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RAM CONSTRUCTION FOR INDUSTRIAL LIFT TRUCKS

Filed Oct. 22, 1951

3 Sheets-Sheet 1

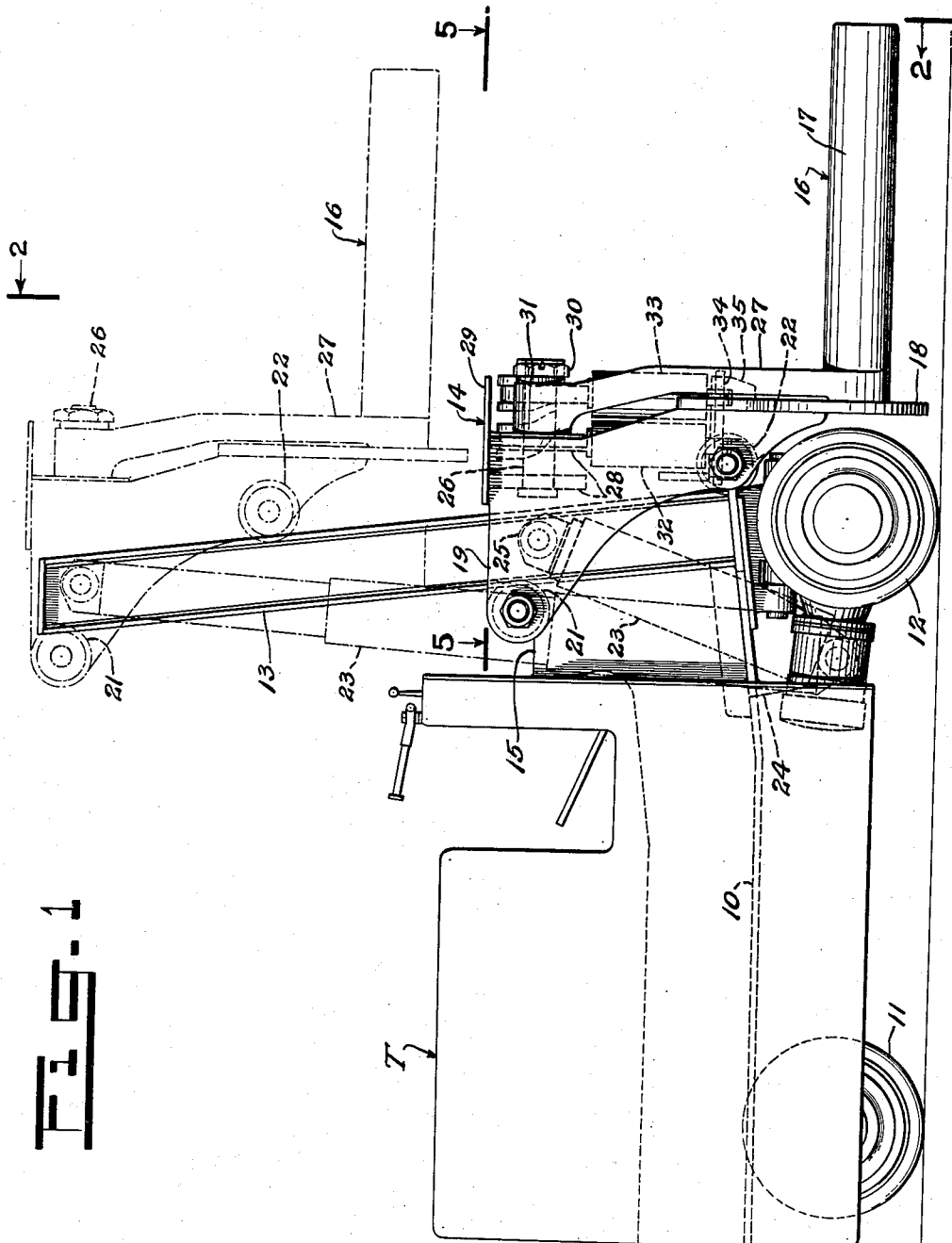


Fig. 1

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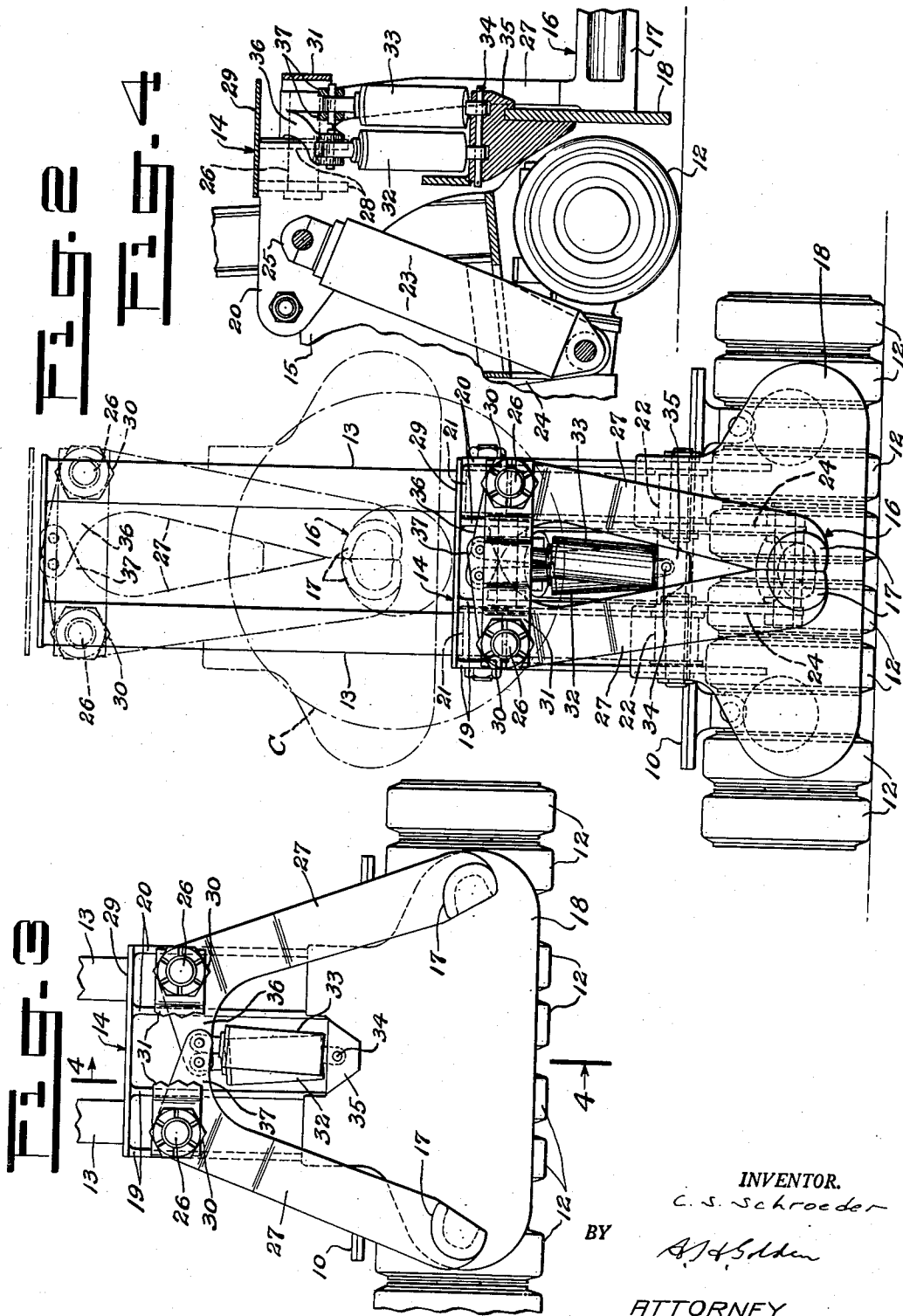
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RAM CONSTRUCTION FOR INDUSTRIAL
LIFT TRUCKS

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This invention relates to industrial lift trucks of the class in which the load lifting member is an outwardly extending arm or ram that is inserted into an aperture or other confining part of a load.

As one feature of my invention, I construct the ram of my truck in two sections, these sections when moved apart serving as two rams capable of engaging and lifting an increased number of relatively light loads simultaneously. As a further feature, the ram sections are complementary in shape so that when moved together they form a single ram to handle a single load.

As another feature of the invention, I mount the ram sections through a particular construction of the lifting carriage whereby the operator of the truck may very readily present to the load to be picked up either one or two rams as may be desired at any particular moment.

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. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of my invention, in order to prevent the appropriation of my invention by those skilled in the art.

Referring now to the drawings:

Fig. 1 is a side view of my novel ram truck.

Fig. 2 is an end view taken on the line 2-2 of Fig. 1.

Fig. 3 is a partial end view showing the ram sections separated to form two rams.

Fig. 4 is a sectional side view taken substantially on the line 4-4 of Fig. 3.

Fig. 5 is a plan view taken on the line 5-5 of Fig. 1.

In the drawing, a preferred form of my invention is shown as embodied in a truck, indicated generally by the letter T, having a main frame 10, rear wheels 11, and traction wheels 12 that are located beneath the extreme front end portion of the frame 10. This truck may be powered and steered through any suitable means for the

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purpose, and the particular details of these means are not important to an understanding of my invention. As is customary in lift trucks of the class described, the front end of the truck frame 10 is equipped with a pair of uprights 13 upon which a load-lifting carriage 14 is mounted for upward and downward movement. In the particular embodiment shown, the uprights 13 are reinforced by a pair of plates 15, and are fixed at a substantial rearward inclination so that the center of gravity of the load will be shifted inwardly toward the truck as the lifting carriage 14 moves upwardly thereby improving the stability of the truck when the load is in an elevated position.

The load-engaging ram of my invention is designated generally by the numeral 16 and extends horizontally forward from a lower portion of the carriage 14 in the manner of a conventional ram. My ram, however, is longitudinally split so as to provide two complementary ram sections 17 that can be laterally separated so as to provide in effect two rams. In order to afford this lateral movement of the ram sections 17 and to support these sections most effectively through the lifting carriage 14, I utilize a novel construction that will now be described.

The main body portion of the lifting carriage 14 includes primarily a transverse face plate 18 (Fig. 1), and two pairs of vertical plates 19, 20 that are secured to the back of the face plate in such an arrangement as to extend rearwardly adjacent opposite sides of each of the uprights 13 (Fig. 5). Between the vertical plates 19, 20 of each pair are journaled upper rollers 21 that run along the rear surfaces of the uprights 13, and lower rollers 22 that run along the front surfaces of the uprights. The vertical plates 19, 20 are approximately triangular in shape, with the parts that carry the upper rollers 21 projecting rearwardly of the uprights 13, and with the face plate 18 carried in a downwardly projecting position in front of the lower rollers 22. Through this arrangement the rollers 21 and 22 guide the lifting carriage 14 as it moves along the uprights 13, and when the carriage is in its lowermost position the face plate 18 will occupy a position in front of the traction wheels 12. As a means for lifting the carriage 14, a hydraulic ram 23 is pivoted to brackets 24 on the truck frame 10, and is equipped at its upper end with a crosshead 25 that is pivoted to the inner vertical plates 19, 20 between the uprights 13.

It has already been pointed out that the ram 16 extends forwardly from a lower portion of

the carriage 14. However, the actual attachment of the ram 16 or the sections 17 of which it is composed is through a pair of pivot shafts 26 in the upper portion of the carriage. Each of the ram sections 17 is integrally formed at the lower end of an arm 27 that depends from one of the pivot shafts 26, thereby mounting the ram sections for the desired lateral movement. The rearward ends of the ram sections 17 abut the face plate 18 so that the rearward reaction resulting from loads upon the sections will be accepted by the face plate, and the pivot shafts 26 will be relieved of a considerable amount of stress. The face plate 18 is extended in a lateral direction, as may be seen, for example, in Fig. 3, so that it will offer support to the ram sections 17 in any of the lateral positions to which the sections may be moved.

In order to support the pivot shafts 26 upon the lifting carriage 14, a pair of spaced vertical plate members 28 are welded between the upper portions of each pair of carriage plates 19, 20 in transverse positions forwardly of the uprights 13. The pivot shafts 26 are mounted in apertures in these plate members 28 and are thereby located in positions extending longitudinally of the truck immediately forward of each upright. The plate members 28 do, of course, serve to reinforce the lifting carriage 14, and a top plate 29 that is welded to the plate numbers 28 and to the vertical plates 19, 20 also forms a part of the lifting carriage. The depending arms 27 are retained upon the pivot shafts 26 by nuts 30, these nuts also retaining a cross member 31 that braces the outer ends of the pivot shafts.

The means that swings the ram sections 17 laterally is in the form of a pair of hydraulic rams 32, 33, and in order that these hydraulic rams may be located in the limited space between the innermost vertical plates 19, 20 of the lifting carriage, they are relatively offset along the center line of the truck. The lower ends of the hydraulic rams 32, 33 are mounted through a common pivot pin 34 upon a base member 35. The base member 35 may conveniently be formed as a casting and is welded in position between the lower portions of the vertical carriage plates 19, 20 immediately behind the face plate 18. The upper ends of the hydraulic rams 32, 33 are pivoted to operating levers 36, 37 that are each formed integrally with one of the depending arms 27, and that form with said arms bell-crank levers through which the hydraulic rams 32, 33 move the ram sections 17 laterally. It will be observed that the operating lever 37 and the operating lever 36 are offset relatively to each other because of the offset relationship of the rams 32 and 33. As a result of this offset arrangement, the operating levers 36, 37 may be made longer than would otherwise be permissible, and the rams 32, 33 are thereby afforded increased leverage for moving the ram sections 17. It will be seen, therefore, that the operator may through suitable control means actuate the hydraulic rams 32, 33 to move the load-engaging ram sections 17 outwardly so as to form separate rams as shown in Fig. 3, or may on the other hand move these sections together to form a single ram as shown in Fig. 2.

The ram sections 17, being complementary in shape, present a substantially continuous rounded upper surface for supporting the load when they are disposed together, as is customary in unitary rams. Thus, it will be observed in Fig. 2 that a load indicated by the letter C is sup-

ported upon a rounded surface provided by both of the ram sections 17. When these sections are moved apart as shown in Fig. 3, they will still present rounded upper supporting surfaces because of their rotation about the pivot shafts 26 during their separating movement.

It is believed that the operation of my novel ram truck will be clear from the foregoing description, and that its advantages will now be fully apparent.

I now claim:

1. In a truck of the class described, a lifting carriage, means mounting said lifting carriage for lifting and lowering movement on said truck, a pair of complementary ram sections forming when held in juxtaposed relation a single ram for lifting engagement with a load, an arm extending from the inner end of each of said ram sections to support said ram section in a position extending outwardly from said lifting carriage, pivot means mounting said arms on said lifting carriage for movement of said ram sections laterally of said truck into and out of juxtaposed relation to one another, means for moving said ram sections laterally on said arms into separated positions whereby to present in effect two rams for lifting engagement with two loads to be lifted by said lifting carriage, and a face plate on said lifting carriage juxtaposed to the inner ends of said ram sections to offer support to said ram sections in the various positions to which they are swung on said pivot means.

2. In a truck of the class described, a lifting carriage, means mounting said lifting carriage for lifting and lowering movement on said truck, a pair of load-engaging members forming when juxtaposed to one another a single ram, an arm supporting each of said load-engaging members in a position extending forwardly from said lifting carriage, pivot means mounting said arms on said lifting carriage for lateral swinging movement of said load-engaging members relatively to each other, a curved surface portion on each load-engaging member shaped to provide in conjunction with the curved surface portion on the other member an upper substantially continuous load-lifting surface when the load-engaging members are in juxtaposed relation, means for swinging said arms on said pivot means to move said load-engaging members from said juxtaposed relation to a separated relation whereby to form two rams, and the curved surface portions on said load-engaging members presenting upwardly a load-lifting surface on each of said two rams.

3. In a truck of the class described, a lifting carriage, means mounting said lifting carriage for lifting and lowering movement on said truck, a transverse face plate on said lifting carriage, a pair of load-engaging members forming when juxtaposed to one another a single ram, an arm supporting each of said load-engaging members in a position juxtaposed to said face plate and extending forwardly therefrom, pivot means mounting said arms on said lifting carriage for lateral swinging movement of said load-engaging members relatively to each other across the front of said face plate, a curved surface portion on each load-engaging member shaped to provide in conjunction with the curved surface portion on the other member when the load-engaging members are in juxtaposed relation to one another an upper substantially continuous load-lifting surface on said ram, means for swinging said arms on said pivot means to move

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said load-engaging members from said juxtaposed relation to separated positions whereby to form two rams, and said face plate offering support to said load-engaging members in both the juxtaposed and separated positions of said members.

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