H. B. ROSS.

PORTABLE ELEVATOR.

APPLICATION FILED DEC. 4, 1916.

1,271,947.

Patented July 9, 1918.

3 SHEETS—SHEET 1.

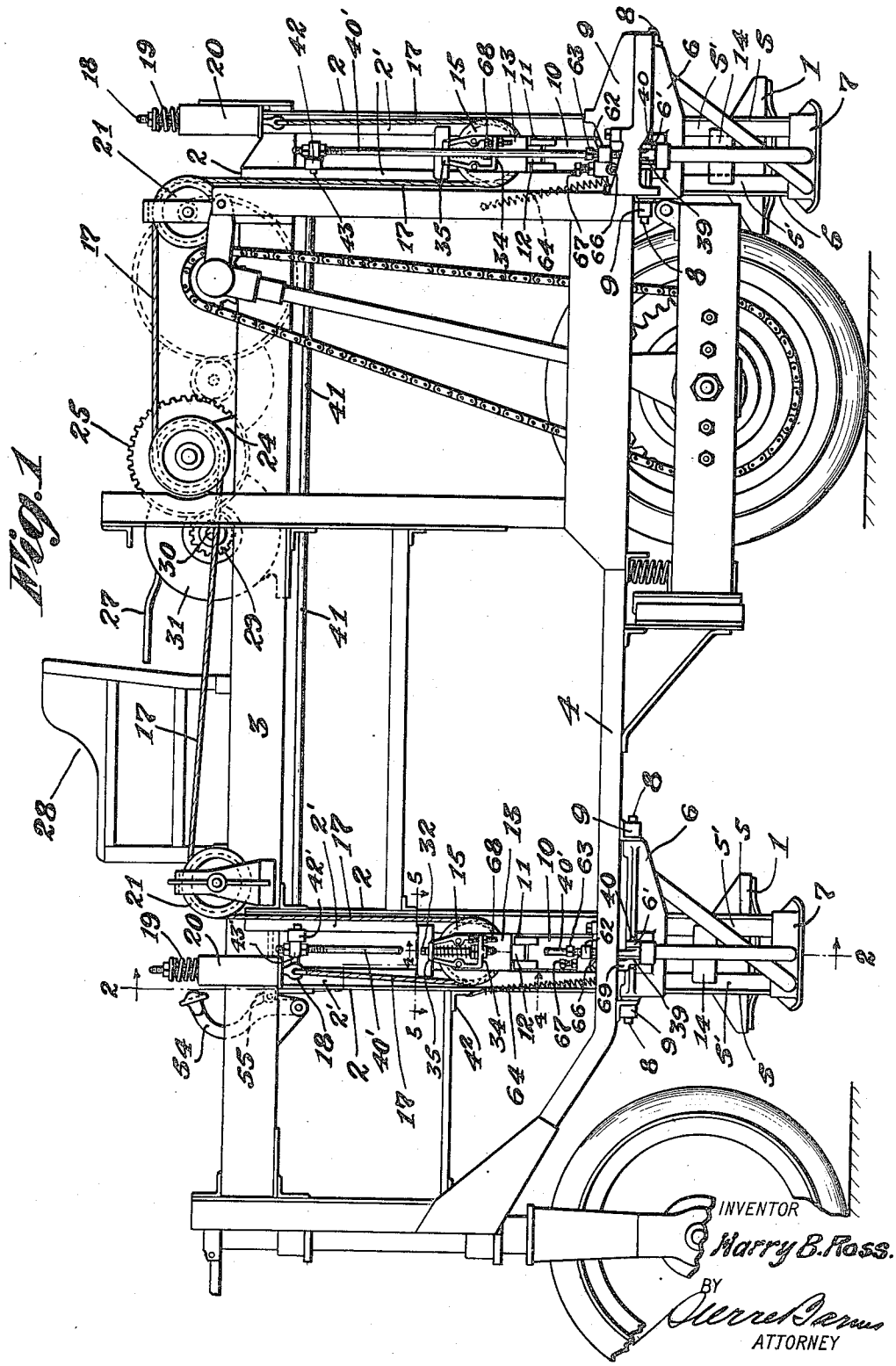


Fig. 1.

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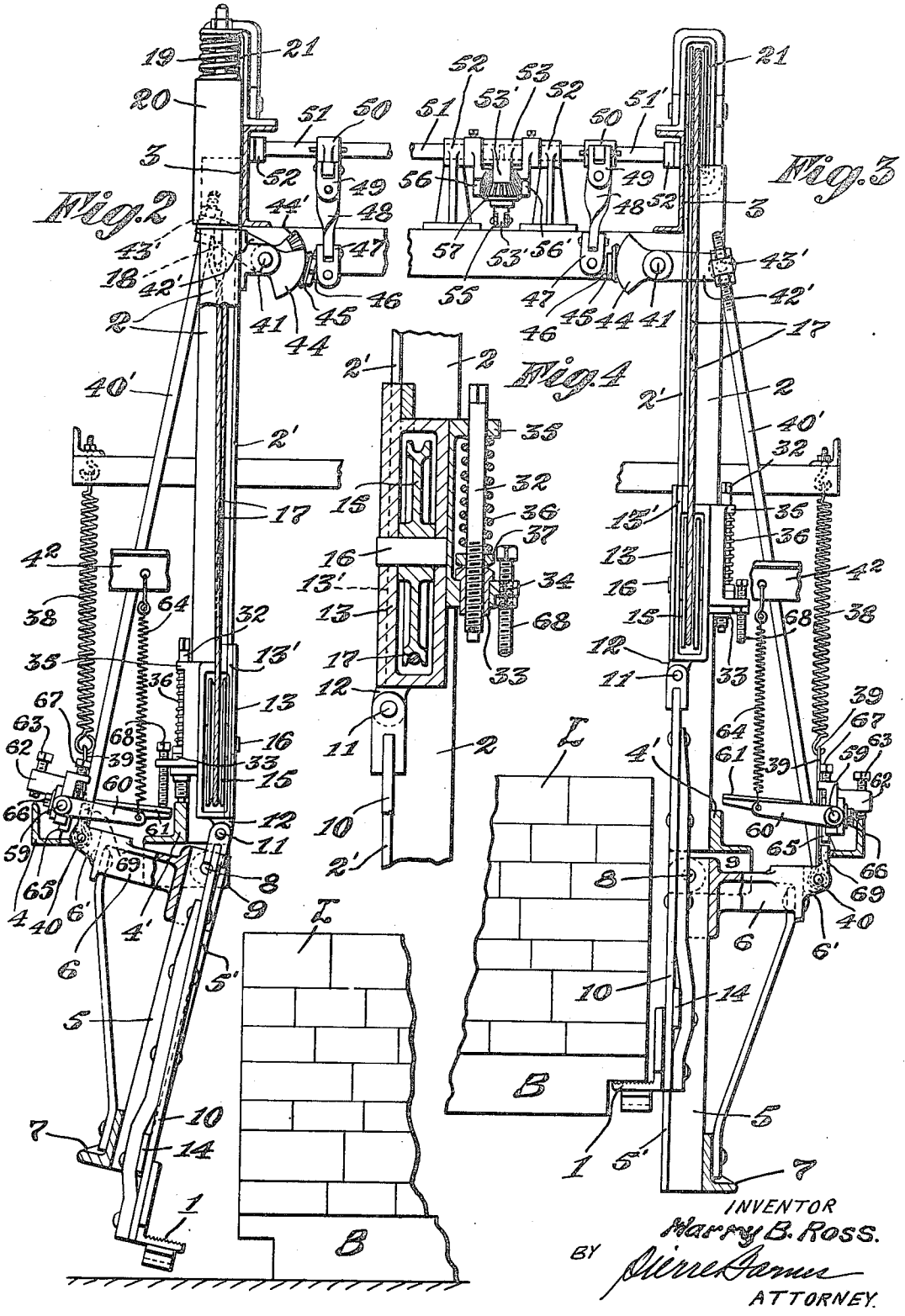
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Fig. 6

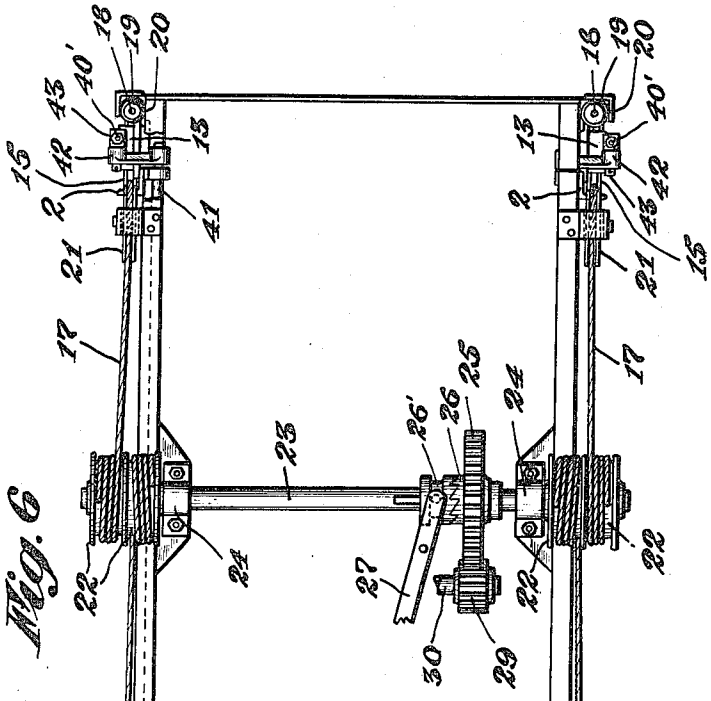


Fig. 7

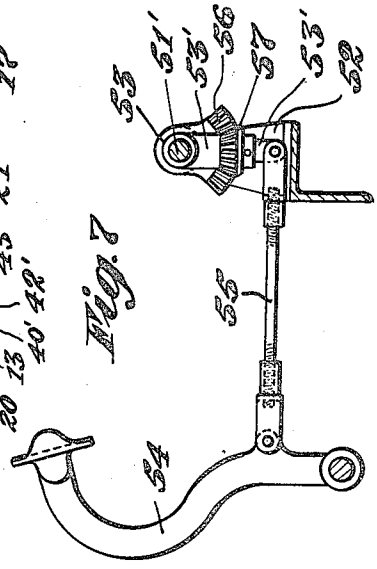
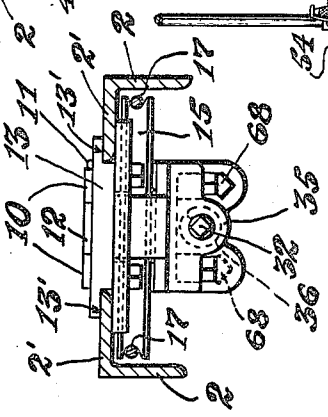


Fig. 5



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UNITED STATES PATENT OFFICE.

HARRY B. ROSS, OF BENTON HARBOR, MICHIGAN.

PORTABLE ELEVATOR.

1,271,947. Specification of Letters Patent. Patented July 9, 1918.

Application filed December 4, 1916. Serial No. 134,802.

To all whom it may concern:

Be it known that I, HARRY B. ROSS, a citizen of the United States, residing at Benton Harbor, in the county of Berrien and State of Michigan, have invented certain new and useful Improvements in Portable Elevators, of which the following is a specification.

This invention relates to improvements in portable elevators and, more especially, to the lumber-grappling and hoisting devices, and is designed, more particularly, for use on motor trucks such as illustrated and described in my patent application, Serial No. 837,613, filed in the U. S. Patent Office May 11, 1914.

The main object of the invention is the provision of apparatus of this character whereby a load may be conveniently and reliably hoisted for transporting.

A further object of the invention is to provide an elevator with manually applied load-grappling features including equalizing devices which afford independent movements to the grappling hooks to enable the same to accommodate themselves to various positions of a load relative to the truck.

A still further object of the invention is the provision of mechanism which serves in the hoisting of a load to automatically lock the grappling devices against accidental disengagement.

To these and other ends, the invention consists in the novel construction, adaptation and combination of parts as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a truck with my invention applied thereto. Fig. 2 is a vertical transverse sectional view taken through 2—2 of Fig. 1 showing one side of the elevator and a grappling hook thereof in position engageable with a pile of lumber. Fig. 3 is a view similar to Fig. 2 of the opposite side of the elevator and representing the latter somewhat raised and carrying a load. Figs. 4 and 5 are detail sectional views to an enlarged scale through 4—4 and 5—5 of Fig. 1. Fig. 6 is a plan view of the truck, shown partly broken away and parts omitted to illustrate the arrangement of the elevator hoisting appliances and the mechanism for regulating the operation of the grappling devices. Fig. 7 is a sectional view through 7—7 of Fig. 6.

The body of the truck, to which the present invention is applied, is formed with a rigid frame of an inverted U-shape in transverse section and is supported upon wheels substantially as illustrated and described in the above mentioned patent application.

According to this invention, I provide four lifting hooks 1, two at each side of the truck, and movable vertically in guides which are desirably formed of angle bars. The upper portions 2 of these guides are fixedly secured at their ends to the frame members 3 and 4^1. The lower portion of each guide has its complementary angle-bar elements 5 coupled at their upper and lower ends by being secured to castings 6 and 7 and is arranged for lateral swinging movements by means of a pin 8 hingedly connecting the respective casting 6 with an attachment 9 secured to a frame member 4^1.

A hook 1 is provided with a shank 10 which is hingedly connected by a pin 11 with a lug 12 which depends from a pulley-block 13. Each of the hooks is caused to bear against the guide bar flanges 5^1 by having the shank 10 thereof interposed between the latter and serving as a spacing element between a hook and a plate 14 secured to the opposite side of the shank. The pulley-blocks 13 are provided with grooves 13^1 to receive the flanges 2^1 of the upper guide-bars.

In each block is a sheave 15 rotatable upon a pin 16 and running under the sheaves are hoisting ropes 17, each having an end connected to an eye-bolt 18 supported upon a spring 19 which is borne by a bracket 20 of a frame-member 3. The other ends of said hoisting ropes, after passing over guide sheaves 21, are secured to winding drums 22, there being two at each end of a transverse shaft 23 which is journaled in bearing boxes 24 provided on the frame.

25 is a spur gear mounted loosely on said shaft and engageable therewith by suitable clutch devices such as complementary clutch elements 26 and 26^1, of which the latter is splined to the shaft and is shifted into and out of couple with its mate by means of a forked lever 27 extending into convenient reach of the operator's seat 28.

As illustrated, the gear 25 is rotated by a pinion 29 from a power-driven shaft 30 which may be the armature shaft of a motor, indicated by 31 in Fig. 1.

Carried by each pulley-block is a stop screw 32 which is threaded in a nut 33 having its lower portion machined to make a

sliding fit in a bracket arm 34 of the block while the screw is guided in another block-arm 35.

36 represents a helical spring acting between the block-arm 35 and a lock-nut 37 superposed upon the nut 33 and serves to yieldingly hold the bolt in its lowermost position, as regulated by adjusting the nut 33.

In lowering, the blocks are arrested by the screws 32 coming into contact with the frame members 4^1 to prevent the respective hooks 1 from encountering the ground. The weight of the blocks and the parts depending therefrom are, moreover, afforded by the springs 36 a cushion support when the truck is traveling in an empty condition with the hooks in their lowered position. When the hooks are released they are automatically swung outwardly with the guides 5, as shown in Fig. 2, by means of springs 38, one end of each being attached to the truck-frame and its other end connected by a link 39 to an arm 6^1 provided on the respective casting 6 by means of a pin 40.

The hooks are swung inwardly to engage a load by means of push-rods 40^1 connecting the pins 40 with actuating mechanism which I will now describe.

41 represent rocker shafts, one on each side of the truck frame, having fixedly secured to the rear end of each (see Fig. 6) an arm 42 to which the upper end of the adjacent push-rod 40^1 is connected by a swivel pin 43.

At its forward end each of the shafts 41 carries differential devices consisting of two tooth gear sectors 44 and 44^1, the latter being keyed to the shaft and the other one, 44, is loosely mounted thereon and is provided with an arm 42^1 to which the adjacent push-rod 40^1 is connected by a swivel pin 43^1.

Intermediate a pair of sector gears and meshing therewith is a bevel pinion 45 which is rotatably mounted on an arm 46 which, in turn, is loosely mounted on the shaft. The arms 46 at opposite sides of the truck are connected by links 47, 48 and 49 with lever arms 50 (Figs. 2, 3 and 6) which are keyed to axially alined transverse shafts 51 and 51^1, journaled in boxes 52 and having their adjacent ends extend into a hub 53 provided with an arm 53^1 which is connected with a pedal lever 54 by a rod 55.

Said pedal lever is furthermore connected with the shafts 51 and 51^1 by differential power transmission devices comprising toothed sector gears 56 and 56^1 rigidly secured to the respective shafts, and an intermediate pinion 57 which is rotatably mounted on the hub arm 53^1.

The object of the aforedescribed differential devices is to afford independent lateral movements to swingable lower portions of the guides 5 and the hooks which are carried thereby so that where a load which is to be engaged is not positioned centrally or squarely with the truck, all of the hooks will be forced into engaging positions independently of each other; that is to say, the differential devices enable the operator, through the medium of the pedal lever, to apply all of the hooks under or against a load regardless of how the same may lay under the truck.

Included in the invention are locking devices whose offices are to prevent the accidental disengagement of the hooks from a load and to obviate any lateral swaying of the load while in transit over an uneven road. Said locking devices each consist of a lever fulcrumed on a pivot-pin 59 and having, with respect to the truck frame, two inwardly directed arms 60 and 61 and an outwardly directed arm 62.

Extending through the arm 62 is an adjustable screw 63 which acts as a stop against the adjacent frame member 4 (Fig. 3) when the lever is influenced by a spring 64 connecting with the lever arm 60 and a frame part 4^2.

65 is a bolt held in a socket of the lever by a set screw 66 in its adjusted position as regulated by an adjustable screw 67. When a block 13 is lowered, a screw 68 provided thereon encounters the lever arm 61, forcing the same downwardly, thereby causing the lower end of said bolt to be moved outwardly so as to be clear of a contact finger 69 provided on the arm 6^1 of the relatively movable guide whereupon the spring 38 asserts itself to swing the guide from the position in which it is illustrated in Fig. 3 to one corresponding to that shown in Fig. 2, which will occur immediately after the bolsters, such as B, upon which the load L rests, reach the ground and the hooks thereby are released.

The operation of the invention may be explained as follows:—

With the hooks 1 held in open position (Fig. 2) by the springs 38, the truck is moved over a load L and stopped with the hooks opposite the bolsters B. The operator then presses the pedal lever 54 with his foot to exercise through the medium of the rod 55 and arm 53^1 orbital motion to the pinion 57 and thereby impart rotary motion through the sector gears 56 and 56^1 to the respective shafts 51 and 51^1 wherefrom orbital motion is transmitted through the medium of links 49, 48 and 47 and arms 46 to the pinions 45.

These pinions being thus affected exert equal forces on the sector gears 44 and 44^1 to actuate the arms 42^1 directly and the other arms 42 through the medium of the rocker shafts 41. The arms 42 and 42^1 are thus caused to act in unison to force the respective rods 40^1 downwardly and thereby swerve the guides 5 and hooks 1 inwardly. Any of the hooks, however, may be arrested

by coming into contact with a bolster or the load without impeding the other hooks because the pinions 45 and 57 of the differential devices are capable of rotating to equalize the contending forces.

When the truck or the load are supported upon an uneven surface, a hook in closing may strike against the end of a bolster instead of passing therebelow and in such event the hook may be depressed in opposition to a spring 36 by the attendant bearing down upon the hook with his foot or by means of a lever.

After the hooks are engaged, the operator continues to hold them in such positions by maintaining foot pressure against the pedal lever 54 until the shoes are elevated by the aforedescribed hoisting mechanism to cause the weight of the load to be borne by the hooks which are thereby held in operative position.

After the load is raised several inches from the ground, the screws 68 are withdrawn from the lever arms 61, whereupon the springs 64 restore the trip levers to their normal positions (Fig. 3) and accordingly present the bolts 65 above the fingers 69 of the respective guides to positively prevent the guides swinging outwardly and dropping the load accidentally.

The construction and operation of the invention will, it is thought, be understood from the foregoing description.

What I claim, is—

1. In apparatus of the class described, the combination with the vehicle frame, of guide bars hingedly connected to said frame, means connected with said bars for swinging the same laterally of the frame, load-engageable devices slidably connected to said guide bars, and means for effecting the vertical movements of said devices.

2. In apparatus of the class described, the combination with the vehicle frame, of grappling devices comprising opposing hooks disposed at opposite sides of the frame, means operatively connected with said hooks for moving them individually or collectively into load-engaging positions, and means for effecting the vertical movements of said hooks.

3. In apparatus of the class described, the combination with a vehicle frame, of load-grappling devices connected thereto for relative horizontal and vertical movements, manually actuated means for controlling the horizontal movements of said grappling devices to thereby engage a load, power-actuated means for effecting the vertical movements of said grappling devices, and means rendered operative in the elevation of said grappling devices for locking the same against accidentally releasing the load.

4. In apparatus of the class described, the combination with a supporting frame, jointed guides secured thereto, grappling devices and means for raising and lowering the same subject to the action of said guides, of means rendered effective by the lowering of said devices whereby said guides are influenced to effect the relative opening movements of said devices, and manually operated means for closing the devices to engage the load.

5. In apparatus of the class described, the combination with the truck frame, guide-frames hingedly connected thereto for lateral movements, load-grappling hooks vertically slidable in the respective guide frames, hoisting devices for raising and lowering said hooks, springs tending to swing said guide-frames outwardly, means to releasably secure said guide-frames against outward swinging movements, and means rendered operable in the lowering of the grappling hooks whereby the first named means are rendered temporarily inoperative to enable said springs to swing the guide-frames outwardly.

6. In apparatus of the class described, the combination with grappling devices having hook elements arranged for relative opening and closing movements, and means for elevating and lowering said grappling devices, of means rendered operative in the lowering of said devices for automatically effecting the opening movements of the same, means to effect the closing movements of said devices for engaging a load, and means rendered operative in the early part of the elevation of the devices for locking the same against accidental disengagement from the load.

7. In apparatus of the class described, the combination with the truck frame, of grappling devices arranged for vertical and lateral movements, means to cause said devices to be swung inwardly with relation to the truck frame for engaging a load, hoisting means for raising and lowering the load through the agency of said grappling devices, means rendered operative by the load encountering the ground whereby the grappling devices are released from the load, and springs serving to swing the grappling devices outwardly when released from the load.

8. In apparatus of the class described, the combination with a frame and guides hingedly connected thereto for lateral movements, grappling devices slidable in the respective guides, springs tending to yieldingly hold said guides and grappling devices in their outer positions, means to swing said guides inwardly to cause the grappling devices to engage a load, means to elevate said grappling devices for hoisting the load, and means rendered operative after the load has been raised a short distance to positively prevent the grappling devices from becoming disengaged from the load and until the latter has been lowered.

9. In apparatus of the class described, the combination with a truck frame, power-driven drums carried on the frame, pulley blocks, and load-engaging hooks depending from the respective blocks, of a hoisting rope for each of said hooks, said ropes having one end of each connected with the frame, thence passing under the pulley of the respective block to the respective drum.

10. In apparatus of the class described, the combination with a frame, and guides thereon, of load-engaging devices slidable vertically in the respective guides, pulley blocks from which said devices respectively depend, power-driven drums, guide sheaves, hoisting ropes for the respective grappling devices, each of said ropes having one end connected to one of said bolts, thence passing under the pulley of the respective block and then over a guide sheave to have its other end connected to a drum.

11. In apparatus of the class described, the combination with a frame, grappling devices arranged for vertical and lateral movements with respect to the frame, and power-operated means to raise and lower all of the grappling devices in unison, of manually actuated means including differential mechanisms whereby the grappling devices may be moved collectively or individually to engage a load.

12. In apparatus of the class described, the combination with the truck frame, an elevator having a plurality of load-grappling members, pulley-blocks supporting the respective members, hoisting ropes therefor, means to operate the hoisting ropes for raising and lowering said members through the medium of said blocks, and spring-supported devices carried by the blocks and engageable with said frame for yieldingly holding said members at a selected elevation.

13. In apparatus of the class described, the combination with grappling devices having hook elements arranged for relative opening and closing movements, and means for elevating and lowering said grappling devices, of means rendered operative in the lowering of said devices for automatically effecting the opening movements of the same, and means to effect the closing movements of said devices for engaging a load.

14. In apparatus of the class described, the combination of a frame, grappling devices arranged for vertical and lateral movements with respect to said frame, means to elevate and lower said grappling devices, operating means for collectively moving said grappling devices inwardly with respect to the frame for engaging a load, and differential mechanisms included in the last-named means to render said grappling devices individually yieldable when engaging the load.

Signed at Benton Harbor, Mich., this 23 day of Nov. 1916.

HARRY B. ROSS.

Witnesses:
C. P. JOHNSON,
E. M. BROWN.