Nov. 25, 1952 P. JESSEN 2,619,241

DEVICE FOR LOADING AND UNLOADING INDUSTRIAL TRUCKS

Filed Feb. 18, 1948 3 Sheets-Sheet 1

FIG. 1

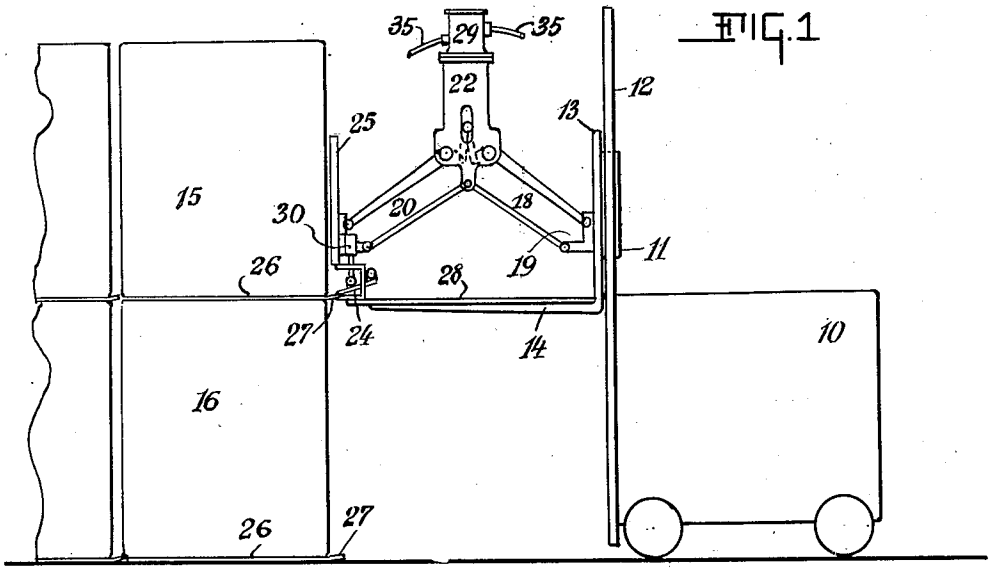
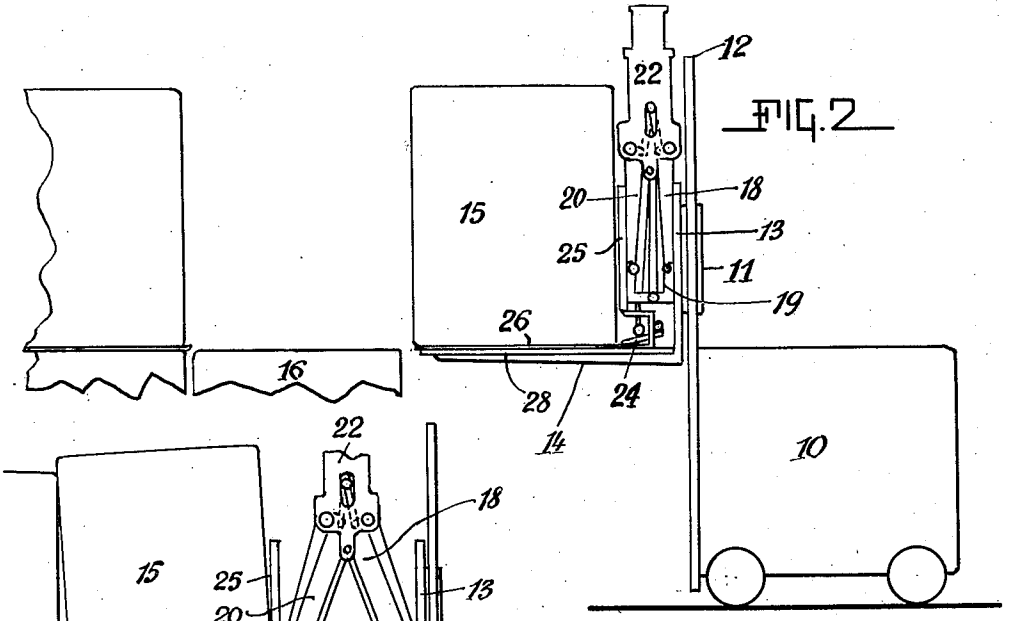


FIG. 2



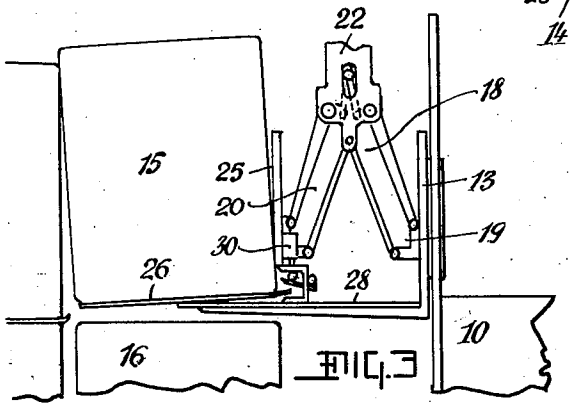


FIG. 3

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Nov. 25, 1952 P. JESSEN 2,619,241

DEVICE FOR LOADING AND UNLOADING INDUSTRIAL TRUCKS

Filed Feb. 18, 1948 3 Sheets-Sheet 2

FIG. 4

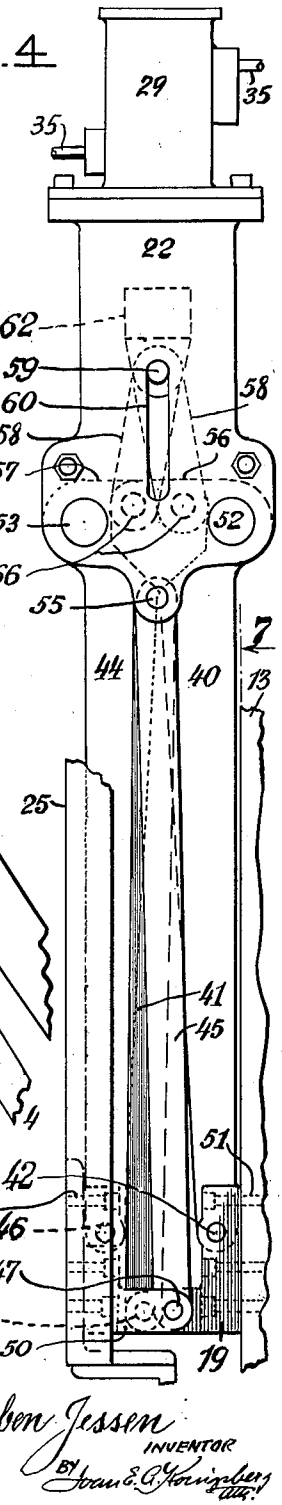


FIG. 5

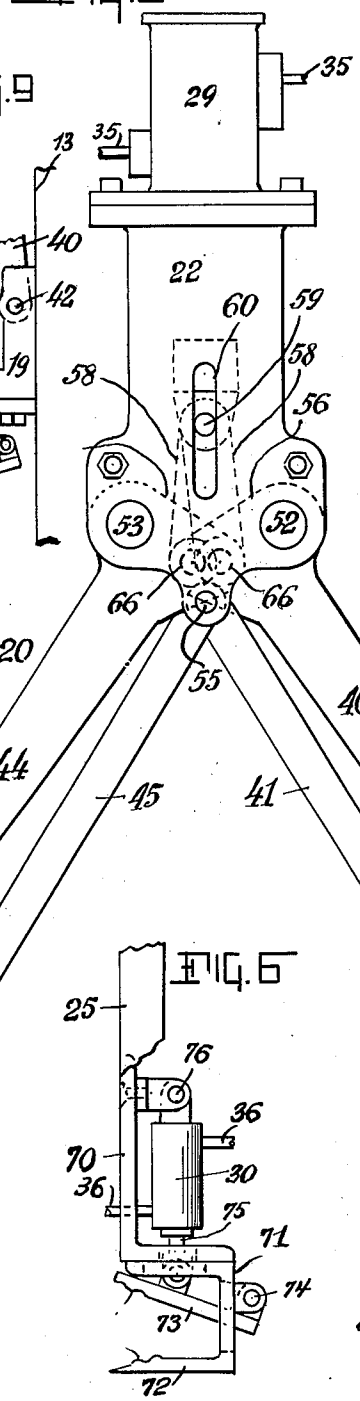


FIG. 8

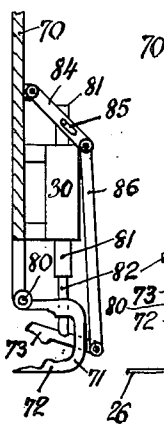


FIG. 9

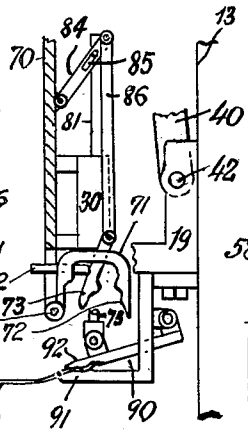


FIG. 10

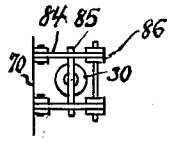
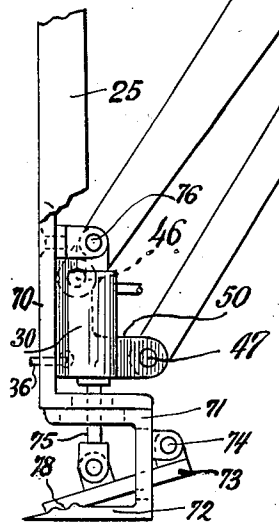


FIG. 6

FIG. 7



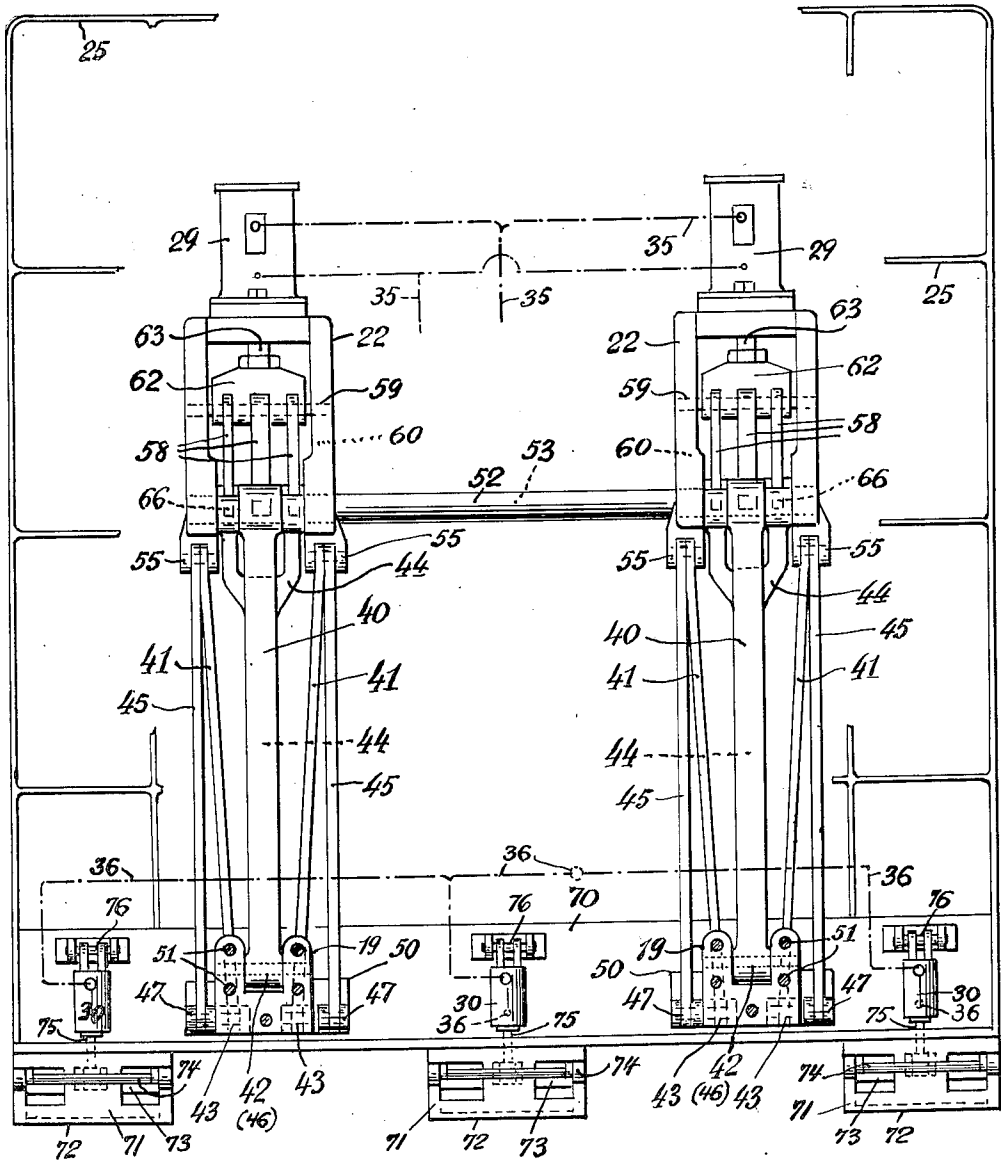
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Nov. 25, 1952 P. JESSEN 2,619,241

DEVICE FOR LOADING AND UNLOADING INDUSTRIAL TRUCKS

Filed Feb. 18, 1948 3 Sheets-Sheet 3

FIG. 7



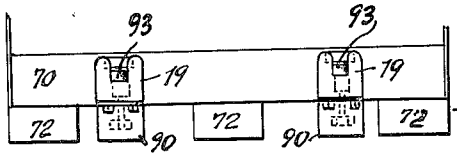


FIG. 11

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2,619,241

DEVICE FOR LOADING AND UNLOADING INDUSTRIAL TRUCKS

Preben Jessen, Ridgefield Park, N. J.

Application February 18, 1948, Serial No. 9,057

2 Claims. (Cl. 214—65)

1

The object of this invention is to provide a novel and improved load handling mechanism embodied in a load-take-on and a load discharging device adapted to be mounted upon an industrial lift fork truck for loading and unloading material upon and from the truck.

The device is to be used in handling loads which do not rest upon pallets or skids, but upon a transfer sheet which is placed underneath the load unit when the unit is stacked. The transfer sheet is a sheet of cardboard or the like which is slightly larger than the load unit so that a few inches of cardboard projects in front of the load to serve as a gripping edge.

The load take-on device is a gripper and means for operating it. When for example a railroad car is to be unloaded, the industrial truck is driven into the proper load take-on position and then the gripper is actuated to seize the projecting edge of the transfer sheet and pull the latter and the load unit aboard the truck. The truck is provided with a transfer platform in the form of a thin metal sheet which is detachably or permanently supported upon the forks of the truck. The transfer platform receives the transfer sheet with the load unit resting on the sheet. Thus the load units need not be supported upon pallets or skids before or after having been taken on and discharged from the truck. The truck may carry a pallet or skid upon the truck forks to receive the load unit resting upon the transfer sheet and the load may be discharged from the sheet upon a pallet or skid.

The invention is embodied in a load-take-on and a load discharging device in the form of an upright compass having two legs pivotally joined at their upper ends. The foot of one of the legs is secured to the elevator plate of the truck lift or like lifting means. The foot of the other leg is free to move and carries the gripper and a load push-off device. Normally the compass is collapsed. When a load unit is to be taken on, the compass is extended so that the gripper may seize the projecting edge of the transfer sheet. Then the compass is collapsed whereby the load upon the transfer sheet together with the sheet is pulled aboard the truck and comes to rest upon the transfer platform.

When the truck reaches the place of discharge it is driven into a position so that the load may be discharged immediately above the place where it is to rest. This may be the floor or a higher level. Then the compass is extended and at the same time the truck is backed away from the load to withdraw the forks from underneath the load. The free end of the compass is brought to bear

2

against the load to keep it above its final resting place. When the truck is finally clear of the load, the compass will have been fully extended and the load will then settle down into its final place of deposit.

In order to prevent the transfer sheet from being discharged with the load as the latter is being pushed off the transfer platform, the invention includes sheet holding or retaining grippers which are actuated to seize the free edge of the transfer sheet and retain the sheet upon the transfer platform while the load is being pushed off. In such case the pull-on grippers are modified in construction so as to be moved away from the transfer sheet and release the sheet. After the load has been discharged from the transfer sheet, the latter may be used for handling another load.

The invention is embodied in a load handling device as hereinafter described and as illustrated in the accompanying drawings in which

Fig. 1 is a diagrammatic view of a fork lift truck equipped with a load handling device embodying the invention and showing the compass device extended ready to take on a load.

Fig. 2 is a similar view showing the load unit having been taken aboard the truck and resting upon the transfer platform.

Fig. 3 illustrates the load discharging operation.

Fig. 4 is an enlarged view of the compass device showing it in collapsed position.

Fig. 5 is a view of Fig. 4 with parts broken away and showing the compass device in extended position.

Fig. 6 is a detail view of the gripper for seizing the edge of the transfer sheet underneath the load.

Fig. 7 is a view of the compass device looking forward from the truck, the view being taken on the line 7 in Fig. 4 with parts broken away and parts in section. Hydraulic pressure supply lines are in this view indicated by dot and dash lines.

Fig. 8 is a detail side view of the pull-on grippers arranged to release the transfer sheet.

Fig. 9 is a similar view showing the pull-on gripper in sheet releasing position so that the retaining grippers may act on the sheet.

Fig. 10 is a detail view of parts shown in Fig. 8.

Fig. 11 is a diagrammatic view showing the relative positions of the pull-on grippers and the retaining grippers.

Referring first to Figs. 1, 2 and 4 an industrial fork lift truck is indicated at 10 having a load elevator 11 operated between guides 12. The elevator carries a front elevator plate 13 and loading forks 14. Inasmuch as trucks of this type

are known in the art further description and illustration are deemed not necessary in order to understand the invention. For the sake of explanation load units are marked 15 and 16. The load units may be handled at floor level or higher levels.

The compass device provided by this invention comprises a rear compass leg 18 which is pivotally secured upon a pivot support 19 secured to the elevator plate 13, and a forward extensible compass leg 20. The two legs 18 and 20 are pivotally joined at their upper ends by a pivot head 22. The forward leg 20 carries a gripping mechanism 24 and also a load push-off member 25. From the two ultimate positions of the compass device shown in Figs. 1 and 2 it is clear that when a load unit is to be taken on to the truck, the compass is extended to seize the load and as the load is taken aboard the truck the compass is collapsed.

On the truck the load unit rests upon a transfer platform 28, the projecting edge 27 of the load transfer sheet 26 having been seized by the gripper 24. The transfer platform 26 is supported upon the forks 14. The compass device as well as the gripping means are power operated by means of hydraulic double acting cylinders 29 and 30 of any suitable construction and operation connected by pipes 35, 35 and 36, 36, respectively, to a suitable pumping unit, not shown, carried by the truck 10. The power, hydraulic or otherwise, for operating the compass is separate from the power for operating the gripper 24. With this limitation any other arrangement and means may be employed for supplying power to these devices to operate them.

In Fig. 1 the compass is shown extended and the gripper 24 has seized the projecting edge of the transfer sheet 26 underneath the load unit 15. Thereafter the compass is collapsed whereby the load 15 is pulled or taken aboard the truck to rest upon the transfer platform 28. The latter may be a pallet or skid, not shown. In Fig. 2 the load is aboard the truck and the latter may then drive away. Fig. 3 shows the unloading operation. The truck is operated to position the load 15 immediately above the load 16 upon which it is to be deposited. Then as the truck starts to back away from the load, pressure is applied to operate the compass to extend the leg 20 and whereby the push-off member 25 exerts a steady pressure upon the load to prevent it from following the movement of the truck, the compass being more and more extended as the truck backs away. When the latter is clear of the load the latter will automatically settle down upon the load 16 or other support. The load 15 is now fully discharged from the truck.

Referring now to Figs. 4, 5, 6 and 7, the several parts of the compass device are perhaps best seen in Figs. 5 and 7. Each compass leg 18 and 20 consists of three arms. The rear leg 18 consists of the main arm 40 and two side arms 41, 41. The lower ends of these arms are pivoted at 42, 43, respectively, on the pivot support 19. The front leg 20 consists also of three arms, namely the main arm 44 and two side arms 45, 45. The lower ends of these three arms are pivoted at 46, 47, respectively, upon a pivot support 50 which corresponds to the pivot support 19 aforesaid. The latter is secured to the elevator plate 13 by bolts 51. The bolts are seen in section in Fig. 7. The front pivot support 50 carries the push-off member 25.

As seen in Fig. 7 there are two compass devices side by side. The same reference numbers apply to each of them. By using two devices, the parts of each can be lighter and smaller and operating strains divided and equally distributed.

At the top the two main arms 40 and 44 are pivoted upon two shafts 52 and 53 which are supported in the pivot heads 22. The shafts extend across from one pivot head to the other. Hence the two compass devices move together when power is applied or released. The side arms 41, 41 and 45, 45 are pivoted on the pivot heads 22 on axially alined pivot studs 55, 55. The main arms 40 and 44 are bell crank shaped at their upper ends as shown at 56, 57 respectively. The short arms of the bell cranks are pivotally connected at 66, 66 by links 58, 58 to a shaft 59 which is slidably supported in slots 60 in the pivot heads 22. The shaft 59 is carried in a pressure head 62 slidably carried in the pivot heads 22. The pressure head 62 has a stem 63 which is the piston stem in the pump cylinder 29, details being omitted. The pivot head 50 for the front leg 18 is secured to the push-off member 25 by bolts 65, Fig. 4.

The push-off member 25 is an open work member as shown. The bottom of the push-off member, Fig. 7, is a plate 70 which extends across the member. To this plate is secured the gripper devices which are spaced so as to grip the transfer sheet with equal force along its edge. Each gripper device consists of a housing 71 forming a fixed lower gripper jaw 72 having a sharpened edge as shown so as to move easily in under the edge of the transfer sheet 26. A movable upper gripper jaw 73 is pivoted in the housing at 74. The upper jaw is pivotally connected to the piston stem 75 of the pressure cylinder 30 which in turn is pivoted at 76 upon the plate 70. By applying or releasing pressure in the cylinder the gripper is closed or opened. The jaws have teeth 78 for better gripping function.

Normally the compass device is collapsed as shown in Figs. 2 and 4. When a load unit is to be picked up by the truck, the truck is driven to the load as shown in Fig. 1. The valve 34 is then fully opened or enough to supply pressure to the cylinder 29 to force the piston stem 63 down, Fig. 7. The pressure head 62 moves down with the shaft 59 and the links 58 then operate on the short arms of the bell cranks 56, 57 upon the main arms 40 and 44 to cause the latter to be swung about their pivots 42 and 46, respectively, and thereby extend the compass device, the side arms 44 and 45 serving as a guiding mechanism to pull down or cause the pivot heads 22 to move down as the pressure is increased and applied to the pressure heads 62 and sliding shafts 59.

In the fully extended position of the compass as shown in Fig. 1, see also Fig. 5, the sharp edge of the fixed gripper jaw 72 slides in under the projecting edge 27 of the transfer sheet 26. Then pressure is supplied to the gripper cylinder 30 and the gripper closes upon the sheet. The pressure in the cylinder 30 is maintained during the load-take-on operation.

Thereafter pressure is applied in the cylinders 29 to lift the pressure heads 62 with the shafts 59 and the links 58 are caused to lift the bell cranks and the main arms move back into collapsed position whereby the load is taken aboard the truck as seen in Fig. 2. Pressure may be balanced in the cylinders 29 to keep the load in position on the transfer sheet and trans-

fer platform during transport and the grippers may remain closed for the same purpose.

When the truck arrives at the unloading point as in Fig. 3 the pressure in cylinders 29 is gradually increased to extend the compass device to push the load off the truck and when the forks and transfer platform have been withdrawn from underneath the load, the grippers are opened.

In order to save the transfer sheets for subsequent uses the invention includes a mechanism whereby the grippers 72—73 may be opened to release the transfer sheet during the discharging operation and other grippers operated to retain the sheet on the transfer platform. The device illustrated in Figs. 8 to 11 serves this purpose. In these figures the gripper jaws are numbered 72—73 as before, but they are of slightly different shape and the gripper housing 71 is pivoted at 80 on the push-off plate 70. The cylinder 30 which actuates the movable gripper jaw 73 in Fig. 6 actuates the same jaw in Fig. 8 but is not directly connected thereto. In Fig. 8 the cylinder stem 81 acts upon a short stem 82 suitably supported and operatively connected to the jaw 73 to operate the latter. The stem 81 extends through the cylinder 30 and is connected to a pair of levers 84, 84 by a pin and slot connection as at 85. The levers 84 in turn are connected to links 86, 86 which serve the double purpose of operating the movable gripper 73 and also lifting the gripper about the pivot 80 from the position in Fig. 8 to the position in Fig. 9. When a load is to be discharged the pull-on grippers 72—73 are thus released from the sheet and swung into inoperative position.

Two sheet retaining grippers 90, 90 are secured to the pivot members 19, Figs. 4 and 7, between the grippers 72—73, Fig. 11. Each gripper 90 comprises a fixed gripper jaw 91 and a movable gripper jaw 92. The latter is actuated by a cylinder 93 in the same manner in which the movable jaw 73 is operated by the cylinder 30. Fig. 9 shows the retaining grippers 90 in position on the pivot members 19. The cylinders 93 are not shown in Fig. 9 but appear in Fig. 11.

When a load is to be pushed off the transfer sheet, the pull-on grippers are opened and swung out of the way, Fig. 9. Thereafter the retaining grippers 90 are closed and grip the transfer sheet. Inasmuch as the retaining grippers are mounted on the stationary pivot members 19 it follows that the sheet 26 remains stationary on the transfer platform. When the load has been discharged, the retaining grippers are opened and the sheet may then be removed and used over again.

No attempt has been made in this disclosure of the invention to describe and illustrate any specific pressure supplying, reversing and operating mechanisms beyond the diagrammatic illustrations referred to above. Such mechanisms are common knowledge in the art of industrial trucks.

The transfer platform 28 may be a pallet or a skid in which case the operations may be performed as described and the load unit may with equal facility be discharged upon a pallet or skid, and may be taken on and discharged at different levels. These specific uses of the invention are not illustrated.

I claim:

1. The combination with an industrial truck having load elevating means, a device for loading and unloading the truck with loads resting upon transfer sheets, said device being in the form of an upright compass having two depending legs pivotally joined at their upper ends, means for pivotally securing one of said legs to said elevating means, the other leg being freely movable with respect to the first leg, a load push off member, means for pivotally securing the free end of the said other leg to said member, gripping means, adapted to engage the said load supporting transfer sheet, means for mounting said gripping means upon said load push off member, means for operating said device to extend the said compass into a load take on position and collapse the compass to load the truck and means for operating said gripping means to seize said transfer sheet when said compass is moved into its load take on position and maintain the grip upon the transfer sheet while the compass is moved into collapsed position whereby to load the truck.

2. A device according to claim 1 including two upright compass mechanisms in spaced side by side relation across said truck and means for simultaneously operating said compass mechanisms as set forth, and including three gripping means in spaced side by side relation across the said truck and in staggered relation with said compass mechanisms and means for simultaneously operating all of the gripping means as set forth.

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