April 12, 1932. R. L. STIFFLER 1,853,887

LIFTING COUPLER FOR CONTAINERS AND THE LIKE

Filed Aug. 26, 1930 2 Sheets-Sheet 1

FIG. I.

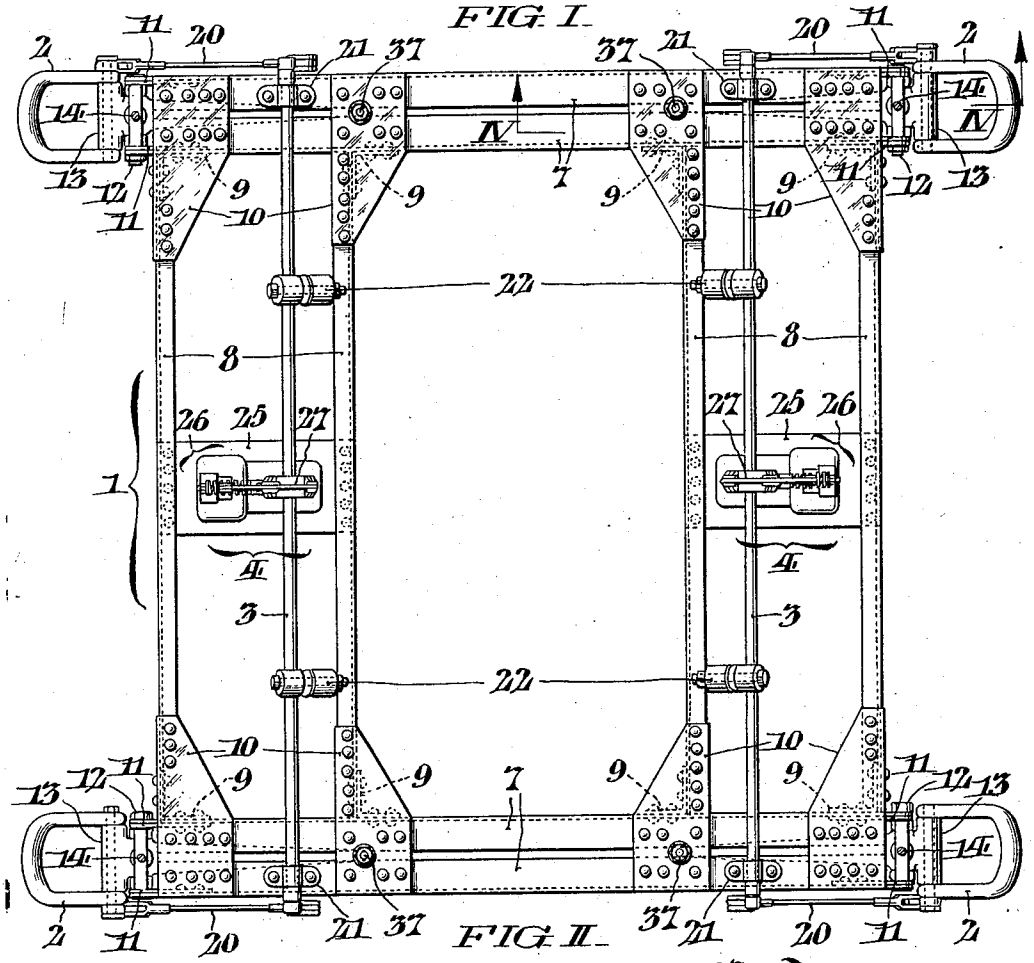
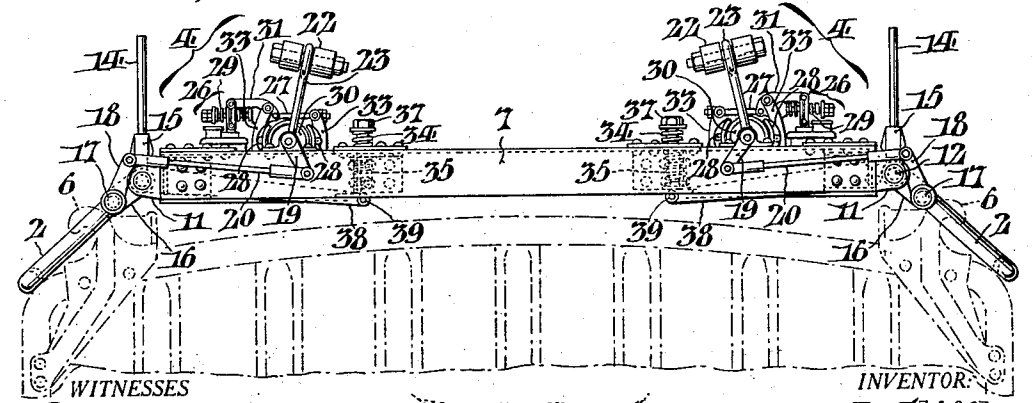


FIG. II.



WITNESSES

Thomas W. Kerr, Jr.

George M. Mueckamp

INVENTOR:

Ralph L. Stiffler,

BY Fraley & Paul

ATTORNEYS.

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FIG. III.

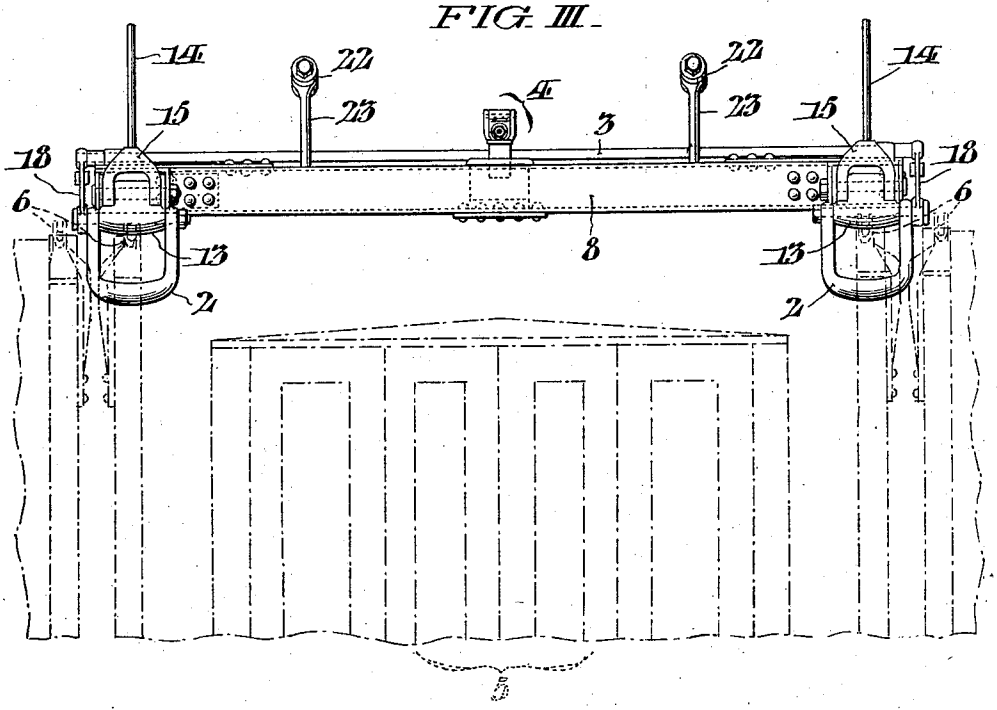
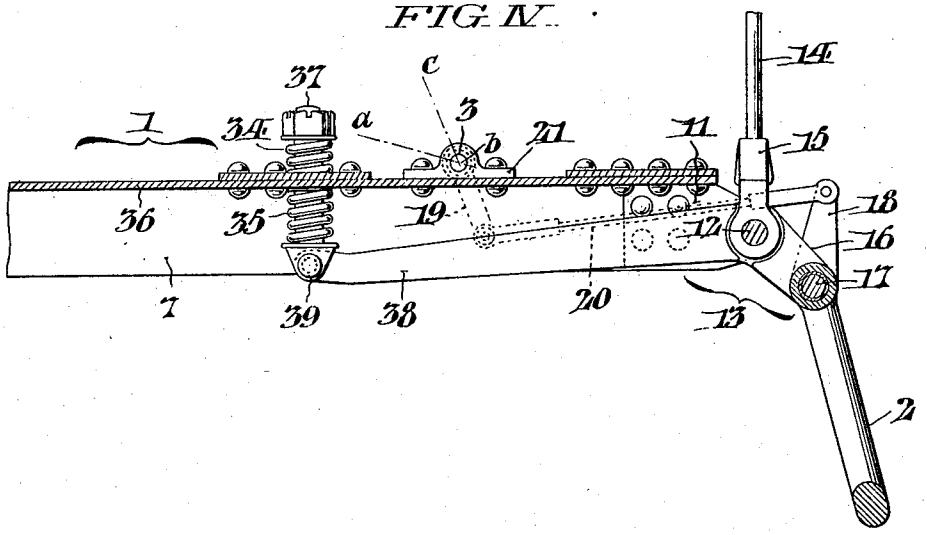


FIG. IV.



WITNESSES

Thomas W. Kerr, Jr.

George M. Moorhouse

INVENTOR:

Ralph L. Stiffler,

BY Fraser & Paul

ATTORNEYS.

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UNITED STATES PATENT OFFICE

RALPH L. STIFFLER, OF ALTOONA, PENNSYLVANIA

LIFTING COUPLER FOR CONTAINERS AND THE LIKE

Application filed August 26, 1930. Serial No. 477,964.

This invention relates to lifting couplers and is especially adapted to couplers for lifting bodies such as railroad shipping containers to facilitate their transfer from one place to another. Such containers are customarily accommodated side by side in double or single rows on the floor of a freight car, and to position them properly necessitates a hoisting apparatus having provision for raising, lowering and shifting a container in a truly vertical position square with respect to the other containers resting on the floor of the car. Otherwise, considerable difficulty is experienced in lowering a container into its proper position.

It has heretofore been proposed to employ lifting frames separate from a hoisting apparatus for engaging the top of containers to facilitate their transfer, but such devices have required the services of a number of men, and their use has involved delays in the positioning of the lifting frame above the containers and the securing of the load engaging members to the proper points of attachment on the containers.

The principal object of the present invention is to provide an automatic lifting coupler separate from the hoisting apparatus but adapted to be positioned above and to engage the load by means controlled from the hoisting station, so that the operations of hoisting, lowering, shifting, engaging, and disengaging containers may all be performed by a single individual.

Another object of the invention is to provide in a lifting coupler such as described, shock-absorbing means adapted to relieve the frame of the coupler of the initial strain caused by the application of the load when the object to be lifted is first raised from its place of rest.

Other objects and advantages characterizing the invention will be more fully apparent from the detailed description which follows, having reference to the accompanying drawings, in which there is illustrated one embodiment or example of the invention. Of the drawings:

Fig. I represents a plan view of a lifting coupler adapted for use with railroad shipping containers.

Fig. II represents a side elevation of the same, showing also the top portion of a container engaged by the coupler.

Fig. III represents an end elevation of the same; and,

Fig. IV represents an enlarged cross-section of a part of the coupler taken along the lines IV—IV of Fig. I, showing the load-engaging members in the position they assume when the load is engaged.

The apparatus shown in the drawings comprises generally a spacing frame 1 of substantially rectangular shape, load engaging members 2 in the form of shackles pivotally mounted at the four corners of the frame, a brake shaft 3 link-connected to the shackles 2, and a magnetic brake 4. The frame 1 corresponds roughly in its dimensions to the rectangular area at the top of the shipping container 5 within the hooks 6 which are located near the corners of the container and are outwardly directed. In the example illustrated, the frame comprises two side pieces 7, in the form of angles, and a series of transverse channel bars 8 joining the side pieces 7 at spaced intervals and rigidly secured thereto by means of angles 9 and gussets 10.

Projecting outward a short distance from each corner of the frame 1 are plates 11 riveted to the side pieces 7. The plates 11 carry at their outer ends pins 12 which serve as fulcrums for a bell crank lever 13 and also as points of attachment for the suspension cables 14. The cables 14 are connected to the pins 12 by means of yokes 15 which straddle the bell crank lever 13, as shown in Fig. III. At the end of the short arm 16 of each bell crank lever 13 there is a pin 17 to which is pivoted a shackle 2. Each shackle 2 has rigidly attached thereto an arm 18 forming with the shackle a lever pivoted about the pin 17 as a fulcrum.

Connecting the end of each arm 18 with a crank 19 on the shaft 3 there is a link 20 in the form of a turnbuckle, the length of which may be varied to adjust the angle between the depending shackle 2 and the frame 1. Accordingly, it will be seen that when the

shackles 2 at opposite sides of the container are spread apart from the position shown in Fig. IV, to that shown in Fig. II, this will effect a turning movement of the shafts 3 within their bearings 21, the extent of rotation of the shafts 3 being indicated by the angle *a b c*, of Fig. IV, which represents the angular movement of weights 22 attached to the shafts 3 by arms 23. The booster weights 22 tend to maintain the shackles 2 in a substantially vertical position, such as shown in Fig. IV. When the shackles 2 are in this position, the weight arms are in the position indicated by the line *a b*, and a considerably greater leverage force is applied to the shaft 3 than is the case when the shackles are in the spread position and the weight arms in the position indicated by the line *b c*. Thus the booster weights 22 are in a relation to the load engaging member 2 such that the force due to the weight of the booster weights increases an amount equivalent to the decrease in force due to the weight of the load engaging members as the load engaging members swing downward towards the container hooks.

Associated with each shaft 3 is a remote controlled magnetic brake 4. The magnetic brakes are shown mounted on plates 25 centrally of the shafts 3. They comprise in general a solenoid 26, the plunger 27 of which is linked to brake shoes 28, and a spring 29 tending to apply the brake shoes to the disk 30. When the solenoid is energized, the shoes 28 are drawn apart by the plunger 27 acting through levers 31, 32 and 33. When the solenoid is de-energized, the spring 29 forces the levers 33 together, bringing the brake shoes in contact with the disk 30, and thus holding the shaft 3 against rotation. The function of the brakes 4 is to maintain the opposite pairs of shackles 2 in spread position. The brakes being magnetically applied can be operated from a remote station, and the controlling switch is preferably located within convenient reach of the hoist operator.

To raise and lower the frame 1, various types of hoisting apparatus may be employed, and I preferably use a traveling crane provided with drums from which the cables 14 are suspended. In such manner the lifting coupler can be kept level and square with the lot of containers.

Mounted also on the frame 1 are springs 34 and 35 above and below the horizontal flanges 36 of the side pieces 7. A bolt 37 passes through each set of springs and joins the arm 38 of the bell crank lever 13 with a pivotal connection 39. The springs 34 and 35 serve to absorb the shock incident to the application of the load to the frame when the container is raised from its platform, the shock being transmitted to the springs through the shackles 2 and the bell crank levers 13.

The operation of the lifting coupler is as follows: When it is desired to shift the position of the container, the lifting coupler is transferred by means of the overhead crane to a point directly above the container. The lifting coupler, with its magnetic brakes 4 applied and the shackles 2 held in the spread position shown in Fig. II, is lowered to the top of the container to be lifted and guided so that the shackles will rest on the top edges of the container adjacent the hooks 6. The brakes 4 are then simultaneously released by energizing their magnets by a switch at the hoist operator's station. Upon the release of the brakes from the shafts 3, and the subsequent raising of the frame 1, the weight of the shackles 2 assisted by the weights 22 turns the shafts and the shackles 2 through the links 20 until the shackles assume the position shown in Fig. IV. As the shackles are thus drawn together and the lifting coupler raised, the shackles fall into engagement with the hooks 6 and the container is lifted from its platform. After the container has been transferred to the proper point, it is lowered to the platform. Upon striking the platform a further lowering of the lifting coupler, due to the weight of the frame 1 and the contour of the top of the container 5, causes the shackles to be spread apart and to disengage the hooks 6. When the shackles are thus spread, the brakes 4 are applied by opening the switch at the operator's station and de-energizing their magnets. With the shackles spread and the brakes applied, the coupler is in readiness to engage the next container.

It will be observed that the cables by which the lifting coupler is suspended join the frame at the pivotal points of the load engaging members, and that accordingly the load is carried direct to the hoisting apparatus, only a small fraction of the load being actually carried by the frame.

From the above description of the operation of the lifting coupler of this invention, it will be apparent that the engagement or disengagement between the shackles 2 of the lifting coupler and the hooks 6 of the container is effected automatically by the raising and lowering of the frame 1, the pivotal points of the load engaging shackles 2 being so spaced from each other as to cause the shackles to be guided by engagement with the top of the container into outwardly spread positions beyond the hooks 6 as the frame is dropped centrally upon the container, and to cause the shackles to fall of their own weight, assisted by the weights 22, into engagement with the hooks as the frame is raised. Accordingly, it is unnecessary to provide mechanism for moving the container hooks, and the operator controls the entire operation of the lifting coupler merely by raising and lowering the frame thereof and

by applying the remote controlled brakes, when it is desired to release the lifting coupler from a container, while the shackles 2 are in outwardly spread position.

While I have described my invention in some detail with reference to a specific embodiment thereof, it will be apparent that various changes may be made in the form of the apparatus disclosed without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. An automatic lifting coupler comprising a frame of a shape substantially corresponding to the object to be lifted, connections from said frame to an overhead hoisting apparatus, load engaging members pivotally mounted on said frame at opposite sides thereof, a shaft link-connected to a load engaging member, a remote controlled brake for holding said shaft against rotation to maintain the load engaging members in a spread position, and means on said frame for absorbing the initial shock incident to the lifting of the object from its resting place.

2. In combination with a rectangular container having outwardly directed hooks near the top corners thereof, an automatic lifting coupler comprising a frame substantially corresponding to the top of said container, and having connections to an overhead hoisting apparatus, load engaging shackles pivotally mounted on said frame at the corners thereof and so spaced from each other as to cause said shackles to be guided by engagement with the top of the container into outwardly spread positions as said frame is dropped centrally upon the container and to cause said shackles to fall into engagement with said hooks as said frame is raised, and means mounted on said frame for locking said shackles in outwardly spread positions.

3. In combination with a rectangular container having outwardly directed hooks near the top corners thereof, an automatic lifting coupler comprising a frame substantially corresponding to the top of said container, and having connections to an overhead hoisting apparatus, load engaging shackles pivotally mounted on said frame at the corners thereof and so spaced from each other as to cause said shackles to be guided by engagement with the top of the container into outwardly spread positions as said frame is dropped centrally upon the container and to cause said shackles to fall into engagement with said hooks as said frame is raised, means mounted on said frame for locking said shackles in outwardly spread positions, and connections from said frame to an overhead hoisting apparatus, said connections joining said frame at the pivotal points of said shackles whereby the load is carried direct to the hoisting apparatus.

4. In combination with a rectangular container having outwardly directed hooks near the top corners thereof, an automatic lifting coupler comprising a frame substantially corresponding to the top of said container, and having connections to an overhead hoisting apparatus, load engaging shackles pivotally mounted on said frame at the corners thereof and so spaced from each other as to cause said shackles to be guided by engagement with the top of the container into outwardly spread positions as said frame is dropped centrally upon the container and to cause said shackles to fall into engagement with said hooks as said frame is raised, and a remote controlled brake mounted on said frame for holding said shackles in spread positions.

5. A lifting coupler comprising a frame, a bell crank lever pivoted thereon, load engaging members pivotally attached to one arm of said lever, means associated with the other arm of said lever for absorbing the inital shock incident to the lifting of an object from its resting place, and connections from said frame to an overhead hoisting apparatus, said connections joining said frame at the fulcrum of said bell crank lever.

6. A lifting coupler comprising a frame, load engaging members pivoted on said frame, means on said frame for maintaining said load engaging members in an outwardly spread position, said means including a brake shaft and a linkage connecting said load engaging members with said shaft, and a booster weight mounted on said brake shaft in such angular relation to said load engaging members as to apply a maximum of leverage when the load engaging members are in substantially vertical position and a minimum of leverage when the load engaging members are in spread position.

In testimony whereof, I have hereunto signed my name at Altoona, Pennsylvania, this 22nd day of August, 1930.

RALPH L. STIFFLER.