

Feb. 21, 1956

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2,735,564

LIFT FORK FOR BRICK STACKS

Filed Aug. 27, 1953

2 Sheets-Sheet 1

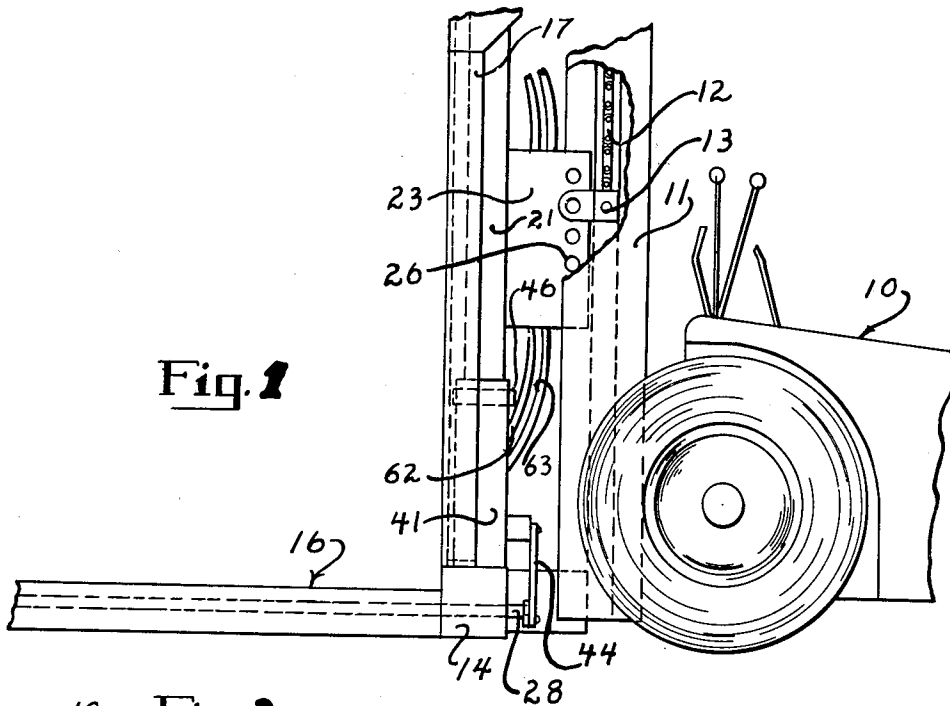


Fig. 1

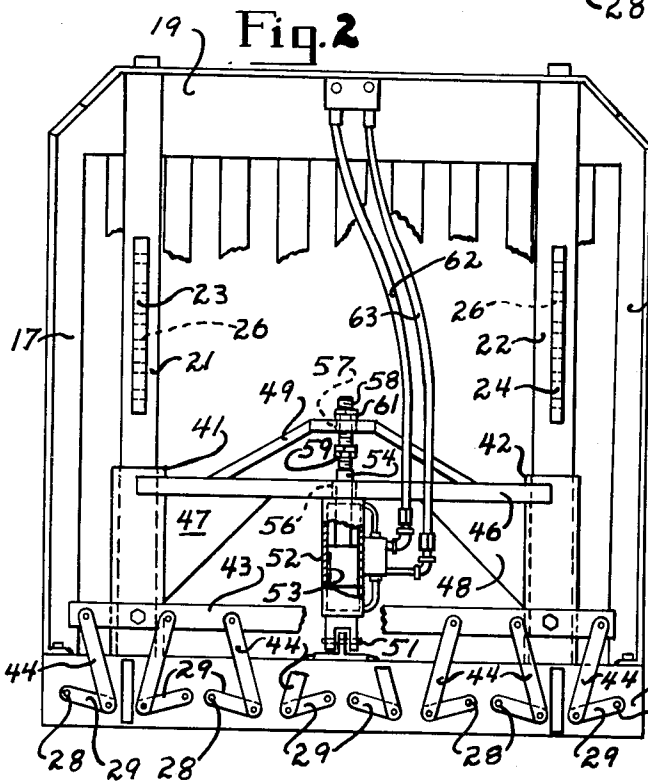


Fig. 2

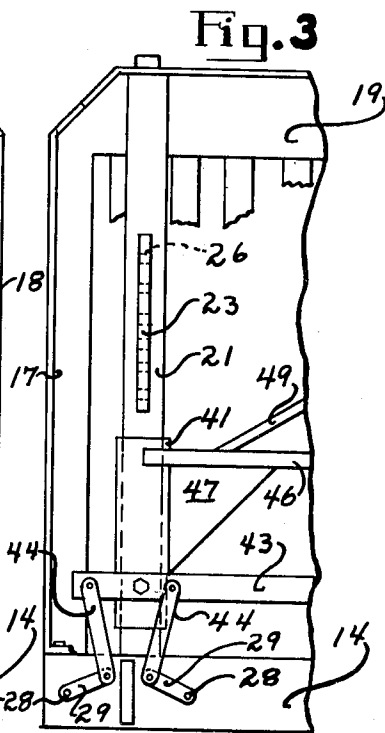


Fig. 3

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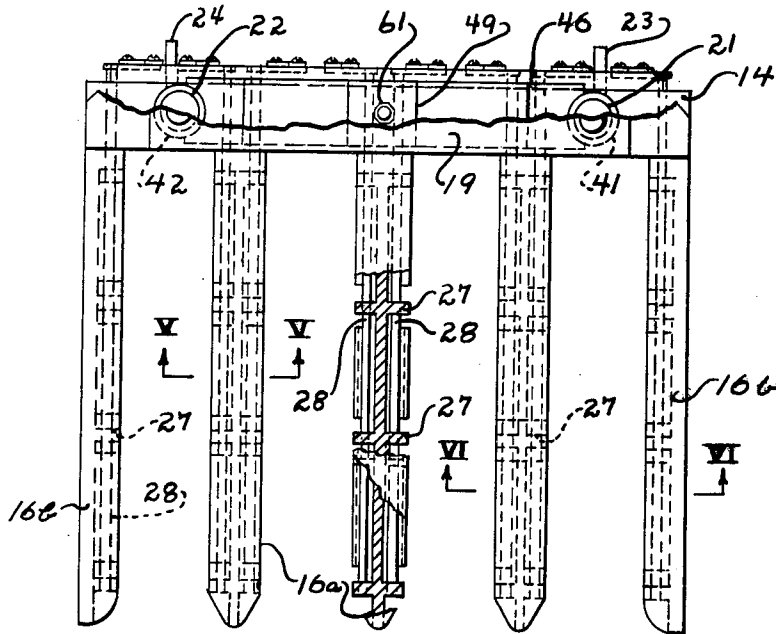


Fig. 4

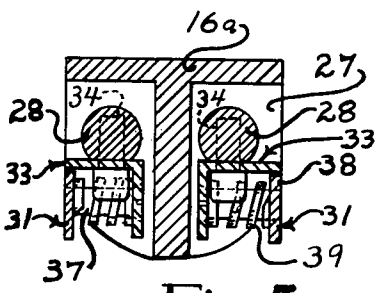


Fig. 5

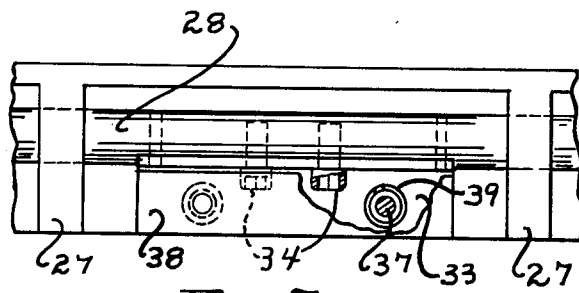


Fig. 7

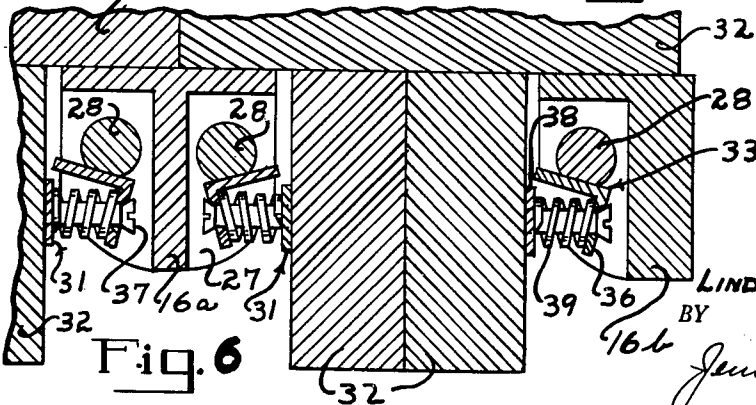


Fig. 6

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LIFT FORK FOR BRICK STACKS

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Application August 27, 1953, Serial No. 376,827

1 Claim. (Cl. 214—655)

This invention relates to lift forks such as are employed in lifting and transporting goods from place to place in factories, warehouses, and brickyards, and is particularly related to such forks where employed to handle piles of stacked rectangular objects such as brick, and has for an object the provision of improved apparatus of the character designated which shall be capable of handling stacks of such objects without the use of a pallet and regardless of the size and weight of the stack.

Specifically, my invention is an improvement on that described and claimed in my previously filed application, Serial No. 211,165, filed February 15, 1951, now Patent No. 2,681,741 granted June 22, 1954, in that positive means are provided for actuating the gripper elements carried by the tines of the fork.

A further object of my invention is to provide a lift fork embodying rigid tines carrying rotary gripper shafts with gripper elements carried thereby for engaging and holding a lower course of objects, together with pressure operated means for operating the shafts.

A still further object of my invention is to provide a lift fork which shall embody a rigid tine frame, a rigid lift frame rigidly secured to the tine frame, rotary gripper shafts carried by the tines, and pressure operated means for actuating the gripper shafts.

Another object of my invention is to provide a lift fork having rigid tines and gripper elements carried by the tines, together with pressure operated means for actuating the gripper elements and means to vary the force exerted by said gripper elements.

Apparatus embodying features of my invention is illustrated in the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a side elevational view with parts broken away showing my improved lift fork mounted on a tractor vehicle;

Fig. 2 is a rear elevational view of the fork, removed from the tractor, with parts broken away and in section and showing the gripper operating arms in release position;

Fig. 3 is a partial rear elevation, similar to Fig. 2, but showing the gripper operating arms in gripping position;

Fig. 4 is a plan view of the fork, with parts broken away and in section;

Fig. 5 is a sectional view taken along the line V—V of Fig. 4, drawn to a larger scale, and showing the grippers in release position;

Fig. 6 is a sectional view taken along the line VI—VI of Fig. 4, showing the grippers engaged with objects to be lifted; and

Fig. 7 is a fragmentary side elevation of a tine showing the mounting of a gripper shaft.

Referring to the drawings, I show in Fig. 1 a tractor vehicle, or lift truck 10, having the usual hoisting frame 11 at the front thereof with a hoisting chain 12, and hoisting brackets 13 secured thereto (only one of which is shown), all as is well understood in the art. Mounted at

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the front of the hoisting frame 11 is my improved lift fork which embodies a tine frame having a rigid base beam 14 at the rear thereof to which are rigidly joined a plurality of rigid tines 16 extending forwardly therefrom. Extending upwardly from the base beam 14 and rigidly secured thereto is a lift frame comprised of lateral upright members 17 and 18 joined together at the top by a cross frame member 19. Also rigidly secured to the base beam 14 and extending upwardly therefrom, inwardly of the members 17 and 18, are two lift frame members 21 and 22. Secured to the member 21 is a bracket 23 and secured to the member 22 is a similar bracket 24 each of which is provided with a plurality of spaced holes 26 to which the chain brackets 13 may be connected. Preferably, the lift frame members 21 and 22 are cylindrical in cross section and may be secured to the base beam 14 by any suitable means known to the art.

By referring to Figs. 4 to 6 inclusive, it will be seen that the tines comprise intermediate members 16^a which are T-shaped in cross section and lateral members 16^b in the shape of a right angle in cross section, the angles facing inwardly of the tine frame. Each of the tines 16^a and 16^b is provided with a plurality of transverse, spaced lugs 27 which form bearings for a gripper shaft 28 which extend therethrough, as shown in Figs. 4 to 7. Only one shaft 28 is mounted alongside each of the lateral tines 16^b, while two shafts 28, are mounted one on each side of the intermediate tines 16^a. Each of the shafts 28, as shown in Figs. 2 and 3, extends through the base beam 14 and has secured thereto a rocker arm 29 by which it may be rotated.

Mounted on each of the gripper shafts 28 is a gripper element 31 which, upon rotation of the shaft 28, is disposed to grip and hold an object 32 to be lifted, such as the lower course of a stack of bricks. While any suitable gripper elements 31 may be employed, I prefer to use one such as is described and claimed in my previously filed application aforesaid, Serial No. 211,165. These gripper elements embody an angle member 33 which is secured to the shaft 28 by means of cap screws 34. Loosely mounted in the depending flange 36 of the angle member 33 is a bolt 37 which carries on its inner end a gripping plate, or bar, 38 which is rigidly secured thereto. Surrounding the bolt 37 between the flange 36 and the bar 38 is a spring 39. When the gripping elements are released, they assume the positions shown in Fig. 5, whereas upon rotation of the shafts 28, as shown in Fig. 6, the plates 38 are pressed against the objects 32 to be lifted with a yieldable pressure, by reason of the compression of the springs 39.

In accordance with my invention, I have provided means for rotating the shafts 28, thereby to operate the grippers 31 with a positive adjustable pressure. Slidably mounted on the cylindrical upright members 21 and 22 are sleeves 41 and 42. Extending transversely of the lift frame, and rigidly joined to the sleeves 41 and 42 is a cross bar 43. Each of the shafts 28, through its rocker arm 29, is connected to the cross bar 43 by means of a link 44, the links 44 and rocker arms 29 being so disposed that when the cross bar is raised from the position shown in Fig. 2 to that shown in Fig. 3 of the drawing, the shafts 28 are rotated to bring the gripping elements 31 into gripping engagement with the objects 32, as shown in Fig. 6. Extending transversely of the frame and rigidly joined to the upper ends of the sleeve members 41 and 42 is a bar 46. Reinforcing gussets 47 and 48 may be secured to the cross bar 46 and the sleeve members 41 and 42 to add further rigidity and strength. Extending over the bar 46 and rigidly joined thereto is a yoke member 49.

Pivotaly mounted on the base beam 14, at 51, is a pressure operated cylinder 52. The cylinder 52 is provided

with a piston 53 having a piston rod 54 extending out of the upper end thereof. The piston rod 54 passes loosely through an opening 56 in the bar 46 and through an opening 57 in the yoke 49. The upper end of the piston rod 54 is threaded as shown at 58. Screwed onto the threaded end of the piston rod, below the yoke 49, are nuts 59 and screwed onto the rod above the yoke 49 are nuts 61. Upon upward movement of the piston 54, the nuts 59 engage the yoke 49 causing the yoke, the sleeves 41 and 42, and cross bar 43 to move upwardly, thus rotating the gripper shafts 28. Upon downward movement of the piston 53, the nuts 61 engage the yoke 49 and move the sleeves 41 and 42 and cross bar 43 downwardly to rotate the gripper shafts 28 to release position. It will be seen that by varying the relative positions of the nuts 59 and 61, the effective stroke of the piston 53 may be varied. Fluid under pressure, which preferably is hydraulic pressure, is admitted to the cylinder 52, alternately to the opposite ends thereof, through conduits 62 and 63 by valve means, not shown, but which are well understood in the art.

In the use of my improved lift fork, the objects to be lifted and transported, such as the bricks 32 illustrated in Fig. 6, are stacked with spaced rows edgewise, as shown, with the upper rows of the stacks placed flatwise on the edgewise bricks so as to provide spaces between the edgewise rows for receiving the tines 16^a and 16^b of the work. The fork is advanced under the stack with the tines 16^a between the intermediate rows and the tines 16^b along the outside edgewise rows. Pressure is then admitted to the lower end of the cylinder 52 to raise the piston 53 to the upper end of the cylinder. In the upward movement of the piston rod 54, the nuts 59 engage the yoke 49 raising it, with the cross bar 43 and links 44 to rotate the gripper shafts to the gripping positions shown in Fig. 6. The grippers thus engage and lift the edgewise rows of bricks, as the fork is raised by means of the hoisting chain 12 and lifting frame. The main portion of the load of the stack being, of course, lifted by means of the rigid tines, leaving the gripping elements to lift only the edgewise rows of spacing bricks.

It will thus be seen that with my improved lift fork, the gripping and raising of the edgewise rows of bricks 32 is not dependent upon relative movement of the tine frame and lifting frame, or upon the weight of the load being

raised. It will also be seen that by means of my invention, the intermediate edgewise rows of bricks are held by positive pressure which may be regulated by means of adjusting nuts 59 and 61 which determine the effective stroke of the piston 53.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claim.

What I claim is:

In a lift fork, a tine frame including a rigid base beam, a plurality of rigid tines rigidly connected to the base beam and extending forwardly therefrom, gripper shafts rotatably mounted on the sides of the tines and extending through the base beam, yieldable gripper elements mounted on the shafts and disposed upon rotation of the shafts to grip and hold objects to be lifted, rocker arms on the ends of the shafts adjacent the base beam, cylindrical lift frame members rigidly connected to the base beam and extending upwardly therefrom, sleeves slidably mounted on said lift frame members, a cross bar connecting the sleeves, links connecting the cross bar to the rocker arms, a yoke member rigidly connecting the sleeves above the cross bar, a pressure cylinder mounted on the base beam, a piston for the cylinder having a piston rod passing slidably through the yoke, and spaced nuts on the piston rod for engaging the yoke and for varying the effective stroke of the piston.

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