Jan. 20, 1959 D. S. HILEMAN 2,869,742

ATTACHMENTS FOR FORK LIFT TRUCKS

Filed Oct. 17, 1957 3 Sheets-Sheet 1

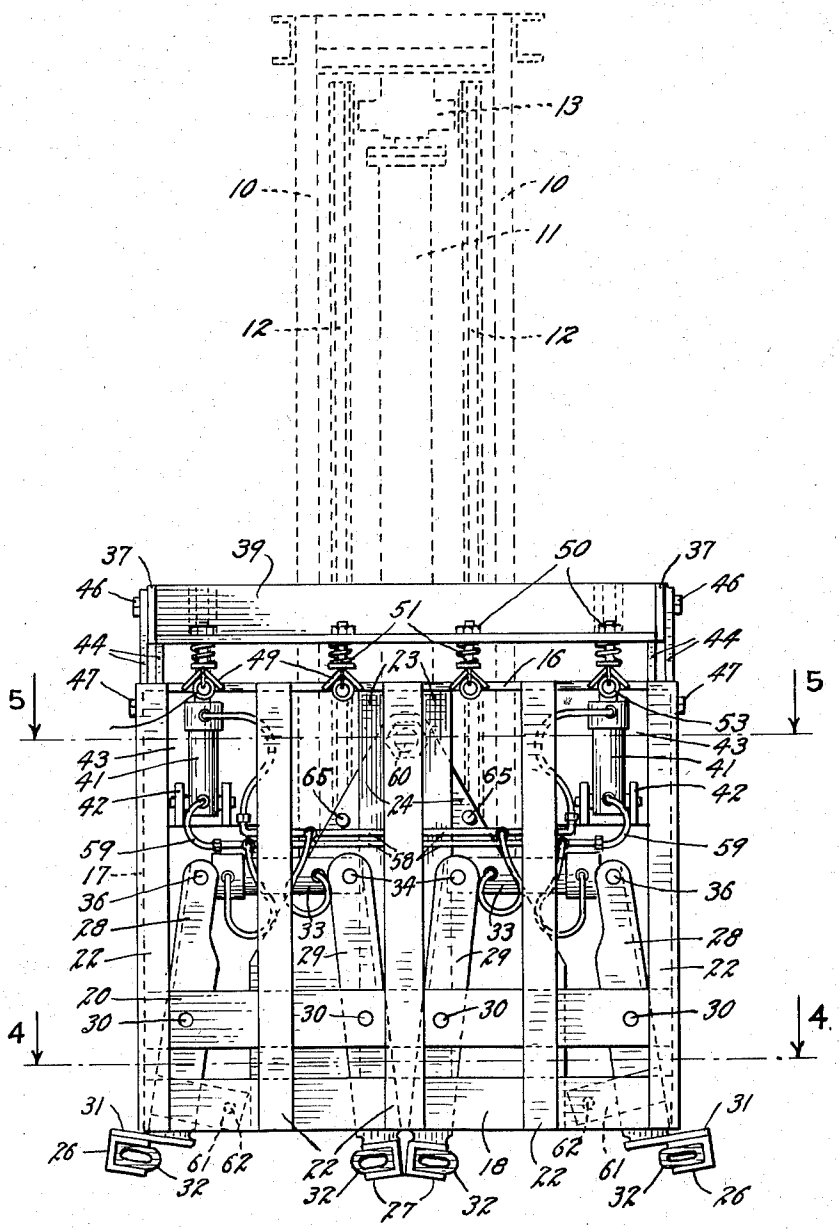


Fig. 1

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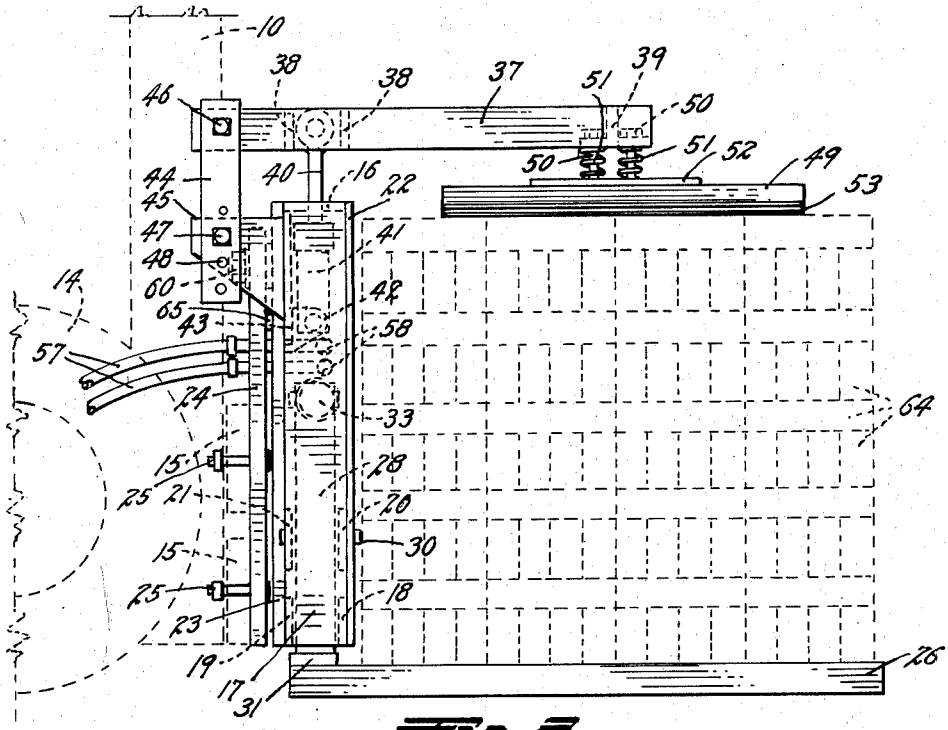


FIG 2

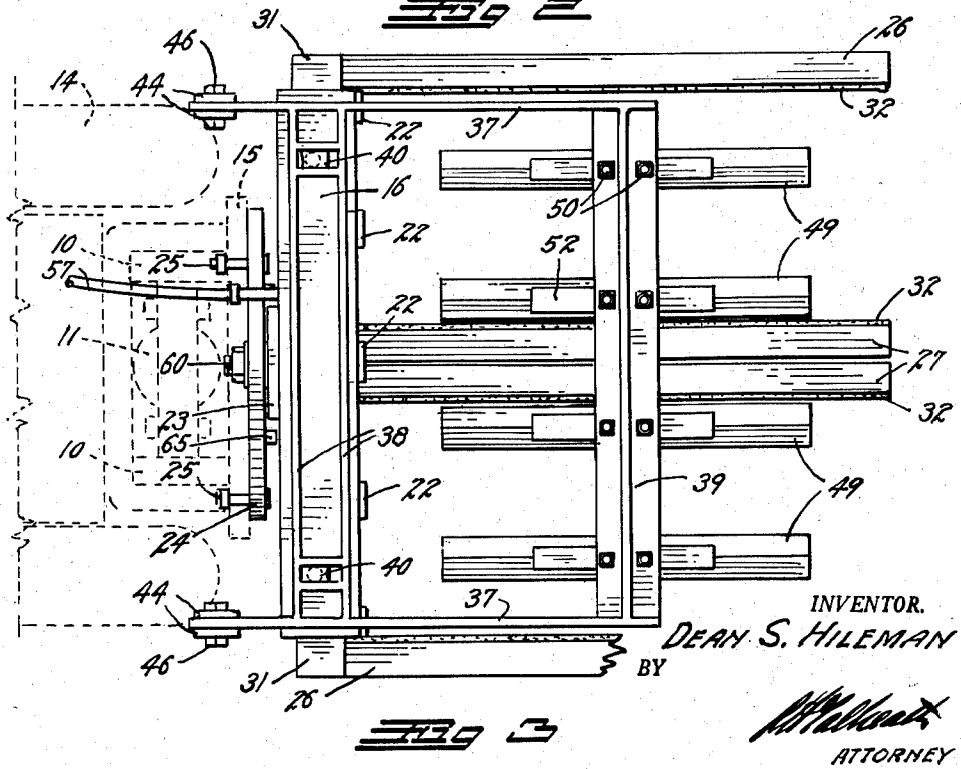


FIG 3

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Filed Oct. 17, 1957 3 Sheets-Sheet 3

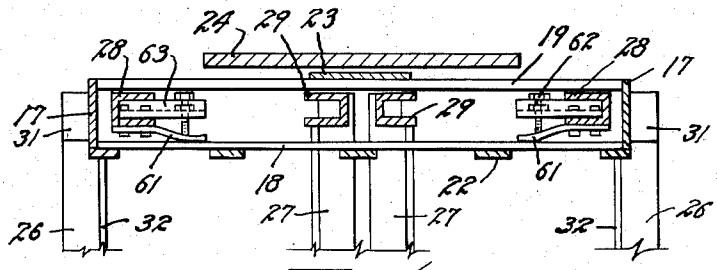


Fig 4

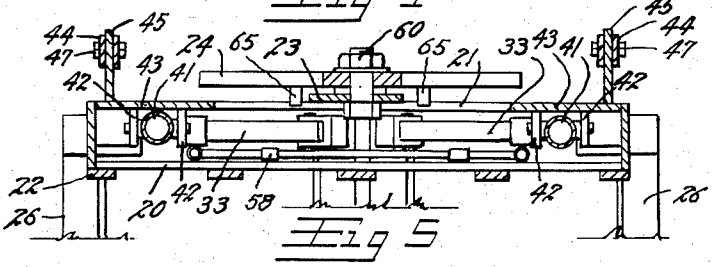


Fig 5

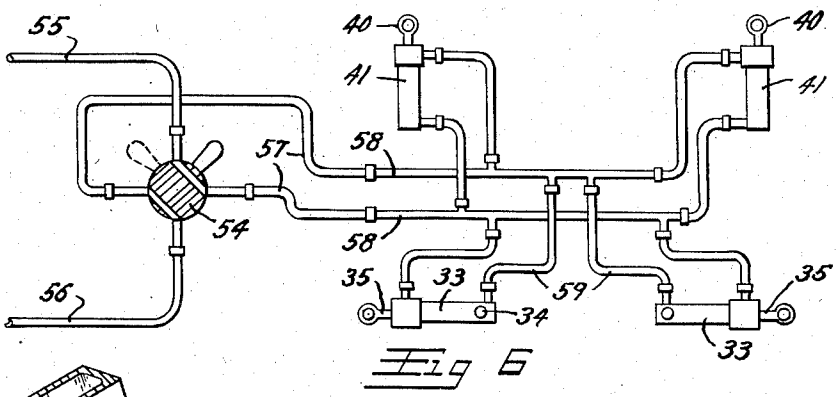


Fig 6

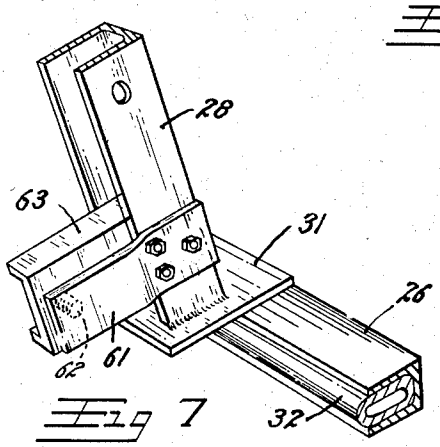


Fig 7

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United States Patent Office 2,869,742 Patented Jan. 20, 1959

2,869,742

ATTACHMENTS FOR FORK LIFT TRUCKS

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Application October 17, 1957, Serial No. 690,663

4 Claims. (Cl. 214—654)

This invention relates to an attachment for a fork-lift truck and more particularly to an attachment to adapt the truck for handling piles of bulk brick.

Bricks have been handled with fork-lift trucks but with the conventional truck it is necessary to provide a support for the bricks, such as a pallet, or otherwise provide space for the fork to enter below the pile. The use of pallets is time and space consuming, and impractical when changing and unloading brick kilns where the bricks are stacked upon the kiln floor.

The principal object of this invention is to provide an attachment for conventional fork-lift trucks which will make the use of pallets unnecessary and by means of which an operator can pick up a plurality of relatively high ricks and stacks of bricks directly from the ground floor and which will securely support the stacks while they are being transported and piled.

Another object is to provide hydraulically-actuated means in a fork-lift truck attachment which will act to grip the lower course of brick in a stack from opposite sides to place the bricks in the lower course under horizontal compression so that the course will act as a sustaining platform to support the superimposed stack thereon.

A further object is to provide a hydraulically-actuated top clamp which will place the rick of brick, supported by the laterally compressed lower course, under vertical compression so as to prevent sideward tilting of the rick while it is being transported and piled.

A still futher object is to provide a brick handling attachment which will be a complete self-contained unit which can be quickly and easily mounted upon any of the conventional type of fork-lift trucks and to so construct the attachment that it will be self-adjustable to any incline in the ground or floor from which the bricks are to be raised or upon which the bricks are to be deposited.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a front view of the improved brick handling attachment for fork-lift trucks;

Fig. 2 is a side view thereof with a rick of brick in place therein;

Fig. 3 is a top plan view thereof;

Fig. 4 is a horizontal section looking downwardly on the line 4—4, Fig. 1;

Fig. 5 is a similar section looking downwardly on the line 5—5, Fig. 1;

Fig. 6 is an enlarged fragmentary detail perspective view of a portion of the improved attachment; and

Fig. 7 is a hydraulic circuit diagram illustrating the hydraulic flow in the improved attachment.

The improved attachment is applicable for mounting upon any of the fork-lift trucks in general use. To illustrate the relation between the attachment and the truck, a fork-lift truck of the "Clark" type has been outlined in broken line in Figs. 1, 2, and 3. Conventional elements of the fork-lift truck are designated by numeral as follows: upright tracks 10, lift cylinder 11, lift chains 12, piston head 13, drive wheels 14, and bumper bars 15. For conventional uses L-shaped forks are hooked over the upper bumper bar 15 and extend downwardly and forwardly therefrom. For the use of this invention the conventional forks are removed.

The improved brick handling attachment is contained in and supported from a rectangular frame outlined by a horizontal top frame member 16 from which two side frame members 17 depend. The side frame members 17 are maintained in rigid vertical spaced relation by means of a front horizontal bottom bar 18 and a rear horizontal bottom bar 19 welded at their extremities in parallel relation to the side frame members. A front bearing bar 20 is positioned above the front bottom bar 18 and a rear bearing bar 21 is positioned above the rear bottom bar 19. The bearing bars 20 and 21 are welded at their extremities, in parallel, spaced-apart relation to the side frame members 17.

A plurality of spaced bumper bars 22 extend vertically between the top frame member 16 and the front bottom bar 18 over the latter and in front of the front bearing bar 20. A relatively wide vertical supporting bar 23 is positioned madially of the rear of the rectangular frame and overlies, and is welded to, the top frame member 16, the rear bearing bar 21 and the rear bottom bar 19.

The attachment is supported from the conventional truck bumper bars 15 by means of a mounting plate 24 which is designed to be mounted on the front of the bumper bars 15 in any desired manner such as by means of suitable attachment bolts 25. If a more permanent attachment is desired, the mounting plate 24 may be welded directly to the bumper bars 15. The mounting plate 24 extends upwardly from the bumper bars and supports a pivot bolt 60 which extends through the supporting bar 23 and pivotally supports the entire attachment forwardly of the fork-lift truck so that it may be raised or lowered by actuation of the conventional lift cylinder 11 of the truck.

The attachment, as illustrated, is designed to lift one or more ricks or stacks of bricks by gripping the lowermost horizontal course of brick of each stack between a pair of gripping bars. For two stack use, two pairs of gripping bars are provided consisting of two outside gripping bars 26 and two inside gripping bars 27. Each outside gripping bar 26 is mounted on the lower extremity of an outside grip lever 28 and each inside gripping bar 27 is mounted on the lower extremity of an inside gripping lever 29.

The gripping levers 28 and 29 are mounted in pairs upon pivot shafts 30 extending through and between the front and rear bearing bars 20 and 21. The gripping levers 28 and 29 are preferably channel-shaped in cross-section with the channels of the levers of each pair facing each other. The lower extremity of each inner lever is welded or otherwise secured to the rear extremity of one of the inner gripping bars 27 and the lower extremity of each outer lever 28 is similarly secured to a sidewardly extending attachment plate 31 to which the rear extremity of one of the outside gripping bars 26 is secured.

The gripping bars extend forwardly in parallel relation and they also are preferably channel-shaped in cross-section to provide elongated recesses for elongated, resilient gripping pads 32, there being one gripping pad

fitted into the channel of each gripping bar so that the pads of each pair of bars will face each other. The gripping pads may be formed of rubber or rubber impregnated fabric. For convenience, they may be lengths of fabric-enforced rubber hose flattened and forced into the bar channels.

A horizontal hydraulic cylinder 33 is pivotally mounted, as shown at 34, between the sides of each inside gripping lever 29 at the upper extremity of the latter. Each cylinder 33 is provided with a conventional hydraulically-actuated plunger 35 and the plunger of each cylinder is connected to a plunger pin 36 at the upper extremity of one of the outside gripping levers 28.

It can be seen that if hydraulic fluid under pressure be admitted to the cylinders 33 each cylinder and plunger combination will be caused to expand to simultaneously urge the upper extremities of the levers apart to cause the gripping bars 26 and 27 to approach each other.

A press frame for holding the stacks of bricks in place is mounted over the handling attachment. The press frame employs to side arms 37 having two cross braces 38 secured thereto and acting to maintain them in parallel, spaced relation. A T-shaped beam 39 extends between the forward extremities of the side arms 37.

The side arms are supported upon plungers 40 extending upwardly from vertical hydraulic cylinders 41. The cylinders 41 are tiltably mounted in supporting brackets 42 projecting forwardly from corner plates 43 welded in the two upper corners, and at the back, of the rectangular frame. The rear extremities of the arms 37 are connected by means of connecting links 44, to bracket plates 45 welded to, and extending rearwardly from, each of the corner plates 43.

The links 44 are pivotally secured to the arms 37 and to the bracket plates 45 by means of upper and lower attachment bolts 46 and 47, respectively. A plurality of bolt openings 48 are provided in the links to provide means for presetting the height of the forward extremities of the arms 37.

A plurality of parallel press members 49 are suspended from the beam 39 in spaced relation by means of suspension bolts 50 which extend upwardly through the beam 39. Compression springs 51 surround the bolts 50 and act to continually urge the press members downwardly from the beam 39.

The press members may have any desired construction. As illustrated, they are formed from lengths of angle iron positioned with their apex edges directed upwardly and having bolt retaining strips 52 welded thereto from which the bolts 50 extend. The channels of the angle irons are directed downwardly and a cushion strip 53, which may consist of a length of rubber hose is secured in the channel of each strip in any desired manner.

The improved brick handling attachment is controlled from a conventional four-way valve 54 located at any convenient point on the truck. The four-way valve is connected to the pump pressure line of the truck by means of a pressure pipe 55 and to the fluid sump of the truck by means of a return pipe 56. Flexible supply hoses 57 connect the valve 54 with hydraulic fluid manifolds 58 mounted on the handling attachment. Hydraulic hoses 59 lead from the manifolds 58 to the respective hydraulic cylinders 33 and 41.

The hydraulic connections are such, as shown in Fig. 7, that when the valve 54 is turned in one direction hydraulic fluid will be admitted to the inner extremities of the two hydraulic cylinders 33 to urge the plungers outwardly and to the upper extremities of the vertical cylinders to urge the press members 49 downwardly.

In use the truck with the attachment in place is driven forwardly against a stack of brick, the gripping bars 26 and 27 forcing their way through or at the sides of the bottom course of the stack. The valve 54 is then actuated to cause the bricks of the bottom course to be gripped lightly between the pairs of gripping bars so that the intermediate bricks in the bottom course will frictionally lock against vertical movement.

As the gripping bars close against the bottom brick courses, the press members 49 will simultaneously move downward against the upper courses of brick in the stacks to prevent tipping of the piled brick. The stacked bricks are then simultaneously lifted by the truck hydraulic mechanism, conveyed and deposited where desired. It will be noted that the bricks are picked up directly from the floor and that the supported bricks can be deposited directly upon the floor or upon previously piled stacks without the use of pallets.

Due to the free swinging action of the entire attachment about the pivot bolt 60, the plane of the gripping bars can tilt if the bars are lowered against an inclined surface or floor so the gripping bars are automatically positioned in the plane of the bottom brick course regardless of incline of the supporting surface.

The closing action of the gripping jaws must be relatively powerful in order to support the lower brick course. This places a severe torque upon the outside grip levers 28 and tends to swing the forward extremities of the outside gripping jaws outwardly so as to prevent uniform contact with the rows of bricks in the bottom courses. To offset this, a bracket arm 63 is fixed between the sides of each grip lever 28 adjacent its lower extremity and a relatively heavy leaf spring 61 is also affixed to the lower extremity overlying the projecting bracket arm 63. An adjusting screw 62 is threaded through each bracket arm into contact with the projecting leaf spring 61. The springs are designed to slide on and along the rear face of the front bottom bar 18 to absorb the torque applied to the grip levers 28 by the gripping bars 26. Adjustment of the screws 62 serves to apply torque to the levers 28 to bring and hold the outside gripping bars in accurate parallelism. The degree of side swing about the pivot bolt 60 is limited to a predetermined arc by means of stop studs 65 in the plate 24.

While a specific form of the improvement has been described and illustrated herein, it is to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. A brick handling attachment for fork-lift trucks of the type having an elevatable member comprising: a mounting plate; means for securing said mounting plate to said elevatable member; a substantially rectangular hollow frame; means pivotally mounting said frame upon said mounting plate; a front bearing bar extending horizontally across said frame; a rear bearing bar extending across said frame in parallel relation to said front bearing bar; four pivot shafts mounted in and extending between said bearing bars in horizontal alignment and in spaced-apart relation; an outside grip lever pivotally mounted on each of the two outer shafts; an inside grip lever mounted on each of the inner shafts; two horizontally-positioned hydraulically-expansible devices, there being one hydraulically-expansible device extending between the upper extremity of each outside grip lever to the upper extremity of the adjacent inside grip lever; four parallel gripping jaws, there being an inside gripping jaw mounted on and extending forwardly from the lower extremity of each inside grip lever, and an outside gripping jaw extending forwardly from the lower extremity of each outside grip lever, so that expansion of said expansible devices will cause said inside gripping jaws to move outwardly while said outside gripping jaws move inwardly to simultaneously grip two adjacent stacks of brick.

2. A brick handling attachment as described in claim 1 having means for preventing said outside gripping jaws from being forced from their parallel position.

3. A brick handling attachment as described in claim

2 in which the means for preventing the outside gripping jaws from being forced from their parallel position comprises a front bottom bar extending across said frame below said front bearing bar and a brace means extending inwardly from adjacent the lower extremity of each outer grip lever into frictional contact with said front bottom bar.

4. A brick handling attachment as described in claim 3 having means for adjusting the amount of frictional contact of said bearing members against said bottom bar.

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