cl. 214—653)

1

This invention relates broadly to lift trucks and more specifically to improvements in barrel grab mechanisms therefor.

One of the objects of the invention is to provide a grab shoe actuating mechanism which is designed to position the movable shoes of the assembly into confronting relation with the circumferential wall of a barrel during the clamping operation thereof.

Another object of the invention is to provide power multiplying linkage in the actuating mechanism for the movable shoes.

Another object of the invention is to provide a pivotal support for the grab mechanism to accommodate lateral movement thereof relative to the head of a barrel during the initial clamping operation.

Another object of the invention is to provide a lock to restrain pivotal movement of the grab mechanism after the clamping operation has been effected.

Another object of the invention is to provide a grab mechanism for a barrel or similar cylindrical body which will not obscure the operator's view forwardly of the machine.

Another object of the invention is to provide a grab mechanism which may be attached to the elevating carriage of a lift truck without structural modification thereof.

Further objects of the invention reside in the provision of a grab mechanism which is efficient of operation, sturdy of structure, and free from the hazards attendant the manipulation of mechanisms for the same general purpose.

Other objects and advantages more or less ancillary to the foregoing, and the manner in which all the various objects are realized, will appear in the following description, which, considered in connection with the accompanying drawings, sets forth the preferred embodiment of the invention.

In the drawings:

Fig. 1 is a side elevational view of a fragmentary portion of a lift truck embodying the invention;

Fig. 2 is a plan view of the device in its retracted position;

Fig. 3 is a front elevational view of the grab mechanism;

Fig. 4 is a transverse sectional view of a fragmentary portion of the pivotal supporting structure; and

Fig. 5 is a plan view of the device in its extended position.

Referring first to Fig. 1, the lift truck chosen

2

herein as exemplary of one of the environs within which the improved grab mechanism may be used comprises a body 10 having drive wheels 11 thereon, a mast 12 on the forward end thereof, a slide 13 organized for vertical translation relative thereto, and a carriage 14 mounted for independent movement on the slide. The carriage frame, which may be of any conventional form, embodies generally a pair of horizontally disposed plates 15, vertical tie bars 16 on the forward face thereof, arms 17 on the opposed face of the plates constituting the supporting medium for the carriage elevating chains, and a horizontal plate 18 upon the upper ends of the bars 16.

The improved grab mechanism is supported for pivotal movement in a horizontal plane by a column 19 welded or otherwise secured upon a bracket 20 bolted to the lower carriage frame plate 15 and anchored adjacent its upper end in a collar 21 secured to the tie bars 16. The free end of the column is provided with a sleeve 22 mounted in wear bushings 23 which are restrained against axial movement by shoulders 24 and thrust washers 25. The sleeve supports a tubular guideway 26 of rectangular transverse section, having a slide 27 mounted for free reciprocative movement thereon. The guideway 26 is welded to the upper end of the sleeve and further supported by a bracket 28 affixed upon a pair of arms 29 which in turn are mounted on the sleeve adjacent the lower end thereof. The arms 29 are cross-drilled for the reception of a pin 30 forming the pivotal support for an arcuate shoe or jaw 31 designed for engagement with the barrel or other cylindrical body to be moved. The shoe is lined with a yieldable facing material 32 to assure retention of the barrel and avoid mutilation thereof during the clamping operation. The outer ends of the bracket 28 are provided with buffer plates 33 arranged for abutting engagement with the top of a barrel during the descent of the carriage and the initial operative adjustment of the grab mechanism.

The upper face of the tube defining the guideway 26 supports a yoke 34 having a pin 35 therein constituting the fulcrum for a hydraulic cylinder 36 and piston 37. The cylinder is drilled and tapped adjacent the ends thereof for the reception of hose couplings leading in the customary manner to a source of pressure fluid and a valve arranged for manipulation by the operator of the vehicle. The outer end of the piston rod is pivotally connected to a yoke 38 mounted on a rectangular tube 39 constituting a guideway

for a pair of bars or runners 40 mounted in superposed relation and formed with depending arms 41 for the support of the outer grab shoes 42. The shoes are mounted for pivotal movement on pins 43 in the arms and bosses on the shoes, the lower ends thereof being urged inwardly by leaf springs 44 secured upon the outer face of the arms. The inner faces of the shoes are provided with a yieldable facing material to assure the frictional engagement of the shoes with the barrel. The inner face of each arm is formed with a lug 45 (Figs. 2 and 5) having a pin 46 therein for the pivotal support of a pair of links 47 which in turn are fulcrumed on a pin 48 in the end of a bellcrank 49. The bellcrank is mounted for pivotal movement on a pin 50 retained in a channel 51 supported by gusset plates 52 welded to the inner wall of the tube 39. The other and longer arm of the bellcrank is drilled for the reception of a pin 53 supported in openings in a pair of links 54 disposed in straddled relation with the arm and pivoted through a pin 55 upon a bracket 56 welded to the lower face of the guideway housing 26.

The sleeve 22, as will be seen in Figs. 1 and 4, is provided with a collar 57 having a vertical groove 58 in the circumferential face thereof which is engaged by the eccentric portion of a cam 59 mounted on a shaft 60 journalled in bearings 61 on the plate 18. The eccentric portion of the cam is rotatively urged against the collar 57 by a helical spring 62 mounted on the shaft 60 with the central portion thereof attached thereto through a pin 63 and the ends thereof attached to the plate 18. The shaft is provided with an upwardly directed lever 64 having a cord 65 thereon leading to the instrument panel of the vehicle for manipulation by the operator. When the lever is drawn rearwardly, the shaft will rotate and retract the eccentric portion of the cam from the groove 58 in the collar and thus permit the grab assembly to swing laterally about the column 19. As this occurs, however, the spring 62 is wound upon itself under the influence of the pin 63 in the shaft. Hence, when the cord 65 is released, the cam will track against the face of the collar 57 under the torsional effort of the spring until the groove 58 is brought into alignment therewith. As this occurs, the cam will be forced therein and the grab assembly locked against rotative movement.

In operation the valve controlling the pressure fluid is first adjusted to the position that effects the distention of the piston and the consequent outward movement of the shoes or jaws 42. As the slide 27 moves outwardly, the links 54 will effect the rotative movement of the bellcranks 49 which in turn will move the runners 40 and jaws 42 laterally. The operator of the vehicle will then elevate the carriage, if necessary, and maneuver the vehicle until the jaw 31 is disposed in confronting relation with the band or drum and the jaws 42 overhang the head thereof. Thereafter the operator will lower the carriage until the buffer plates or stops 33 engage the barrel and as a final operation, will adjust the pressure fluid valve to effect the retraction of the piston and thus cause the convergent movement of the jaws into clamping engagement with the barrel. When the drum or barrel to be moved is disposed in angular relation to the medial axis of the vehicle, or when it is desired to release the barrel at a point remote from the center line of the machine, the operator may unlatch the cam and collar assembly and swing the grab assembly about the column 19 until the jaws or barrel as the case may be, are disposed in the requisite position.

From the foregoing it will be recognized that the combined lateral and inward movement of the jaws will accommodate a wide range of barrels or drums of different size, that the clamping action thereof may be effected with ease and dispatch, and that the clamping effort of the outer jaws will be multiplied through the ratio of the bellcrank arms and the action of the linkage.

Although the foregoing description is necessarily of a detailed character, in order that the invention may be completely set forth, it is to be understood that the specific terminology is not intended to be restrictive or confining, and that various rearrangements of parts and modifications of detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In a lift truck embodying a vertically movable carriage, a barrel grab mechanism therefor comprising a guideway mounted on the carriage for pivotal movement in a horizontal plane, a grab shoe supported by the carriage and movable with said guideway, a plunger in said guideway, a hydraulic cylinder mounted on said guideway, a piston therein attached to said plunger for reciprocative movement therein, a second guideway mounted on the end of said plunger in normal relation thereto, slide bars therein, arms depending therefrom, grab shoes pivotally mounted thereon, bellcranks fulcrumed on said second-named guideway, links intermediate said slide bars and the shorter ends of said bellcranks, and links intermediate the other ends of said bellcranks and the first-named guideway, said links and said bellcranks being arranged to effect the convergent and divergent movement of the grab shoes on said arms toward and away from the first-named grab shoe during the reciprocative movement of said plunger.

2. In combination with a lift truck having a vertically movable carriage thereon, a barrel grab mechanism therefor comprising a guideway mounted on the carriage in normal relation to the outer face thereof, a plunger supported thereby, a grab shoe subjacent said guideway, a cylinder supported by said guideway, a piston therein connected to said plunger, a second guideway mounted on said plunger in normal relation thereto, arms supported for sliding movement toward and away from each other in said second guideway, grab shoes thereon, levers supported by said guideways and pivotal connections therefor anchored to the first-named guideway to effect the convergent and divergent movement of said arms relative to the first-named grab shoe during the reciprocative movement of said plunger.

3. A barrel grab mechanism for a lift truck having a vertically movable carriage thereon comprising a vertically disposed column mounted on the carriage, a sleeve pivoted thereon, a latch mechanism to arrest the pivotal movement of the sleeve, a grab shoe mounted on said sleeve, a guideway mounted on said sleeve in normal relation thereto, buffer plates secured to said sleeve subjacent said guideway to arrest the descent of the carriage when engaged with a barrel, a load-carrying plunger supported by said guideway, a hydraulic cylinder supported by the guideway, a piston therein connected to said

plunger, a second guideway supported on the free end of the plunger, arms supported for sliding movement thereon, grab shoes carried by said arms, bellcranks pivoted on the second guideway, operative connections between said arms and said bellcranks, and links pivotally connected to said bellcranks and one of the members mounted on the sleeve whereby distention of the piston and plunger will effect simultaneous distention of said arms.

4. In a lift truck embodying a vertically movable carriage, a barrel grab therefor comprising an arm mounted on the carriage in normal relation to the face thereof, a grab shoe supported by the carriage, a slide on said arm, a crosshead on the free end thereof, slide bars thereon, grab shoe supported thereby, hydraulic means for reciprocating said slide, and linkage coupled with said slide bars and said cross head and said arm for moving the last-named shoes convergently and divergently toward and away from the first-named grab shoe during the reciprocation of said slide.

5. In a lift truck embodying a vertically movable carriage, a barrel grab mechanism therefor comprising a grab shoe mounted on the carriage an arm mounted on the carriage in normal relation to the face thereof, a hydraulically-operated slide thereon, a crosshead on said slide, bars guided thereon, grab shoes supported by said bars, and means connected to the bars, the crosshead and said arm for moving the last-named grab shoes convergently and divergently toward and away from the first-named shoe simultaneous with the movement of said slide.

6. In a lift truck embodying a vertically movable carriage, a barrel grab mechanism therefor comprising a column mounted on said carriage in vertical relation therewith, a sleeve mounted for pivotal movement thereon, a collar on said sleeve having a notch in the circumferential edge thereof, a cam mounted on the carriage and arranged for engagement in said notch, a spring urging said cam against the circumferential edge of said collar, a lever operatively connected to said cam for the actuation thereof, a grab shoe mounted on said sleeve, a guideway mounted on said sleeve in normal relation thereto, stop plates to delimit the descent of the carriage mounted on said sleeve below said guideway, and above said grab shoe, a slide mounted in said guideway, a hydraulic cylinder supported on the guideway, a piston therein connected to said slide, a crosshead on said slide constituting a second guideway, arms mounted for sliding movement in said crosshead, grab shoes mounted on depending end portions thereof, bellcranks mounted on said crosshead, links connecting one end of said bellcranks with said arms, and links connecting the other end of said bellcranks to said arms whereby the last-named shoes will be moved transaxial said slide during the translation thereof.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
228,557	Pike	June 8, 1880
2,282,608	Rempel	May 12, 1942
2,340,812	Koob	Feb. 1, 1944
2,447,300	Williams	Aug. 17, 1948
2,473,410	Bevevino	June 14, 1949
2,500,055	Baker	Mar. 7, 1950
2,545,021	Coupland et al.	Mar. 13, 1951
2,574,131	Steinbrecher	Nov. 6, 1951
2,604,220	Frischmann	July 22, 1952