

July 21, 1936.

L. M. SHOWERS, JR

2,048,144

LIFTING SLING

Filed Nov. 25, 1935

5 Sheets-Sheet 1

FIG. I.

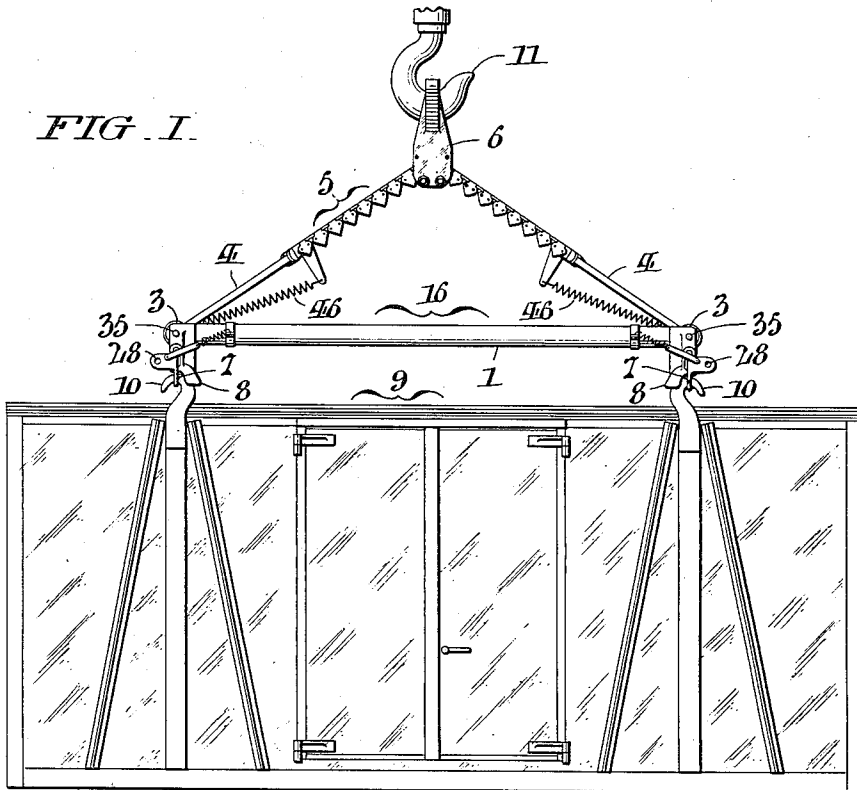
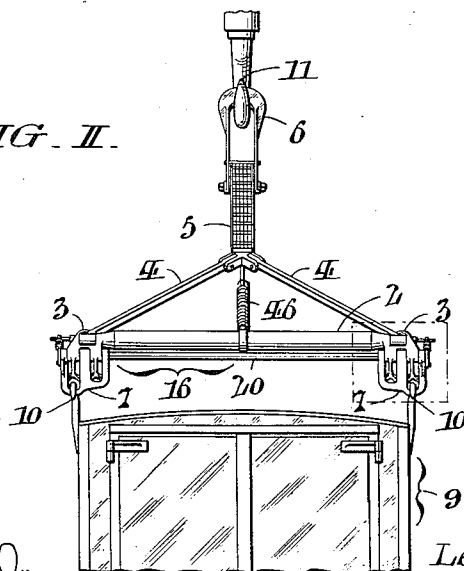


FIG. II.



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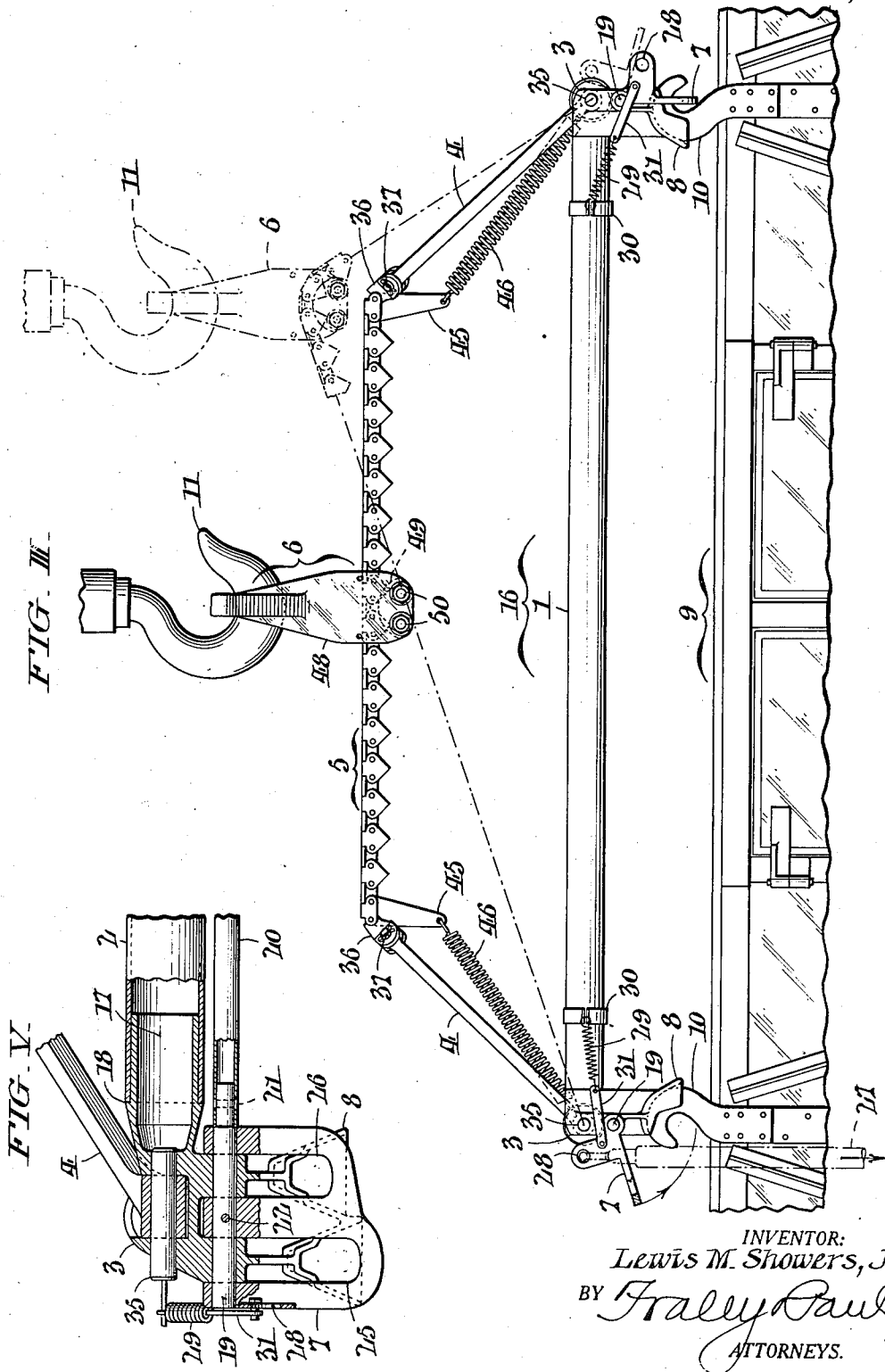
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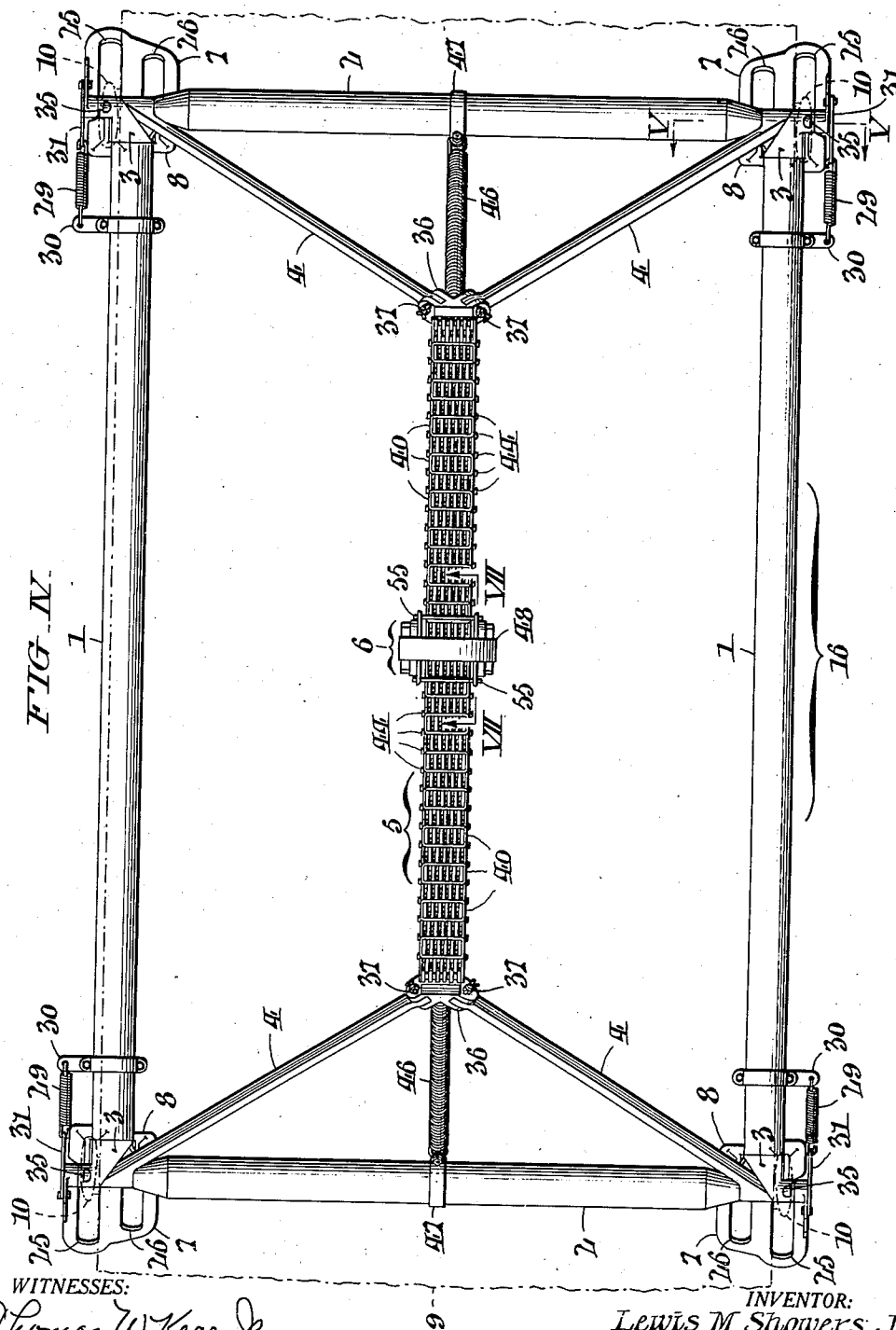
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5 Sheets-Sheet 3



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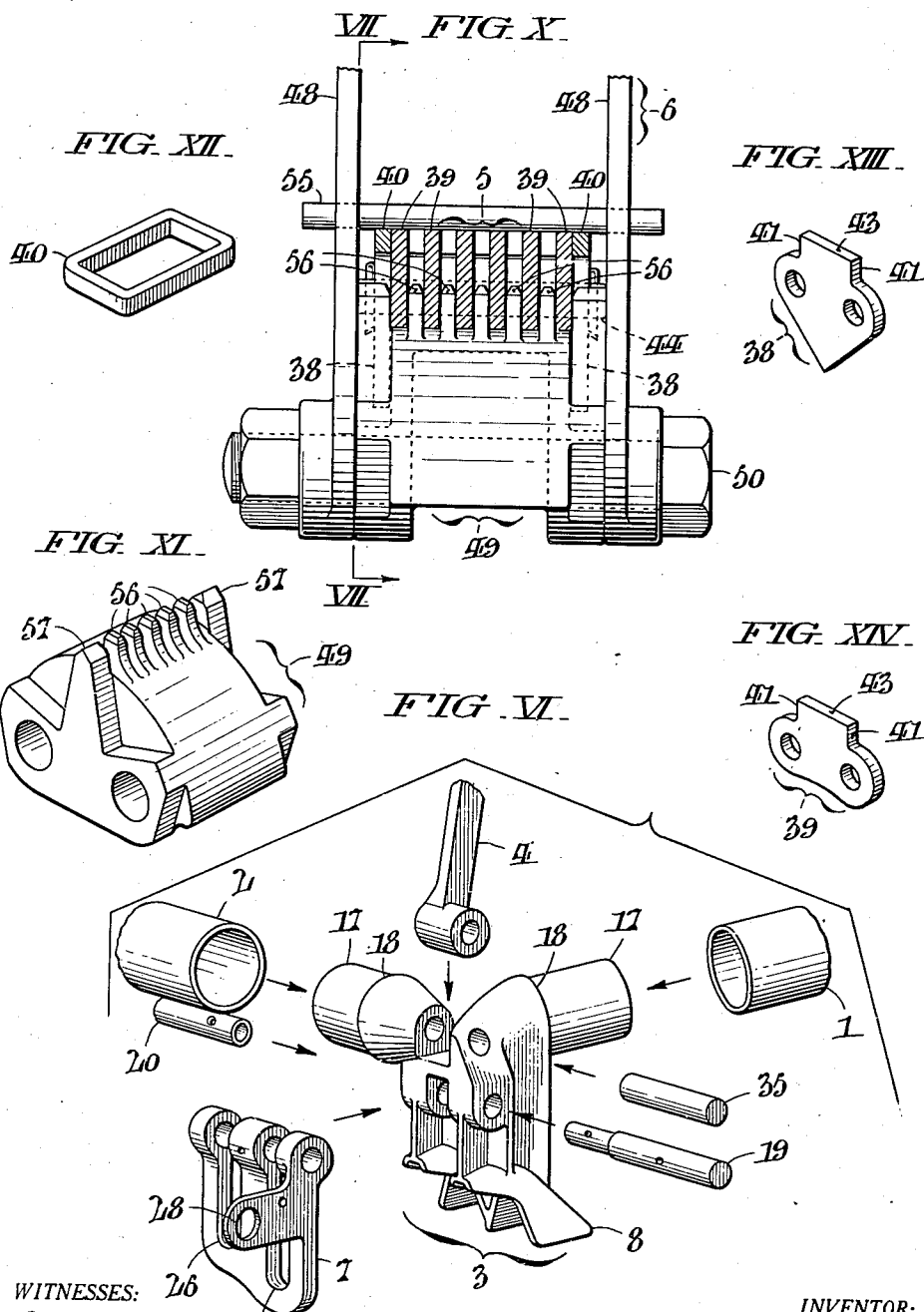
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LIFTING SLING

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5 Sheets-Sheet 4



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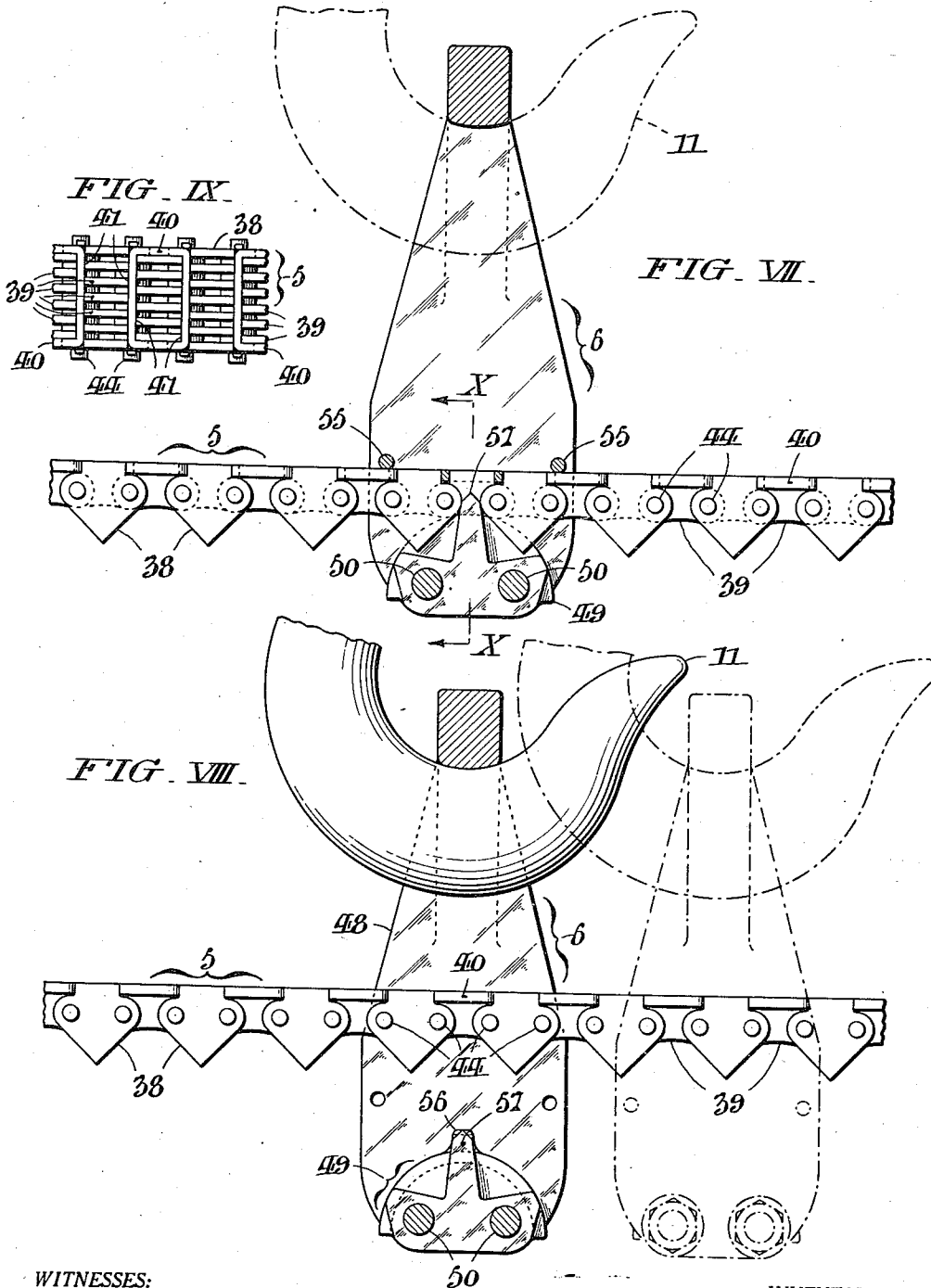
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LIFTING SLING

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,048,144

LIFTING SLING

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Application November 25, 1935, Serial No. 51,368

7 Claims. (Cl. 294-67)

My invention is related generally to lifting slings for handling truck bodies, railway containers, or similar loads; more specifically, it is related to lifting slings which may be adjusted to loads in which the mass is unevenly distributed. These loads will not remain level when suspended unless the point of suspension is over the center of gravity, which varies in position according to the mass distribution.

In the handling of truck bodies and railway containers, it frequently happens that the truck body or container must be lowered or lifted between two other bodies or containers, or in a confined space. Unless the truck body or container remains level, it may become jammed just as an ordinary desk drawer jams when pulled out or pushed in at an angle. There are many situations which require that the load remain level when suspended and uneven loading is met with regularly.

In many cases the center of gravity is displaced more in the direction of one of the base dimensions than in the other, in relation to the center of area of the base. Further many of these situations may be dealt with in practice provided there is no tilting about one axis even though there be some tilting about the other axis of the suspended load. Consequently, an adjustment which will hold a load level about either its length or its width has great practical value. Because of the greater moments involved, it is usually preferable to adjust for the center of gravity in the load in the direction of the long base dimension. Other means may be resorted to in order to check a tilting in the direction of the short dimension.

Accordingly, the principal object of my invention is the provision of a lifting sling which will lend itself to adjustment for unevenly distributed mass in the load and offer resistance to tilting in any direction. Another object is the provision of a lifting sling which will balance the load in a level position in the direction of one of its base dimensions by the simple moving of the point of suspension so that it is more nearly over the center of gravity of the load. Another object of my invention is the provision of a lifting sling and suspension eye which is easily movable in adjustment and yet becomes positively fixed on the suspension of the load. Another object of my invention is the provision of a lifting sling of rugged structure, and capable of rapid and efficient operation in adjustment, coupling and uncoupling.

Still further advantages will appear from the

following detailed description of a preferred embodiment of my invention, having reference to the accompanying drawings of which:

Fig. I is a side view of my lifting sling, showing the same engaged with a truck body and suspended from a suspension hook.

Fig. II is an end view of the same.

Fig. III is a side view of my lifting sling showing the hook engaging members at one end of the sling in engagement with the hooks of a truck body which is partially shown, and the hook engaging members at the other end of the sling before engagement with the hooks of the truck body. This view also indicates in dotted lines the operation of the lifting sling when adjusted for a center of gravity which is not over the center of the truck body.

Fig. IV is a plan view of my lifting sling.

Fig. V is a partial section, taken about the lines V-V of Fig. IV.

Fig. VI is an exploded view in perspective of one corner of the frame of my lifting sling enclosed in the dot-and-dash line square in Fig. II.

Fig. VII is a fragmentary view, taken about the lines VII-VII in Figs. IV and X, partially in section, showing the lifting shackle in engagement with the lifting span, the lifting hook being indicated in dotted lines.

Fig. VIII is a view similar to Fig. VII, except that the lifting shackle is disengaged from the lifting span and the retaining pins removed from the lifting shackle; the dotted lines indicate the capacity for free movement in the direction of the length of the lifting span when the retaining pins are removed.

Fig. IX is a plan view of a segment of the lifting span.

Fig. X is a partial section, taken about the lines X-X in Fig. VII.

Fig. XI is a perspective view of the engaging member of the lifting shackle.

Fig. XII is a perspective view of a locking ring which fits on top of the lifting span.

Fig. XIII is a perspective view of one of the stop links; and,

Fig. XIV is a perspective view of one of the connector links.

For the purpose of description, the preferred embodiment of my invention shown in the drawings may be regarded as comprising the following elements, each of which will be described in detail later: tubular longitudinal frame members 1; tubular transverse frame members 2; corner pieces 3 joining the longitudinal and transverse frame members 1, 2; span rods 4 pivotally at-

tached to the corner pieces 3; a flexible or chain-like lifting span 5 connected to the span rods 4; a lifting shackle 6 engaging the lifting span 5; and hook engaging members 7 and engaging saddles 8 attached to each corner piece 3. In the drawings there is also shown in relation to the operation of the lifting sling a truck body 9 having hooks 10 for the engagement of the lifting sling. A suspension hook 11 is also shown in the drawings indicating the suspension means by which the lifting sling is operated.

The longitudinal and transverse frame members 1, 2 are tubular in form and are joined by the corner pieces 3 forming a rectangular frame 16. The corner pieces 3 each have two tubular arms 17 formed integrally therewith and extending at right angles to each other. These arms 17 are designed to fit snugly into the frame members 1, 2, and they are provided with shoulders 18 to make a tight joint. The hook engaging member 7 is pivotally attached to the corner piece 3 by a pin 19 to which the hook engaging member 7 is integrally attached by a rivet or pin 22. The pins 19 at each end of the frame 16 are joined by a cross connector 20 made integral with each pin 19 by a rivet 21 piercing both the cross connector 20 and the pin 19. Thus the hook engaging members 7 at each end of the frame 16 are integrally attached to each other so that when one hook engaging member 7 is moved the other hook engaging member 7 is moved likewise. These hook engaging members 7 are each double, having two engaging eyes 25, 26 to provide for two different sizes of truck bodies. The hook engaging member 7 is operated by an operator using an operating hook 27 in engagement with eye 28, as indicated by dotted lines in Fig. III. The hook engaging member 7 has an actuating spring 29 which holds the hook engaging member 7 in the up position against corner piece 3 and also in the down position against hook 10. This actuating spring 29 is fastened by a collar 30 to the frame member 1, and also to the hook engaging member 7 by a link 31. In order that the actuating spring 29 may be operable in both up and down position of the hook engaging member 7, the point of attachment of the link 31 to the hook engaging member 7 must be such that an imaginary line drawn between this point of attachment to the hook engaging member 7 and the point of attachment to the frame member 1 passes above the center of the pin 19 when the hook engaging member 7 is in the up position and below the pin 19 when the hook engaging member 7 is in the down position. For each engaging eye 25, 26 there is provided an engaging shoulder 8 formed integrally with the corner piece 3 and shaped to fit over the top and down the back of the hook 10 on the truck body 9, thus providing a guide for positioning the lifting sling over the truck body 9.

The span rods 4 are pivotally attached to the corner pieces 3 by pins 35. These span rods 4 are in pairs, one pair at each end of the frame 16. The span rods 4 of each pair extend upward and inward to connect pivotally by pins 37 to a joining element 36, to which the lifting span 5 is also connected.

The lifting span 5 is composed of a plurality of stop links 38, connecting links 39, and locking rings 40. Both the stop links 38 and the connecting links 39 are formed with a square topped section 43 providing vertical abutting faces 41 which operate against the locking ring 40, as will hereinafter appear. The body of span 5 is com-

posed of a number of connecting links 39 joined longitudinally and transversely by pins 44; and along each outside edge of the span 5 is a row of stop links 38, with the separate stop links 38 of each row in transverse alignment. The stop links 38 are separated in a longitudinal direction by connecting links 39 as clearly appears in the drawings. In order to prevent the lifting span from bending downward the locking rings 40 are provided. These locking rings 40 fit into the space between the abutting faces 41 of adjacent stop links 38 and connecting links 39. They are shrunk onto the square top sections 43 of alternate transverse rows of connecting links 39. The lifting span 5 is thus free to bend upward but any downward bending is prevented by the locking rings 40 between the faces 41 of adjacent stop links 38 and connecting links 39. At each end of the lifting span 5 there is inserted in place of one of the connecting links 39 a downwardly extending arm 45 to which is attached a spring 46 which in turn is fastened to a collar 47 around the transverse frame member 2. The tension on the spring 46 urges the arms 45 outward thereby creating a force urging the lifting span 5 downward into a straight line. The springs 46 also urge the span rods 4 downward to their rest position. This arrangement with the weight of lifting shackle 6 thus holds the lifting span 5 in a straight line when not in suspension and facilitates its operation.

The lifting shackle 6 comprises an inverted U-shaped casting 48 with a separate engaging member 49 bolted in place between the ends of the inverted U by bolts 50. There are two retaining pins 55 extending through the U-shaped casting 48 and these are so positioned that they engage the top of the lifting span 5 when the engaging member 49 is in engagement with the underside of the lifting span 5. The function of the retaining pins 55 is to support the heavy lifting shackle 6 in an upright position on the span 5 to receive the suspension hook 11; and as soon as the suspension hook 11 has engaged the lifting shackle 6, these pins 55 are removed to allow adjustment of the lifting shackle 6 on the span 5. The engaging member 49 is formed with a row of upwardly projecting teeth 56 which fit into the spaces between adjacent connecting links 39 and two end teeth 57 which are designed to fit in the spaces between longitudinally adjacent stop links 38 and guide the teeth 56 into proper engagement with the span 5. Thus when the engaging member 49 is fully engaged with the underside of lifting span 5 there can be no displacement of the lifting shackle 6 in any direction due to a displaced center of gravity in the truck body 9. When the lifting shackle 6 is adjusted for a displaced center of gravity the adjustment will be preserved during suspension because of this positive engagement between the engaging member 49 and the underside of the lifting span 5.

While the operation of the lifting sling has been referred to in the detailed description above, the following description of a complete cycle of its operation should be helpful. First, the suspension hook 11 is engaged with the lifting shackle 6 and the pins 55 removed as explained above. The lifting sling is then suspended by the suspension hook 11 directly over the truck body 9 and lowered until the engaging saddles 8 come into contact with the hooks 10. As the lifting sling is further lowered, the engaging saddles 8, due to their shape, act as guides on the tops and backs of the hooks 10, guiding the lifting sling into position over the

truck body 9. The hook engaging members 7 which are in the up position are now pulled downward, overcoming the force of spring 29, by the use of an operating hook 27 in eye 28. The spring 29 holds the hook-engaging members 7 in positive engagement with hooks 10. The shackle 6 is then moved along the span 5, until it is approximately over the transverse line passing through the center of gravity of the load in the truck body 9. The engaging member 49 of the shackle 6 is then engaged with the underside of the lifting span 5. The suspension hook 11 is then raised and the truck body 9 lifted by means of the lifting sling. As the lifting force is applied, the lifting span 5 bends upward against the force of the springs 46 taking a position something like the showing in dotted lines in Fig. III, thus keeping the truck body 9 in a substantially level position in suspension. When the place of deposit is reached, the truck body 9 is lowered to the ground and the suspension hook is further lowered until the engaging saddles 8 of the lifting sling are resting on the tops and backs of hooks 10. The span 5 assumes a straight line under the influence of springs 46. The hook engaging members 7 are then snapped upward by the operating hook 27; the lifting shackle 6 moved back to a center position; and the sling is disengaged by lifting it clear of the hooks 10. If the suspension hook 11 is to be disengaged from the lifting shackle 6, the pins 55 are first replaced to support the lifting shackle 6 in an upright position on span 5. Thus the transfer of the truck body 9 is efficiently and quickly accomplished, preserving at all times a substantially level position of the truck body 9 in spite of a displaced center of gravity in the load. The adjustment for the displaced center of gravity in the load is easily accomplished and positive in its operation. The coupling and uncoupling by means of the operating hook is obviously a speedy process. The positioning of the lifting sling by means of the engaging saddles 8 also speeds up the entire operation.

While my invention has been described in some detail with reference to a specific embodiment, various changes in the form of apparatus used are within the contemplation of the invention and such changes should not be deemed to constitute a departure from the invention as hereinafter claimed.

Having thus described my invention, I claim:

1. A lifting sling having hook engaging members, a flexible lifting span connected to said hook engaging members, and a lifting means engaging the underside of said span, said span having a plurality of downwardly projecting stops providing spaces to engage said lifting means.

2. A lifting sling having hook engaging members, a flexible lifting span connected to said hook engaging members, a lifting shackle engaging said lifting span, said lifting span being made up of stop links and connector links pivotally attached to each other, and means for preventing the span from bending downward from the straight line of the top surface of the links without preventing a free bending upward.

3. The invention of claim 2 characterized by the further fact that the lifting shackle is formed with a toothed engaging member to fit into the spaces between adjacent links and a removable retaining pin extending above the lifting span across the opening in the shackle whereby the retaining pin holds the shackle in an upright position on the span for engagement and disengagement with a suspension means.

4. A lifting sling having a frame, hook engaging members attached to the frame, a pair of span rods pivotally attached to each end of the frame, a flexible lifting span connected to each pair of span rods where the members of each pair connect, said span being made up of stop links and connector links pivotally attached to each other, said links having abutting faces and locking rings for contacting said abutting faces to limit said pivotal action, and a movable lifting shackle engaging the underside of said span between adjacent stop links.

5. The invention of claim 4 characterized by the further fact that the links of the span and span rods are spring urged to a position in which the links lie in a straight line.

6. The invention of claim 4 characterized by the further fact that the span is urged into a straight line by a downwardly extending lever arm which is urged outward by a spring attached to said frame.

7. The invention of claim 4 characterized by the further fact that said frame is rectangular in shape and said span is of substantial width to oppose tilting in the direction of the width of the frame.

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