

April 10, 1951

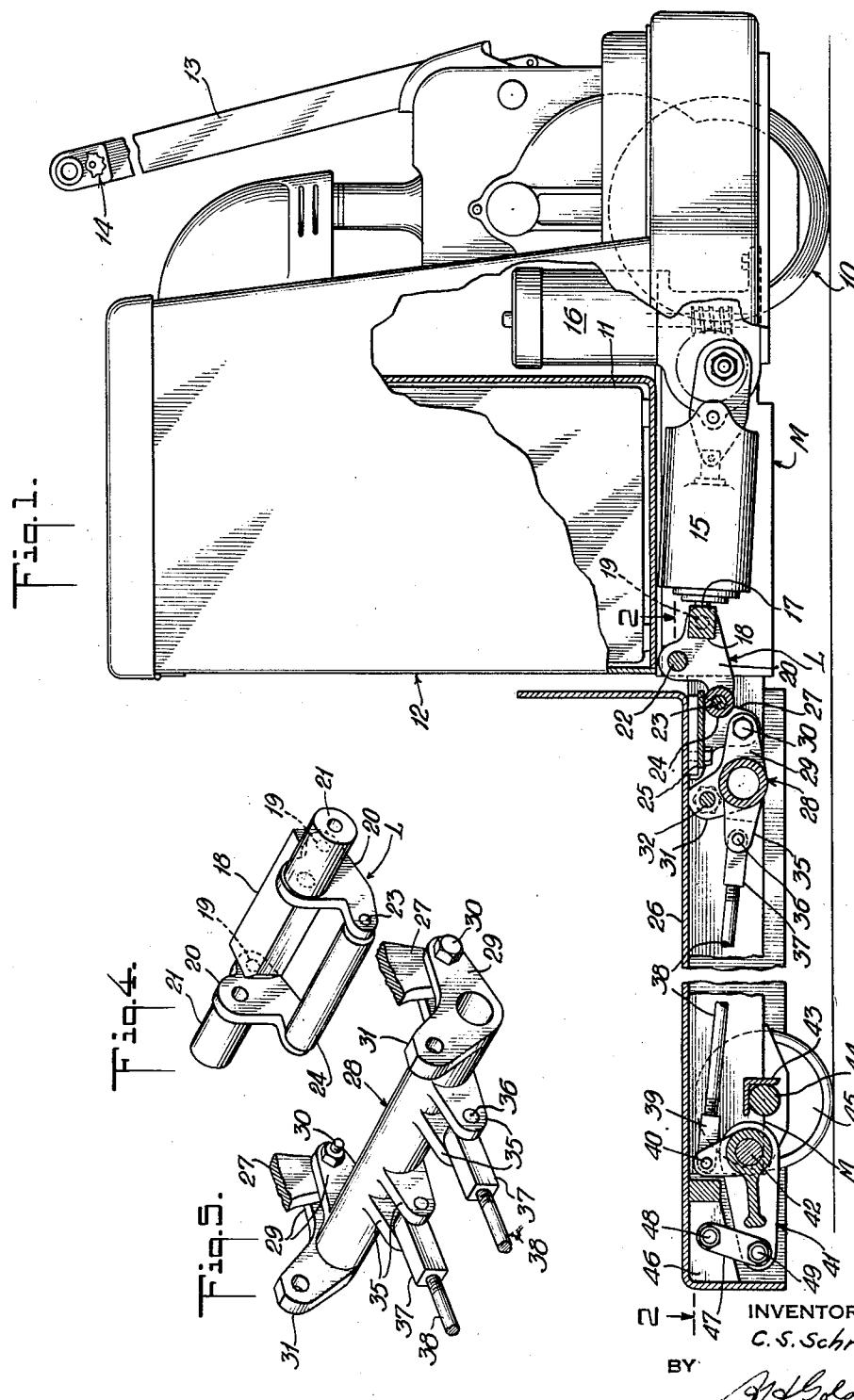
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**2,548,322**

## INDUSTRIAL TRUCK

Filed Feb. 27, 1946

2 Sheets-Sheet 1



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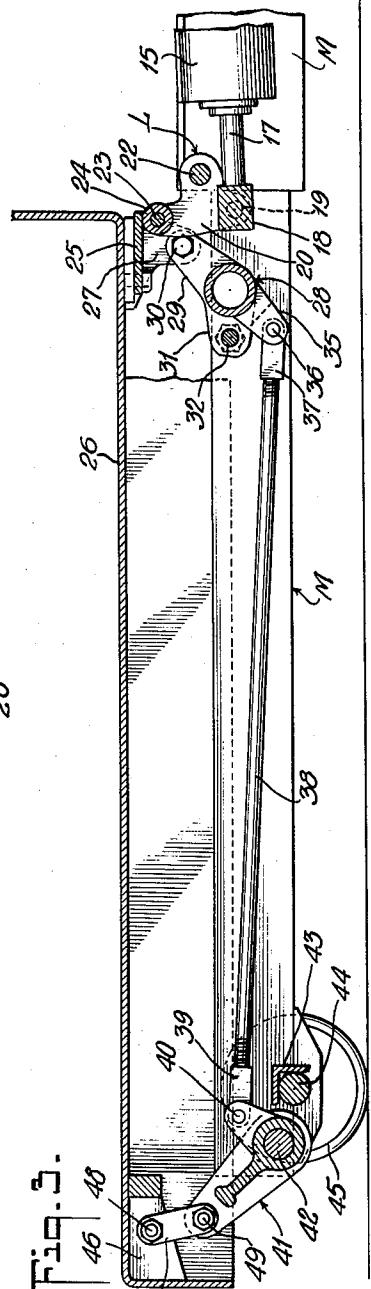
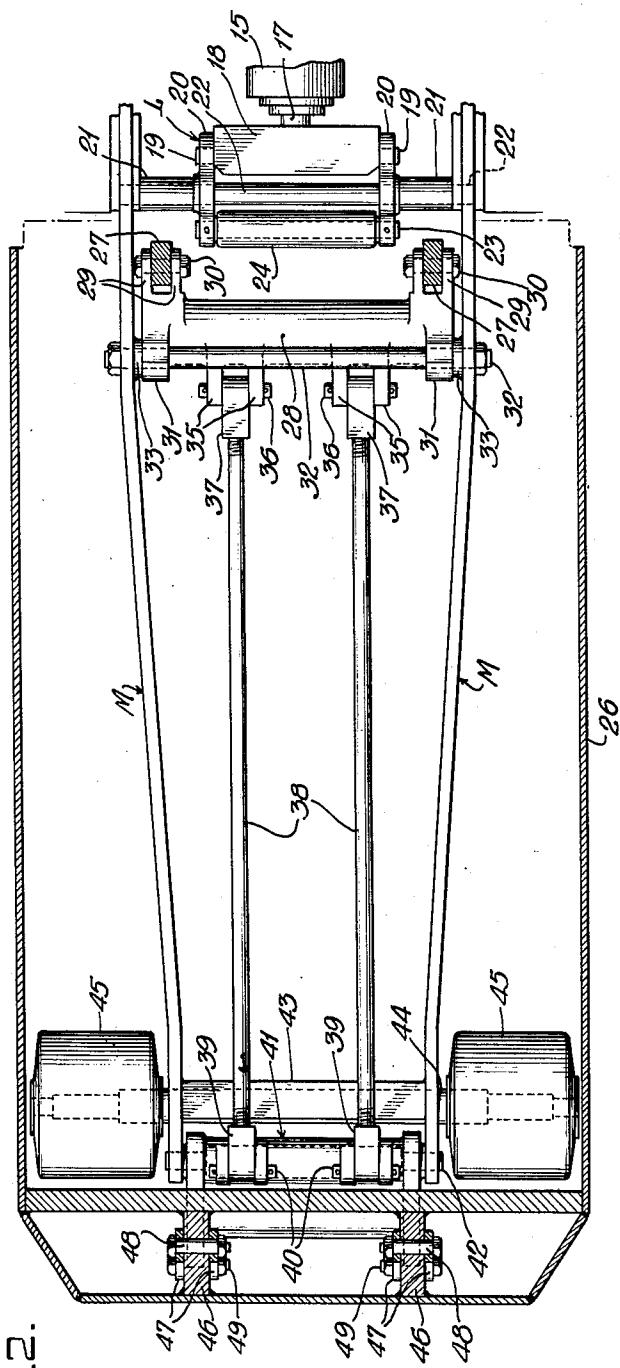
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**2,548,322**

## INDUSTRIAL TRUCK

Filed Feb. 27, 1946

2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,548,322

## INDUSTRIAL TRUCK

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Application February 27, 1946, Serial No. 650,479

5 Claims. (Cl. 254—9)

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This invention relates to an industrial truck, and more particularly to an industrial truck of the type in which an elevating frame is adapted to be raised relatively to a main frame. Even more particularly, the invention relates to a truck of the class described in which the lifting of the elevating frame is accomplished by a hydraulic ram that must necessarily be positioned for operation in a substantially horizontal position and at a very low level relatively to the main frame.

It is the object of my invention to contribute a mounting for an elevating frame or platform whereby the said frame or platform may be adapted for efficient vertical movement relatively to a main frame, the said vertical movement to be accomplished with a minimum of horizontal movement.

It is a further object of my invention to contribute a construction whereby an elevating platform may be raised vertically by a hydraulic ram that is positioned horizontally at a very low level and substantially in alignment with the underside of the elevating platform.

It is a further object of the invention to coordinate the mounting means of the forward and rear ends of an elevating platform or frame for lifting movement of the elevating platform by a lifting means not directly secured to the said elevating platform.

Referring now to the drawings, Fig. 1 is a vertical elevation and partial section of an industrial truck equipped with my invention. Fig. 2 is a section taken along lines 2—2 of Fig. 1. Fig. 3 is a view taken along the same lines as Fig. 1 and illustrating the elevating frame or platform in its fully elevated position. Fig. 4 is a perspective view of the lifting link operated by the hydraulic lifting ram. Fig. 5 is a perspective view of the forward support link for the elevating platform.

Referring now more particularly to the drawings, and especially Fig. 1, the truck there illustrated is of the motorized type disclosed more particularly in my patent application, Serial No. 431,356 filed February 18, 1942, now Patent No. 2,399,605, dated April 30, 1946. In a truck of the particular class, a forward wheel 10 is adapted to be driven by suitable motor mechanism powered by a battery 11 within a battery compartment 12. For steering the truck through the pivotal movement of the wheel 10, I utilize a steering handle 13 that moves wheel 10 and the entire steering head relatively to the main frame M of the truck. The handle is equipped with switch mechanism 14 whereby to control the

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direction and speed of movement of the truck through the rotation of the wheel 10 by the motor mechanism.

I have thus set forth the general construction of the type of truck to which my invention is applied in order that the importance of my invention may be better appreciated. Thus, in a truck of the class described, it is impossible, without considerable waste of space, to utilize a lifting hydraulic ram positioned as has generally been found desirable in lift trucks. I have found it necessary to position the hydraulic lift ram under the battery compartment 12, and in Fig. 1 I show a hydraulic lift ram 15 so positioned. For the purposes of the present invention, it is merely necessary to understand that fluid will be supplied to the ram 15 under the control of the operator through a motor 16 and a suitable pump, all as is rather fully set forth in my application Serial No. 459,380, filed September 23, 1942, now Patent No. 2,417,018, dated March 4, 1947. Naturally, the hydraulic ram 15 may take any desirable form and may be supplied by fluid manually or by power, as may be deemed desirable. My invention contemplates merely that the ram shall be positioned substantially horizontally and below the battery compartment on the main frame.

The plunger of the lifting ram 15 is designated 30 by reference numeral 17, and is secured as is illustrated in Figs. 2 and 4 to a pressure block 18. The pressure block 18 is in turn fitted with end trunnions 19 that are pivoted to opposed plates 20 of a lifting link L. This lifting link L is formed with sleeves 21 secured to the plates 20, and through which passes a shaft 22 whereby the lifting link L may be pivotally supported on the main frame M, the shaft 22 being suitably mounted in the main frame as is best seen in Fig. 2. The lifting link L supports a shaft 23 extending between its plates 20, and on this shaft is mounted a thrust roller 24. This thrust roller 24 bears against a hardened steel plate 25 secured to the underside of the elevating frame or platform 26.

The elevating platform 26 has a pair of downwardly extending brackets 27 mounted at its forward end. A forward support link 28, best shown in Fig. 5, is equipped with bifurcated ears 29 at 50 each end whereby through studs 30 it is pivotally secured to the brackets 27. The forward link 28 is further formed with extensions 31 for the passage of a shaft 32. This shaft 32 is supported in bearings 33 on the main frame M and there fore mounts the forward support link 28 for

rotary pivotal movement relatively to the main frame.

It will now be readily appreciated that when the plunger 17 of the lifting ram 15 moves from its position of Fig. 1 to its position of Fig. 3, the thrust roller 24 will effect upward lifting movement of the elevating platform 26 through a swinging movement thereof on the forward support link 28, all as is well illustrated in the drawings. It will be interesting to note that this movement of the elevating platform is accompanied by practically no longitudinal movement of the elevating platform relatively to the main frame M of the truck.

The forward support link 28 is utilized for imparting lifting movement to the rear end of the elevating platform 26. For this particular purpose, the forward support link 28 is equipped with two pairs of ears 35, each pair supporting a stub shaft 36 to which is pivoted a connecting block 37. A connecting rod 38 is adjustably screwed into each connecting block 37 and extends to the rear of the truck and is there threaded into a connecting block 39. Each connecting block 39 is in turn pivoted through a stub shaft 40 to a rear support link 41. This rear support link 41 is through a suitable shaft 42 mounted for pivotal movement on the main frame M. At this point it will be well to indicate that this main frame M through a structural angular member 43 supports a rear axle 44 on which are mounted rear support wheels 45.

The rear end of the elevating platform 26 has welded thereto a pair of cross bars 46 on each of which are pivoted links 47 through stub shafts 48, the said links being in turn pivoted at 49 to the rear support link 41. It is obvious from an examination of Figs. 1 and 3, that counterclockwise rotation of each forward support link 28 is accompanied by clockwise rotation of each rear support link 41, with the result that the elevating platform is raised from the position of Fig. 1 to the position of Fig. 3. As was indicated earlier, this vertical movement of the elevating platform is accomplished with substantially no longitudinal movement thereof. It is further obvious that vertical movement of the elevating platform is accomplished effectively by a lifting ram substantially horizontally positioned at an extremely low level relatively to the main frame of the truck, and relatively to the elevating platform. Those skilled in the art will now fully appreciate the considerable merits of my contribution to the art.

I now claim:

1. In a truck of the class described, a horizontally extending main frame, a horizontally extending elevating platform, a forward support link pivoted at its rear end to said main frame and at its forward end to said elevating frame and with the rear end pivot thereof above the forward end pivot when the elevating frame is lowered, the forward end pivot swinging upwardly above the rear end pivot to lift the elevating frame relatively to the main frame, a rear support link for the rear end of said elevating frame, means pivoting said rear support link at its forward end on said main frame, an auxiliary link pivoted to the rear end of said rear support link and also to said elevating platform, a tension member secured to said rear support link and to said forward support link for co-ordinating the upward movement of the forward and rear ends of said elevating frame, a lifting link pivoted on said main frame and having a part thereof bearing against said

elevating frame, a hydraulic ram mounted on said main frame, and means whereby said hydraulic ram rotates said lifting link on its pivot for imparting thrust to said elevating platform to lift said platform relatively to said main frame.

2. In a truck of the class described, a horizontally extending main frame, a horizontally extending elevating platform, a forward support link pivoted at its forward end to said elevating frame and at its rear end to said main frame and with the rear end pivot thereof above the forward end pivot when the elevating frame is lowered, the forward end pivot swinging upwardly above the rear end pivot to lift the elevating frame relatively to the main frame, a rear support link for the rear end of said elevating frame, means pivoting said rear support link at its forward end on said main frame, an auxiliary link pivoted to the rear end of said rear support link and also to said elevating platform, a tension member secured to said rear support link and to said forward support link for co-ordinating the upward movement of the forward and rear ends of said elevating frame on said forward and rear support links, a lifting link pivoted on a horizontal axis relatively to said main frame and having a part thereof in sliding thrust relation to said elevating platform, a hydraulic ram mounted on said main frame, and means whereby said hydraulic ram rotates said lifting link on its pivot for imparting thrust to said elevating platform to lift said platform relatively to said main frame.

3. In a truck of the class described, a horizontally extending main frame, a horizontally extending elevating platform, a forward support link pivoted at its forward end to said elevating frame and at its rear end to said main frame and with the rear end pivot thereof above the forward end pivot when the elevating frame is lowered, the forward end pivot swinging upwardly above the rear end pivot to lift the elevating frame relatively to the main frame, a rear support link for the rear end of said elevating frame, means pivoting said rear support link at its forward end on said main frame, an auxiliary link pivoted to the rear end of said rear support link and also to said elevating platform, a tension member secured to said rear support link and to said forward support link for co-ordinating the upward movement of the forward and rear ends of said elevating frame on said forward and rear support links, a lifting link pivoted on a horizontal axis relatively to said main frame, a thrust part carried by said lifting link, a surface on the underside of said elevating frame against which said thrust part bears, a hydraulic ram, means mounting said hydraulic ram on said main frame with its thrust imparting member in a substantially horizontal position and with its axis of movement below the pivot of said lifting link on said main frame, and means whereby said hydraulic ram rotates said lifting link on its pivot for imparting thrust to said elevating platform to lift said platform relatively to said main frame.

4. In a truck of the class described, a horizontally extending main frame, a horizontally extending elevating platform, a forward support link pivoted at its ends to said elevating frame and with its main frame pivot above said elevating frame pivot when said elevating frame is lowered, the elevating frame pivot swinging above the main frame pivot to lift the elevating frame relatively to the main frame, a rear support link, means pivoting one end of said

rear support link on said main frame, an auxiliary link pivoted to the rear end of said rear support link and also to said elevating platform, a tension member secured to said rear support link and to said forward support link for co-ordinating the upward movement of the forward and rear ends of said elevating frame on said links, a lifting link pivoted on said main frame and having a part thereof bearing against said elevating frame, a hydraulic ram mounted on said main frame, and means whereby said hydraulic ram rotates said lifting link on its pivot for imparting thrust to said elevating platform to lift said platform relatively to said main frame.

5. In a truck of the class described, a horizontally extending main frame, a horizontally extending elevating platform, a forward support link pivoted at its ends to said elevating frame and main frame and with its main frame pivot above said elevating frame pivot when said elevating frame is lowered, the elevating frame pivot swinging above the main frame pivot to lift the elevating frame relatively to the main frame, a rear support link, means pivoting one end of said rear support link on said main frame, an auxiliary link pivoted to the rear end of said rear support link and also to said elevating platform, a tension member secured to said rear support link and to said forward support link for co-ordinating the upward movement of the forward and rear ends of said elevating frame on

5 said links, a lifting link pivoted on a horizontal axis relatively to said main frame, a thrust part carried by said lifting link, a surface on the underside of said elevating frame against which said thrust part bears, a hydraulic ram, means mounting said hydraulic ram on said main frame with its thrust imparting member in a substantially horizontal operating position and with its axis of movement below the pivot of said lifting link on said main frame, and means whereby said hydraulic ram rotates said lifting link on its pivot for imparting thrust to said elevating platform to lift said platform relatively to said main frame.

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