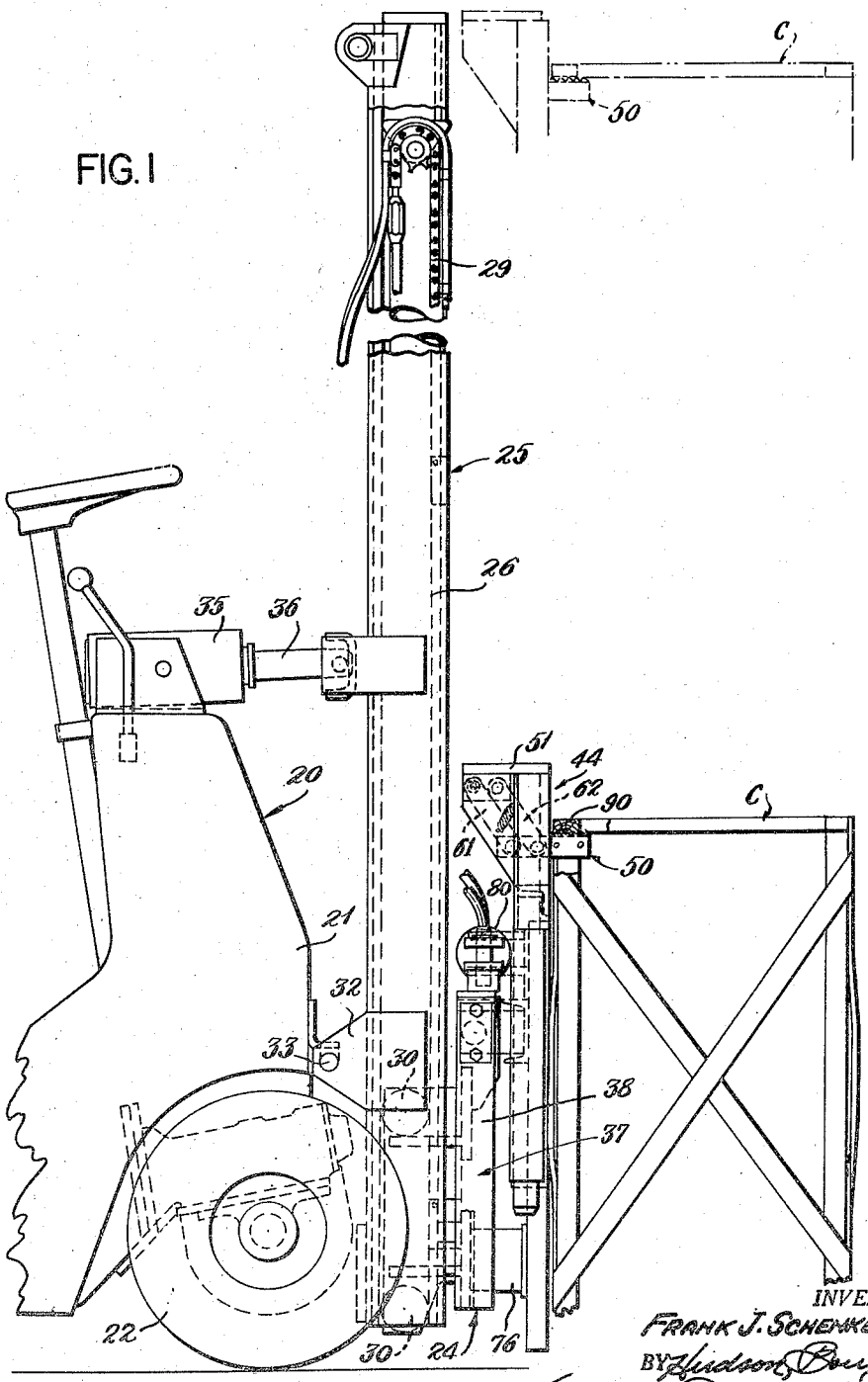
March 11, 1958 F. J. SCHENKELBERGER 2,826,323

CRATE HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

Filed Sept. 21, 1954 6 Sheets-Sheet 1

FIG. 1



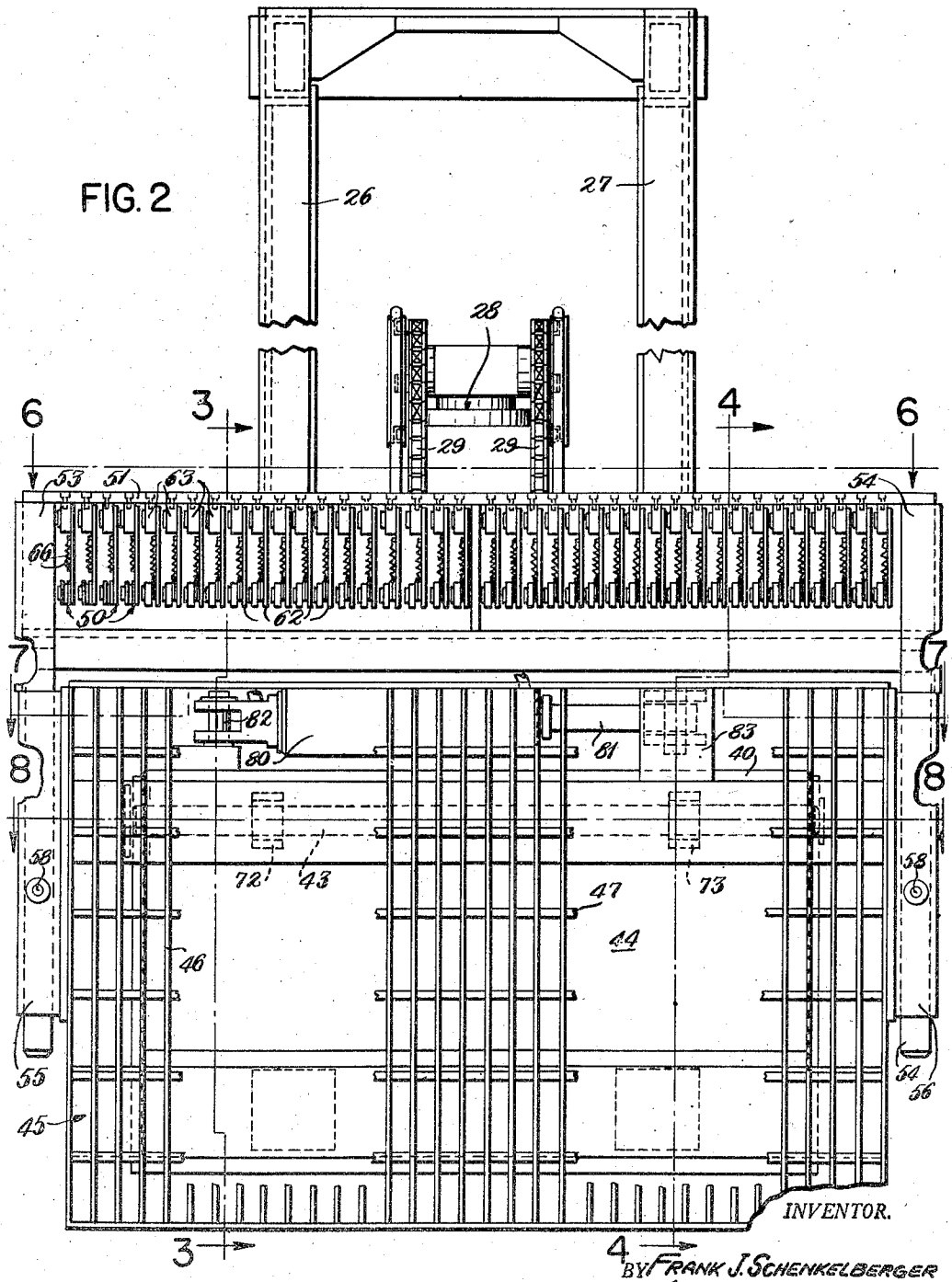
INVENTOR.
FRANK J. SCHENKELBERGER
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

March 11, 1958 F. J. SCHENKELBERGER 2,826,323

CRATE HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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FIG. 2



INVENTOR.

BY FRANK J. SCHENKELBERGER

Hudson, Boughton, Williams, David & Hoffmann

ATTORNEYS

March 11, 1958 F. J. SCHENKELBERGER 2,826,323

CRATE HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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FIG. 3

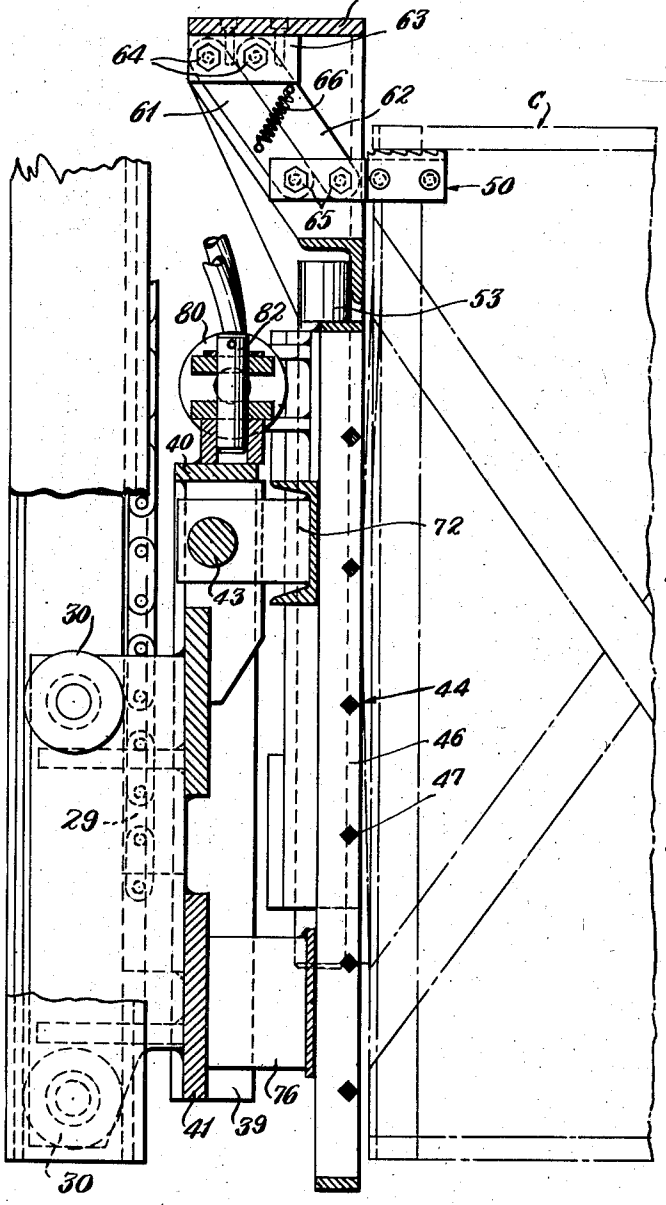
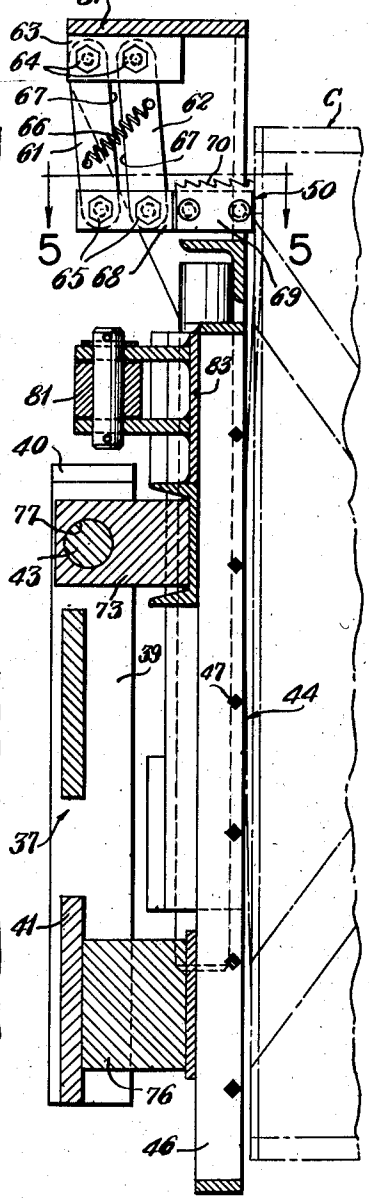


FIG. 4



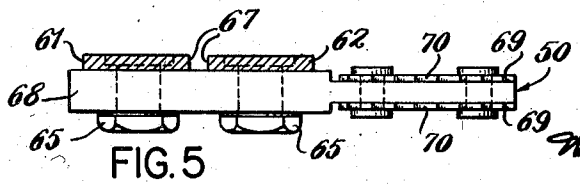


FIG. 5

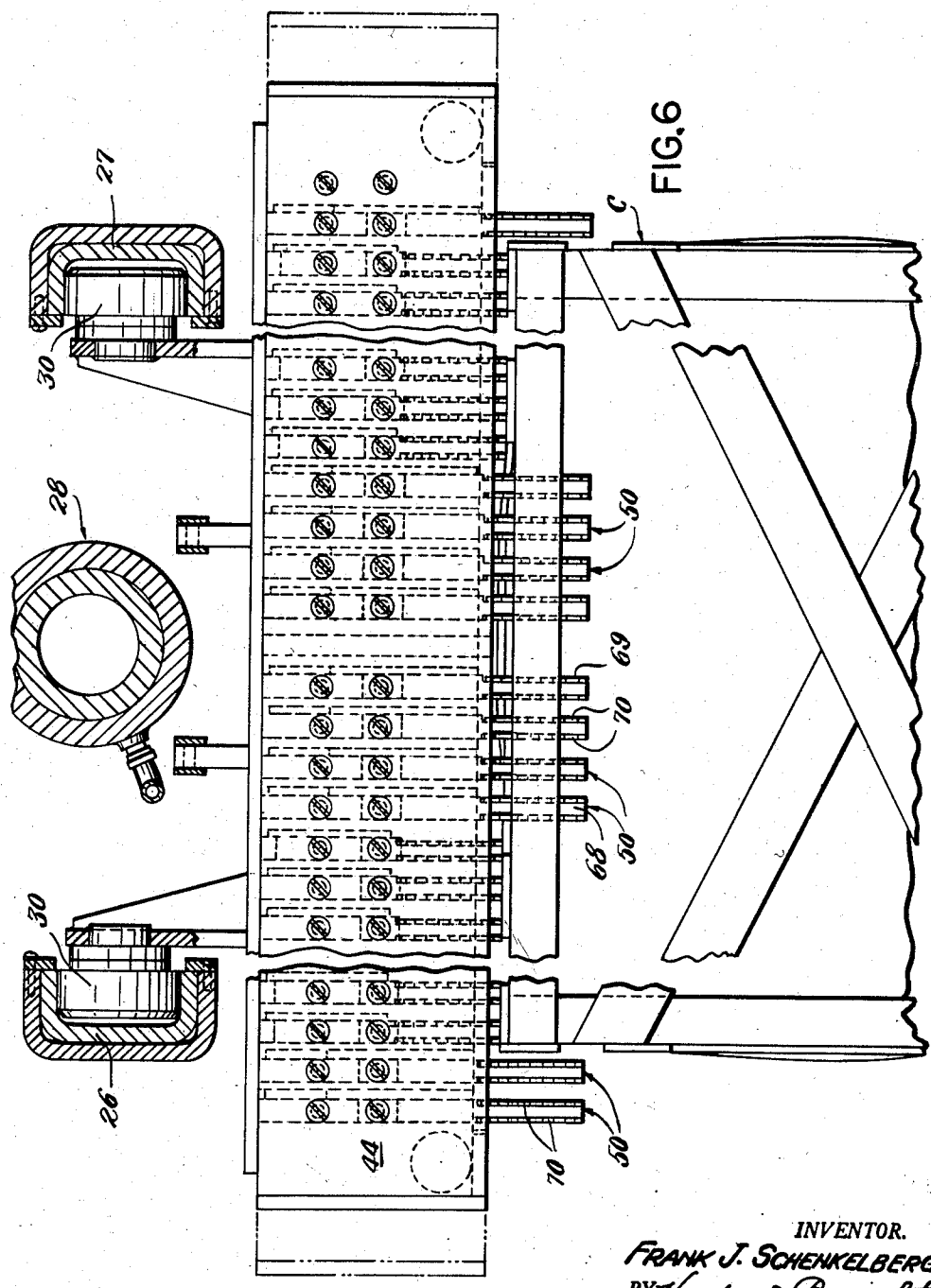
INVENTOR.
FRANK J. SCHENKELBERGER
BY Hudson, Boughton, Williamson, David & Hoffmann
ATTORNEYS

March 11, 1958 F. J. SCHENKELBERGER 2,826,323

CRATE HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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FIG. 6



INVENTOR.
FRANK J. SCHENKELBERGER
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

March 11, 1958 F. J. SCHENKELBERGER 2,826,323

CRATE HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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FIG. 7

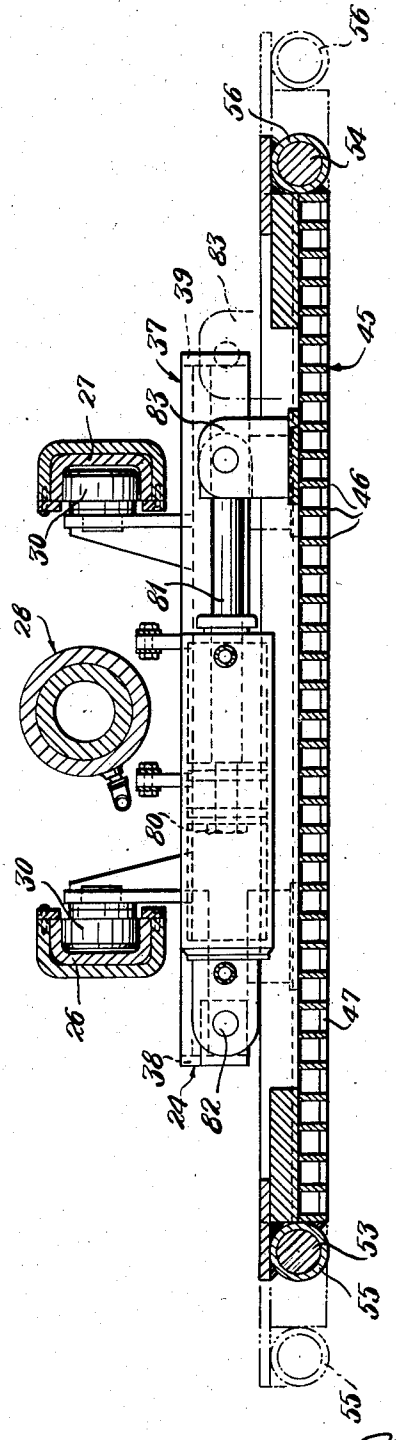
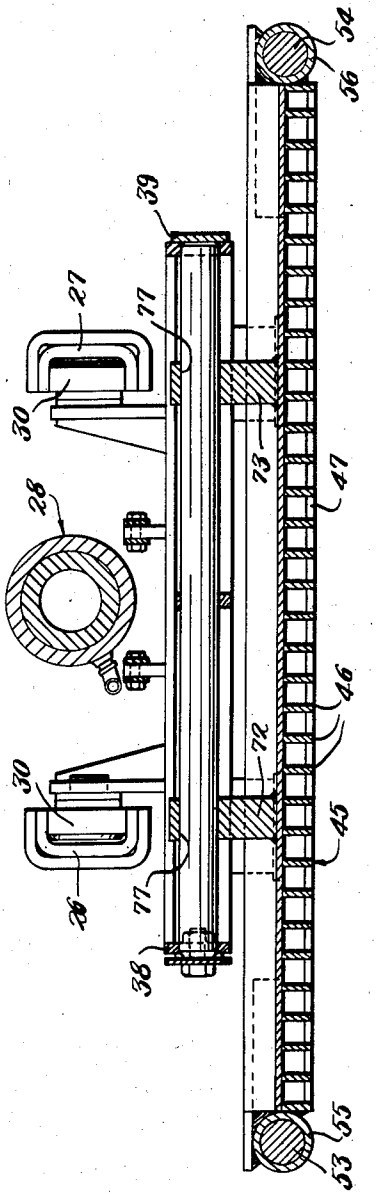


FIG. 8



INVENTOR.
FRANK J. SCHENKELBERGER
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

March 11, 1958 F. J. SCHENKELBERGER 2,826,323

CRATE HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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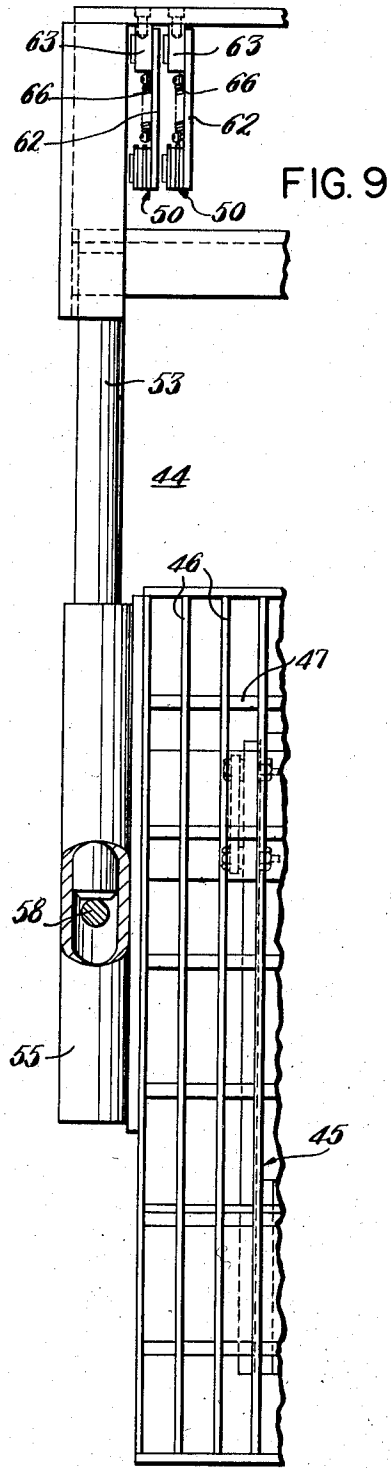


FIG. 9

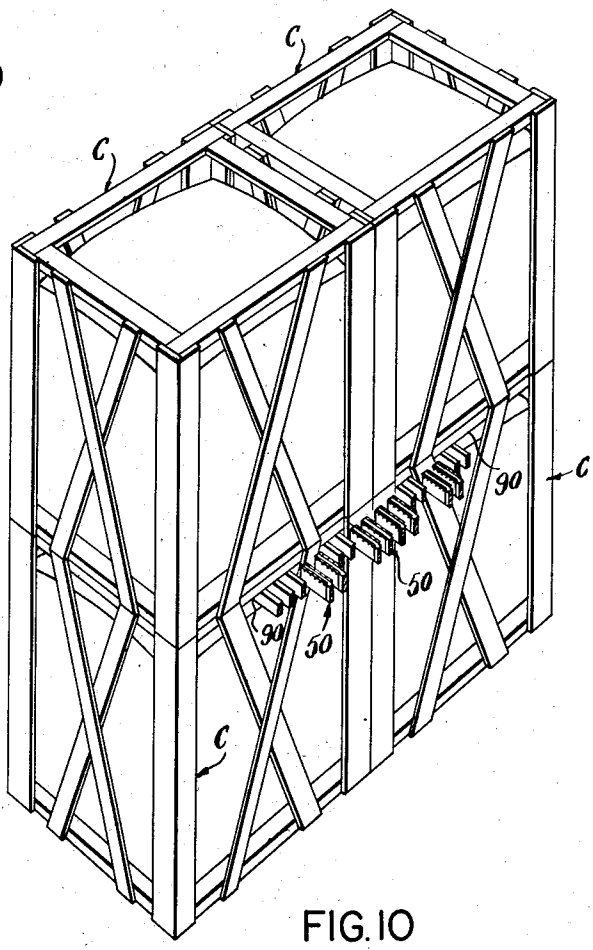


FIG. 10

INVENTOR.
FRANK J. SCHENKELBERGER
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

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Patented Mar. 11, 1958

2,826,323

CRATE HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

Frank J. Schenkelberger, North Olmsted, Ohio, assignor, by mesne assignments, to Otis Elevator Company, New York, N. Y., a corporation of New Jersey

Application September 21, 1954, Serial No. 457,523

5 Claims. (Cl. 214—730)

The present invention relates to industrial trucks having an elevatable load carriage on the forward end thereof and, more particularly, to such a truck having a load carriage especially suitable for handling loads housed in crates and the like.

The principal object of the present invention is the provision of a new and improved industrial lift truck having an elevatable load carriage which is simple, positive, and reliable in operation and which includes movable load engaging and lifting elements normally biased to an outwardly extending load engaging and lifting position with each element being movable inwardly toward a retracted position by endwise abutting engagement with a load.

Another object of the present invention is the provision of a new and improved industrial lift truck having a load carriage including lifting elements or fingers for engaging the lower side of one or more abutments or cleats positioned on the load to be handled above the bottom thereof, a plurality of which are individually supported for movement from an outer load engaging and lifting position toward a retracted position, the retractive movement of the lifting element including a downward component.

Another object of the present invention is the provision of a new and improved industrial lift truck having a load carriage supported at one end thereof which includes a lifting element or finger for engaging one side of an abutment or cleat carried by the load to be handled, such as a crate or the like, and parallel motion means for supporting the finger in an outward load engaging and lifting position and permiting the finger to be moved inwardly to a retracted position without tilting.

Another object of the present invention is the provision of a new and improved industrial lift truck having an elevatable load carriage on one end thereof, the load carriage including a plurality of elements individually supported along a line transversely of the truck and having an outward position wherein they are adapted to engage the under side of a generally horizontal abutment or abutments carried by the crate or other load to be handled above the bottom thereof with the fingers being supported by individual parallel motion means so as to be movable inwardly from the outward load engaging position by endwise abutting engagement with the load along a line of movement which includes a downward component, the supporting means for the elements including resilient biasing means for urging the elements to their outward position.

Another object of the present invention is the provision of a new and improved industrial truck having a load carrier frame supported thereon for vertical and horizontal movement, the load carrier frame having lifting elements or fingers extending outwardly thereof in a load engaging and lifting position and connected to the frame by parallel motion means permitting the elements to be moved inwardly toward a retracted position along a line of movement including a downward component the elements being yieldably urged to their outer load engaging and lifting position.

Another object of the present invention is the provision of a new and improved attachment for use with an industrial truck having an elevatable load carriage thereon, the attachment comprising a framework adapted to be attached to the load carriage and having a plurality of load lifting elements extending outwardly therefrom adapted to engage the under side of a cleat or abutment positioned on a load to be handled above the bottom thereof, the elements being supported by individual parallel motion means so as to be movable toward a retracted position along a line of movement which includes a downward component.

The invention resides in certain constructions and combinations and arrangements of parts and further objects and advantages thereof will be apparent to those skilled in the art to which the invention relates from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of this specification, in which:

Fig. 1 is a fragmentary view of the front end of an industrial truck having an elevatable load carrier thereon and embodying the present invention;

Fig. 2 is a front elevational view of the truck of Fig. 1;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 2 showing a lifting element or finger in an outward load engaging position;

Fig. 4 is a sectional view taken approximately along the line 4—4 of Fig. 2 showing a finger or lifting element in an inner retracted position;

Fig. 5 is a view taken approximately along line 2—2 of Fig. 4;

Fig. 6 is a view taken approximately along line 6—6 of Fig. 2;

Fig. 7 is a view taken approximately along line 7—7 of Fig. 2;

Fig. 8 is a view taken approximately along line 8—8 of Fig. 2;

Fig. 9 is a fragmentary front elevational view with parts broken away showing the construction of the load carrier frame; and

Fig. 10 is a perspective view of a crate adapted to be handled by the present invention.

While the present invention is susceptible of various modifications and uses, it is herein, for purposes of illustration, embodied in an industrial lift truck having an elevatable load carriage on the front end thereof. Referring to the drawings, Fig. 1 shows the front end of an industrial lift truck **20** adapted to handle loads which may be housed in crates, cartons and the like and having a frame or chassis **21** supported on wheels **22**, only one of which appears in the drawings. A load carriage **24** for supporting the load is carried on the front end of the chassis by an elevator mast assembly **25** comprising spaced upright guides **26, 27** and a ram **28** as is best shown in Fig. 2. The load carriage **24** is provided with rollers **30** adapted to operate in guides **26, 27** and may be moved vertically with respect to the guides **26, 27** by the ram **28** connected to the load carriage **24** by chains **29**.

The elevator mast assembly **25** is pivotally connected to the chassis **21** by brackets **32** connected to the uprights **26, 27** and pivot pins **33** for securing the brackets to the chassis **21**. Only one of the brackets **32** and pivot pins **33** appear in the drawings. The elevator mast assembly may be tilted with respect to the vertical about the axis of the pins **33** by means of a hydraulic cylinder **35** connected to the chassis **21** and having its piston rod **36** connected to the elevator mast assembly **25**.

The rollers **30** of the load carriage **24** are mounted on a supporting framework **37** which includes vertical side

frame members 38, 39 and upper and lower horizontally extending frame members 40, 41. The upper frame member 40 is contained in a substantially horizontal plane while the lower horizontal frame member 41 is contained in a generally vertical plane. A slide rod 43 is removably supported between the side frame members 38, 39.

A load carrying frame or rack 44 is supported in the illustrated embodiment on the supporting framework 37 of the load carriage 24. The load carrying frame 44 may be either an attachment or may be an integral part of the load carriage 24, according to the particular needs of the user.

The load carrying frame 44 shown in the drawings comprises a rack-like portion 45 including spaced vertical members 46 welded to spaced horizontal rods 47. A plurality of load engaging and lifting elements or fingers 50 are supported above the rack-like portion 45 and are biased outwardly of the load carrying frame 44 in a load engaging and supporting position. The fingers 50 are supported from a horizontal plate 51 extending between the upper ends of spaced vertical cylindrical members 53, 54 which telescope respectively into vertical tubes 55, 56 mounted on the opposite sides of the rack-like portion 45. The cylindrical members 53, 54 are held in position in the tubes 55, 56 by means of a pin 58 passing through the tubes 55, 56 and an aligned opening in the cylindrical members 53, 54 as is best shown in Fig. 9. The cylindrical members 53, 54 may be provided with a plurality of openings for passing the pins 58 to permit adjustment of the height of the load engaging and lifting fingers 50.

According to the present invention, the load engaging and lifting fingers 50 are supported from the under side of the plate 51 by individual parallel motion linkages 60 which permit the fingers 50 to be moved inwardly toward a retracted position along a line of movement having a downward component. The fingers 50 while moving inwardly are maintained in a position parallel to their load engaging and lifting position which is, in the illustrated embodiment, substantially horizontal.

The parallel motion linkages 60 of the preferred and illustrated embodiment each includes two parallel links 61, 62 pivotally connected at one end to a block 63 secured to the under side of the plate 51 and at the other end to the finger 50 at spaced points therealong. The pivotal connections to the block 63 of the parallel links 61, 62 include pivot pins 64 which are located above pivot pins 65 constituting the connection of the links 61, 62 to the finger 50. The links 61, 62 are contiguous when the fingers are in their outer load engaging and supporting position and move apart as the fingers move inwardly. The links 61, 62 permit each finger to be moved outwardly of the load carrying frame 44 and inwardly of the frame while maintaining the finger 50 in a substantially horizontal position. The finger 50, however, will when moving from an outer position to an inner position move along a line which will have a downward component. This is desirable for reasons pointed out hereinafter.

The fingers 50 are each yieldably urged to their outer load engaging and lifting position by means of a tension spring 66 secured between the parallel links 61, 62 of each of the parallel motion supports for the individual fingers. The spring 67 of each linkage will exert a force which will tend to move the parallel links 61, 62 of the linkage to a position where their adjacent sides 67 are in engagement with each other. As shown in Fig. 3 and as mentioned above, the links are constructed and supported so that this occurs when the finger 50 is in its outer load engaging position. It can now be seen that if an individual finger is moved toward an inner or retracted position as shown in Fig. 4 the spring 66 of its support means will exert a force tending to move the finger 50 toward its outer position.

In the illustrated embodiment each finger 50 comprises a body member 68 to which the parallel links 61, 62 are connected. The vertical sides of the body member adjacent the outer end thereof are recessed as shown in Fig. 5 to receive vertical tooth plates 69 each having an upper horizontal serrated edge 70 providing a load engaging and gripping surface. The serrated edge 70 is adapted to engage the underside of an abutment or cleat carried by load and is shown as engaging the underside of an upper horizontal frame member of a crate C.

The load carrying frame 44, in the preferred and illustrated embodiment, is supported on the load carriage 24 so as to be movable transversely of the chassis 21 enabling the load to be side shifted. To this end, the load carrying frame 44 has a horizontal frame member 71 extending between the vertical side members of the rack-like portion 45 which carries spaced bearing blocks 72, 73 adapted to slide on the rod 43 of the supporting frame 37. If the load carrying frame 44 is to be used as an attachment, the frame 44 may be mounted on the support frame 37 by removing the rod 43, positioning the load carrying frame 44 and inserting the rod 43 through openings 75 in the bearing blocks 72, 73. The load carrying frame 44 also mounts spaced abutments 76 adjacent the lower part of the rack-like portion 45 for spacing the load carrying frame from the horizontal frame member 41 of the support framework 37. The abutments 76 may be mounted on a horizontal plate extending between the vertical side members of the rack-like portion 45.

A hydraulic cylinder 80 having a piston rod 81 is provided for shifting the load carrying frame 44 transversely of the supporting frame 37. As is best shown in Fig. 6 the cylinder 80 is pivotally secured to the upper horizontal frame member 40 of the support framework 37 by means of a pivot pin 82 and the piston rod 81 is pivotally secured at its outer end to a bracket 83 welded to the rack-like portion 45 of the load carrying frame 44. The introduction of fluid pressure into the hydraulic cylinder 80 causes the load carrying frame 44 to shift sideways with respect to the chassis and the support frame 37 of the load carriage 21.

It may now be seen that the present invention provides a load carrier for an industrial truck which is particularly suitable for handling loads having horizontal abutments or cleats positioned above the bottom thereof, such as loads housed in boxes, cartons or crates. In operation the truck is moved into position to pick up a load having a generally horizontal abutment such as the crate C illustrated in Fig. 10 having a second crate supported thereon. The load engaging and lifting elements or fingers 50 are, by the movement of the truck, placed under an abutment or cleat 90 of the crate C, which may be a frame member of the crate, and functions to lift the crate when the load carriage 24 is elevated by the ram 28. It is not necessary that the abutment 90 be of continuous length so as to receive all the fingers 50. In the event that the crate has a frame or other member in the way of some of the fingers 50, the fingers will be moved inwardly of the load carrying frame 44 as the truck is moved into position to pick up the crate by endwise abutting engagement with the load. It will be noted that the inward movement will include a downward component and that the finger 50 will be maintained parallel during the movement in a position parallel to its outer load engaging position. The downward component of the movement of finger 50 is advantageous since boxes or crates housing loads to be handled often contain horizontal bracing members located above the abutments or cleats forming recesses or spaces for receiving the lifting fingers 50. If the fingers have an upward component when they are being moved inwardly, engagement with this bracing member would occur and the movement of the finger jammed. The parallel motion of the finger is advantageous inasmuch as jamming due to the tilting of the finger is eliminated.

As is shown in Fig. 10, the load carrying frame may

be used to lift four crates C with two of the crates being positioned on the two other crates and the fingers 50 engaging the two lower crates.

It may now be seen that the present invention accomplishes the objects set forth and provides a load carrying frame as part of or as an attachment for an industrial lift truck which facilitates the handing of loads having generally horizontal abutments thereon such as loads housed in crates and the like, the load carrying frame being provided with a plurality of individually operable load engaging or lifting elements which are biased into an outer load engaging position and which may be moved towards a retracted position by endwise abutment with the load.

While the preferred form of the invention has been described in considerable detail, it will be apparent that the invention is not limited to the constructions shown or the uses referred to, and it is my intention to cover hereby all adaptations, modifications, and changes which come within the practice of those skilled in the art to which the invention relates and the scope of the appended claims.

Having thus described my invention, I claim:

1. In an industrial truck, a chassis, a load carriage including a frame extending transversely of said chassis at one end thereof, means connecting said load carriage to said chassis and supporting said load carriage for vertical movement and including spaced uprights for guiding the vertical movement of said carriage, means connected between said chassis and the first-mentioned means for tilting said uprights and said load carriage relative to the vertical, a load engaging and lifting element extending horizontally outwardly of said frame in an outer load engaging position, parallel motion means for movably supporting said element for retractive movement having a downward component from its outer load engaging position comprising parallel links, first pivot means connecting said links to said frame, second pivot means connecting said links to said element, and spring means for urging said element to its outer load engaging position.

2. A load handling attachment for the load carriage of an industrial truck comprising a load supporting frame, a plurality of aligned lifting elements extending horizontally outwardly from said frame in positions for engaging a generally horizontal abutment on the load to be handled for lifting the load, parallel motion linkages connected between said elements and said frame for supporting said elements for individual retractive movement from their load engaging positions along lines of movement, each including a downward component, and spring means for urging said elements to their outer load engaging positions.

3. In an industrial truck, a load carriage comprising a frame, a plurality of spaced elements extending horizontally outwardly from said frame for engaging the underside of horizontal abutment means on the load to be handled, individual parallel motion linkages connected respectively between said elements and said frame and supporting said elements for individual retractive movement, each of said linkages including parallel motion links and first pivot means connecting the links to the frame and second pivot means connecting the links to the elements, said first pivot means being positioned above said second pivot means, and spring means for urging said elements to their outer load engaging positions.

4. An attachment for an industrial truck including a load carriage, said attachment comprising a frame adapted to be secured to the load carriage of the truck, a plurality of elements extending horizontally outwardly from said frame in a position for engaging the underside of horizontal abutment means on the load to be handled, individual linkages comprising parallel links for respectively supporting said elements for retractive movement from their outer load engaging positions, first pivot means connecting said parallel links to said frame, second pivot means connecting said parallel links to said elements, the first pivot means being positioned above said second pivot means, and spring means urging said elements to their outward load engaging position.

5. An attachment for the load carriage of an industrial truck comprising a frame adapted to be secured to the load carriage, a plurality of horizontally spaced elements extending horizontally outwardly from said frame in a position for engaging the underside of horizontal abutment means on the load to be handled, parallel links supporting each of said elements for individual retractive movement from its outer load engaging position, first pivot means connecting said parallel links to said frame, and second pivot means below said first pivot means connecting said links to said elements, and individual spring means connected between the links of each pair for urging the element supported thereby to its outer load engaging position.

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