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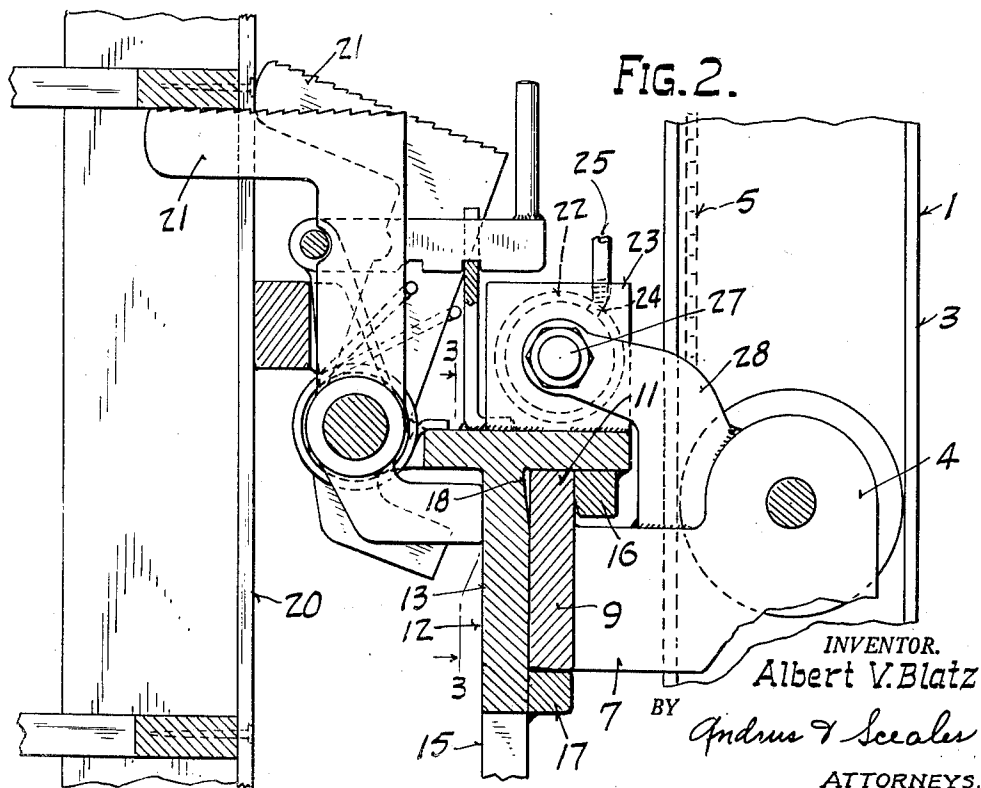
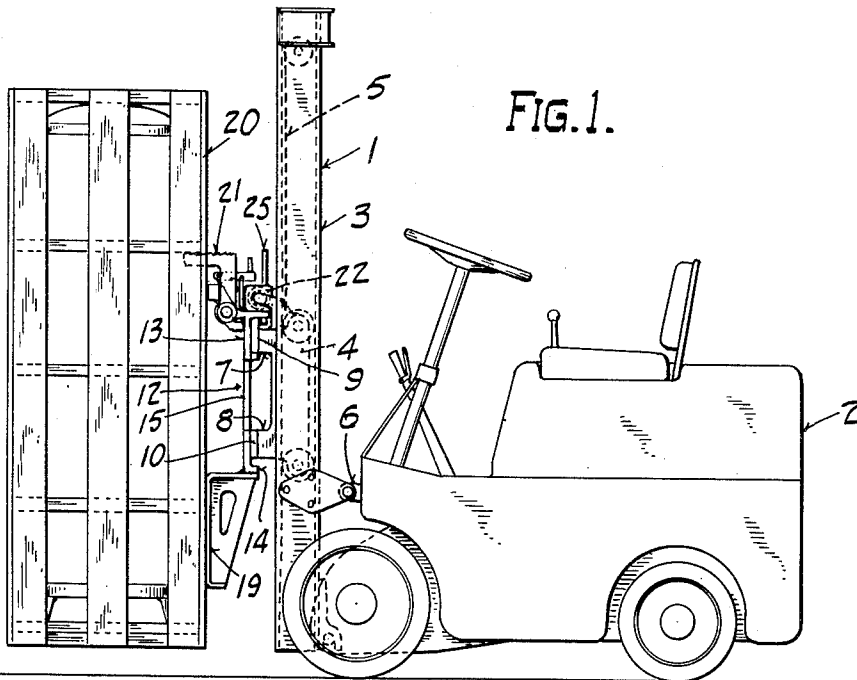
A. V. BLATZ

2,650,733

SIDE SHIFT FOR CRATE LIFTING ATTACHMENT

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2 Sheets-Sheet 1



INVENTOR.
Albert V. Blatz
BY
Andrus & Seales
ATTORNEYS.

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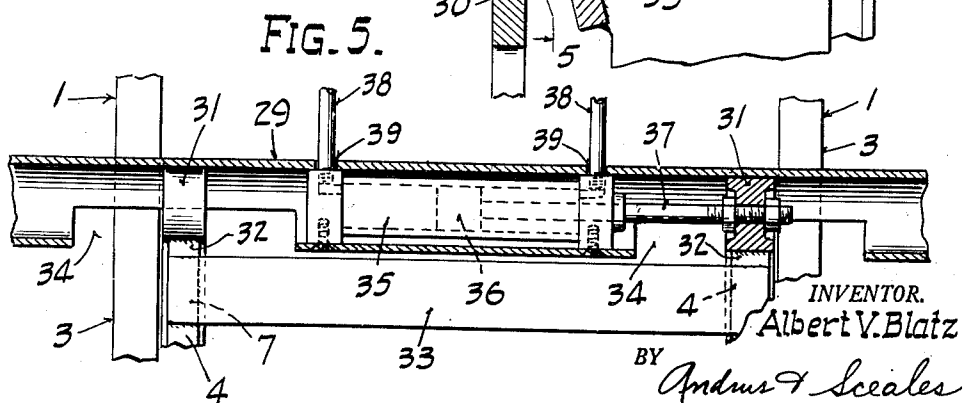
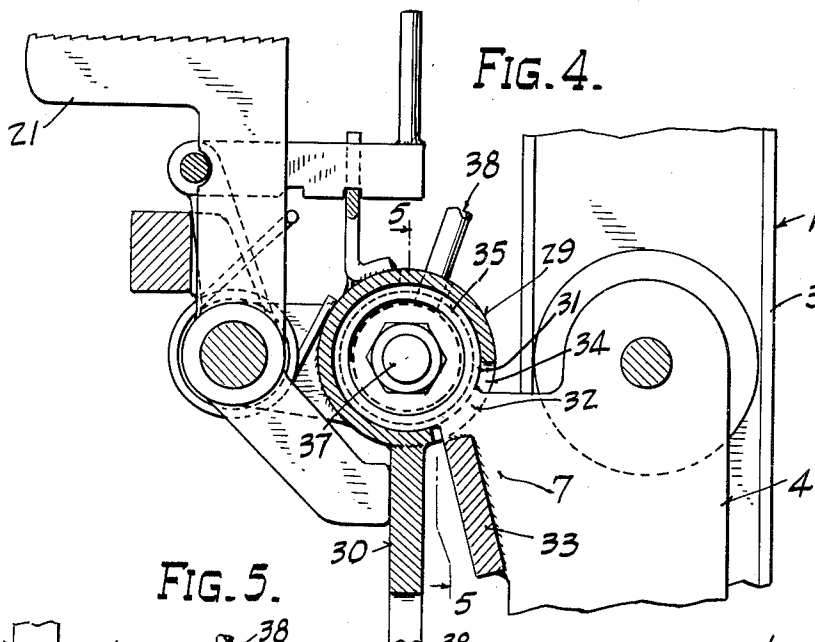
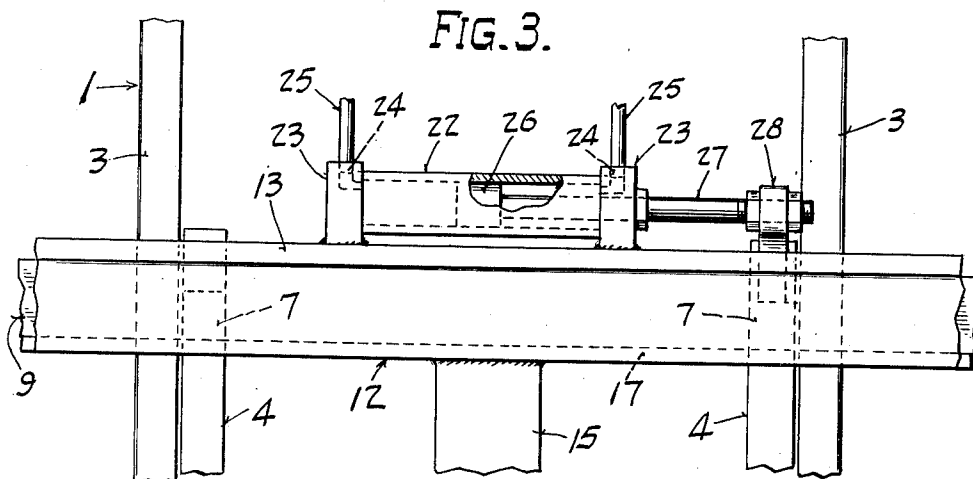
A. V. BLATZ

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SIDE SHIFT FOR CRATE LIFTING ATTACHMENT

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2 Sheets-Sheet 2



INVENTOR.

Albert V. Blatz

BY

Andrew J. Seales

ATTORNEYS.

UNITED STATES PATENT OFFICE

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SIDE SHIFT FOR CRATE LIFTING
ATTACHMENTAlbert V. Blatz, Thiensville, Wis., assignor to A. O.
Smith Corporation, Milwaukee, Wis., a corpo-
ration of New York

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7 Claims. (Cl. 214—730)

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This invention relates to lift truck side shift mechanisms, and particularly to a hydraulic side shift for use with crate and carton lifting attachments.

An object of the invention is to provide a side shift mechanism constructed to eliminate binding between the load carrying frame and the rail on which the frame is slidably supported.

Another object of the invention is to provide a load carrying attachment which is constructed to pivot forwardly in the event the lower portion of the attachment is backed into an obstruction, thereby preventing damage to the attachment mounting means and side shift mechanism.

Another object is to provide a hydraulic side shift cylinder mounted within a movable load carrying sleeve to insure that no binding will occur when the sleeve is actuated by the cylinder and piston associated therewith.

Another object of the invention is to provide a side shift cylinder for a crate lifting attachment having a horizontal row of retractable fingers and a load abutting apron carried below the fingers, said cylinder serving to shift the crate lifting fingers for maximum crate carrying efficiency.

The lift truck attachment, in general, comprises a frame slidably mounted in interlocking relation with the horizontal rail of a lift truck elevator assembly, a plurality of forwardly projecting spring biased retractable fingers mounted on the frame for insertion into the interspaces of a crate or the like to lift the same, and a hydraulic cylinder mounted immediately adjacent the rail to shift the frame therealong. In another embodiment of the invention the side shift cylinder is mounted within a sleeve and the fingers are mounted on the sleeve, so that all binding is eliminated when the sleeve and fingers are shifted by operation of the cylinder.

Other objects and advantages will be set forth more fully in the following description of embodiments of the invention illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a side elevation showing the attachment as mounted on the elevator of an industrial lift truck;

Fig. 2 is a detail sectional view of the side shift cylinder and fingers of Fig. 1;

Fig. 3 is a cross-sectional view taken along line 3—3 of Fig. 2;

Fig. 4 is a view, corresponding to Fig. 2, of the cylinder and fingers of a second embodiment of the invention; and

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Fig. 5 is a section taken along line 5—5 of Fig. 4.

Referring to the drawings and particularly to Fig. 1, the attachment is shown as mounted on an elevator mast 1 which is pivotally connected at its lower end to the frame of an industrial lift truck 2. The mast 1 is preferably formed with a pair of opposed channel members 3 adapted to serve as rails for a corresponding pair of roller shoes 4 mounted therein. The shoes 4 are attached to the lift truck elevator chains 5 for vertical movement therewith as the chains are actuated by the hydraulic or other suitable elevator means conventionally provided on industrial trucks.

In order to provide for forward or backward tilting of the mast to facilitate load carrying and unloading, a tilting link 6 is connected between the mast 1 and a suitable hydraulic cylinder, not shown. The operation of this mechanism is such that the mast 1 may be tilted approximately five degrees forwardly from the vertical and fifteen degrees rearwardly therefrom.

The shoes 4 are formed with upper and lower connecting portions 7 and 8, respectively, which project forwardly to support a horizontal rail 9 formed integral with the upper portions 7 and a bearing plate 10 formed integral with lower portions 8. The rail 9 is provided with a raised edge 11 which serves to slidably support the generally rectangular frame 12 of the attachment next to be described.

Frame 12 comprises an upper horizontal T section bar 13 and a lower L section bar 14, the said bars being joined by a plurality of spaced vertical bars 15. In order to interlock the T bar 13 with the rail 9, a flange 16 is welded to the horizontal portion of T bar 13 for engagement with the raised rail edge 11, and a second flange 17 is welded to the vertical stem of the T bar for engagement with the lower edge of the rail.

Referring to Fig. 2, the T bar 13 is grooved or hollowed out at 18 to allow the frame 12 to pivot in a clockwise direction, counterclockwise pivot being prevented by the bearing plate 10 which is abutted by the inner vertical face of L bar 14. The provision for clockwise pivot is made in order to prevent possible injury to the attachment in the event the L bar 14, or the depending apron member 19 welded thereto, is accidentally caught on an obstruction as the truck 1 is backed away from a load.

In order to support the crate 20, or other object to be handled, a horizontal row of forwardly projecting spring biased retractable fingers 21

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are pivotally mounted at the forward edge of the T bar 13. The structure and operation of these fingers, as well as of the depending apron 19, are fully described in my copending application Serial No. 131,163 for a Crate Lifting Attachment, filed December 5, 1949, and assigned to the assignee of the present invention.

In operating the crate lifting attachment described in the application referred to it is frequently desirable to deposit the crate immediately adjacent a wall, for example a freight car wall, to conserve shipping space and decrease shipping and storage costs. It is also desirable to have means for shifting the fingers 21 laterally of the truck in order to properly register them with the interspaces of the crate to be handled. Accordingly, a hydraulic side shift cylinder 22 is disposed on the T bar 13 to shift the frame 12 along rail 9 for approximately four inches in either direction.

As shown in Figs. 2 and 3, the cylinder 22 is provided with a pair of opposed rectangular heads 23 which are welded to the upper T bar surface and have ports 24 for flexible hoses 25 leading to suitable control valves and a source of fluid, not shown. A piston 26 is mounted within the cylinder and connected to a piston rod 27 which extends through one of the heads 23 for connection with a bracket 28 welded to one of the shoes 4. The piston 26 and rod 27 are thus held stationary by bracket 28, so that the introduction of fluid into one of the ports 24 will operate to shift the cylinder 22, frame 12, fingers 21, and apron 19 along the rail 9 and bearing plate 10.

The location of the cylinder 22 is such that its operation will produce very little torque about a horizontal axis normal to the rail 9. Accordingly, the binding tendency between the rail and the frame sliding therealong will be very slight and the side shift action will be generally smooth and free of sticking. In order to further reduce this binding torque, a second embodiment of the invention is illustrated in Figs. 4 and 5 wherein the side shift cylinder is shown as mounted along the axis of the rail associated therewith.

According to the invention as shown in Figs. 4 and 5, the fingers 21 and related apparatus are mounted on the forward surface of tubular sleeve 29 having a depending horizontal bar 30 welded to the lower portion thereof and connected to the L section bar 14 and apron 19 described in connection with the first embodiment of the invention. The sleeve 29 is slidably supported on a pair of internal bearings 31 each of which is welded to an upturned portion 32 of the elevator shoe portions 7 previously described. Portions 32 are preferably braced by a horizontal bar 33 welded therebetween.

To permit sliding of the sleeve 29 along the bearings 31, so that the bearings serve the function of the rail of the first embodiment, a slot 34 is provided in the sleeve 29 for each upturned shoe portion 32. The slots 34 are preferably at least ten inches in length to permit the sleeve to shift four inches in either direction and to allow for the thickness of the upturned portions 32. In addition, slots 34 are made relatively wide to provide for clockwise pivot of the attachment when the apron 19 is accidentally backed against an obstruction.

To actuate the sleeve 29 relative to the bearings 31, a hydraulic cylinder 35 is secured axially of the sleeve at approximately the center thereof

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and is provided with a stationary piston 36 connected through a piston rod 37 with one of the bearings 31. Fluid is introduced at each end of the cylinder through a pair of flexible hoses 38 which extend upwardly through suitable openings 39 in the sleeve 28 and to a source of fluid pressure. Due to the fact that the cylinder is secured to the sleeve and moves with it, the openings 39 are not made in the form of slots, the movements of the cylinder being permitted by the flexibility of the hoses 38.

In operation, the introduction of fluid into one end of the cylinder 35 causes the cylinder, sleeve 29, fingers 21, etc., to shift relative to the stationary piston 36 and bearings 31 in a direction corresponding to the end of the cylinder into which the fluid is pumped. The action is reversed by merely releasing the fluid from the one end of the cylinder and pumping fluid into the opposite end thereof.

The apparatus described in connection with both embodiments of the invention constitutes extremely simple and practical means of attaining the desired side shifting movement. The elimination of binding, as well as the provision of means of preventing damage to the attachment in the event of backing into an obstruction, are highly important in the smooth operation of the side shift and in the prevention of injury thereto.

Various embodiments of the invention may be employed within the scope of the accompanying claims.

I claim:

1. The combination with an industrial lift truck having a mast, elevator means mounted in said mast, and rail means carried by said elevator means for vertical movement therewith, of a support mounted on said rail means and movable horizontally therealong laterally of said truck, a row of forwardly projecting finger members mounted on said support for insertion into the interspaces of a crate to lift the same upon elevation of said rail means and support by said elevator means, spring means biasing said fingers forwardly with the finger members engaging the slats of the crate automatically moving rearwardly against the tension of said spring means and the remaining finger members being free to pass the slats into the interstices of the crate, and a hydraulic cylinder and piston operably connected with said support to shift said support and fingers laterally of said truck, said cylinder and piston being disposed longitudinally of said rail means and closely adjacent thereto to minimize binding torque between said support and rail means.

2. The combination with an industrial lift truck having a mast, elevator means mounted in said mast, and rail means carried by said elevator means for vertical movement therewith, of a support mounted on said rail means and movable horizontally therealong laterally of said truck, a row of forwardly projecting spring biased retractable fingers mounted on said support above said rail means for insertion into the interspaces of a crate to lift the same upon elevation of said rail means and support by said elevator means, an apron carried by said support below said rail means for engagement with said crate, a hydraulic cylinder secured to the top of said support and extending longitudinally of said rail means, and a piston for said cylinder and secured at one end to said rail means and held against lateral movement thereby to shift

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the support from one side to the other side of said mast, said cylinder and piston being disposed closely adjacent said rail means to minimize binding torque between said support and rail means when fluid is introduced into said cylinder to shift said support and fingers laterally of said truck.

3. In an attachment of the character described adapted to be employed with a lift truck having a mast, a shoe assembly mounted in said mast for vertical movement by the elevator mechanism of said truck, and a horizontal rail carried by said shoe assembly, a frame mounted on said rail and movable therealong laterally of said truck, a plurality of finger members mounted on the upper portion of said frame and extending vertically upwardly and with said fingers projecting forwardly from the uppermost vertical portion thereof for insertion into the interspaces of a crate, and a hydraulic cylinder mounted on said frame, and a piston coupled between the cylinder and said frame and said shoe assembly to effect movement of said frame and finger members laterally of said truck.

4. In an attachment of the character described adapted to be employed with a lift truck having a mast, an elevator mechanism mounted in said mast, and a shoe assembly vertically movable by said elevator mechanism and adapted to support both a horizontal rail and a bearing plate disposed below said rail, a frame interlocked with said rail and bearing against the forward face of said plate for sliding movement along said rail and plate laterally of said truck, a row of forwardly projecting spring biased retractable fingers mounted on said frame above said rail for insertion into the interspaces of a crate to lift the crate upon elevation of the attachment, a hydraulic cylinder secured on said frame closely adjacent said rail, a piston for said cylinder connected to said shoe assembly and held stationary thereby, and an apron carried by said frame below said rail for engagement with said crate, said frame being provided with grooved portions to permit the frame to pivot away from said bearing plate to prevent damage to said attachment in the event the apron is caught on an obstruction during backing of said truck.

5. The combination with an industrial lift truck having a mast and elevator means mounted in said mast, of a horizontal sleeve carried by said elevator means and movable horizontally laterally of said truck, load carrying means mounted on said sleeve to engage and support a load, and a hydraulic cylinder and piston disposed axially within said sleeve and connected thereto to laterally shift the sleeve and load carrying means with a minimum of binding torque.

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6. The combination with an industrial lift truck having a mast and a shoe assembly mounted in the mast for vertical movement by the elevator mechanism of said truck, of a plurality of bearings carried by said shoe assembly, a horizontal sleeve mounted on said bearings for movement laterally of the truck, a horizontal row of spring biased retractable fingers pivotally mounted on said sleeve and projecting forwardly therefrom for insertion into the interspaces of a crate, and a hydraulic cylinder and piston disposed within said sleeve and axially thereof, said cylinder and piston being coupled between said sleeve and one of said bearings to move said sleeve laterally of the truck with a minimum of binding torque.

7. In an attachment of the character described adapted to be employed with a lift truck having a mast, an elevator mechanism mounted in said mast, and a shoe assembly vertically movable by said elevator mechanism and adapted to support a plurality of internal bearings and a bearing plate disposed below said bearings, a horizontal sleeve exteriorly mounted on said bearings and slotted for restricted pivotal movement and for sliding movement along said bearings laterally of said truck, a row of forwardly projecting retractable fingers mounted on said sleeve for insertion into the interspaces of a crate to lift the crate upon elevation of the attachment, a hydraulic cylinder secured axially within said sleeve, a piston for said cylinder connected to one of said bearings and held against lateral movement thereby, and apron means depending from said sleeve and prevented by said bearing plate from pivoting away from said crate, said apron means being permitted by the slots in said sleeve to pivot away from said bearing plate to prevent damage to said attachment in the event the apron is caught on an obstruction during backing of said truck.

ALBERT V. BLATZ.

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