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ROTATING CLAMP ATTACHMENT FOR LIFT TRUCKS

Filed May 27, 1954

3 Sheets-Sheet 1

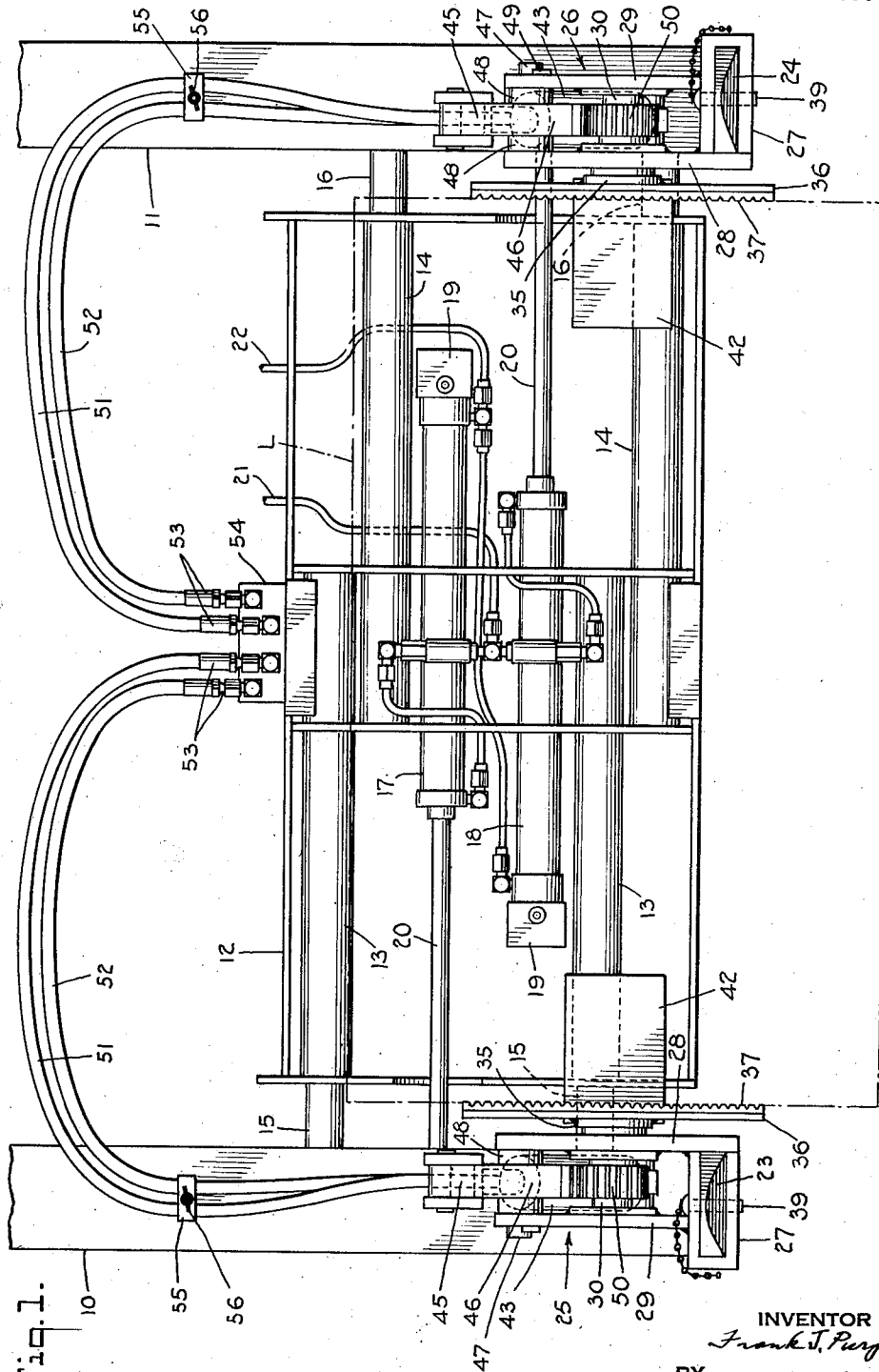


Fig. 1.

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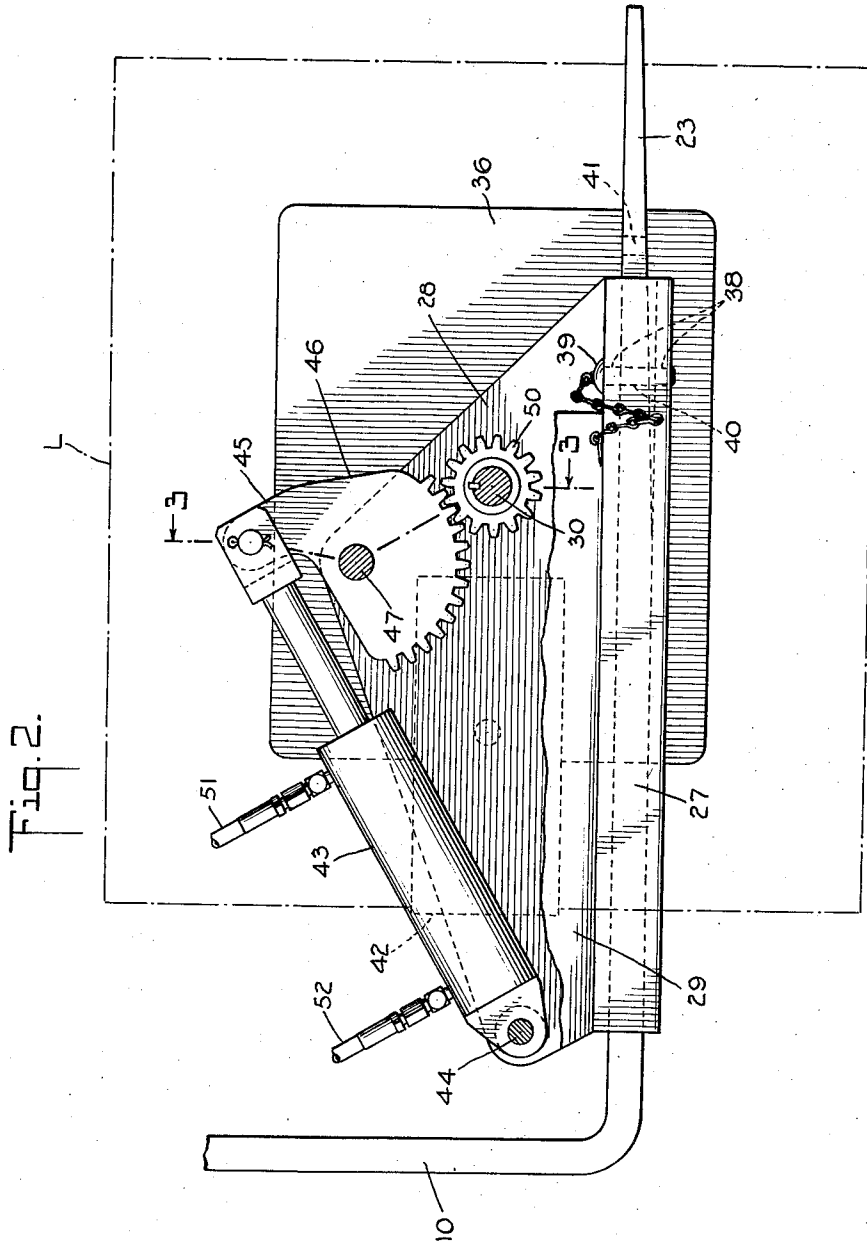
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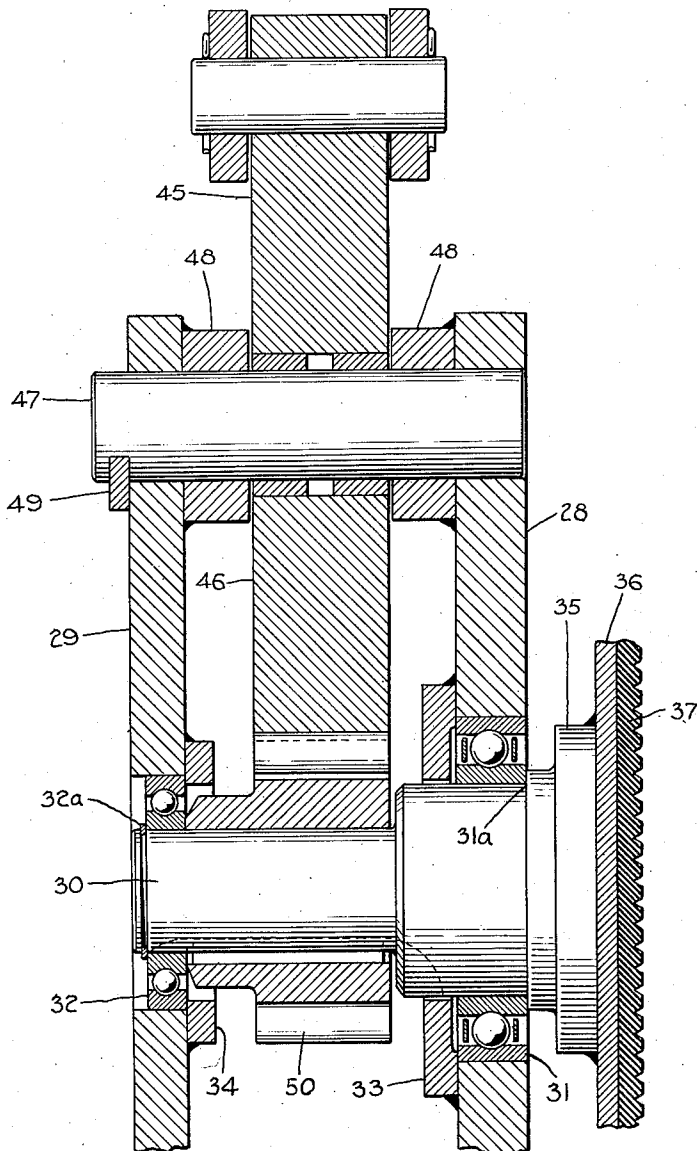
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Fig. 3.



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ROTATING CLAMP ATTACHMENT FOR LIFT TRUCKS

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6 Claims. (Cl. 214—620)

This invention relates to a load handling attachment for an industrial lift truck, and more particularly a load handling attachment for clamping and rotating a load.

As a particular feature of my invention, I contribute a load clamping and rotating attachment that may be applied readily to any industrial truck of the type having the usual lift forks and means for adjusting those lift forks laterally toward and away from one another.

Those skilled in the art will readily appreciate that I thereby convert an ordinary lift truck into a truck that is capable of clamping a load and rotating that load, thereby broadening greatly the utility of the particular truck.

As a feature of my invention, I utilize the usual hydraulic power source of the truck for actuating the load rotating means of my invention, while using further the mere movement of the forks toward one another for clamping the load through the medium of the load rotating means of my invention.

As a particular feature of my invention I apply to each fork of a truck having a pair of laterally moving forks, what I term a bracket. This bracket is constructed so as to fit on any standard fork, the bracket having suitable load clamping means that are also rotatable relatively thereto. Hydraulically actuated means for rotating the said load clamping means are carried on each bracket and are adapted for connection to the hydraulic source that supplies the power for adjusting the forks relatively to one another.

As a more particular feature of my invention, each bracket is formed with a sleeve-like portion adapted to slide longitudinally into position on each fork tine. Each bracket has means for securing the sleeve portion in one of a series of particular positions on its tine whereby to hold in aligned relation the axes in which the clamping members rotate. These securing means are extremely simple and comprise a pin on each bracket adapted to enter any one of a series of openings in the fork tines.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings:

Fig. 1 is a front view showing my novel attachment applied to the forks of a truck.

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Fig. 2 is a side view of the attachment, partly in section.

Fig. 3 is a cross-section on the line 3—3 of Fig. 2.

Referring now to Fig. 1, I show a pair of forks 10, 11, together with the mounting means for these forks and means whereby the forks are moved toward and away from one another for adjustment to a particular load. Thus, I show a frame 12 that may be attached to the lifting carriage of a truck, or that may conceivably be an integral part of the lifting carriage. This frame 12 is equipped with a pair of upper and lower tubular guides 13 mounted in transverse positions on the left hand portion of the frame 12, and a pair of similar guides 14 mounted on the right hand portion of the frame. The tubular guides 13, 14 are rather long, and overlap somewhat on the central portion of the frame 12. The fork 10 is mounted integrally upon a pair of upper and lower rods 15 that slide within the tubular guides 13, and the fork 11 is similarly mounted on rods 16 sliding within the tubular guides 14. Through this arrangement, the forks 10, 11 are supported on the frame 12 for horizontal movement relatively to one another. For moving the forks, the frame 12 is equipped with hydraulic rams 17, 18. Each ram 17, 18 is mounted at one end on the frame 12 through a bracket 19, and moves a corresponding fork 10, 11 through a piston rod 20. Suitable hydraulic lines 21, 22 lead from a source of power on the truck to the rams 17, 18 for actuating these rams, as will be understood by those skilled in the art.

The forks 10, 11 have the usual forwardly projecting tines 23, 24 adapted to be inserted under a load such as a skid or pallet in position to lift said skid or pallet. Of course, through the action of the rams 17, 18, the tines 23, 24 may be adjusted to suit the particular skid or pallet. The extremely novel attachment that I have now conceived enables me to clamp and to rotate a load that cannot be handled by the conventional action of lift forks. For the particular purpose, I mount upon the tines 23, 24 opposed parts of the attachment of this invention, indicated generally by the numerals 25, 26 in Fig. 1. Each of these opposed parts 25, 26 includes a mounting bracket having a sleeve portion 27 adapted to be slipped longitudinally onto one of the tines 23, 24, with surfaces between the sleeve portion and tine engaging to prevent rotation of the sleeve portion on the tine. Extending vertically upward from the sleeve portion 27 on each bracket is an inner side plate 28, and an outer side plate 29 in spaced relation to plate 28. It may be observed at this point that the opposed parts 25, 26 of my novel attachment are reversed in form so that the inner side plates 28 may lie at the inner sides of the fork tines 23, 24, but the opposed parts of the attachment are otherwise identical.

Somewhat above the sleeve portion 27 on each part of the attachment, I mount a transverse shaft 30, best seen in Figs. 2 and 3. Each shaft 30 rotates in a horizontal axis on ball bearings 31, 32 mounted in openings in the inner and outer plates 28, 29, and is held relatively to these bearings through a shoulder 31a on the inner end of the shaft and a snap ring 32a on the outer end of the shaft. Rings 33, 34 are welded to the plates 28, 29 to hold bearings 31, 32 in position, thereby enabling the shaft 30 to accept axial thrust. At the inner side of the plate 28, each shaft 30 is formed with a flange portion 35, and welded to this flange is a vertical clamping plate 36. Thus, when the fork tines 23, 24 are brought toward one another, the clamping plates 36 may be brought against the opposed sides of a load L to clamp the load. To obtain a firm frictional engagement between the clamping plates 36 and the load, I prefer to attach

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to the inner surface of each plate a grooved pad 37 of resilient material.

Each clamping plate 36 rotates in the axis of its particular shaft 30, and to hold both shafts 30 aligned so that both plates rotate actually in the same axis, I form the sleeve portion 27 of each bracket with openings 33, Fig. 2, adapted to receive a locking pin 39. I form in each fork 23, 24 an opening 40 that is in aligned relation to the openings 38 in the sleeve portion 27 when the shafts 30 on the opposed parts 25, 26 of my attachment are aligned relatively to one another. Thereby, the pin 39, when inserted through the openings 33 and 40, maintains the clamping plates 36 in position to rotate in a common axis. To handle different types of loads, it may, of course, be desirable to adjust relatively to the front of the truck the axis in which the load rotates. I therefore provide in each fork tine 23, 24 at least one additional opening 41 for the locking pin 39, these openings 41, like openings 40, being formed in positions directly opposed to one another. Through this arrangement, it is possible to adjust the axis of rotation by sliding the brackets on the fork tines 23, 24, but with the clamping plates 36 rotating in a common axis in all adjusted positions of the brackets. To assist the operator when moving the truck into position to clamp the load L between the plates 36, I prefer to equip each clamping plate 36 with an angular stop member 42, Figs. 1 and 2, that extends inwardly whereby to engage the rear surface of the load L.

I equip each part 25, 26 of the attachment with a hydraulic ram 43 for rotating the clamping member 36. As best seen in Fig. 2, the ram 43 is pivoted at its rear end to the side plates 28, 29 through a pivot shaft 44, and is pivoted at its forward end to an upwardly extending arm 45 on a gear sector 46. The gear sector 46 is positioned between upper parts of the side plates 28, 29, and rotates on a shaft 47, Fig. 3, that is mounted in openings in the side plates 28, 29. I prefer to weld spacers 48 to the inner surfaces of the plates 28, 29 to hold gear sector 46 in position on the shaft 47, with the shaft 47 in turn held in position by a key 49 engaged in a groove in the shaft, as best seen in Fig. 3. Keyed to the shaft 30 of each clamping plate 36 is a pinion 50, this pinion being meshed with the gear sector 46. Thereby, the rams 43 can rotate the load L when clamped between the plates 36 through the clamping action of the fork tines 23, 24.

The details of the means whereby I apply hydraulic pressure to the rams 43 are not important to an understanding of my invention, but I do prefer to apply the fluid to the rams through hydraulic lines that have a detachable connection relatively to the load carriage of the truck. Thus, referring to Fig. 1, I show a pair of flexible hydraulic lines 51, 52 for each of the rams 43, with each of these lines attached through a separable coupling 53 to a connector block 54 on the frame 12. Preferably, each pair of hydraulic lines 51, 52 is supported on one of the forks 10, 11 through a clamp 55 held by a wing nut 56. It will be apparent, therefore, that each part 25, 26 of my novel attachment may be very easily removed from the truck after first removing the locking pin from each part 25, 26 of the attachment, disengaging the hydraulic couplings 53, and then loosening the wing nuts 56. With my attachment removed from the fork tines, these tines obviously may be utilized in a conventional way. Of course, it is equally easy to apply my novel attachment to the fork tines when it is desired to utilize the truck for clamping and rotating a load.

I believe that the construction and operation of my extremely novel load clamping and rotating attachment will now be understood, and that the very considerable advantages of my invention will be fully appreciated by those skilled in the art.

I now claim:

1. In a truck of the class described, a pair of forks having load surfaces, means for moving said forks toward and away from one another while holding the forks in predetermined aligned relation to one another, a mount-

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ing bracket adapted to be slipped onto each fork, a pair of clamping plates, means mounting a clamping plate to rotate in a particular axis on each of the mounting brackets with the plates facing one another, said clamping plates moving integrally with said forks toward and away from one another so as to clamp a load therebetween and to release said load, surfaces through which each fork when supporting its bracket holds that bracket in predetermined relation to the load surface of the fork whereby to maintain in aligned relation to one another the particular axes in which the clamping plates rotate, a hydraulic ram mounted on each bracket, and means through which said hydraulic rams rotate said clamping plates relatively to said brackets and forks whereby to rotate a load clamped between said plates.

2. In a truck of the class having a hydraulic source of pressure and a pair of forks moved relatively to one another by means actuated through the hydraulic pressure developed by said source, the improvement that comprises a bracket adapted to be slipped onto each fork, a load lifting member for each bracket, means mounting each load lifting member to rotate relatively to its bracket, means for securing each bracket to the corresponding fork with the load lifting members in opposed relation to one another and in position to rotate in a common axis, each load lifting member moving integrally with its fork relatively to the opposed load lifting member, a hydraulic ram mounted upon each bracket, and means whereby said hydraulic rams rotate the load lifting members relatively to said brackets and forks.

3. In a truck of the class having a hydraulic source of pressure and a pair of forks moved relatively to one another by means actuated through the hydraulic pressure developed by said source, the improvement that comprises a bracket adapted to be slipped longitudinally onto each fork, a load lifting member for each bracket, means mounting each load lifting member to rotate in a horizontal axis on its bracket, surfaces through which each fork supports the corresponding bracket with its load lifting member in opposed relation to the other load lifting member, each bracket moving longitudinally on the corresponding surfaces to adjust its load lifting member relatively to the truck, means for securing each bracket in different longitudinally adjusted positions on its fork, a hydraulic ram mounted upon each bracket, and means whereby said hydraulic rams rotate the load lifting members relatively to said brackets and forks.

4. In a truck of the class having a hydraulic source of pressure and a pair of forks having horizontal tines with said forks moved relatively to one another by means actuated through the hydraulic pressure developed by said source, the improvement that comprises a bracket adapted to be slipped longitudinally onto a tine of each fork, a pair of opposed load lifting members, means mounting a load lifting member to rotate on each bracket, surfaces through which each tine when supporting its bracket coacts with the bracket to maintain horizontal the axis in which the corresponding lifting member rotates, means for securing each bracket against longitudinal movement on its tine with the axis in which the corresponding load lifting member rotates aligned relatively to the axis of the opposed member, a hydraulic ram mounted upon each bracket, and means whereby said hydraulic rams rotate the load lifting members relatively to their brackets and forks.

5. In a fork attachment of the class described, a base member adapted to be applied to a fork tine, a bearing support extending vertically upward from said base member and positioned at one side of the fork tine when the base member is applied to the tine, a load lifting member, means mounting said load lifting member on said vertical bearing support to rotate in a particular axis relatively to said support, surfaces through which the tine coacts with the base member to hold the base member against rocking relatively to the tine whereby to maintain horizontal the axis on which the load lifting member rotates, a hydraulic

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ram mounted on said attachment, and means whereby said hydraulic ram rotates said load lifting member in its axis.

6. In a fork attachment of the class described, a sleeve portion adapted to be slipped longitudinally onto a fork tine, a bearing support extending vertically upward from said sleeve portion and positioned at one side of the fork tine when the sleeve portion is on the tine, a load lifting member, means mounting said load lifting member on said bearing support to rotate in a particular axis, means securing the sleeve portion in different longitudinal positions on the tine for adjusting relatively to the truck the axis in which the load lifting member rotates, surfaces through which the tine holds the sleeve portion against rocking relatively to the tine whereby to maintain said axis horizontal, a hydraulic ram mounted on said attachment, and

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means whereby said hydraulic ram rotates said load lifting member in its axis.

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