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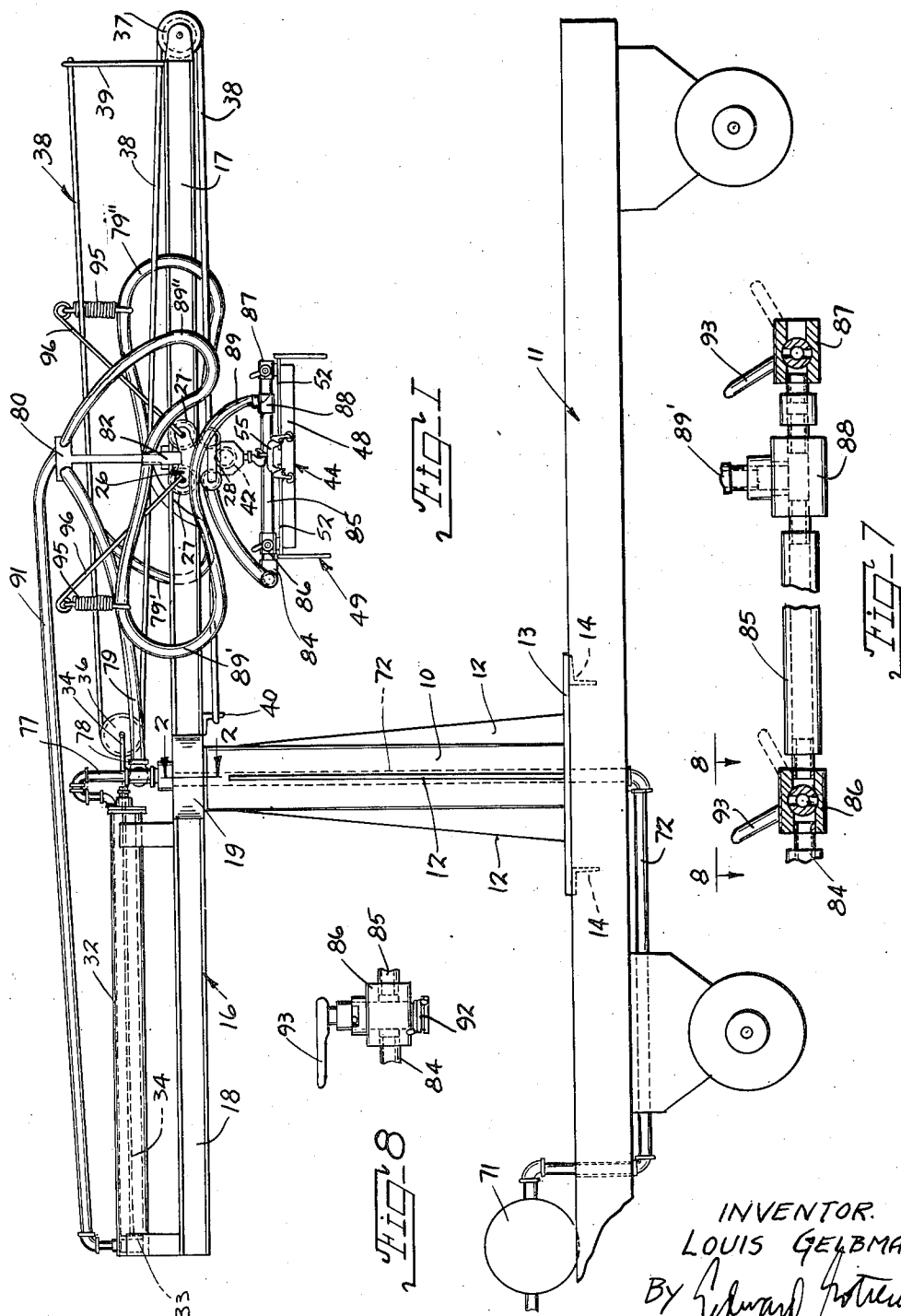
L. GELBMAN

2,478,094

TRUCK HOIST

Filed Jan. 9, 1946

3 Sheets-Sheet 1



INVENTOR.
LOUIS GELBMAN
BY *Edward G. Gentry*
ATTORNEY.

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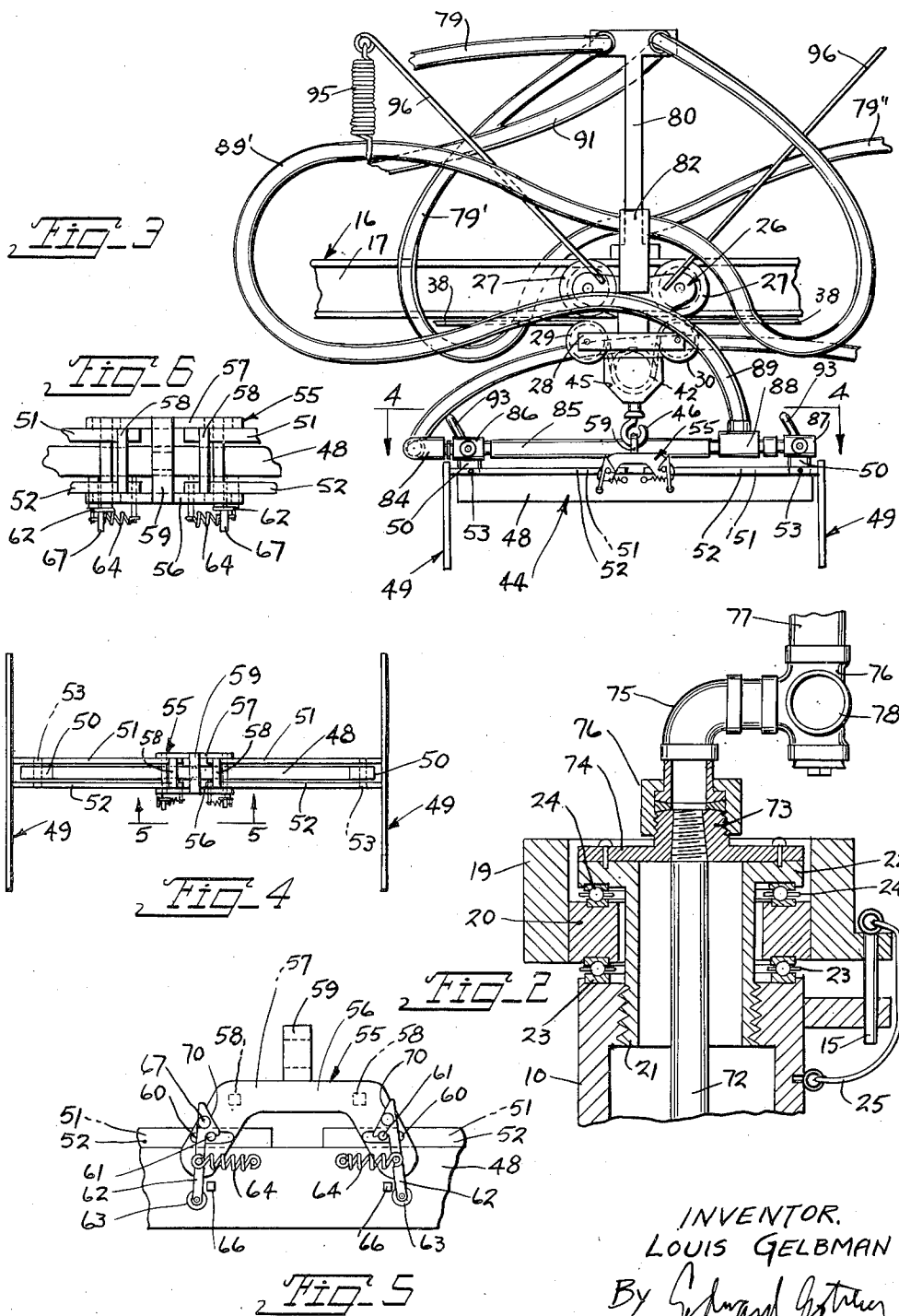
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LOUIS GELBMAN
By *Edward G. Gentry*
ATTORNEY.

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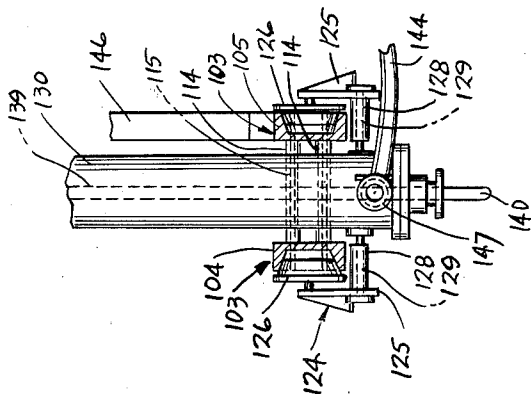


FIG. 10

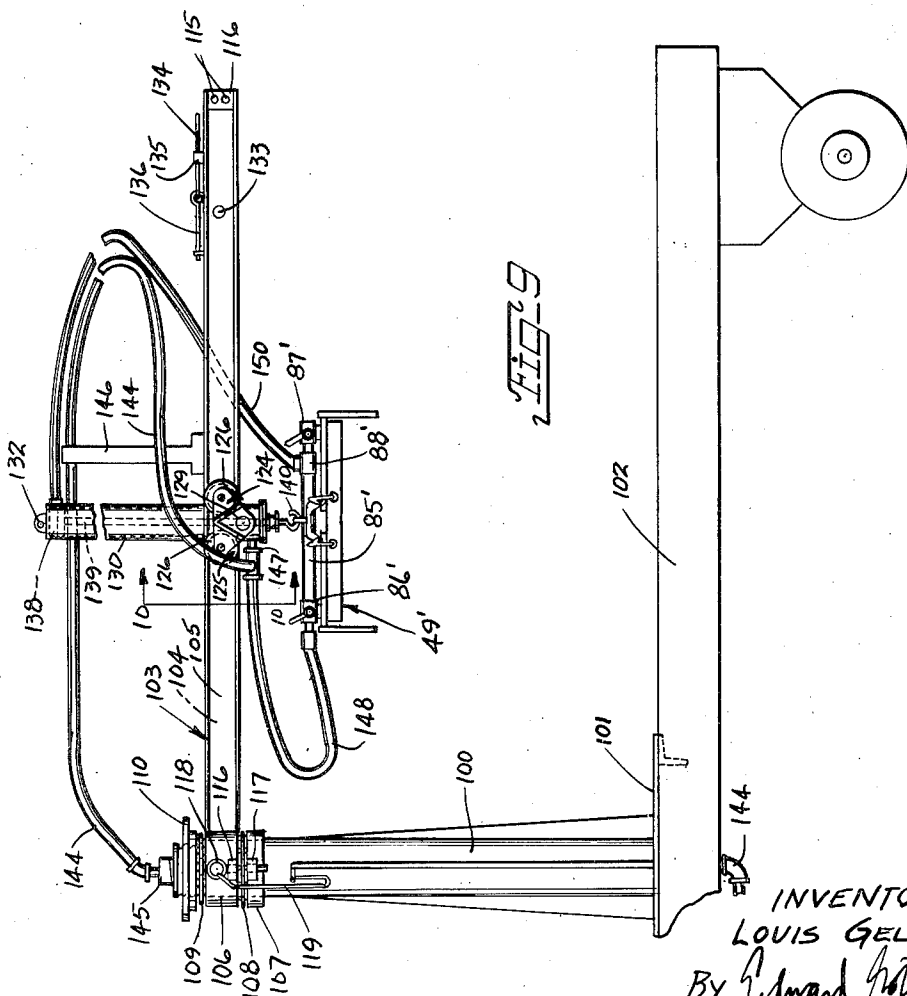


FIG. 9

INVENTOR.
LOUIS GELBMAN
BY *Edward J. Hickey*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,478,094

TRUCK HOIST

Louis Gelbman, Yonkers, N. Y.

Application January 9, 1946, Serial No. 639,957

6 Claims. (Cl. 212—31)

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This invention relates to new and useful improvements in truck hoists.

The invention is particularly intended to cover a truck hoist for loading concrete blocks on and off a truck, though the hoist obviously will have many other uses. Concrete blocks are usually loaded upon trucks by the supplier with a hoist which is foreign to the truck. When the truck reaches a job no hoist usually is available to unload it. It is then a difficult and tedious job to manually unload the truck. More important, the truck is delayed and thus indirectly adds to the cost. With the new hoist it may be possible to unload the truck in half the time or less, and this factor sometimes will make it possible for the supplier to get along with a lesser number of trucks.

The invention is broadly characterized by a horizontal beam turnably mounted on a vertical post adapted to be mounted on a truck. It is proposed that a carriage be slidably mounted along along the beam, and that a lifting fork for blocks and other articles depends from the carriage. It is proposed that an air hoist means be associated with the lifting fork in such a manner that the beam is free to swing around 360°, and the carriage is free to move along the entire length of the beam. It is further proposed that this air hoist means be adapted for raising and lowering the lifting fork. With this arrangement the truck may be efficiently loaded and unloaded.

The broad concepts of the invention may be embodied in any number of forms of truck hoists. Two embodiments have been disclosed in this specification. In one embodiment the air cylinder of the air hoist means is mounted on the beam. In the other embodiment it is mounted upon the carriage.

More specifically, it is proposed to characterize one form of the new and improved truck hoist by the fact that it includes a vertical post adapted to be mounted centrally on the truck. A horizontal beam is turnably mounted on the post. A carriage is slidably mounted on the beam. It is proposed to support a lifting fork from said carriage and to operate the lifting fork in a particularly simple manner so that the truck may be efficiently loaded. The lifting fork may be moved along the length of the beam, and the beam may be turned to various positions, and in this way the entire truck may be easily and conveniently loaded. An advantage of the construction resides in the fact that the truck hoist re-

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mains permanently on the truck and is available for unloading as well as loading the truck.

The other form of this invention is characterized by an air hoist cylinder pivotally mounted upon a carriage which in turn is slidably mounted upon a horizontal beam which is turnably mounted upon a vertical post adapted to be mounted on a truck. It is proposed that the air hoist cylinder be capable of pivoting from a vertical to a substantially horizontal position. It is proposed to provide an air hoist cylinder with a piston rod which extends from one end of the cylinder. It is proposed that a lifting fork depends from the extended end of the piston rod. With this arrangement it is possible to place the air hoist piston in a vertical position for directly raising and lowering the lifting fork. When the truck travels it is proposed that the air hoist cylinder be pivoted downwards, to its horizontal position so that it does not project upwards an unreasonable distance from the truck. In this form of the invention it is also proposed to use air control valves mounted on the lifting fork and connected with and controlling the compressed air supply line for controlling the raising and lowering of the lifting fork.

The invention also proposes that the new and improved truck hoists be of exceptionally simple and efficient construction so that they may be manufactured at a low cost and applied upon trucks at but a slight increase over the cost of the truck.

The invention, more specifically, contemplates to mount an air hoist means directly or indirectly upon the beam previously mentioned and to control this means with simple mechanism by which the lifting fork may be raised and lowered to any desirable position. It is proposed to so arrange the lifting means so that at all times the lifting fork is free to be moved along the length of the beam. The truck may be provided with a small air compressor for supplying the necessary air for operating the truck hoist.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a fragmentary side elevational view of a truck hoist constructed in accordance with this invention.

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Fig. 2 is a fragmentary enlarged vertical sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary enlarged detailed view of a portion of Fig. 1.

Fig. 4 is a fragmentary plan view of certain parts illustrated in Fig. 3, this view being taken as though looking in the direction of the line 4—4 of Fig. 3, with certain parts removed.

Fig. 5 is a fragmentary enlarged elevational view looking in the direction of the line 5—5 of Fig. 4.

Fig. 6 is an enlarged detailed view of the central portion of Fig. 4.

Fig. 7 is a fragmentary enlarged detailed view of a portion of Fig. 3 but illustrated with the valves in section so that their construction and operation may be better understood.

Fig. 8 is a fragmentary plan view looking in the direction of the line 8—8 of Fig. 7.

Fig. 9 is a fragmentary side elevational view of a truck provided with a truck hoist constructed in accordance with another form of this invention.

Fig. 10 is a fragmentary enlarged vertical sectional view taken on the line 10—10 of Fig. 9.

The truck hoist, in accordance with this invention, as shown in Figs. 1 to 8, includes a vertical post 10 adapted to be mounted upon a truck 11. The vertical post 10 is hollow. It is reinforced with several ribs 12. It is provided with a bottom flange 13 by which it is mounted on angle members 14, which in turn are mounted upon the flooring of the truck 11. A horizontal beam 16 is turnably mounted upon the top of the post 10. The beam 16 consists of a front beam section 17 and a back beam section 18 which are disposed in a line with each other and which are attached at their inner ends upon an annular member 19. This annular member 19 is provided with an internal flange 20. A bushing 21 is threadably engaged on the top of the post 10. The bushing 21 has a top flange 22. The internal flange 20 is disposed between the flange 22 and the top of the post 10. A ball bearing 23 is located between the top of the post 10 and the bottom of the internal flange 20. A ball bearing 24 is located between the top of the internal flange 20 and the bottom of the flange 22. These bearings 23 and 24 serve to indirectly turnably support the beam 16 on the post 10.

A bolt 15 is removably mounted between the annular member 19 and the post 10 for holding the beam from turning when the truck 11 is travelling. A cable or chain 25 prevents the bolt 15 from becoming lost. A carriage 26 is slidably mounted on the front section 17 of the beam 16. This carriage 26 includes rollers 27 which slidably engage the flanges of the beam 16. The carriage 26 has a bottom section 28 upon which a pair of spaced rollers 29 and 30 are rotatively mounted. An air hoist cylinder 32 is fixedly mounted upon the rear section 18 of the beam 16. This air cylinder 32 is provided with a piston 33 which is connected with a piston rod 34 extending from one end of the air cylinder 32. A roller 35 is mounted on the extended end of the piston rod 34. A roller 37 is mounted upon the outer end of the section 17 of the beam 16.

A cable 38 has one of its ends fixedly connected with the outer end of the section 17 of the beam 16. This end of the cable is attached upon a rod 39 which is mounted on the beam 16. The cable 38 extends over and along the beam 16 and then around the pulley 36 and continues and extends over the pulley 37 and then con-

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tinues and extends under the beam 16 and over the rollers 30 and 29 from which it continues and terminates by being attached at its end upon an angle member 40 fixedly mounted upon the bottom of the beam 16 at a point immediately adjacent the post 10. A roller 42 is mounted upon and supported by the cable 38 at a point between the said pair of rollers 29 and 30. A lifting fork 44 depends from said roller 42. The construction is such that when the piston rod 34 moves outwards of the air cylinder 32 the cable 38 will be slackened and the lifting fork 44 will be lowered because of its weight.

The roller 42 is mounted within a roller housing 45 which is provided with a bottom hook 46 from which the lifting fork 44 depends. The lifting fork 44 includes a bar 48 upon the ends of which a pair of gripping plates or jaws 49 are pivotally mounted. More specifically, the ends of the bar 48 are provided with upwardly directed lugs 50. The gripping jaws 49 have inwardly directed arms 51 and 52 which straddle the lugs 50. Pintles 53 pass through these arms and the lugs 50 by which the jaws 49 are pivotally supported.

A yoke 55 extends over the inner ends of the arms 51 and 52. This yoke 55 consists of side plates 56 and 57 which are rigidly connected together by transverse connecting rods 58 and by a transverse eye member 59. The hook 46 passes through the eye member 59. The side plates 56 and 57 are provided with horizontal slots 60 through which pins 61 project. These pins 61 are fixedly mounted upon the inner ends of the arms 51 and 52. A latch is associated with each pin 61 for indirectly holding the gripping jaws 49 in their open positions. Each latch consists of a hook 62 which is pivotally mounted at its bottom end upon a boss 63 supported on the bar 48. A spring 64 acts between each hook 62 and the bar 48 for normally urging the hooks 62 on to the pins 61. Each hook 62 is pivotally limited by a lug 66 which projects from the bar 48.

Each hook 62 is provided with a handle 67 by which it may be manually moved. As illustrated on the drawing, the gripping jaws 49 are latched in their open position. In this condition, the lifting fork may be lowered over a group of building blocks, or other objects, to be lifted. The hooks 62 are then manually disengaged from the pins 61. Now, when the lifting fork 44 is moved upwards, the yoke 55 will lift the pins 61 and cause the arms 51 and 52 to pivot so as to indirectly cause the gripping jaws 49 to move towards each other and grip the building blocks or other objects to be lifted. The top ends of the hooks 62 are formed with beveled edge portions 70 against which the pins 61 will strike when the load of the lifting fork 44 is released and the yoke 55 moves downwards. The pins 61 will cam apart the hooks 62 and then will pass beneath the hooks 62 so as to become latched in the positions illustrated in Fig. 5 which relatches the lifting fork 44 in its open position.

The truck 11 is provided with a compressed air tank 71 which may receive a supply of compressed air from a compressor, or other device not illustrated on the drawings. A pipe line 72 is connected with the tank 71 and extends through the vertical post 10. This pipe line 72 connects with a tubular projection 73 upon a disc 74 which is fixedly mounted across the flange 22. An elbow 75 connects with a pipe connection 76 from which a pipe line 77 extends and connects with the front end of the air hoist cylinder 32. The pipe connection 76 has a

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branch 78 which connects with a flexible hose 79. This flexible hose 79 extends along and above the beam 16 to support bracket 80 which is fixedly mounted on the beam 16. From the support bracket 80 the flexible hose 79 extends in a loose loop 79' to a bracket 82 which is mounted upon the carriage 26. The flexible hose 79 then continues from the bracket 82 into another loose loop 79'' which continues to a pipe connection 84.

The pipe connection 84 connects with one end of a pipe line 85 which is mounted on the bar 48 of the lifting fork 44. The pipe line 85 contains the two valves 86 and 87. Between the valves 86 and 87 the pipe line 85 is provided with a T-connection 88. A flexible hose 89 connects with the T-connection 88 and extends into a loose loop 89' which is supported on a bracket 82 which is mounted on the carriage 26. The loose loop 89' then continues into another loose loop 89'', which is supported in the stationary bracket 80 which is mounted on the beam 16. The flexible hose 89 now connects with a pipe line 91 which connects with the back end of the air cylinder 32.

The valves 86 and 87 are of identical construction. Each is provided with a spring 92 which normally urges the valve closed. Each of said valves has a handle 93 by which it may be manually opened. When the valves are opened the compressed air may flow through them. The loops 79' and 89' are resiliently supported by springs 95 which are supported by brackets 96 mounted on and projecting from the carriage 26.

The operation of the device may be understood from the following:

The compressed air from the tank 71 is permanently connected with the front end of the air cylinder 32 and acts to force the piston 33 to the back end of the cylinder. The parts are illustrated in this condition in Fig. 1. It should be noted that the lifting fork 44 is in its raised position. The lifting fork is free to be manually moved along the length of the section 17 of the beam 16. When this is done the carriage 26 merely moves along the beam 16. The bottom section of the cable 38 merely passes over the pulleys 29, 30 and 42 during movements of the carriage 26. The hose loops 79' and 89'' vary in shape as the carriage 26 is moved to its different positions.

The lifting fork 44 is lowered by opening the valve 86. Compressed air may now flow through the pipe line 72 to the elbow 75, the pipe connection 76, the pipe connection 78, the hose 79, through the loop 79', and through the loop 79'' to the pipe connection 84. When the valve 86 is opened, the compressed air flows through the pipe line 85 to the T-connection 88, and then through the flexible pipe line 89, passing through the loop 89', the loop 89'', and the pipe line 91. The piston 33 will now be driven towards the front end of the cylinder 32 because the area of the back face of the piston 33 is larger than the area of its front face. The piston rod 34 reduces the area of the front face of the piston 33. The piston rod 34 now extends, so that the roller 36 moves towards the roller 37. This slackens the cable 38 which lowers the lifting fork 44. As long as the valve 86 is held open the lifting fork will descend. It should be noted that this is true in all positions of the carriage 26 along the length of the section 17 of the beam 16. When the valve 86 is allowed to close, the lifting fork 44 maintains a stationary position.

The lifting fork 44 may be caused to move upwards, merely by opening the valve 87. The compressed air from the back end of the cylinder

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32 may now escape. It passes through the pipe line 91 and then through the flexible hose 89, passing through loop 89'', the loop 89', the T-connection, and out through the valve 87. When the valve 87 is closed the piston 33 will stop moving. If the valve 87 is held open long enough the piston 33 will reach its initial position, the one illustrated upon the drawing.

When the fork 44 is lowered over concrete blocks or other objects which are to be picked up, the hooks 62 are moved off the pins 61. Now when the fork 44 is moved upwards, the yoke 55 will move upwards and pivot the arms 51 and 52, and indirectly pivot the jaws 49 which grip and hold the blocks. In this way the blocks may be raised and lowered and the truck may be loaded or unloaded. It is possible to pile the blocks upon the truck 11, in positions all around the post 10. The beam 16 is free to swing 360°.

In Figs. 9 and 10 another form of the invention has been disclosed. In this form a vertical hollow post 100 is provided with a bottom flange 101 by which it is mounted upon a truck 102. A horizontal compound beam 103 is turnably mounted upon the post 100. The compound beam 103 is formed from a pair of spaced beam sections 104 and 105. The inner ends of the beam sections 104 and 105 are connected with a ring 106 which is mounted coaxially around the post 100. A support ring 107 is fixedly mounted on the post 100 and supports a ball bearing 108 which engages against the bottom of the ring 106. The top of the ring 106 is engaged by a ball bearing 109 which is supported by a bushing 110 adjustably mounted on the top of the post 100. Preferably the bushing 110 is threadedly engaged on the post 100 so that it may be adjusted upwards and downwards. The outer ends of the beam sections 104 and 105 are connected together by several tubular members 114 which are mounted between said beam sections and through which holding bolts 115 pass. Blocks 116 are mounted upon the ends of the beam sections 104 and 106 through which bolts 115 also pass. With this construction the beam 103 is free to be turned 360° on the post 100.

The ring 106 is provided with a perforated lug 116' superimposed upon a perforated lug 117 formed on the ring 107, when the beam 103 is extended rearwards on the truck 102. A bolt 118 removably engages through perforations of the lugs 116' and 117 and serves to normally lock the beam 103 from swinging. The bolt 118 is connected with a chain or cable 119 which has an end attached to the post 100. It is proposed that the bolt 118 be used to hold the beam 103 from swinging when the truck is travelling. When the truck is being loaded and unloaded the bolt 118 is removed so that the beam 103 is free to swing on the post 100.

A carriage 124 is slidably mounted on the beam 103. This carriage 124 consists of a pair of brackets 125 positioned to the front and the back of the beam 103. Rollers 126 are mounted upon brackets 125 and engage the flanges of the beam sections 104 and 105. The brackets 125 are provided with bearings 128 through which trunnion elements 129 are mounted. The trunnion 129 projects from a member 130. This member 130, in the particular design illustrated on the drawing comprises an air hoist cylinder. It should be noted that the air hoist cylinder 130, because of the trunnion 129 is free to pivot between the beam sections 104 and 105. It is illustrated in a vertical position, in Figs. 9 and 10. It should be

recognized that the air hoist cylinder 130 is free to be pivoted downwards into a substantially horizontal position. The top of the air hoist cylinder 130 is provided with a perforated lug 132. The beam section 104 and 105 have aligned apertures 133. A bolt 134 is normally held in a clip 135 on one of the beam sections of the beam 103. The bolt 134 is connected with a chain or cable 136 which has one end attached to the beam 103. It is possible to swing the air hoist cylinder 130 downwards into a substantially horizontal position and then to pass the bolt 134 through the apertures 133 and the perforated lug 132 by which the air hoist cylinder 130 is then latched from further motion. It is proposed that the truck be driven with the air hoist cylinder in this latter position.

A piston 138 is slidably mounted within the air hoist cylinder 130. A piston rod 139 connects with the piston 138 and extends from the bottom end of the air hoist cylinder 130. The extended end of the piston rod 139 is provided with a hook 140. A lifting fork 49' is mounted upon the hook 140. This lifting fork 49' is identical in construction to the lifting fork 49, described in the prior form of the invention.

A compressed air supply line 144 extends through the post 110 and connects with a swivel joint 145 which is mounted across the top of the post 100. The compressed air supply line 144 then continues from the swivel joint 145 and extends above and along the beam 103 to a point where it is supported by a bracket 146 which is mounted on the beam 103. The compressed air supply line 144 then continues into a loop portion, the end of which is connected with a T pipe fitting 147. This pipe fitting 147 is connected with the bottom of the air hoist cylinder 130. The pipe fitting 147 is connected with the pipe line 143 which extends into a loop portion and connects with a valve 86'. The valve 86' is mounted upon the lifting fork 49'. The valve 86' connects with a pipe section 85' which connects with a T 88' which in turn connects with another valve 87' mounted on the lifting fork 49'. The T 88' connects with the pipe line 150 which extends around into a loop portion and then connects with the top end of the air hoist cylinder 130. The valves 86' and 87' are identical in construction to the valves 86 and 87 described in the prior form of the invention.

The operation of this form of the invention may be understood from the following:

Normally the valves 86' and 87' seek a closed position. When these valves are closed the lifting fork 49' retains whatever position it is in. When it is desired to lower the lifting fork 49', the valve 86' is manually opened. The compressed air from the air supply line 144 is connected with the bottom of the air hoist cylinder 130 by the T 147. Now the compressed air is also connected by the pipe 143, the open valve 86', the pipe 85', the T 88', and the pipe line 150 with the top of the air hoist cylinder 130. Since the cross sectional area of the top of the piston 138 is larger than the bottom of said piston because of the area consumed by the piston rod 139, the piston 138 will be forced downwards and the piston rod 139 will be extended from the bottom of the air hoist cylinder 130. In this way the lifting fork 49' moves downwards. It will continue to move downwards as long as the valve 86' is held open. When the valve 86' is closed the lifting fork 49' will maintain any position in which it is at this instant.

When it is desired to raise the lifting fork 49', the valve 87' is manually opened. Now the compressed air which is entrapped in the top of the air hoist cylinder 130 may escape through the pipe 150, the T 88' and the valve 87'. It should be noted that the compressed air supply line 144 is connected by the T 147 with the bottom of the air hoist cylinder 130, and therefore the piston 138 now moves upwards.

It is proposed that the lifting fork 49' be operated in the usual way to grip blocks for loading or unloading the truck 102. The beam 103 may be swung around and the carriage 124 may be moved to any position along the beam 103, during the loading and unloading operations. It should be noted that because the air hoist cylinder 130 is connected with the carriage 124 it will correspondingly move to all positions to which the carriage 124 is moved.

When the truck is driven it is necessary that the bolt 118 be engaged through the perforations in the lugs 116 and 117 to hold the beam 103 from swinging. Furthermore it is necessary that the air hoist cylinder 130 be pivoted downwards and then the bolt 134 may be engaged through the apertures 133 and the perforation in the lug 132 for holding the air hoist cylinder 130 in a downward position. The lifting fork 49' may be removed from the hook 140 and rested on the truck 102 during travelling to the truck.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. A truck hoist, comprising a vertical post adapted to be mounted upon a truck, a horizontal beam turnably mounted upon said post, a carriage slidably mounted upon said beam, a lifting fork depending from said carriage, and air hoist means for raising and lowering said lifting fork connected with said beam for turning along with said beam and having operator valves mounted upon said lifting fork, said air hoist means including an air hoist cylinder pivotally mounted on said carriage.

2. A truck hoist, comprising a vertical post adapted to be mounted upon a truck, a horizontal beam turnably mounted upon said post, a carriage slidably mounted upon said beam, an air hoist cylinder pivotally mounted upon said carriage for assuming a vertical and a substantially horizontal position, a piston in said cylinder, a piston rod connected with said piston and extending from one end of said cylinder, a lifting fork depending from the extended end of said piston rod, a compressed air supply line connected with said cylinder and having sections attached to said lifting fork, and air control valves mounted on said lifting fork and connected with said air supply line for controlling said air piston for raising and lowering said lifting fork.

3. A truck hoist, comprising a vertical post adapted to be mounted upon a truck, a horizontal beam turnably mounted upon said post, a carriage slidably mounted upon said beam, an air hoist cylinder pivotally mounted upon said carriage for assuming a vertical and a substantially horizontal position, a piston in said cylinder, a

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piston rod connected with said piston and extending from one end of said cylinder, a lifting fork depending from the extended end of said piston rod, a compressed air supply line connected with said cylinder and having sections attached to said lifting fork, air control valves mounted on said lifting fork and connected with said air supply line for controlling said air piston for raising and lowering said lifting fork, and means for connecting said air hoist cylinder in a horizontal position with said horizontal beam for holding said air hoist cylinder in a substantially horizontal position.

4. A truck hoist, comprising a vertical post adapted to be mounted upon a truck, a horizontal beam turnably mounted upon said post, a carriage slidably mounted upon said beam, an air hoist cylinder pivotally mounted upon said carriage for assuming a vertical and a substantially horizontal position, a piston in said cylinder, a piston rod connected with said piston and extending from one end of said cylinder, a lifting fork depending from the extended end of said piston rod, a compressed air supply line connected with said cylinder and having sections attached to said lifting fork, air control valves mounted on said lifting fork and connected with said air supply line for controlling said air piston for raising and lowering said lifting fork, and releasable means for connecting said beam and said post for holding said beam from turning on said post.

5. A truck hoist, comprising a vertical post adapted to be mounted upon a truck, a horizontal beam turnably mounted upon said post, a carriage slidably mounted upon said beam, an air hoist cylinder pivotally mounted upon said carriage for assuming a vertical and a substantially horizontal position, a piston in said cylinder, a piston rod connected with said piston and extending from one end of said cylinder, a lifting fork depending from the extended end of said piston rod, a compressed air supply line connected with said cylinder and having sections attached to said lifting fork, and air control valves mounted on said lifting fork and connected with said air supply line for controlling said air piston for raising and lowering said lifting fork, said compressed air supply line including a pipe line coaxially passing through said vertical post,

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and a swivel joint on the top of said pipe line, whereby said beam is free to turn.

6. A truck hoist, comprising a vertical post adapted to be mounted upon a truck, a horizontal beam turnably mounted upon said post, a carriage slidably mounted upon said beam, an air hoist cylinder pivotally mounted upon said carriage for assuming a vertical and a substantially horizontal position, a piston in said cylinder, a piston rod connected with said piston and extending from one end of said cylinder, a lifting fork depending from the extended end of said piston rod, a compressed air supply line connected with said cylinder and having sections attached to said lifting fork, and air control valves mounted on said lifting fork and connected with said air supply line for controlling said air piston for raising and lowering said lifting fork, said compressed air supply line including a pipe line coaxially passing through said vertical post, and a swivel joint on the top of said pipe line, whereby said beam is free to turn, said swivel joint being connected with a pipe line extending over and along said beam, a bracket mounted on said beam for supporting said second named pipe line, said last named pipe line continuing into the loose loop and connecting with the bottom of said air hoist cylinder, another pipe line connecting from the bottom of said air hoist cylinder, a pipe line mounted upon said lifting fork and provided with two valves, said last named pipe line connecting with one of said valves, and a pipe line connected between said valves and connecting with the top of said air hoist cylinder.

LOUIS GELBMAN.

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