Nov. 26, 1929. D. DALIN ET AL 1,736,877

ELEVATOR

Filed Dec. 7, 1927 4 Sheets-Sheet 1

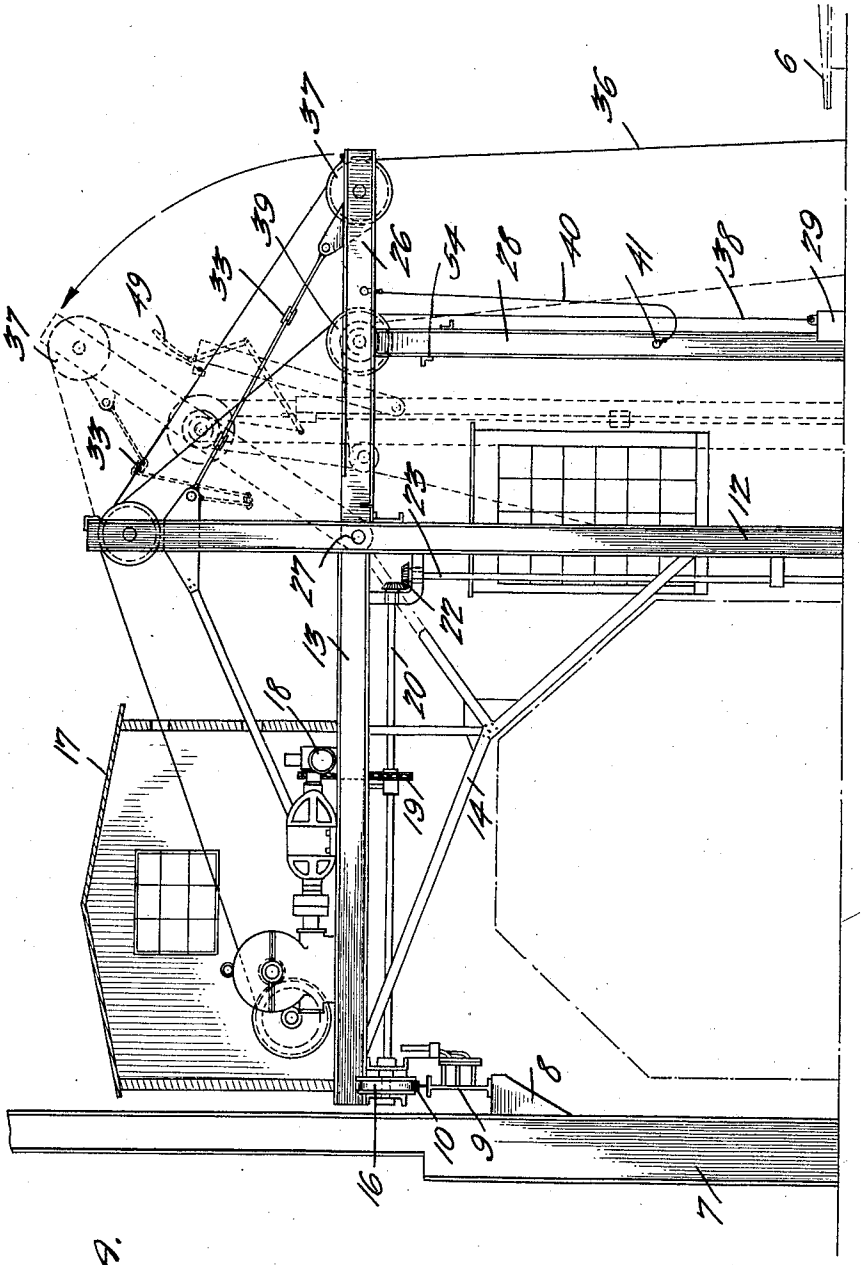


Fig. 1A.

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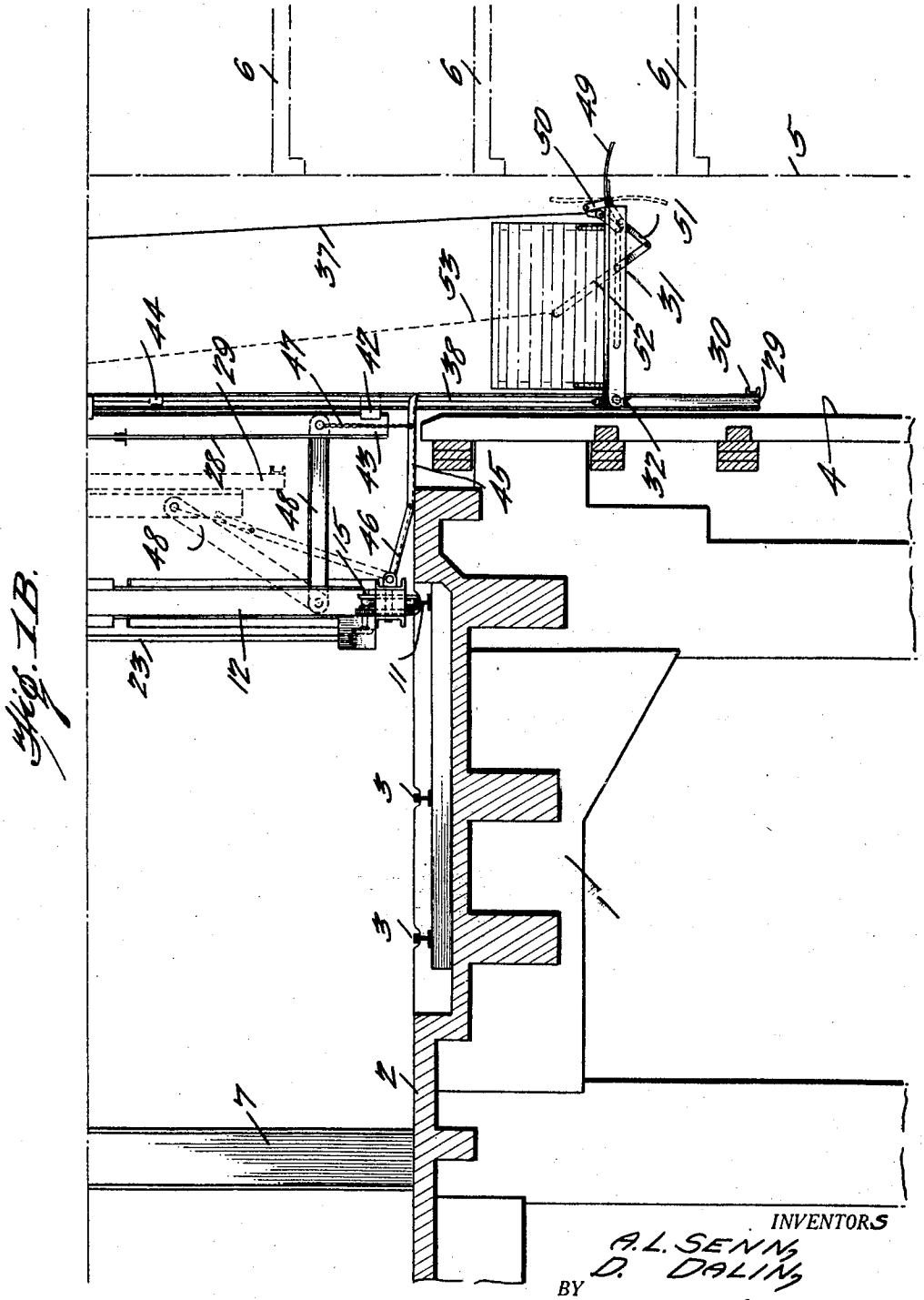


Fig. 1.B.

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Fig. 2.

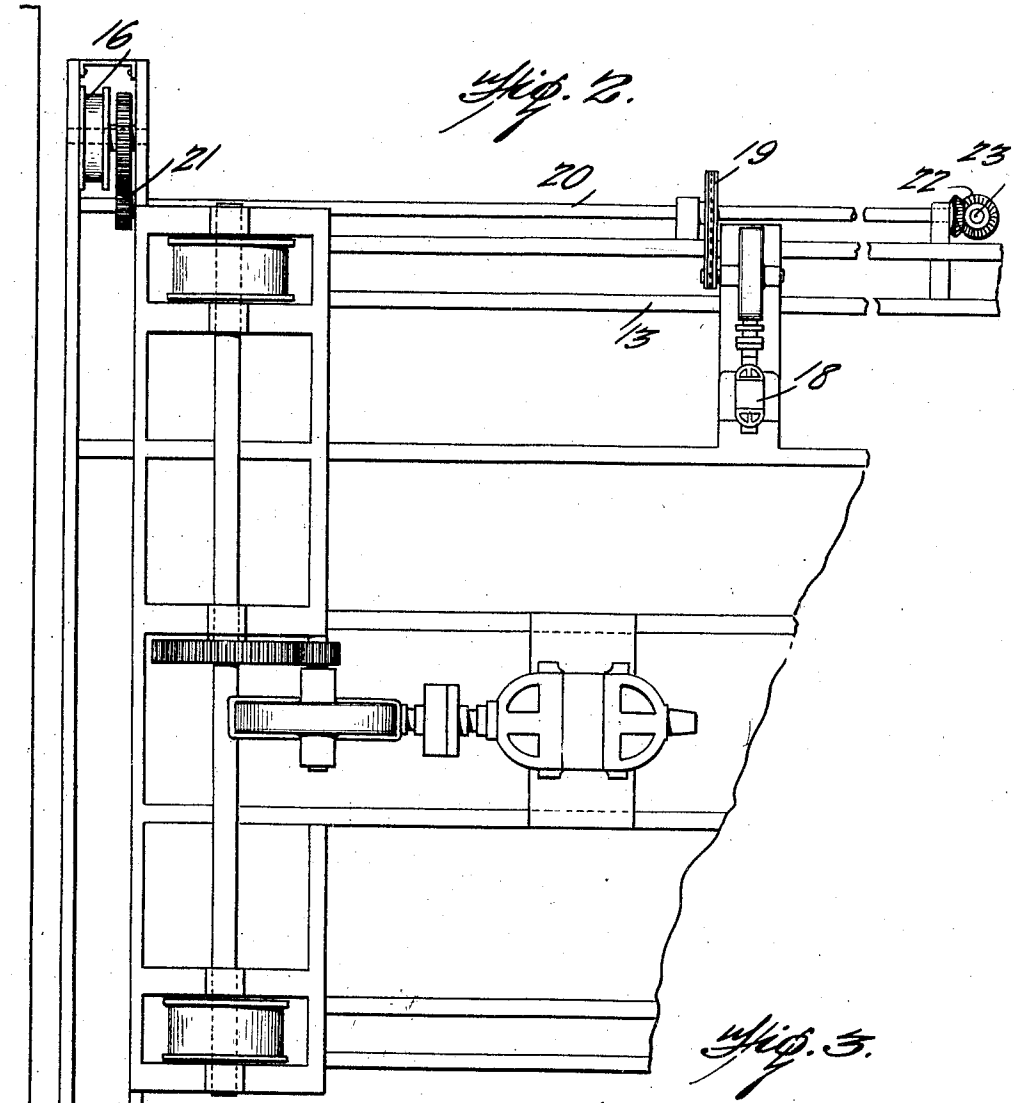
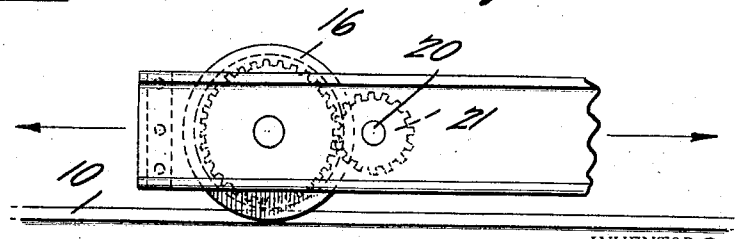


Fig. 3.



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Fig. 4.

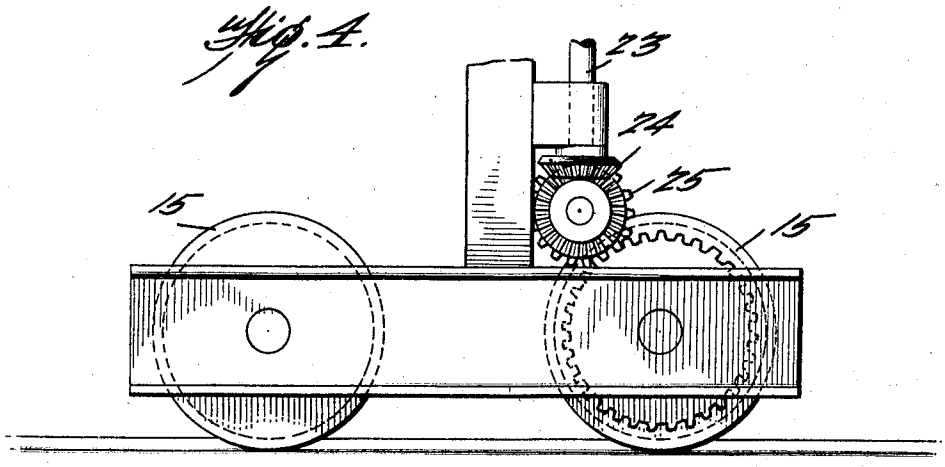


Fig. 5.

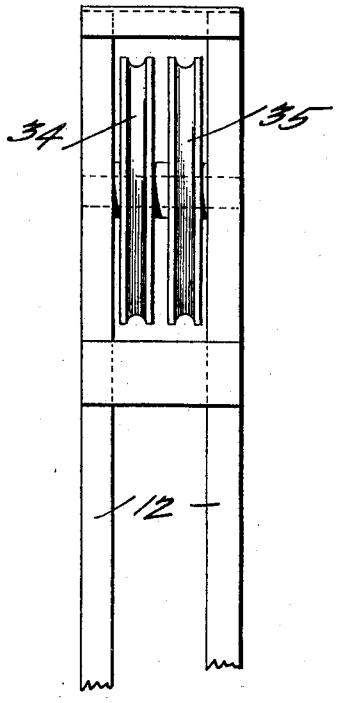
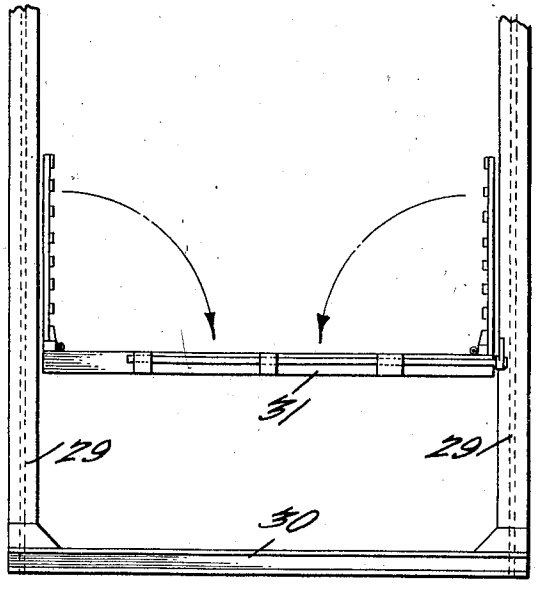


Fig. 6.



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UNITED STATES PATENT OFFICE

DAVID DALIN AND ARTHUR L. SENN, OF SEATTLE, WASHINGTON

ELEVATOR

Application filed December 7, 1927. Serial No. 238,429.

This invention relates to an improvement in elevator systems of that type designed for transferring freight or the like from a dock to a ship alongside of the dock or from the ship to the dock.

The principal object of the present invention is the provision of an elevator system of this character in which the elevator platform may be moved to a position beyond the dock line at will and operated as an elevator in such position to permit the loading into or unloading from any deck of the ship without regard to the particular relation of the water line and dock line at the particular time the ship load is being handled.

A further object of the invention is the provision of an elevator of this character which at will may be moved inwardly of the edge of the dock to thereby avoid any projection of the elevator beyond the dock line and thus avoid obstruction in the docking of ships.

A further object of the invention is the provision of means whereby the elevator may be operated vertically for service as an elevator or moved bodily in a substantially horizontal plane to permit the elevator to be positioned beyond the dock line for service or inwardly of the dock line out of obstructing position when not required for use.

The invention is illustrated in the accompanying drawings, in which:

Figures 1A and 1B together constitute a side elevation of the construction, the elevator being shown in loading position with relation to a ship, the decks of the ship being indicated in dotted lines and the dock structure being shown conventionally in cross section.

Figure 2 is a broken plan view showing the operating mechanism for shifting the elevator.

Figure 3 is a broken side elevation showing the means for operating the track wheels on which the elevator superstructure is bodily movable lengthwise of the dock.

Figure 4 is a broken elevation showing the means for operating the upper track wheels for guiding the elevator superstructure.

Figure 5 is an end elevation of the swinging boom of the elevator structure.

Figure 6 is a front elevation of the elevator and supporting guides therefor.

With particular reference to Figures 1A and 1B, the improved elevator system forming the subject-matter of the present application is designed particularly for use on docks or the like and for the handling of freight and other material in connection with ships. For the purpose of the understanding of the invention, the dock structure is indicated generally at 1, the surface 2 of which is, as usual, provided with a trackway 3 for railroad cars to deliver or receive freight, the front 4, hereinafter termed the edge of the dock, being as usual designed to permit the docking of ships, indicated by dotted lines at 5, having various decks 6 for the reception and discharge of freight.

Owing to tide flow, some of the decks of the ship will be above or below the surface 2 of the dock and in order to conveniently reach these decks below the surface of the dock for the convenient loading or unloading of such decks, it is apparent that the elevator must be capable of operating between the edge or face 4 of the dock and the ship and it is also necessary that the elevator, when not in use for such loading or unloading, must be capable of being drawn inwardly of such dock face in order to be out of the way of ships at the dock when such elevator is not required for use.

The improved elevator system comprises what may be called a dock frame including uprights 7 secured to and rising from the dock surface 2 and suitably braced to provide a rigid structure. These uprights, which may be in appropriate number for the strength desired, are provided at a sufficient height above the dock with a stringer 8 on which is mounted an I-beam 9 supporting a track 10. A similar track 11 is arranged in the surface of the dock, these tracks 10 and 11 supporting the elevator superstructure for travel longitudinally of the dock.

The elevator superstructure comprises a metallic frame including uprights 12 and cross-beams 13 projecting inwardly from the uprights, the whole being braced into a rigid frame, as by braces 14. Carried by the lower

ends of the uprights 12 are track rollers 15 arranged to cooperate with the track 11, similar track rollers 16 being mounted at the inner ends of the cross-beams 13 for cooperation with the track 10, thus permitting the elevator superstructure to be moved to any position longitudinally of the dock within the limits of the trackway.

A machinery house 17 is supported upon this superstructure and contains suitable hoisting mechanism and operating parts which are of general construction and will not be specifically referred to herein except as incidentally noted hereinafter. Mounted in the machinery house is a motor 18 which, through the medium of a chain drive 19, operates a shaft 20 which at one end through gearing 21 operates the upper track rollers 16, as indicated in Figure 3. The shaft 20, at the end opposite the track wheel 16, drives through bevel gearing 22 a vertical shaft 23 which at its lower end, through intermeshing bevel gears 24 and driving gears 25, operates the track wheels 15 cooperating with the lower track 11. Thus, through suitable control of the motor 18, the elevator superstructure may be moved longitudinally of the dock to any desired point within the limits of the trackway, it being understood that the usual braking means of any desired conventional form may be provided, so that the elevator superstructure may be held in the desired position at the will of the operator.

A boom frame 26 is pivotally connected at 27 to the elevator superstructure in line, for example, with the cross-beams 13, this boom frame projecting outwardly from the uprights 12 as indicated. Swingingly dependent from the boom frame are elevator hangers 28 preferably of channeled iron and slidably supported in and movable on the elevator hangers are elevator guides 29. The elevator guides 29, which are connected at their lower ends by a cross-bar 30 to provide a rigid structure, slidably support an elevator platform 31, the frame bars of the platform being provided with rollers 32 which slide freely in the channel form of the elevator guides.

The elevator hangers 28 have a length so that when the boom frame is substantially horizontal, the lower ends of the hangers are just above the surface 2 of the dock, and as the elevator guides are slidable with respect to the hangers and the elevator proper slidable with respect to the guides, it is of course apparent that both the guides and elevator may be moved to a position below the surface of the dock in advance of the dock face, as shown more particularly in Figure 1B.

The boom frame is adapted to be swung upwardly in order to move the elevator structure inwardly with respect to the face 4 of the dock, this movement of the boom frame occurring when the elevator has been drawn to its fully inoperative position as will later appear. The boom frame is held against lowering beyond its horizontal or operative position by a sectional brace 33 which folds as the boom is swung upwardly.

The upper ends of the uprights 12 are provided with pulleys 34 and 35 over one of which passes a cable 36 which also extends over a pulley 37 at the outer end of the boom frame and is connected to the forward or outer edge of the platform 31 of the elevator. A cable 38 passes over the other upright pulley 35 and over a pulley 39 on the boom frame in line with the elevator hangers 28, the operative end of the cable 38 being connected to the inner end of the elevator platform 31.

It will be understood that the elevator proper will at times cooperate with the decks of ships which are positioned above the upper surface 2 of the dock and that, therefore, the elevator guide frame must be capable of being moved to an upper position and held in such position to provide for this operation of the elevator. To provide for this, flexible connectors, as anchor cables 40, depend from the boom frame and have terminal eyes 41 which may be engaged with suitable members on the elevator hanger frame 29 to hold this frame against downward movement and thereby raise the active range of the elevator to a position higher than when such guide frames are in their lowered positions.

The elevator guides 29 are provided with a stop 42 to engage a stop 43 at the lower ends of the hangers 28 when the guides are in their lowermost position, the elevator guides being further provided with an offset 44 adapted to be engaged by the elevator when it is desired to raise the guides and elevator to a higher operating plane, as will later appear.

A metallic apron is provided to bridge the space between the elevator and the dock surface when loading into the elevator from the dock or loading from the elevator onto the dock. This apron provides a metallic plate 45 of sufficient width hingedly connected by arms 46 to the upright 12, the platform section 45 being connected by a flexible connector 47, as a chain, to a bar 48 which is pivotally connected to the upright 12 and to the hanger 28.

The elevator proper is also provided with an apron bridging the space between the elevator and deck entrance to the vessel. This apron comprises a metallic sheet 49 carried by a link 50 connected through a second link 51 with a lever 52. The free end of the lever is connected by a cable 53 to a suitable winch or other hand control (not shown) whereby the cable may be adjusted. Ordinarily, the apron 49 depends as indicated in dotted lines and the apron rope 53 is adjusted so that as the elevator reaches the predetermined position, the pull on the apron rope operates the

lever 52 and moves the apron into a position to bridge the space between the deck and elevator proper, as indicated in full lines in Figure 1B.

In operation, when it is desired to transfer goods to or from a deck of the ship below the upper surface or level 2 of the dock, the boom frame 26 is lowered to its horizontal position. This carries the hangers 28 substantially in line with the face 4 of the dock. The elevator guides 29 moving down the hangers 28 to the limit permitted by the stops 42 and 43 disposes these guides below the upper surface of the dock and immediately in advance of the front face 4 of the dock. The elevator 31 may then be lowered by suitable control of the cables 36 and 38 to the desired position, the elevator apron rope 53 controlling the positioning of the elevator 49 as the elevator is lowered, as previously described. In this movement of the boom frame and elevator hangers 38, the frame bar 48 is brought to the horizontal position indicated in full lines in Figure 1B, thus lowering the dock apron 45 so as to bridge the space between the dock and elevator as the latter is raised in line with the dock surface 2.

If it is necessary to raise the elevator to a position above the upper surface of the dock for cooperation with a deck of the ship above the dock, the cables 36 and 38 are drawn upon by taking up the usual drums which raises the elevator until the latter engages with the stop 44 on the elevator guides. A further upward movement of the elevator raises the guides until the anchor cables 40 may be connected to the elevator guides to suspend the latter in their upper positions. The elevator may now be operated to any position within the limits of the guides to receive or deliver goods.

When the elevator is not in use, it is drawn upwardly, engaging the stop 44 on the guides 29 and moving the guides upwardly until the latter engage stops 54 on the hangers 28. At this point further pull upon the cables 36 and 38 will obviously swing the boom upwardly, as indicated in dotted lines in Figure 1A. As the boom moves upwardly, the elevator is folded on its connection with the elevator guides 29 and raised by the inward swinging of the hangers 28. Incidentally to this movement of the hangers the bars 48 are turned upwardly on their pivotal connections with the uprights 12, thus raising the dock apron into the position shown in dotted lines in Figure 1B.

In case of obstructions, such as fender logs, mooring lines or bollards preventing the structure from being moved longitudinally upon the dock, with the lower extremities of the elevator guide 29, the apron, etc., in position as shown in full lines, it becomes necessary to cause the platform and all its attached parts to assume their positions shown in dotted lines. This is accomplished by setting the hoisting unit into operation to cause the platform to rise until contact is made with the stop or offset 44 on the elevator guides, causing the guides to rise with the platform until arrested by the stop 42. By further hoisting the frame with all its attached parts is caused to fold inwardly until it assumes a position as shown in dotted lines, thus clearing the above-mentioned obstructions.

In order to accommodate the varying water levels due to tidal and flood conditions, the guide is vertically adjustable, and this may be accomplished by causing the platform to contact with the stop 44 and when in the desired position the keeper cable or anchor rope may be attached to the upper end of the guides so as to hold them in their moved position.

In the final position, which may be referred to as the inoperative position, the hangers 28 are swung inwardly of the dock face 4 and raised above the dock. The elevator is raised upwardly and tilted so that all parts are completely out of the way, presenting no obstruction to the ordinary uses of the dock.

Obviously, through the control of the motor 18, the elevator superstructure may be shifted longitudinally of the tracks 10 and 11 to any desired point at which the elevator is to be operated.

What is claimed to be new is:

A ship loading apparatus for use on a dock including trackways laid longitudinally of the dock, a superstructure running on the trackways, a boom pivotally carried by the superstructure, elevator hangers pivotally carried by the boom and superstructure, the said hangers being adapted to be positioned beyond the edge of the dock by the swinging of the boom, a brace bar pivotally connected to the superstructure and to the lower end of the hangers to sustain the hangers in vertical position, the hangers remaining in a vertical position regardless of the position of the boom, elevator guides slidably carried by the hangers, a stop carried on the hangers, a second stop carried on the guides to engage the first mentioned stop, a horizontal platform traveling on the guides and offset on the said guides adjacent the top and adapted to be engaged by the platform to slide the guides to an upper position and means to raise and lower the platform on the guides.

In testimony whereof we affix our signatures.

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ARTHUR L. SENN.