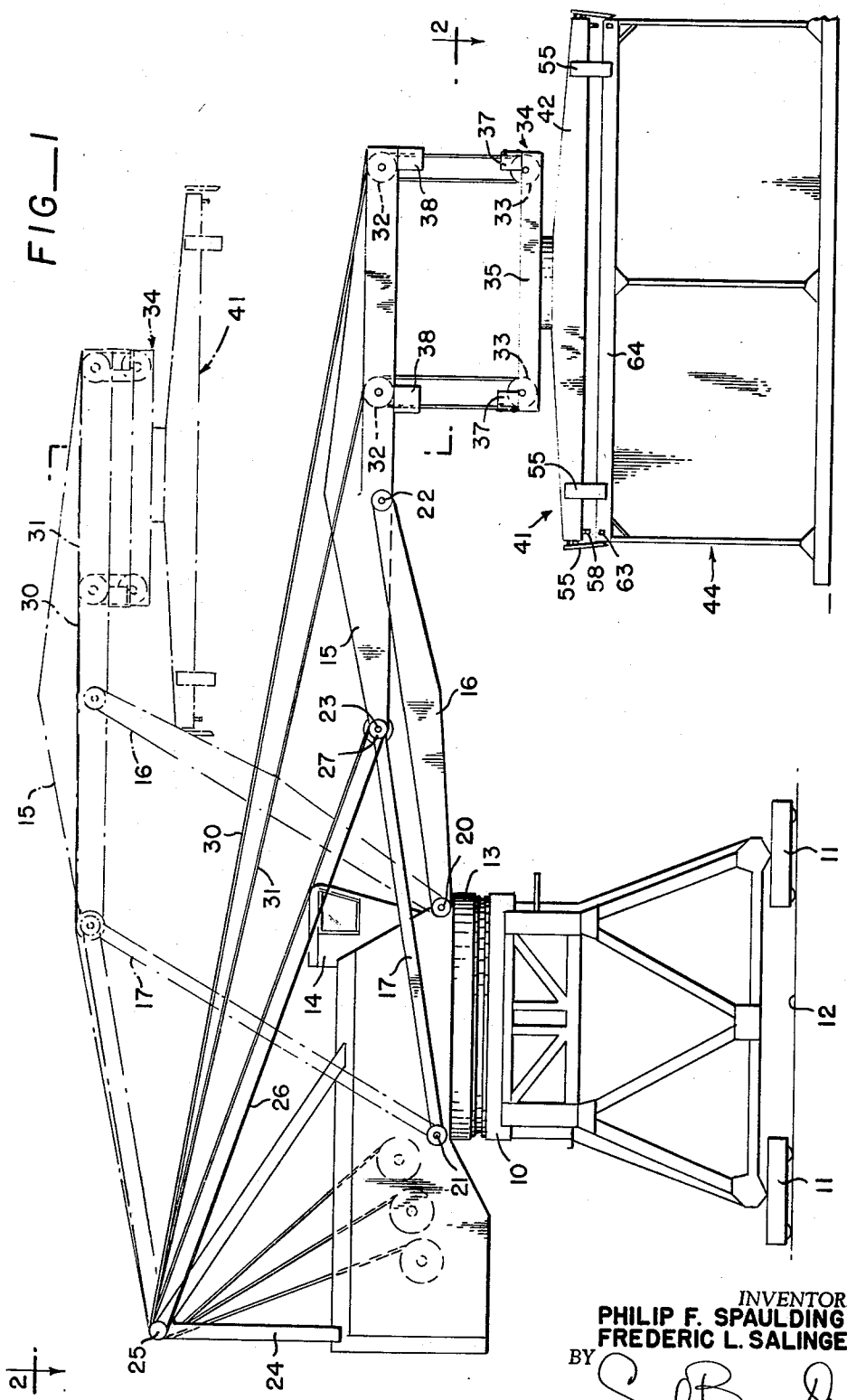
March 3, 1970 P. F. SPAULDING ET AL 3,498,473

CONTAINER-HANDLING CRANE

Filed Jan. 17, 1968 3 Sheets-Sheet 1

FIG. 1



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CONTAINER-HANDLING CRANE

Filed Jan. 17, 1968 3 Sheets-Sheet 2

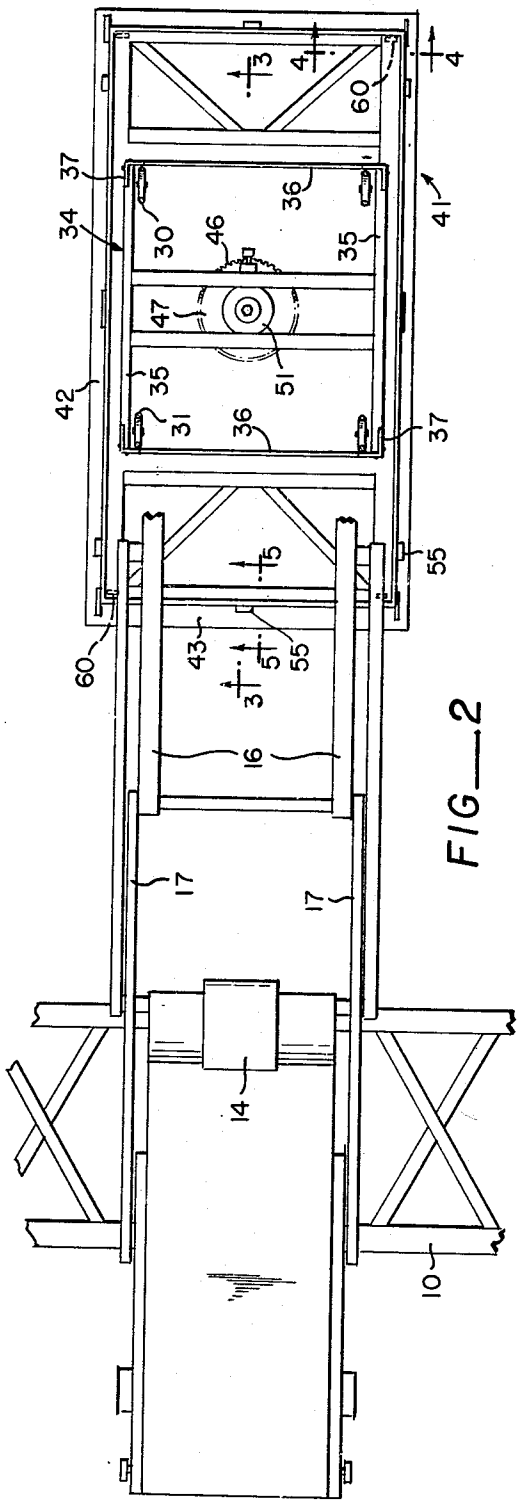


FIG. 2

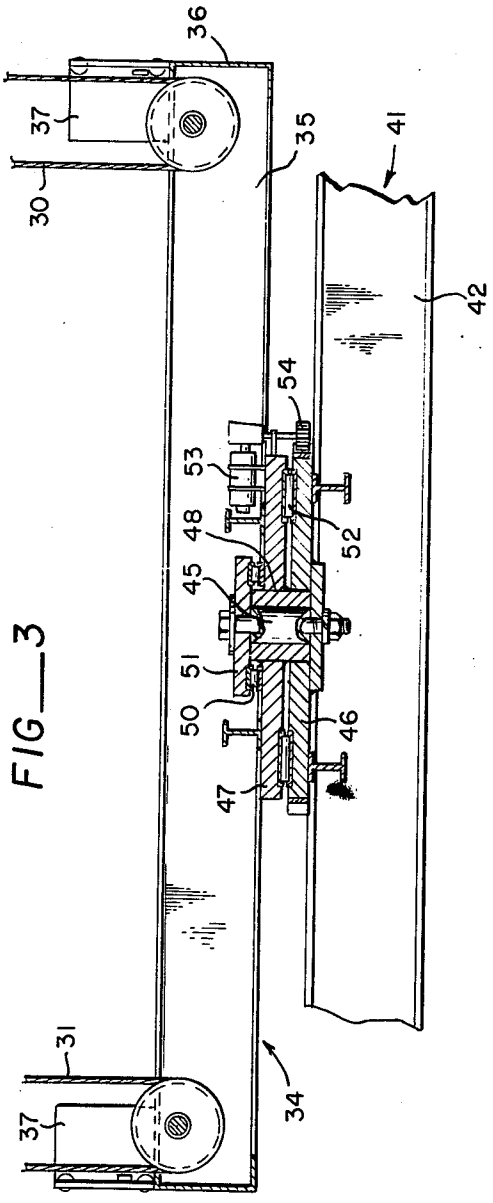


FIG. 3

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CONTAINER-HANDLING CRANE

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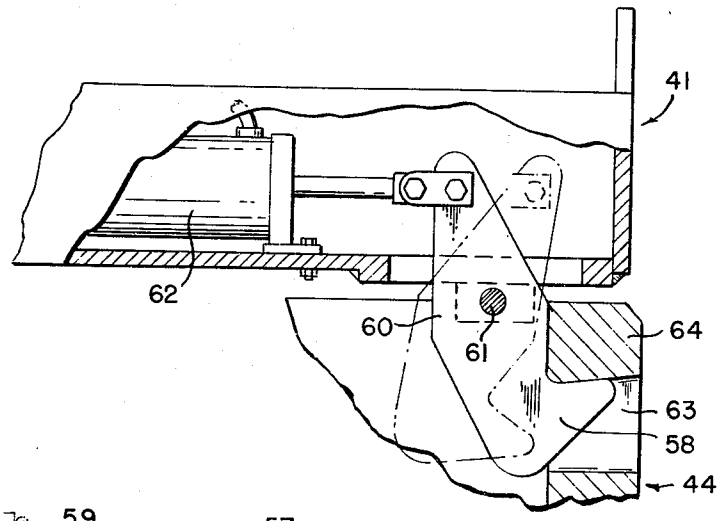


FIG__4

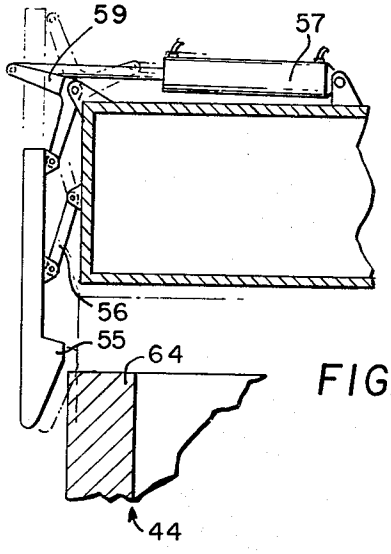


FIG__5

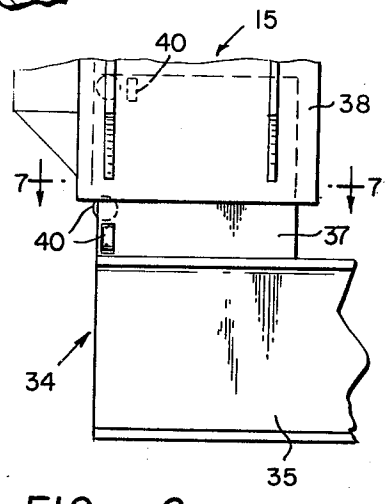


FIG__6

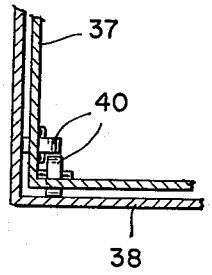


FIG__7

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3,498,473

CONTAINER-HANDLING CRANE

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U.S. Cl. 212—41 3 Claims

ABSTRACT OF THE DISCLOSURE

A material handling crane providing a spreader bar which is suspended from the crane's jib in a manner permitting the bar to be adjusted rotatively in relation to the jib about a vertical axis.

This invention relates to cranes, particularly cranes in which the jib is mounted for slewing and luffing movements and has suspended from said jib a spreader bar or functionally similar apparatus adapting the crane to the handling of containers.

For its principal object the invention aims to engineer into a crane of this nature a perfected means of hanging the spreader bar, and one especially which mounts the spreader bar for controlled rotation about a vertical axis centered in relation to the width and length of the bar, thus permitting the bar to be located upon a container, attached thereto, and moved with the container to a desired point of deposit with unusual ease and expedition and wtih greater precision than has heretofore been possible.

It is a further and particular object to provide a container-handling crane in which the same is made level-luffing, having its jib mounted from the foundation platform by means of parallel linkages so that little headroom is needed in which to luff the jib between a lowered stowing position and elevated operating positions.

These and yet additional objects and advantages of the invention will appear and be understood in the course of the following description and claims, the invention consisting in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIGURE 1 is a side elevational view illustrating a container-handling crane constructed to embody preferred teachings of the present invention, and incorporating therewith a showing of a container. It is here noted that the lowered non-working position of the jib is shown by full lines and the elevated working position by broken lines in order that a top plan view with the parts in a "reach" position may be projected from FIG. 1.

FIG. 2 is said top plan view, made fragmentary, and with parts shown in horizontal section on the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary longitudinal vertical sectional view drawn to an enlarged scale on line 3—3 of FIG. 2.

FIG. 4 is a detail transverse vertical sectional view to a yet larger scale on line 4—4 of FIG. 2.

FIG. 5 is an enlarged-scale detail longitudinal vertical sectional view on line 5—5 of FIG. 2.

FIG. 6 is a fragmentary side elevational view detailing a pocketing action which is provided between the crane's lifting frame and the boom; and

FIG. 7 is a fragmentary horizontal sectional view on line 7—7 of FIG. 6.

Referring to said drawings, the crane is shown as being of the gantry type in which a bridge section denoted by the numeral **10** is carried by wheeled trucks

11 tracking on rails **12**. A carriage is mounted for transverse movement upon the bridge and supports a counterweighted platform **13**. The platform admits to slewing movements and carries operating machinery and all controls necessary for the functioning of the craine, such controls being housed in a cab **14**.

The jib for the crane is denoted by **15** and is mounted from the platform for bodily luffing movement by two matching sets of parallel-motion front and rear links **16** and **17** having their root ends pivoted to the platform, as at **20** and **21**, and their free ends pivoted to the jib, as at **22** and **23**. The two sets are located one at one side and the other at the other side of the jib. The jib has a front-end overhang projecting well out beyond the pivot connections for the front links **16**.

Stanchions **24** are provided adjacent the rear end of the platform at each side thereof, rising to a height elevated a substantial distance above the horizontal plane in which the root pivots **20** and **21** lie. A plurality of sheaves **25** are journeled from the upper ends of the stanchions to take the running bights of topping and hoisting lines spooled upon powered drums included in the platform-mounted machinery. Denoted by **26**, the topping lines—one for each of the two sides of the crane—are trained from a respective sheaves **25** over a respective sheave **27** located at the rear extremity of the jib and are suitably dead-ended.

There are two hoisting lines, denoted by **30** and **31**, at each of the two sides of the crane. By means of said two sets of hoisting lines and a system of upper and lower sheaves **32** and **33**, respectively, about which the lines are trained from a respective sheave **25** over a respective the jib's front-end overhang a lifting head **34**. The lifting head has a frame of rectangular plan configuration defined by side and end beams **35** and **36**, and the lower sheaves in the sheave system are journal-mounted in the four corners thereof for rotation about transverse horizontal axes. The upper sheaves in the sheave system are arranged in the same pattern as the lower sheaves, and are carried by the jib.

Upstanding nose-pieces **37**, angular in shape, are provided at each of the four corners of the lifting head. At the upper limit of the head's lift travel these nose-pieces collectively find a mating fit within a pocket defined by angular guards **38** which depend from the underside of the jib. Rollers **40** (FIGS. 6 and 7) guide the nose-pieces into the pocket.

A spreader bar **41** is hung below the lifting head and is journaled therefrom for rotation about a centered vertical axis while being held against relative movement endwise to said axis. The spreader bar has a generally planar frame including side and end beams **42** and **43**, respectively. The crane is designed to handle either carrier frames **44**, as ilustrated, or containers. For ease of description both of these types of cargo carriers will be hereinafter referred to by the term "container." Plan profile considered, the shape of the spreader bar is rectangular, corresponding to the plan profile of the containers.

The mounting for the spreader bar includes a king-pin **45** and a ring gear **46** which is rigidly secured to both the king-pin and to the frame of the spreader bar. The ring gear underlies a bed plate **47**. Formed with a center-bored hub **48** in which the king-pin is journaled, the bed plate is integrally secured to the frame of the lifting head and takes thrust through a roller bearing **50** from a plate **51** rigidly secured in surmounting relation upon the king-pin. A roller bearing **52** is provided between the bed plate and the ring gear. A reversing motor **53** powered by hydraulic fluid or other suitable medium controls the rotary movement of the spreader bar by passing drive to a pinion **54** meshing the teeth of the ring gear.

As with the spreader bars heretofore devised the bar of the present invention is equipped with means for vertically aligning the bar with respect to the container and for releasably securing the bar to the container. Bars **5**, or flippers as they will be hereinafter termed, perform the former function, being located exteriorly of the frame along the sides and ends thereof. A parallel-motion linkage **56** supports the bars for bodily swing motion in a vertical plane between the inoperative upper position shown by full lines in FIG. 5 and the operating lower position shown by broken lines. A respective double-acting hydraulic jack **57** connects by a bell-crank **59** which includes one link of the parallel-linkage.

The equipment for releasably securing the spreader bar to the container is shown as comprising a set of four hooks **58** occupying corner positions spaced a moderate distance to the inside of the edge margins of the spreader bar and each formed as the depending lower arm of a respective crank **60** fulcrumed at **61** to the spreader bar. The hooks are activated by double-acting hydraulic jacks **62** into and out of catch-holes **63** formed in a crowning rim section **64** provided by the container.

The invention and the manner of operation is believed to be clear from the foregoing detailed description of the now-preferred illustrated embodiment. The spreader bar, admitting to a controlled rotary shift relative to the lifting head about a vertical axis located central to the width and length of the spreader bar, gives to the crane unusual flexibility, containers being picked up more easily and expeditiously and deposited with greater precision than has been heretofore possible.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A crane for handling a container of generally rectangular plan configuration, said crane comprising a slewing platform, a jib supported from said platform, cable means secured to said jib for the raising and lowering thereof, pantograph linkage pivotally secured at one end to said platform at the other end to said jib whereby the jib is raised and lowered and moves inwardly and outwardly in a substantially horizontal position, said jib including spaced, parallel beam members interconnected at their opposite ends to form a rectangular boom, a pair of sheaves secured to each beam in equally spaced longitudinal relationship, a plurality of cable drums positioned on said platform, cables mounted on the drums and extending about said sheaves, a rectangular lifting head adjustably supported at its four corners by said cables, a spreader bar rotatably secured to said lifting head and depending therefrom in a horizontal position, means between the lifting head and spreader bar to rotate the spreader bar, power means remotely controlled to cause said rotation and means on the spreader bar to releasably engage a container.

2. A crane as in claim **1** including a vertical stanchion mounted on said platform and cables extending from drums on the platform over the stanchion and secured to said jib for raising and lowering the jib.

3. A crane according to claim **1** in which the powered means includes a ring gear fixed to the spreader bar in concentric relation to the rotary journal and having its teeth meshed by a motor-driven pinion rotating about an axis localized in relation to the lifting frame.

References Cited

UNITED STATES PATENTS

1,541,766	6/1925	Luce	212—9
2,900,089	8/1959	McIntyre	212—59
2,920,917	1/1960	Sheehan	212—81
3,081,884	3/1963	Minty	212—14
3,101,967	8/1963	Wyrough.	
3,402,824	9/1968	Zweifel	212—17

FOREIGN PATENTS

23,283	11/1930	Netherlands.
587,372	4/1925	France.
1,098,906	1/1968	Great Britain.
153,107	10/1961	Russia.

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U.S. Cl. X.R.

212—59, 66, 144; 294—67