

July 11, 1933.

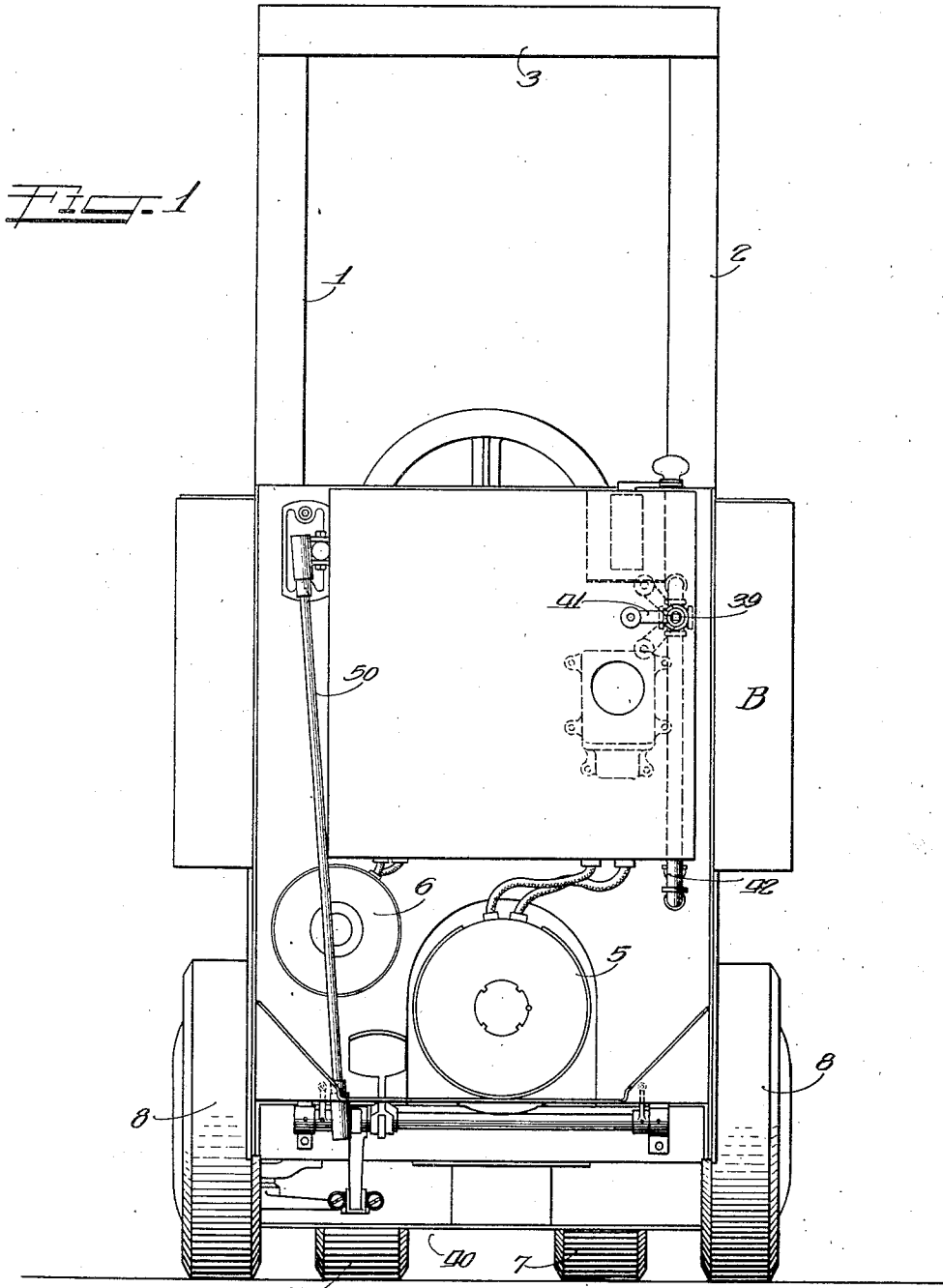
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1,917,602

HYDRAULIC LIFT FOR TRUCKS

Filed June 1, 1931

5 Sheets-Sheet 1



By Charles W. Hills Attorney

July 11, 1933.

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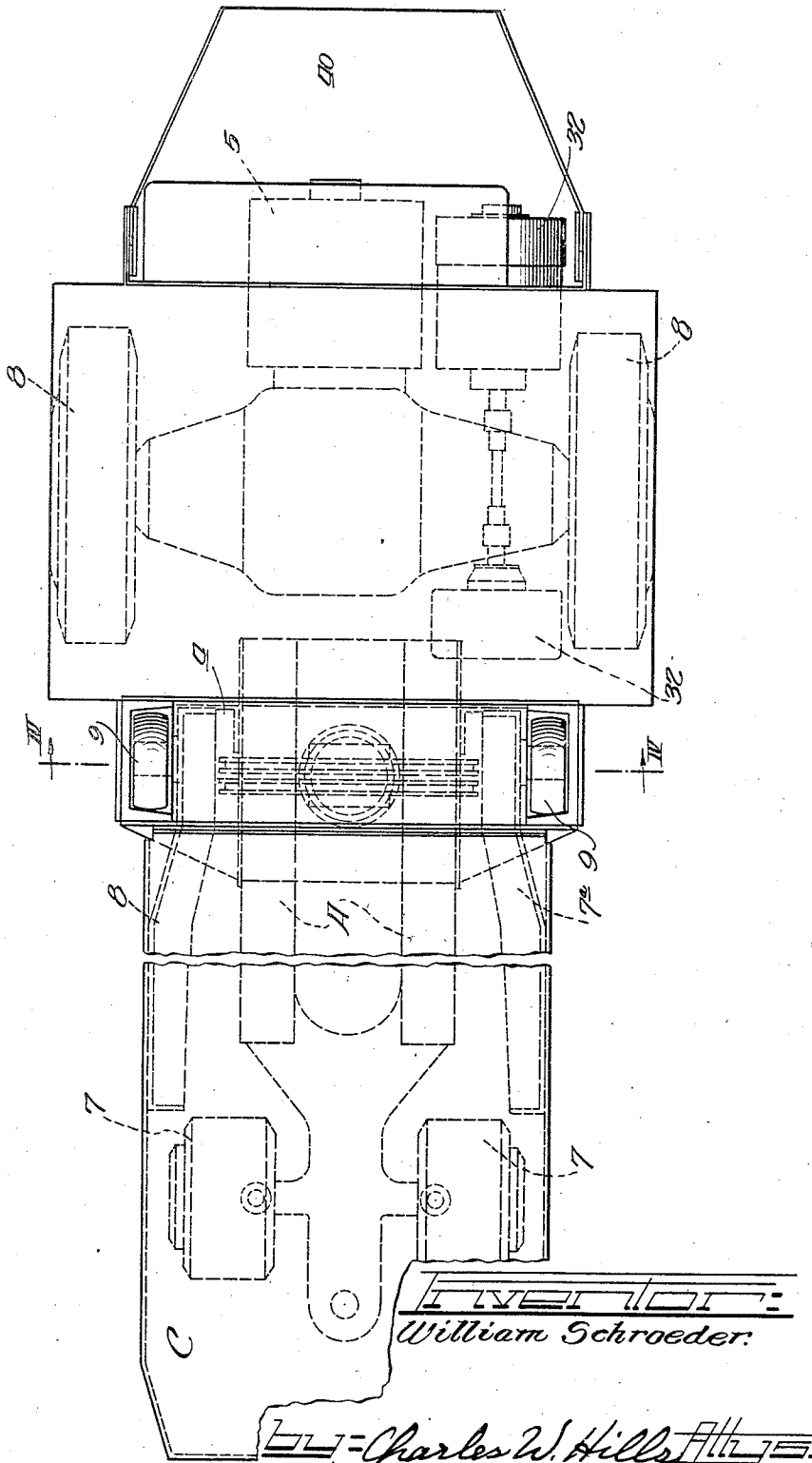
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Fig. 2



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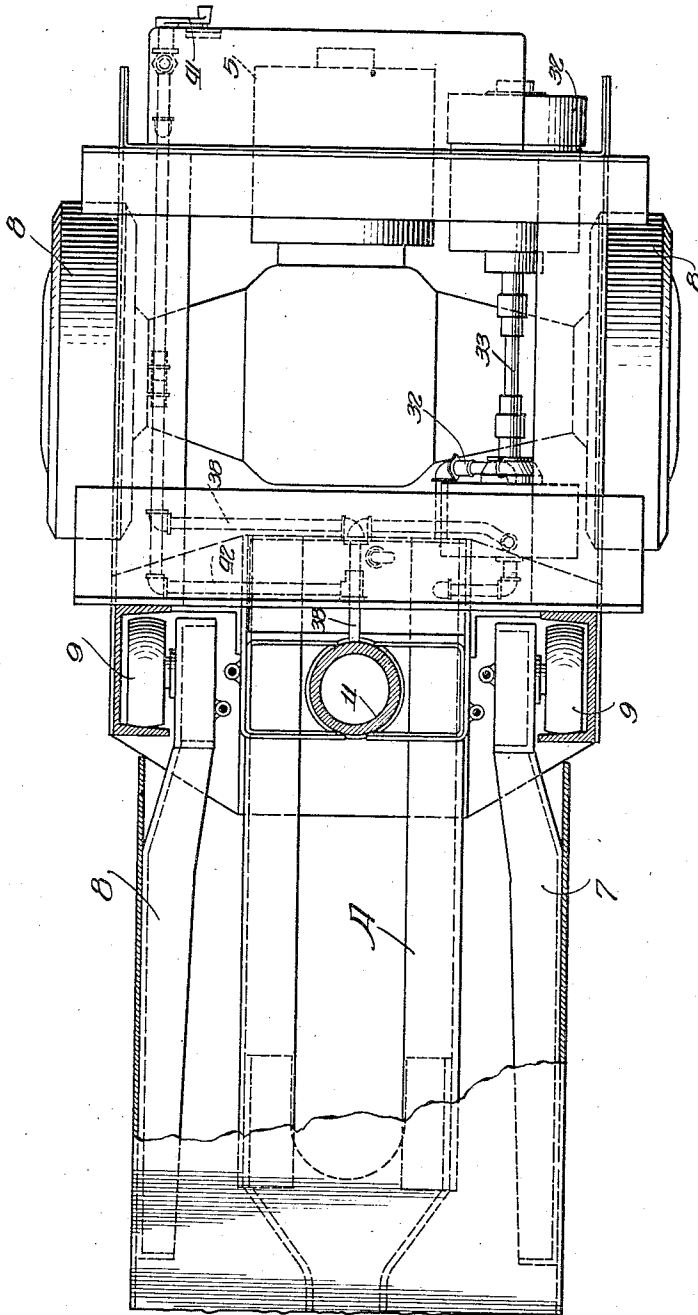
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HYDRAULIC LIFT FOR TRUCKS

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Fig. 3



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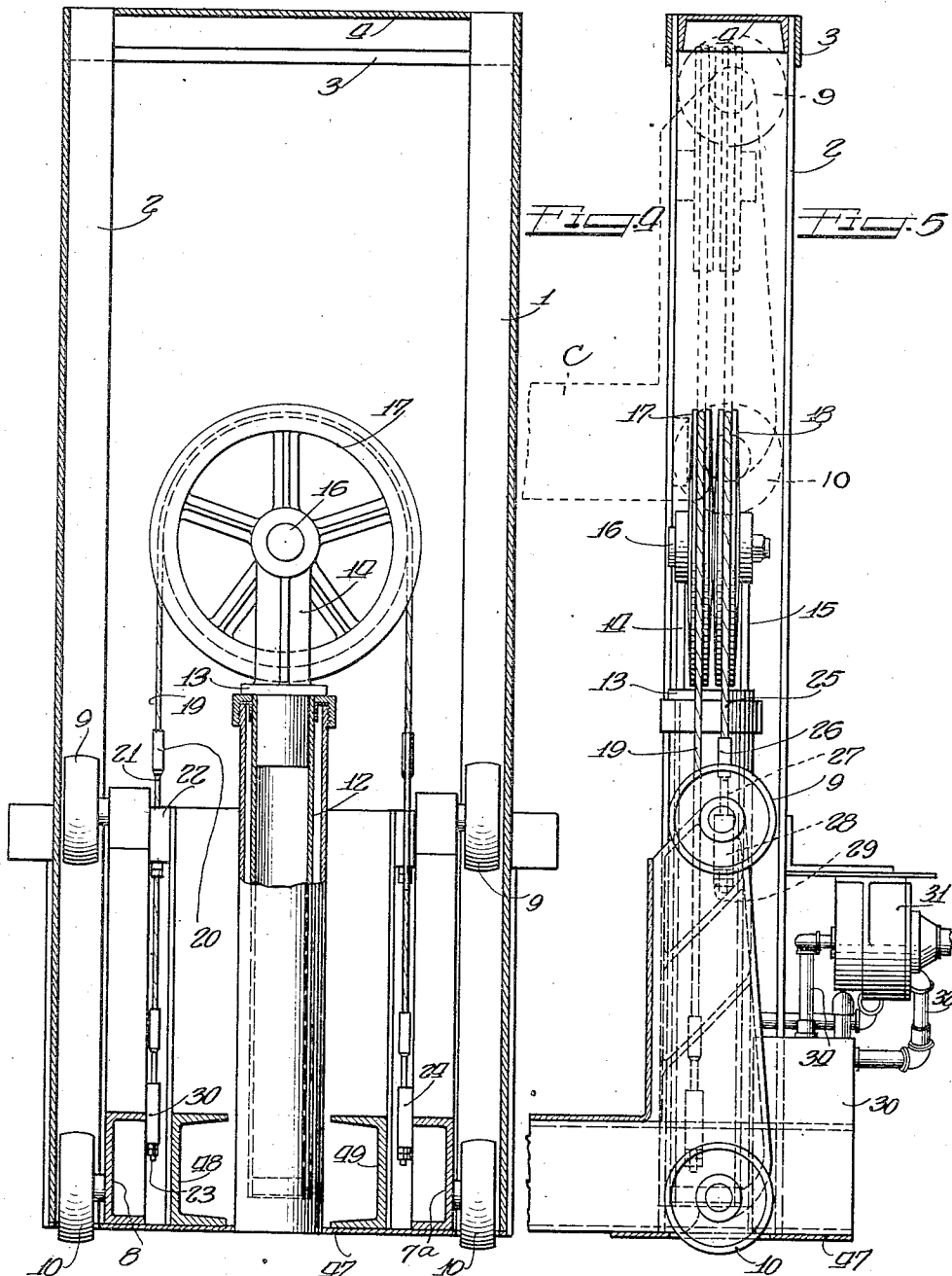
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1,917,602

HYDRAULIC LIFT FOR TRUCKS

Filed June 1, 1931

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1,917,602

HYDRAULIC LIFT FOR TRUCKS

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Fig. 6

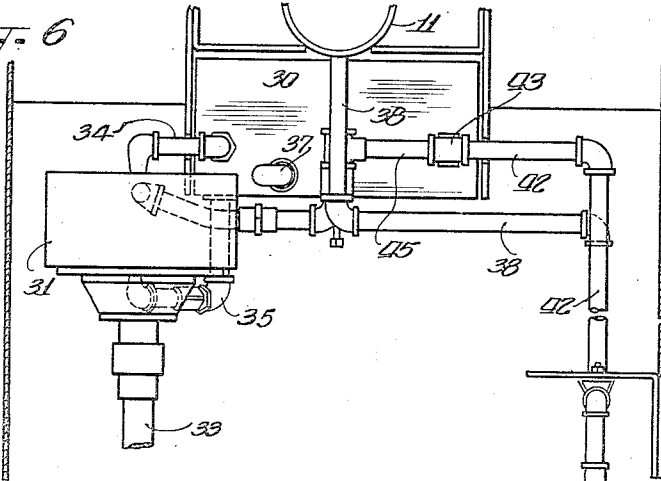


Fig. 7

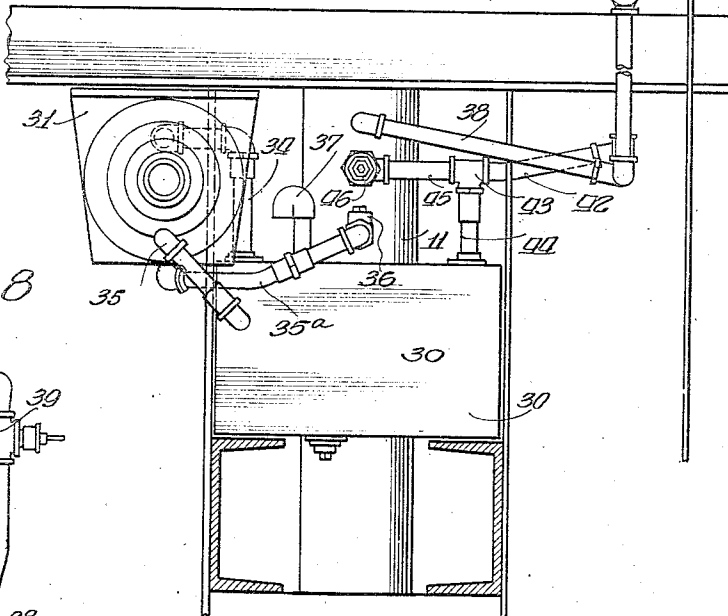
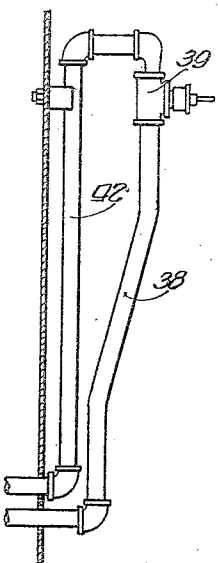


Fig. 8



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UNITED STATES PATENT OFFICE

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HYDRAULIC LIFT FOR TRUCKS

Application filed June 1, 1931. Serial No. 541,311.

The present invention relates to a hydraulic lift for trucks and particularly to one applicable for use in a truck of the type having an elevating platform.

5 An object of the present invention is to provide a hydraulic lift for industrial trucks having elevating platforms wherein the platform is maintained in horizontal position irrespective of the manner of placing the load on the platform.

Another object of the invention is to provide a hydraulic lift for trucks of the type having elevating platforms.

15 A further object of the invention is to provide hydraulic lifts for the elevating platforms of industrial trucks whereby the speed of lowering the platform may be regulated as desired.

20 A still further object of the invention is to provide hoist mechanism for elevating platforms of industrial trucks wherein the platform is equalized throughout its raising and lowering movements by the hoist mechanism.

25 Generally speaking the invention contemplates a hydraulic hoist mechanism for raising and lowering the platforms of the elevating type of industrial trucks wherein cables are attached to opposite sides of the platform and wherein a hydraulic plunger carries sheaves engaging the cables so that lifting effort is distributed equally to the platform thus preventing tilting or canting of the same during its raising and lowering movements.

30 The invention further contemplates a hydraulic hoist for elevating platforms of industrial trucks wherein a raising movement is accomplished by pressure and the lowering movement by gravity.

35 The above, other, and further objects of the invention will be apparent from the following description, accompanying drawings, and appended claims.

40 Embodiments of the invention are illustrated in the accompanying drawings and the views thereof are as follows:

50 Figure 1 is a rear elevational view of an industrial truck equipped with the present invention.

Figure 2 is a top plan view, with parts broken away, of the truck illustrated in Figure 1.

Figure 3 is a fragmental top plan view, partially in section, of the truck illustrated in Figure 1 and showing certain details of construction.

Figure 4 is a fragmental sectional view taken substantially in the plane of line IV—IV of Figure 2.

Figure 5 is a fragmental side elevational view of the upright and hydraulic hoist with a fragmental portion of the platform and showing the manner of mounting the pump in connection with the hoist, and showing in dotted lines the platform in elevated position.

Figure 6 is a fragmental plan view, with parts in section, of portions of the piping circuit.

Figure 7 is a fragmental rear elevational view, with parts in section, showing other details of the piping circuit.

Figure 8 is a side elevational view of a portion of the pipe circuit and illustrating the position of the control valve.

The drawings will now be explained.

The form of industrial truck chosen to exemplify the present invention is similar to that shown in the copending application of this applicant Serial No. 541,309 filed June 1, 1931 and consists of a truck frame designated generally at A and including a pair of channel uprights 1 and 2 arranged with the flanges directed towards each other that is inwardly of the truck and which uprights are connected at the top by a plate 3 and an inverted channel 4 inserted between the inner ends of the flanges of the uprights 1 and 2.

The truck carries a battery box B for containing the electric batteries for operation of the driving motor 5 and the pump motor 6.

Front wheels 7 are provided as well as rear wheels 8 which may be arranged and connected for steering as set forth in copending application above identified.

The elevating platform C is supported on platform side frame members 7^a and 8 which members in turn are provided with top and bottom rollers 9 and 10. The rollers 9 and 10 of the side frame member 7^a are guided

in the upright channel member 1 and the top and bottom rollers of the platform side frame member 8 are in like manner guided in the channel upright 2. The platform is a cantilever platform.

A hydraulic cylinder 11 is supported in the truck frame and is provided with a plunger or piston 12 having a head 13 at its outer end. The head 13 is provided with spaced up-
 10 standing ears 14 and 15 supporting a shaft 16 on which are two sheaves 17 and 18 freely rotatable.

A cable 19 has a socket 20 at one end which socket is provided with a bolt portion 21 en-
 15 gaging an apertured lug 22 on the truck frame structure. Nuts 23 cooperate with the bolt portions of the socket for adjusting the cable in the lug. The cable 19 is trained over the sheave 17 with its other end socketed
 20 and passed through a lug 24 fastened to the platform side frame member 7.

Another cable 25 has a socket 26 fastened to one end which socket is provided with a
 25 bolt portion 27 which enters an apertured lug 28 on the truck frame structure. Nuts 29 are provided for adjusting this end of the cable in the lug 28. The cable 25 is trained over the sheave 18 and has its other end socketed
 30 to the platform side frame member 8.

The cables 19 and 25 are adjusted as to length by means of the nuts at the ends of the socket members where the same engage
 35 the several lugs. The cables once having been properly tightened then as the plunger or piston moves upwardly the platform is lifted evenly and held against tilting or canting no matter where the load may be on the platform.

A pipe circuit is provided for supplying
 40 fluid to the cylinder 11 for moving the plunger or piston 12 to raise the platform C.

A fluid reservoir 30 is carried by the truck frame and a pump 31 is secured adjacent the
 45 reservoir. The pump 31 is driven by a motor 32 carried on the truck and connected to the pump by a shaft 33. An inlet pipe 34 leads from the reservoir 30 to the inlet side of the pump 31. A drain pipe 35 is inter-
 50 posed between the pump and reservoir 30 to return to the reservoir any leakage fluid there may be in the pump.

A pipe 35^a leads from the outlet side of the motor and into the cylinder 11. A check
 55 valve 36 is interposed in this pipe to prevent flow of fluid from the cylinder to the pump. A breather 37 communicates with the interior of the reservoir 30 for admitting atmospheric pressure to the same.

A pipe line 38 leads from the cylinder 11
 60 upwardly near the rear end of the truck and is provided with a control valve 39. The valve is conveniently disposed for the operator who stands on the platform 40 at the rear
 65 of the truck. A handle 41 for the valve 39

is provided for controlling fluid passage through the valve. A pipe 42 leads from the valve 39 to a T 43. A branch pipe 44 leads from the T 43 to the interior of the reser-
 70 voir 30 while another branch 45 connects the T 43 with the interior of the cylinder 11. A relief valve 46 is interposed in the pipe 45.

The cylinder 11 is suitably supported in the truck frame and projects thru an open-
 75 ing in a gusset plate 47 which is welded to side frame members 48 and 49 of the truck frame structure. The uprights 1 and 2 are welded to the gusset plate 47.

The platform D is raised by moving the
 80 plunger 12 upwardly in the cylinder 11 and lowered by gravity through manipulation of the fluid control valve 39.

When it is desired to raise the platform D the control valve 39 is closed. The motor 32
 85 is energized thereby operating the pump 31 to pump fluid from the reservoir 30 into the cylinder 11. The pumping of the fluid into the cylinder 11 raises the plunger or piston
 90 12 and at the same time fills the pipe 38 with fluid up to the control valve 39. When the platform has been raised the desired amount the circuit to the motor 32 is opened thus
 95 stopping the motor and the pump. Provision of the check valve 36 in the inlet pipe 35 to the cylinder 11 prevents backflow of fluid from the cylinder to the pump conse-
 100 quently the cylinder is supported in raised position by the fluid within the cylinder 11.

The provision of the cables 19 and 25 pass-
 105 ing over the sheaves 17 and 18 in opposite directions assures at all times that the platform D is maintained on an even keel otherwise the platform is prevented from tilting or
 110 canting no matter where the load may be placed on the same. This assures easy operation of the platform in its raising and lower-
 115 ing movements.

The platform is lowered by gravity by ma-
 120 nipulation of the control valve 39.

When it is desired to lower the platform
 125 the operator moves the handle 41 of the control valve 39 in a direction to open communication between the pipes 38 and 42 of the pipe circuit the amount of opening of the valve
 130 controlling the flow of fluid past the same. The opening of the valve 39 allows flow of the liquid or fluid in the cylinder 11 from the cylinder through pipe 38, control valve 39,
 135 pipe 42 to the T 43 thence through the connection 44 into the reservoir. The weight of the platform and its supported load at the
 140 elevating mechanism being sufficient to cause the platform to descend by gravity when the pressure against the plunger or piston 12 is
 145 relieved as it is by opening of the control valve 39. The speed of lowering is regulated by the amount of opening in the control valve 39. The valve 39 remaining open until the plat-
 150 form descends to its lowermost position causes removal of most of the fluid from the cylinder

11 by the downward movement of the piston
12. Any excess fluid there may be in the
pump 31 returns to the reservoir 30 through
the pipe 32.

5 It will be observed that the present inven-
tion provides a hoist mechanism for an ele-
vating platform of an industrial truck which
is sufficient to raise capacity loads easily and
quickly and is arranged to support the plat-
10 form to prevent tilting or canting of the
same. The provision of the sheaves and the
arrangement of the cables as before stated
tends to equalize the raising pull applied to
the platform by the cables.

15 The truck is steered by means of a steering
bar 50 disposed at the rear end of the truck
in convenient place for the operator steering
being accomplished through steering mech-
anism such as that described in the copend-
20 ing application above identified.

The invention has been described herein
more or less precisely as to details yet it is
to be understood that changes may be made in
the arrangement and proportion of parts and
25 equivalents may be substituted without de-
parting from the spirit and scope of the in-
vention.

The invention is claimed as follows:

1. An industrial truck of the elevating
30 platform type, including in combination, rais-
ing means for the platform of said truck, said
raising means including cables having simi-
lar ends thereof attached to the sides of the
platform on opposite sides of the center line
35 of the platform, sheaves supported for bodily
movement and also relative rotative move-
ment, said sheaves being disposed with the
axes thereof coincident and extending length-
wise of the truck, said cables being trained
40 over said sheaves in opposite directions and
having similar ends of the cables fastened to
opposite sides of the platform, the other ends
of said cables being fixed against movement,
a single vertically movable member carrying
45 said sheaves, means for moving said member
in the manner stated, the bodily movement of
said sheaves causing raising movement of
said platform, the attachment of the cables
at the sides of the platform being effective to
50 prevent tilting of the platform in service.

2. An industrial truck of the elevating
platform type, including in combination, a
single vertically movable plunger, two rela-
tively rotatable sheaves on said plunger lying
55 in parallel planes which are normal to the
length of the truck, a platform, a cable
trained over one sheave and having one end
connected to the truck adjacent one side there-
of and the other end of the cable connected to
60 the platform adjacent the opposite side of the

truck, a second cable trained over the other
of said sheaves and having one end thereof
connected to the truck adjacent a side there-
of and the other end connected to the plat-
70 form adjacent the opposite side of the truck,
the end of the second cable which is connected
to the platform being on the same side of the
truck center as the end of the first cable which
is connected to the truck, the end of the first
75 cable connected to the platform being on the
same side of the truck center as the end of the
second cable connected to the truck, the latter
mentioned ends of the first and second cables
being on the opposite sides of the truck center
80 from the opposite ends of said cables.

3. An industrial truck of the elevating
platform type, including in combination, a
platform, means for raising and lowering
said platform, said means comprising a sin-
85 gle vertically movable member, two sheaves
carried by said member and arranged thereon
in parallel relation and with the axes thereof
coincident and extending in the direction of
the length of the truck, cables passing over
90 said sheaves, each cable having an end at-
tached to said platform and then dead-ended
to the truck structure, the cable ends which
are attached to the platform being connected
thereto on opposite sides of the truck center
95 and the cable ends dead-ended being attached
to the truck structure on opposite sides of the
truck center from the other ends of the cables
for preventing tilting of the platform while
being raised and lowered, and means for ac-
100 tuating said vertically movable member.

4. An industrial truck of the elevating
platform type, including in combination, a
single vertically movable member, two inde-
pendently rotatable sheaves arranged in side
105 by side relation atop said member, the axis of
rotation of said sheaves intersecting the lon-
gitudinal axis of said member, an elevator,
cables trained over said sheaves, one end of
one cable being fastened to the truck body
110 with the other end of said cable fastened to
the elevator on the opposite side of the me-
dian line of said body from said one end, the
other cable having an end fastened to said
elevator on the same side of the median line
115 of the truck body as the one end of said first
cable and its other end fastened to the truck
body on the same side of the median line
as the other end of said first cable, and means
for effecting vertical movement of said mem-
120 ber to raise and lower said elevator.

In testimony whereof I have hereunto sub-
scribed my name at Chicago, Cook County,
Illinois.

WILLIAM SCHROEDER.