Oct. 31, 1950 B. ULINSKI 2,528,401

INDUSTRIAL TRUCK

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Fig. 1.

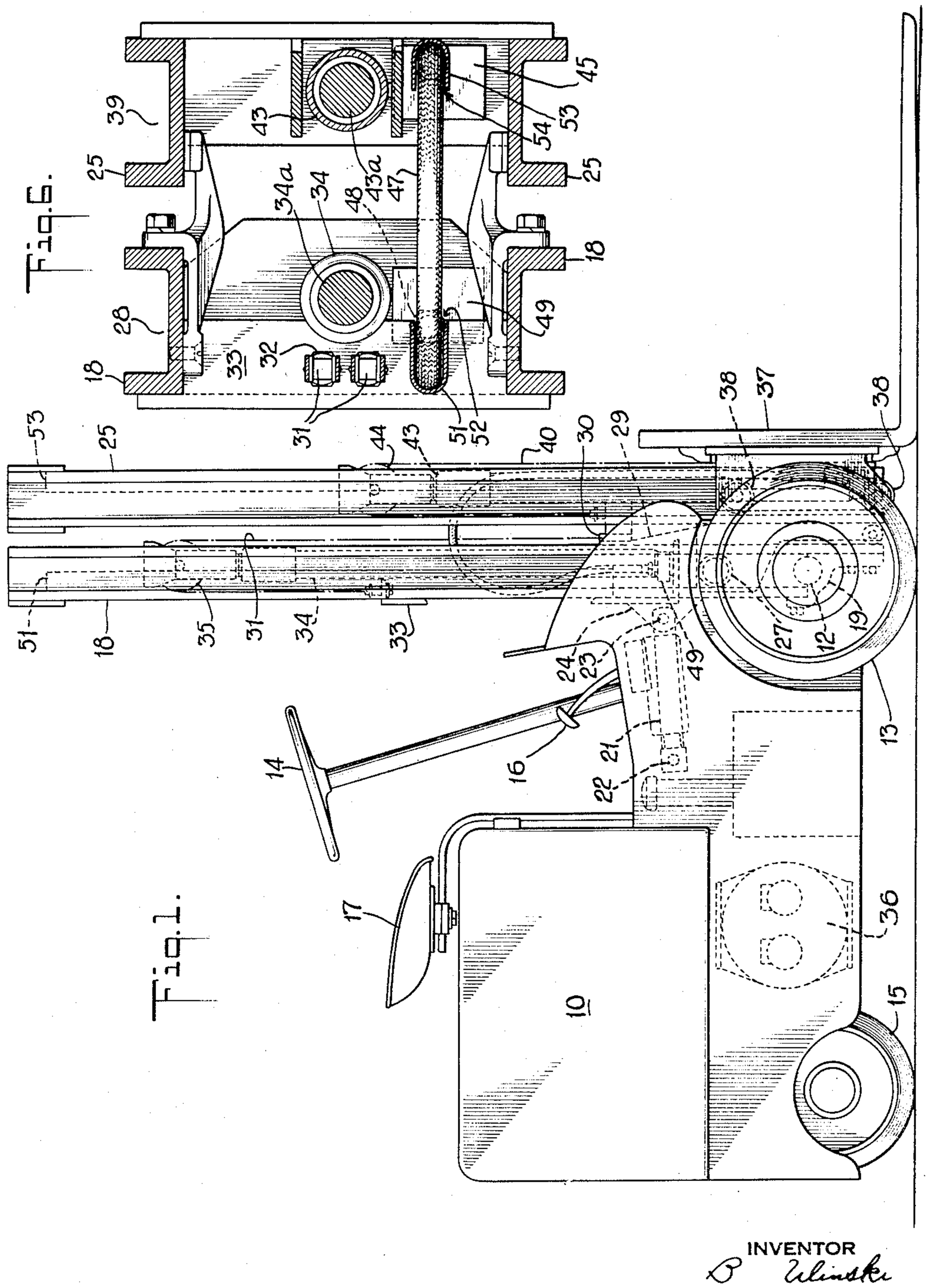

Fig. 5.

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Fig. 2.

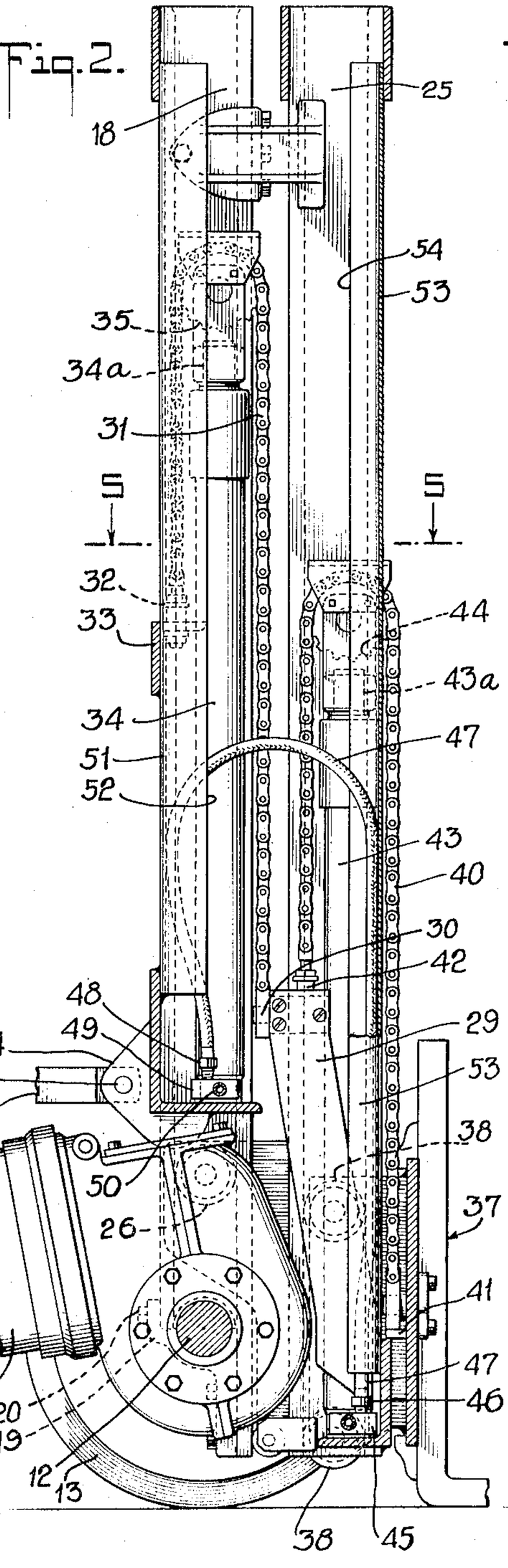

Fig. 3.

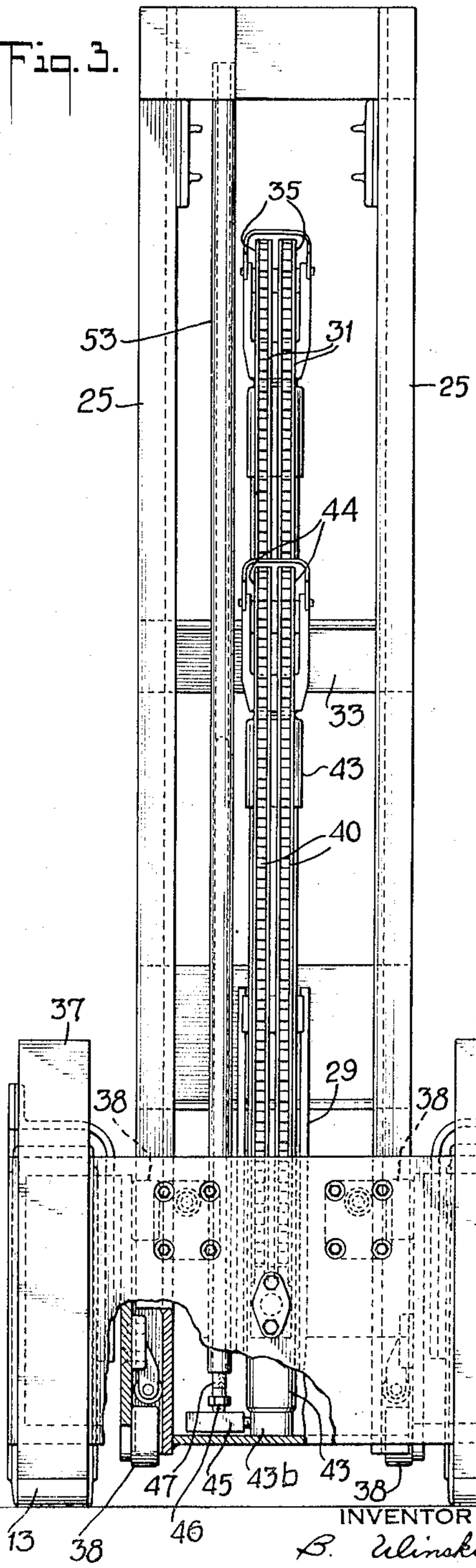

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Fig. 4.

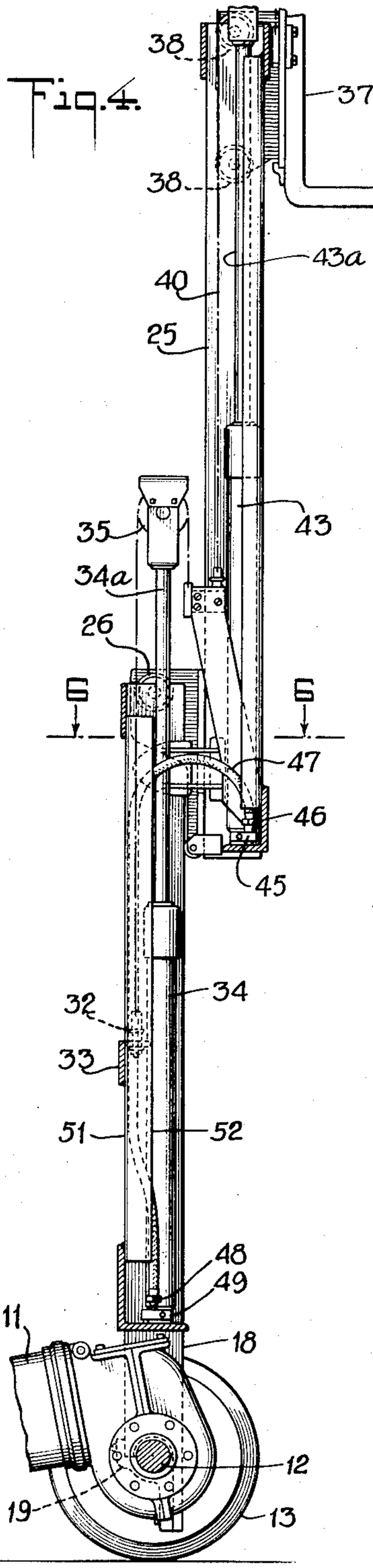
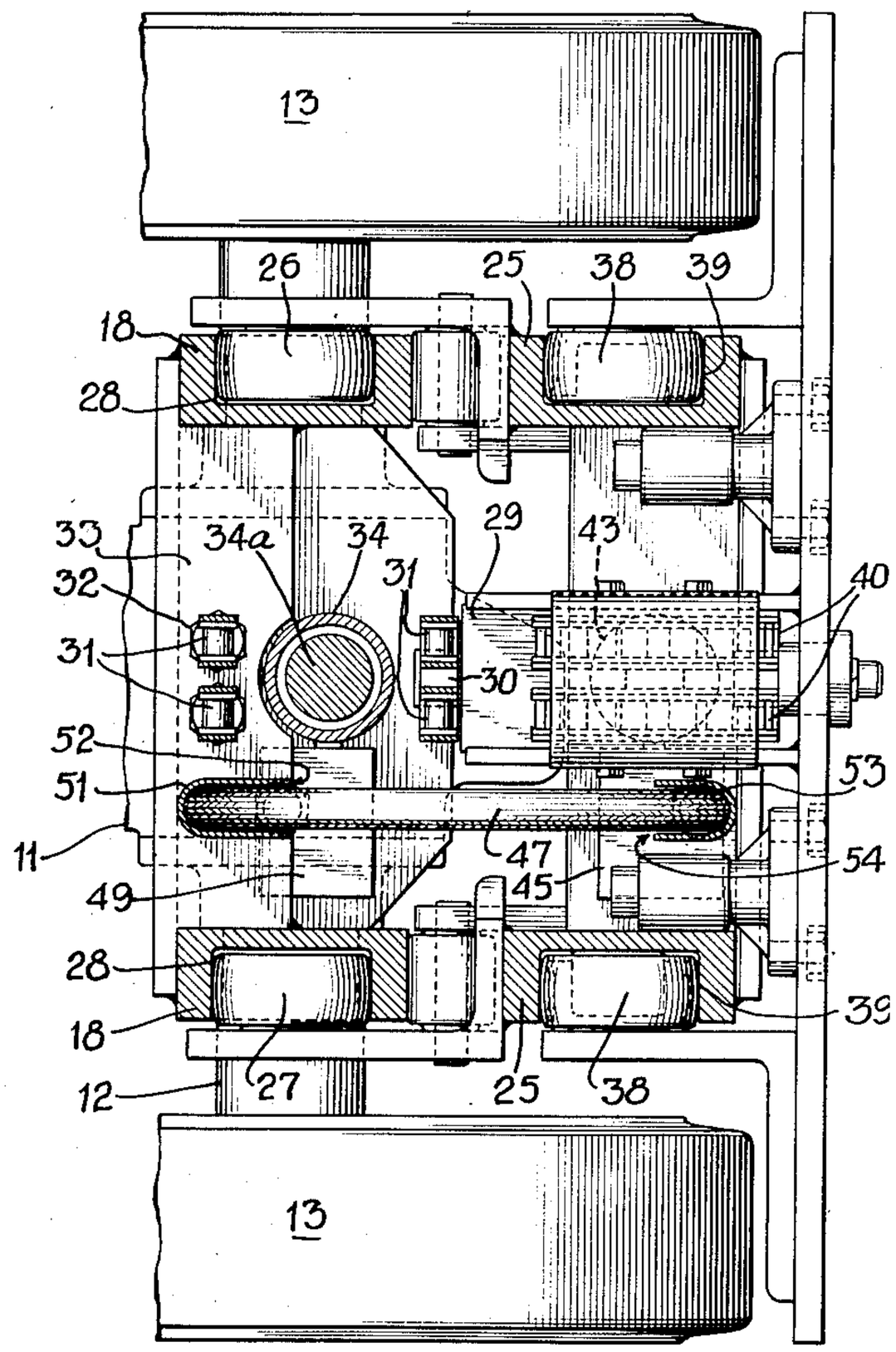


Fig. 5.



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UNITED STATES PATENT OFFICE

2,528,401

INDUSTRIAL TRUCK

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Application October 15, 1946, Serial No. 703,361

11 Claims. (Cl. 187—9)

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This invention relates to an industrial truck, and more particularly to an industrial truck of the type shown in my application Ser. No. 692,465, dated August 15, 1946. In my earlier application, I show an industrial truck of the type in which an elevating carriage is raised relatively to a pair of secondary uprights by a hydraulic ram extending between the secondary uprights and the elevating carriage. The secondary uprights are in turn mounted for vertical movement on primary uprights, and for contributing such movement there is utilized a hydraulic ram extending between the primary uprights and the secondary uprights. In a combination of the class described, it is readily appreciated that the hydraulic ram on the secondary uprights must move relatively to the remainder of the truck and the primary uprights. Therefore, the means carrying the hydraulic fluid under pressure to the ram extending between the elevating carriage and the secondary uprights must be flexible so as to supply the ram in all its positions.

In my earlier application, I show flexible hose adapted to carry the fluid to the moving ram, but the particular arrangement illustrated and described is quite unsatisfactory in that the hose is not maintained in a fixed path. The problem of guiding the hose and maintaining it in a particular fixed path is a rather considerable one, but was finally solved by me through the conception and structure hereinafter set forth.

As a feature of this invention, I contribute guide means for a hose in a combination of the class described, the said guide means serving to guide the hose and maintain it in predetermined relation to the truck structure. As a more particular feature of this part of the invention, I utilize guide means for the legs of a vertical loop formed by the hose. Even more particularly, I employ a pair of simple channels for guiding the hose and maintaining it in a predetermined vertical plane for effective operation in my structural combination.

I have thus outlined rather broadly the more important features of my invention in order that the detailed description thereof that follows may be better understood, and in order that my contribution to the art may be better appreciated. There are, of course, additional features of my invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception on which my disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of my invention.

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It is important, therefore, that the claims to be granted me shall be of sufficient breadth to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings, Fig. 1 is an elevation of a truck in which my invention is embodied. Fig. 2 is an enlarged view of certain parts of the truck shown in Fig. 1. Fig. 3 is an end view looking from the right side of Fig. 2 toward the left. Fig. 4 is a view similar to Fig. 2, but illustrating the action of the hose and the guide means upon vertical movement of the secondary uprights relatively to the primary uprights. Fig. 5 is a section taken along lines 5—5 of Fig. 2. Fig. 6 is a section taken along lines 6—6 of Fig. 3.

Referring now more particularly to the drawings, and especially Fig. 1, I show an industrial truck of the type having a battery compartment 10 adapted to supply power to a traction unit 11, part of which is shown in Fig. 2, the said traction unit driving a traction axle 12 and a pair of traction wheels 13. The truck is steered by a manual steering wheel 14 having suitable connection with trailer and steering wheels 15. A brake treadle is shown at 16 and there is present, of course, a usual type of controller that is not illustrated, the operator being adapted to occupy a seat 17 and to control the truck therefrom.

The primary uprights to which I have alluded are designated by reference numeral 18 and are suitably connected by bracing members as is common in this art. In accordance with the teachings of my earlier patents, the primary uprights 18 are mounted for rotation about the traction axle 12, being secured thereon through means of caps 19 bolted to the uprights at 20, as shown in the drawings. Tilting movement of the uprights about the traction axle 12 is contributed by a hydraulic ram assembly 21 pivoted at 22 to the frame of the truck, and at 23 to a bracket 24 that is integral with the primary uprights 18.

The secondary uprights of my truck are designated by reference numeral 25 and have secured for movement therewith opposed upper and lower rollers 26 and 27, as best seen in Fig. 5, adapted to ride in the channel grooves 28 of the primary uprights 18. Additional rollers and guides may be provided as shown in the drawings, to maintain the secondary uprights securely on said primary uprights, but these rollers and guides are not part of the present invention and are, therefore, not here described in greater detail.

A bracket 29 is secured to the secondary up-

rights 25, and fastened to the said bracket 29 at 30 are two chains 31 secured at their other ends at 32 to a bracket 33 forming a fixed part of the primary uprights 18. A hydraulic ram assembly 34 supported at its lower end on the primary uprights 18 is equipped with sprockets 35 at the upper end of its ram 34*a* adapted to actuate the chains 31, and thereby to elevate the secondary uprights 25. This elevation will be at a speed twice the speed of movement of the ram 34*a* of the ram assembly 34. Fluid will be supplied to the ram assembly 34 from a pump 36, shown in Fig. 1, all as is made quite apparent in my earlier application, and all as will be very clearly understood by those skilled in the art. It may be well at this point to indicate that the parts so far described are not the invention herein claimed, but I shall hereinafter particularly point out the particular contribution of this application.

The elevating carriage of my truck is designated by reference numeral 37, and is equipped with upper and lower rollers 38 adapted to ride in the channel grooves 39 of the secondary uprights 25. Two sprocket chains 40 are fastened at one end to the carriage 37 through means of a bracket 41. At their other ends the chains 40 are fastened to the bracket 29 of the secondary uprights at 42. A ram assembly 43 is supported on the secondary uprights 25 at its lower end, the ram 43*a* of the said ram assembly 43 carrying a pair of sprockets 44 adapted to actuate the chains 40. Obviously, ram 43*a* will life the carriage 37 at two times its own speed of movement. The ram assembly 43 secures its fluid, as best seen in Figs. 2 and 3, through means of a coupling 45 screw threaded into the lower end 43*b* of the ram cylinder forming part of the ram assembly 43. The coupling 45 has threaded therein a nipple 46 at the end of a flexible hose 47. The flexible hose 47 extends from the nipple 46 and the coupling 45 to a nipple 48 entering a coupling member 49 at the lower end of the ram assembly 34. The coupling member 49 receives its fluid from a hose extending from the pump 36 and shown at 50 in Fig. 2 entering the coupling 49. So far as my present invention is concerned, it is merely necessary to know that the moving ram assembly 43 receives its fluid through one end of a flexible hose that preferably is fixed at its other end, and preferably also takes the form of a vertical loop that may extend upwardly from its two ends in the form of vertical legs.

As is explained in my earlier application, hydraulic fluid may be made accessible simultaneously to both ram assemblies, and because the ram assembly 43 has a lesser load to carry than the ram assembly 34, the chains 40 will be actuated first to lift the elevating carriage 37 to its fully lifted position on the secondary uprights 25 shown in Fig. 4. Thereafter, the fluid pressure will be accepted by the ram assembly 34 and the chains 31 will be actuated to lift the secondary uprights 25 together with the elevating carriage 37. During the lifting movement of the secondary uprights relatively to the primary uprights, the hose 47 must move from its position of Fig. 2 to its position of Fig. 4.

For guiding the hose in its movement, I secure to the primary uprights 18 a sheet metal channel 51 open at 52. To the secondary uprights 25 I secure a similar channel member 53 open at 54. It will be noted that the corresponding flanges of the channel members 51 and 53 are in the same vertical plane. The two vertical legs of the loop formed by the hose 47 in Fig. 2 are adapted also

to lie in the same vertical plane and in the plane of the channel members 51, 53. While the particular plane shown in the drawings is parallel to the longitudinal axis of the truck, it is possible to place the hose in a plane angular to the said longitudinal axis. Also, the channels need consist merely of flanges welded to the uprights, and will serve to guide the hose.

As the secondary uprights 25 move vertically relatively to the primary uprights 18, the hose 47 will move so that its left vertical leg of Fig. 2 becomes longer and occupies more and more the length of the channel 51. At the same time, the right leg of the hose 47 will become shorter and shorter and will lie less and less within the channel 53. Of course, in all positions of the secondary uprights the hose 47 will be guided quite adequately and will be maintained in proper position so as not to strike against any of the moving parts of the truck. This contributes long life to the flexible hose 47 and is an extremely important part of the invention, as those skilled in the art will appreciate. Thus, by an extremely simple expedient, all as fully outlined, I am able to guide the flexible hose of my invention so as to contribute long life and safety thereto, thereby making it possible for me to use the dual ram arrangement fully claimed and described in my earlier application.

I now claim:

1. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from a relatively low point of said vertical uprights to a relatively low point of said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, and fixed vertically positioned guide means for guiding said hose or the like as its flexes during the movement of said load lifting assembly relatively to said vertical uprights for maintaining in substantially fixed vertical paths those portions of the flexible hose loop that are vertical during the flexing of the hose incidental to the movement of said load lifting assembly relatively to said vertical uprights.

2. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from a relatively low point of said vertical uprights to a relatively low point of said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, and guide means for said hose positioned on said uprights and said load lifting assembly for fixing the path of movement of said hose as it flexes during the movement of said load lifting assembly relatively to said vertical uprights.

3. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights,

means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from said vertical uprights to said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, and fixed guide means extending linearly parallel to said uprights for guiding said hose or the like as it flexes during the movement of said load lifting assembly relatively to said vertical uprights for maintaining in substantially fixed vertical paths those portions of the flexible hose loop that are vertical during the flexing of the hose incidental to the movement of said load lifting assembly relatively to said vertical uprights.

4. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from said vertical uprights to said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, and channel guides for said hose positioned on said uprights and said load lifting assembly for fixing the path of movement of said hose as it flexes during the movement of said load lifting assembly relatively to said vertical uprights.

5. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from a relatively low point of said vertical uprights to a relatively low point of said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, and guide means for said hose positioned on said uprights and said load lifting assembly for maintaining in substantially fixed vertical paths those portions of the flexible hose loop that are vertical during the flexing of the hose incidental to the movement of said load lifting assembly relatively to said vertical uprights.

6. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from said vertical uprights to said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, and fixed guide means for said hose extending linearly parallel to said uprights for maintaining in substantially fixed vertical paths those portions of the flexible hose loop that are vertical during the flexing of the hose incidental to the movement of said load lifting assembly relatively to said vertical uprights.

7. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from a relatively low point of said vertical uprights to a relatively low point of said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, and channel guides for said hose positioned on said uprights and said load lifting assembly for fixing the path of movement of said hose as it flexes during the movement of said load lifting assembly relatively to said vertical uprights.

8. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from a low point relatively to said vertical uprights to a relatively low point of said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, channel guides secured in a single vertical plane on said load lifting assembly and said uprights for maintaining in substantially fixed vertical paths those portions of the flexible hose loop that are vertical during the flexing of the hose incidental to the movement of said load lifting assembly relatively to said vertical uprights.

9. In a truck of the class described, a pair of vertical uprights, a load lifting assembly, means mounting said load lifting assembly for vertical movement on said pair of vertical uprights, means whereby said load lifting assembly is moved on said uprights, a flexible hose or the like extending from said vertical uprights to said load lifting assembly and taking the form of a vertical loop when said load lifting assembly is in its lowermost position relatively to said vertical uprights and of sufficient length to allow full upward movement of said load lifting assembly relatively to said vertical uprights, channel guides secured in a single vertical plane on said load lifting assembly and said uprights for maintaining in substantially fixed vertical paths those portions of the flexible hose loop that are vertical during the flexing of the hose incidental to the movement of said load lifting assembly relatively to said vertical uprights.

10. In a truck of the class described, a pair of primary vertical uprights, a pair of secondary vertical uprights, means mounting said secondary uprights for vertical lifting movement on said primary uprights and in longitudinally spaced relation thereto, means for lifting said secondary uprights relatively to said primary uprights, a load carriage mounted for vertical movement on said secondary uprights, a hydraulic ram supported on said secondary uprights and adapted to lift said load carriage relatively to said secondary uprights, a flexible hose or the like for carrying hydraulic fluid to said hydraulic ram extend-

ing from a relatively low point on said primary uprights to a relatively low point of said secondary uprights and taking the form of a vertical loop when said secondary uprights are in their lowermost position relatively to said primary uprights and of sufficient length to allow full upward movement of said secondary uprights on said primary uprights, the legs of said vertical loop lying in longitudinally spaced relation and adapted to lengthen and shorten during the vertical movement of said secondary uprights relatively to said primary uprights, and guide means for said legs of the hose loop positioned on said secondary uprights and said primary uprights.

11. In a truck of the class described, a pair of primary vertical uprights, a pair of secondary vertical uprights, means mounting said secondary uprights for vertical lifting movement on said primary uprights and in longitudinally spaced relation thereto, means for lifting said secondary uprights relatively to said primary uprights, a load carriage mounted for vertical movement on said secondary uprights, a hydraulic ram supported on said secondary uprights and adapted to lift said load carriage relatively to said secondary uprights, a flexible hose or the like for carrying hydraulic fluid to said hydraulic ram extending from a relatively low point on said primary uprights to a relatively low point of said secondary uprights and taking the form of a vertical loop when said secondary uprights are in their lowermost position relatively to said primary uprights and of sufficient length to allow full upward movement of said secondary uprights on said primary uprights, the legs of said vertical loop lying in longitudinally spaced relation and adapted to lengthen and shorten during the vertical movement of said secondary uprights relatively to said primary uprights, and channel guides for said hose positioned on said secondary uprights and said primary uprights and in which the legs of the hose loop are guided during the vertical movement of said secondary uprights on said primary uprights.

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