Aug. 20, 1940. H. C. ELLIOTT 2,212,064

BARGE LOADING DEVICE

Filed May 16, 1940 4 Sheets-Sheet 1

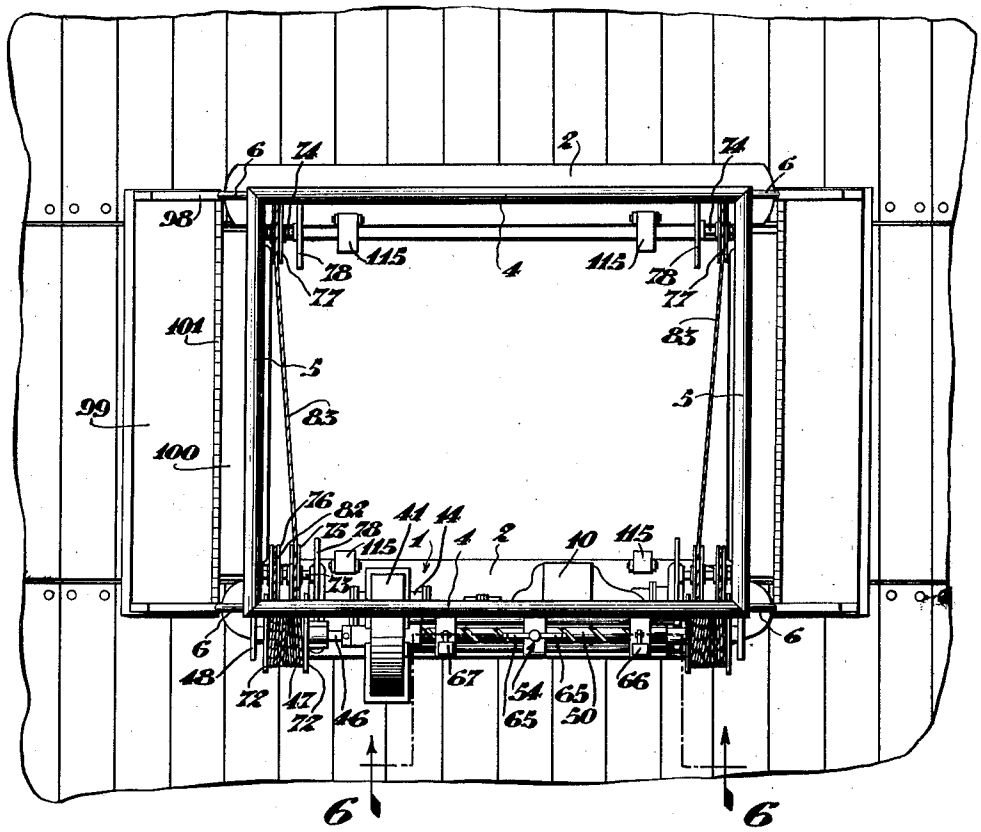


Fig. 1

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BARGE LOADING DEVICE

Filed May 16, 1940 4 Sheets-Sheet 2

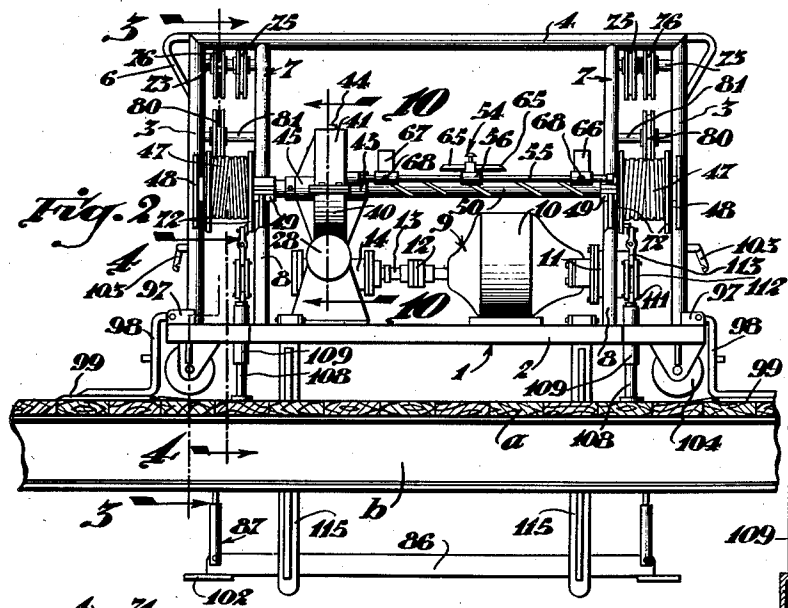


Fig. 2

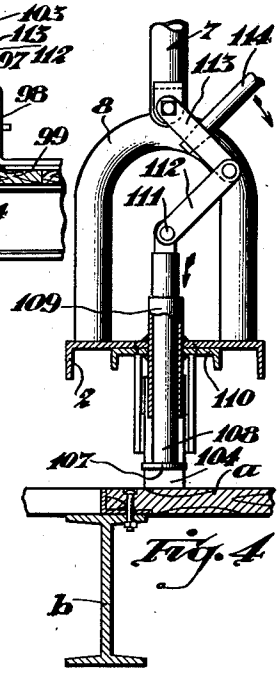


Fig. 4

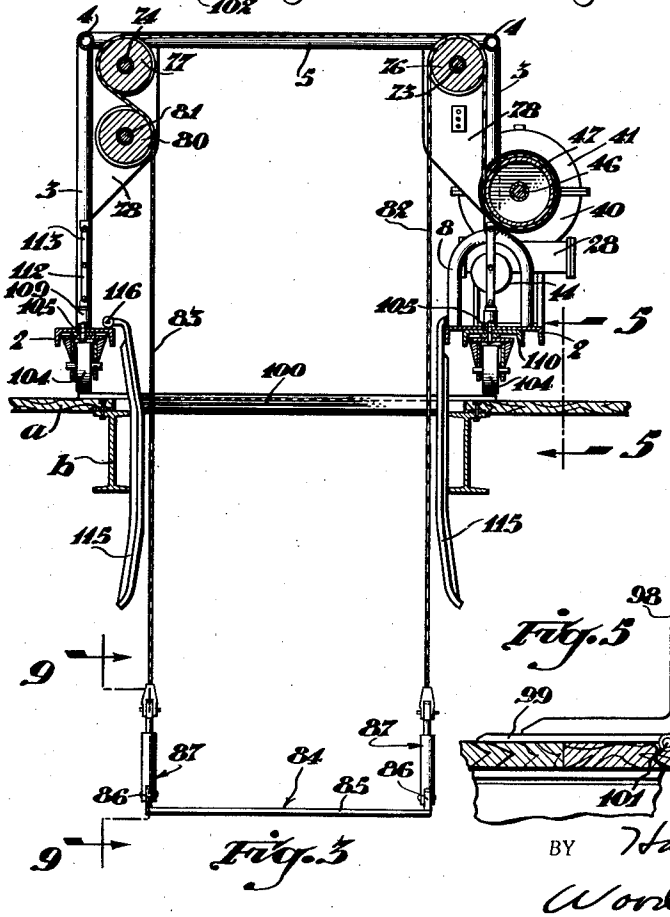


Fig. 3

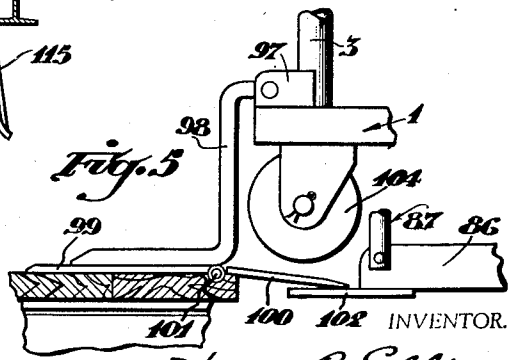


Fig. 5

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Aug. 20, 1940. H. C. ELLIOTT 2,212,064

BARGE LOADING DEVICE

Filed May 16, 1940 4 Sheets-Sheet 3

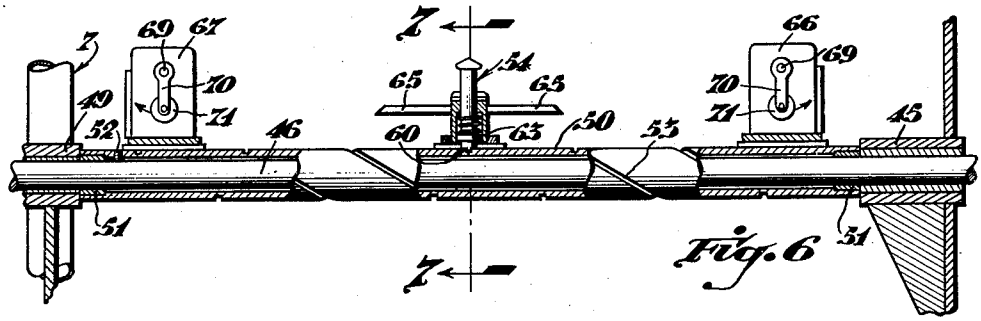


Fig. 6

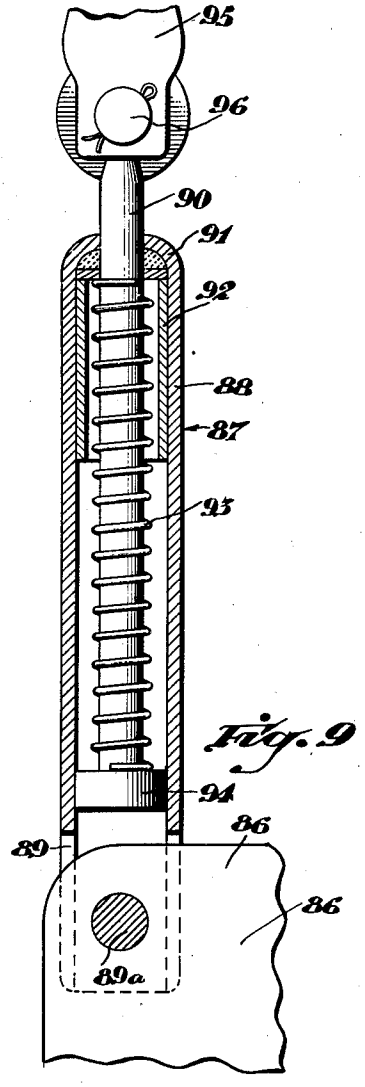


Fig. 9

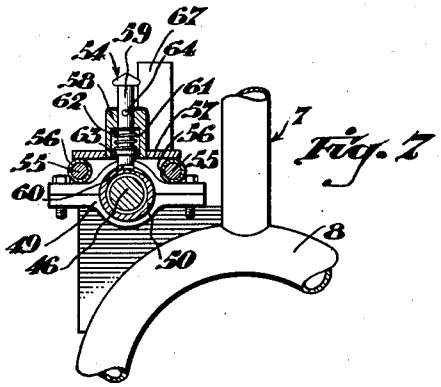


Fig. 7

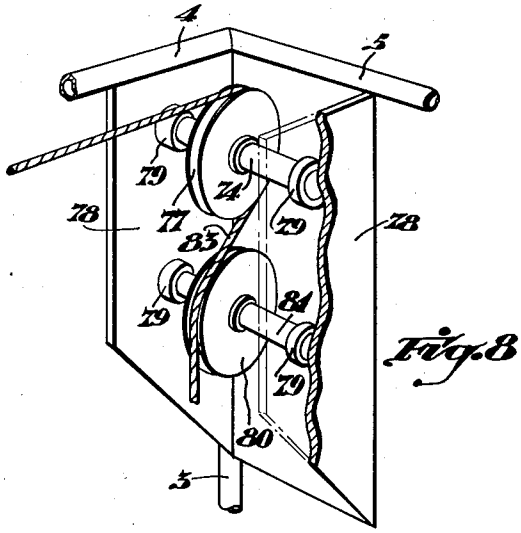


Fig. 8

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Aug. 20, 1940. H. C. ELLIOTT 2,212,064

BARGE LOADING DEVICE

Filed May 16, 1940 4 Sheets-Sheet 4

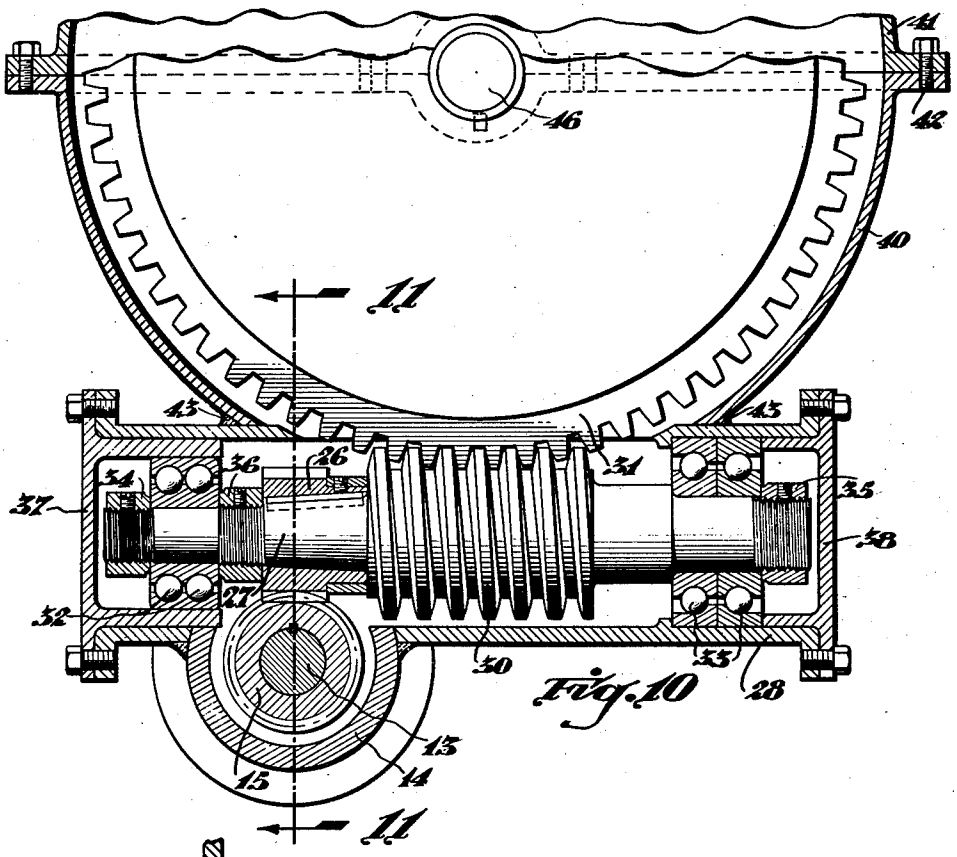


Fig. 10

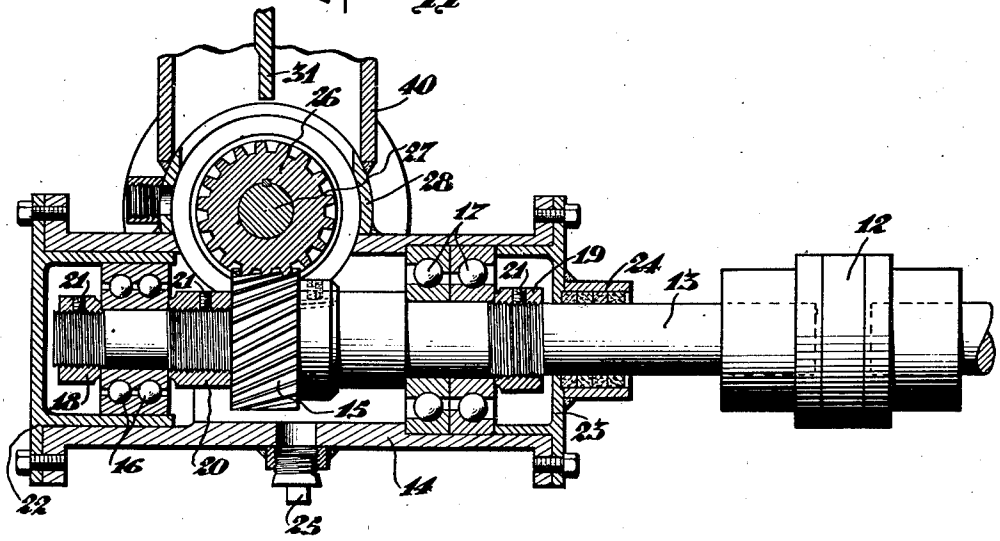


Fig. 11

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Patented Aug. 20, 1940

2,212,064

UNITED STATES PATENT OFFICE

2,212,064

BARGE LOADING DEVICE

Harry C. Elliott, Cincinnati, Ohio, assignor to The Mississippi Valley Barge Line Company, St. Louis, Mo., a corporation of Delaware

Application May 16, 1940, Serial No. 335,595

12 Claims. (Cl. 187—11)

This invention relates to elevators of the type adapted particularly for handling freight. More specifically, the invention relates to a portable elevator suitable for use in the loading and unloading of barges.

In recent years, unit barges have been used extensively in inland waterway transportation; these usually are comprised of a hull providing a hold, a deck which is removable in sections, and a deckhouse, enclosing the hold and the removable portions of the deck. The roof also is made up of hatches which can be lifted from the deck house or rolled to uncover sections of it. In the use of these barges, freight is loaded into the hold through the deck apertures and additional freight is then loaded within the deckhouse. Equipment of the general type is disclosed, for example in the Elliott Patent No. 2,150,763 issued March 14, 1939 and, while the elevators of the present invention are useful for the handling of freight through the hatchways of seagoing vessels as well as of barges, the invention is disclosed particularly in relation to the latter type of equipment.

Heretofore it has been necessary to pass freight by hand into or out of the hold of the barge. The operation obviously is a very slow and tedious one, and the costs of barge loading and unloading constitute a substantial proportion of the total cost of transportation; particularly when the shipping is between local points on a river.

The primary object of the present invention has been to provide a portable elevator for lowering and lifting freight from and to the barge hold. It is intended that the elevator be arranged to operate over a well which is provided through the removal of a portion or section of the deck of the barge, or through the roof of the barge, as the case may be.

A further object of the invention has been to provide a portable elevator of this type which embodies a number of safety features which make its use both safe and convenient; these features include means adapted for guiding the platform during its upward and downward travel but arranged to be collapsed for compaction of the apparatus when the elevator is being placed in position or moved to or from the barge; simple control means for stopping the platform at predetermined positions; means operating in conjunction with the elevator for bridging the gap between the platform and the aperture in the roof or deck through which the freight is being handled; and apparatus for stiffening and rigidifying the frame of the elevator without obstructing the freight handling passageway.

A further object of the invention is to provide means for holding the elevator in stationary position after it has been wheeled to location.

Briefly, the apparatus of the invention comprises a wheeled carriage and a platform or lift, which is arranged to be lowered and hoisted through the carriage and supported from it.

The carriage supports a hoisting or drive mechanism for operating the platform, and also, in the preferred embodiment is provided with a superstructure through which the platform is interconnected with the hoisting mechanism. However, the carriage or chassis for the elevator lift, also carries collapsible guide members which are arranged to depend from it, so as to guide the platform as it is lowered to a plane below the carriage wheels, or, in other words, as it is lowered down into the hold of the barge, when the wheels of the carriage are resting upon the deck.

The collapsible members normally are nested to reside within the superstructure of the elevator so that they are out of the way when it is being positioned for usage. Thereafter, however, these guide units are moved into positions appropriate for them to guide the platform; as it is raised or lowered. In the preferred embodiment the platform includes members cooperating with the guide members of the carriage to prevent it from swinging as it is being operated.

For the control of the elevator upper and lower limit switches, adapted to control the operating of the hoisting mechanism, are operated by a control dog which is driven by a traversing screw rotating in synchronism with the hoisting mechanism. The limit switches are positioned to control the drive apparatus when the platform reaches its upper or lower stopping positions.

The apparatus, on the whole, is sufficiently compact either to be wheeled into a barge over gangplanks appropriately mounted, or to be lowered to the barge by the use of a crane with which most river terminals are provided. Then, the collapsible guide members are moved into their extended, or guiding positions and the elevator is ready to be used upon the provision of electric current, which can be supplied from the terminal or from a towboat.

Various features and advantages of the invention which have not already been described, are disclosed in the following specification and in the drawings, which illustrate a preferred embodiment of the invention. From the foregoing principle description of features upon which the in-

vention is predicated, and from the following detailed description of the structure, those skilled in the art readily will comprehend the various modifications to which the invention is susceptible.

In the drawings:

Figure 1 is a plan view showing the elevator in position over an aperture in a barge deck.

Figure 2 is a side elevation of the elevator with the platform in the process of being lowered or raised.

Figure 3 is a sectional elevation taken on the line 3—3 of Figure 2. In this figure the platform is shown in lowered position.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 2 and illustrates a support for the elevator and toggle for operating it.

Figure 5 is a fragmentary side elevation showing the details of construction of the brow plate.

Figure 6 is a fragmentary elevation showing details of construction of the elevator controller.

Figure 7 is a fragmentary cross sectional view taken on the line 7—7 of Figure 6.

Figure 8 is a fragmentary perspective view showing the arrangement of guide sheaves for supporting the elevator cable.

Figure 9 is a fragmentary sectional elevation taken on the line 9—9 of Figure 3 illustrating the construction of a platform bumper.

Figure 10 is a sectional view taken on the line 10—10 of Figure 2 showing details of the elevator drive gear.

Figure 11 is a sectional view taken on the line 11—11 of Figure 10 showing further details of the elevator drive.

Frame assembly

The frame of the elevator is indicated generally at 1 and is comprised of a pair of channel members 2—2 which are parallel to but spaced apart from one another a distance somewhat greater than the width of the platform which the elevator is intended to operate. One of the side members 2 is wider than the other, and supports the drive mechanism, as explained at a later part of the specification.

Corner posts 3 extend upwardly from each end of each side channel, and a top frame, comprised of the side elements 4, 4, one for each side, and the crosswise elements 5, 5, one for each end is carried upon the corner posts 3 at their upper terminals. It is preferable to construct the superstructure which is carried upon the side channels 2 of tubular steel or of pipe sections appropriately welded together.

Each of the corner posts 3 carries an eye 6 for the reception of sling hooks from a crane. By these eyes, the elevator may be raised and lowered into position to and from a barge, using the lift facilities provided at a river terminal.

Support members indicated generally at 7 are mounted upon the wider of the side members 2, inwardly from the corner posts 3 at each end of it. The posts 7 comprise pipe sections connected at their upper ends to the top side member 4 and terminating at their lower ends in U-shaped forks 8. The forks are employed for the purpose of straddling and making accessible the endwise portions of the elevator drive mechanism which is indicated generally at 9.

Drive mechanism

The drive for the apparatus is mounted upon the wider of the side members 2 and comprises a motor unit 10 which, at one end, is equipped with a power brake 11 for stopping the rotation of the motor after it is deenergized. The latter unit extends through the aperture in the fork 8 at one end of the frame. Motor 10, through a coupling 12, drives a shaft 13 which rotates within a housing 14 where it carries a 45° helical gear 15 (Figure 11). An anti-friction bearing 16 is provided at one end of the housing for supporting the shaft 13, while a thrust bearing 17 is mounted at the other end. The shaft 13 is threaded to receive lock nuts 18 and 19 for holding the bearing elements and helical gear in assembly, and washer 20 is threadedly carried by the shaft intermediate the helical gear and the anti-friction bearing. All of the nuts and washers are provided with lock screws 21 for locking them in position.

Caps 22 and 23 are bolted to the end of the housing 14, the former extending telescopically within the housing to support the anti-friction bearing and the latter being provided with a packing gland 24 through which the shaft 13 extends. The housing is filled with lubricant and is provided with a plugged drain outlet 25.

Helical gear 15 meshes with another 45° helical gear 26 which is carried upon a stub shaft 27 within a housing 28. The stub shaft is at right angles to the shaft 13 and carries a worm 30 which drives a worm wheel 31. The housings 14 and 28 are connected to one another as by welding, and apertures are provided in each through which the helical gears 15 and 26 extend in rotative engagement with one another.

Stub shaft 27, like the main shaft 13, is journalled at one end in an anti-friction bearing 32 and at the other in a thrust bearing 33. This shaft likewise contains lock nuts 34 and 35 and a washer 36 similar to lock nuts 18 and 19 and washer 20, as previously described. The housing 28 carries end caps 37 and 38, the former extending telescopically within the housing to support the journal 27, and the latter being provided with a similar annular flange to abut the thrust bearing assembly and hold it against a seat turned within the housing. Helical gears 15 and 26 and the worm wheel 30 are keyed to the shafts in the usual manner.

The worm wheel 31 rotates in a plane parallel to the axis of shaft 27, and is housed within a casing comprised of upper and lower members 40 and 41 bolted together as at 42. The casing is welded to the casing 28, as at 43, and the upper portion of it includes a lubricant inlet 44. The casings 40, 28 and 14 all are in communication with one another and lubricant introduced at 44 may be removed at the plugged opening 25. The worm wheel casing comprises journals 45 for supporting a shaft 46 to which the worm wheel 31 is keyed.

Shaft 46 operates cable drums 47—47; these are installed intermediate the posts 3 and 7 at each end of the frame. However, the ends of the shaft 46 also are journalled in blocks 48 mounted to the corner posts 3, and in journals 49 carried on the studs 7. From the foregoing description of the drive mechanism it will be seen that the shaft 13 of the drive motor 10 is parallel with the shaft of the cable sheaves. This arrangement is particularly desirable for compacting the structure in order that it be sufficiently narrow to be lowered through barge hatchways.

Drive control mechanism

Shaft 46 carries an elongated sleeve 50 which

extends intermediate the journal 45 at the housing 41—42, and the journal 49 at the one end of the frame. The internal diameter of the sleeve is greater than the diameter of the shaft and bushings 51—51 are disposed intermediate the shaft and the sleeve at points adjacent the journals. The sleeve 50 is locked to rotate with the shaft by means of the set screw 52, and the exterior surface thereof contains a spiral groove 53 which constitutes a drive for the controller dog indicated generally at 54.

Adjacent the shaft 46, and extending parallel with it, is a pair of stationary shafts 55. These are supported upon opposite sides of the posts 7—7 at their ends respectively, for instance, in brackets extending from the journal 49 and the housing member 41, and are positioned slightly above the sleeve 50 for slidably supporting therebetween the control dog 54. The latter unit is comprised of slide bearings 56—56 bored for slidable engagement with the shafts 55—55 respectively. A plate 57 is connected across the bearing members to carry a stud 58 which, in turn, is bored to receive a pin 59 having at its lower end a finger 60 adapted to engage the spiral groove 53 in the sleeve 50. The stud 58 contains a counter bore 61 for receiving a spring 62 surrounding the pin 59, and the pin, in turn, contains a keeper flange 63 with which the lower edge of the spring is in abutment. The spring is of the compression type and tends to keep the finger 60 within the spiral groove of the drive sleeve.

However, a lift pin 64 extends transversely through the pin 59 and normally resides within a slot cut in the stud 58 but the stud 58 also is provided with a raised support portion adapted to receive the pin 64 when the finger 59 is lifted and rotated through a quarter turn. This arrangement permits the finger to be lifted and kept out of engagement with the groove in the sleeve in order that the control assembly 54 be decommissioned or slid back and forth, at will, upon the guide rods 55.

Dog members 65—65 extend from the stud 58 in opposite directions parallel with sleeve 50.

One of the shafts 55 contains upper and lower limit switches 66 and 67 respectively. These are in electrical interconnection with appropriate relays for controlling the source of energy to the drive motor 10 and the power brake 11. The limit switches are adjustably mounted upon the shaft 55 and are free to be slid longitudinally of it by loosening the lock screws 68.

The limit switches are provided with operating shafts 69 which support arms 70—70, each of which at its lower extremity contains an abutment wheel 71. The abutment wheels are positioned in the path of movement of the dog members 65—65, respectively, and the ends of the dogs are chamfered for engagement therewith, so that as the dog assembly 54 moves backward and forward along the shaft one or the other of the limit switches is operated as the dog assembly is driven to upward or downward limiting position.

The pitch of the spiral groove 53 in the sleeve 50 is proportioned to the rotation of the cable sheaves 47 and, since the sleeve 50 moves in unison with the cable sheaves, the dogs 65 are moved linearly relative to the limit switches. The limit switches are positioned upon shaft 56 to be operated by one or the other of dogs 65 when the platform of the elevator is at an upper or lower stopping position.

Cable rigging

The cable drums 47 are provided with end flanges 72 and the surface of each drum is grooved to accommodate two cables. Adjacent the cable drums and above them jack shafts 73—73 are provided, each for supporting two cable sheaves 75 and 76. On the other side of the superstructure jack shafts 74—74 are provided with sheaves 77—77. All of the sheaves are positioned so that the innermost points upon their peripheries extend inwardly of the flanges of the channel members 2 upon which the superstructure is carried. Each of the jack shafts 73 and 74 is supported stationarily between a pair of buttress plates 78—78. One of the plates of each pair extends inwardly from corner post 3 of the superstructure and the other from the adjacent vertical support 7, as shown in Figure 8. The buttress plates preferably are provided with bosses 79 welded thereon, and the jack shafts are carried by the bosses. All sheaves are free to rotate about the shafts and also move longitudinally on them.

At the side of the superstructure opposite the drive mechanism and beneath the sheaves 77 idler sheaves 80—80 are provided, as shown in Figure 3. These are rotatably and slidably mounted upon jack shafts 81—81, at each end of the frame, the jack shafts being mounted intermediate the buttress plates as previously described.

Each cable drum operates two sets of cables, one set 82—82 for the near side of the platform, and the other set 83—83 for the far side of the platform. The cables 82 pass from the drums, up and over the sheaves 76, then down past the drive mechanism. The cables 83 of the other set pass upwardly over the sheaves 75 respectively, across the top of the superstructure and over the sheaves 77. The cables pass around these sheaves and are projected forwardly over the idler sheaves 80 so as to extend downwardly through the frame at the opposite side of the apparatus.

The cables 82 and 83 support the platform which is indicated generally at 84. This comprises an appropriate rigid plate 85 with side flanges 86—86 provided thereon at the opposite edges. The width of the platform is such that it may pass freely intermediate the side channels 2 of the frame, while the length of it is determined in accordance with the apertures or hatches through which it is intended to operate.

The cables 82 and 83 are connected to the platform at its corners through snubbers which are indicated generally at 87; the construction of these is illustrated in Figure 9. Each snubber comprises a tubular member 88, slotted at its lower end as at 89 to provide a clevis connection with the side flange 86 of the platform with the pivot pins 89a connecting the clevises to the side flanges. Housing 88 of the snubber is closed at its upper end to contain a bore of reduced diameter through which a plunger 90 passes, for instance, the housing, as illustrated in Figure 9, may be made from a piece of pipe with the upper end swaged inwardly to provide it with a shoulder 91 against which a sleeve 92 is disposed. Compression spring 93 extends about the plunger 90 intermediate the sleeve, and a flange 94 is provided at the lower end of the plunger. The lower ends of the cable are provided with connectors 95, and these are pinned

as at 96 to the parts of the plungers extending above the housings.

The snubbers are adapted particularly to prevent abrupt shocks in the cable or drive mechanism. When the platform, being lowered, comes into contact with the floor of the barge, the compression springs 93 take up the shock and at the same time keep the cable in taut condition. This feature is of considerable practical importance in view of the fact that the stopping position of the platform varies from time to time as the barge tends to list when it is being loaded or unloaded.

Brow plates for platform

At the ends of the channel members 2, blocks 97 are provided for pivotally supporting brackets 98. These brackets extend beyond the ends of the platform and downwardly to carry brow plates 99 which extend across the elevator frame. The rearward edges of the brow plates are provided with plates 100, hinged thereto as at 101. The hinged plates extend inwardly toward the elevator platform for engagement with sills 102 which are fastened to the lower face thereof at each of its crosswise edges.

During the lifting of the platform, the sills 102 engage the hinge plates 100 and the gap between the edges of the platform and the edges of the aperture of the deck, through which it is operating, is thus bridged. This feature is of considerable practical importance for several reasons; in the first place the deck or roof areaway for the platform varies considerably from barge to barge, and there must necessarily be considerable clearance for the platform. On the other hand, very careful locating of the elevator over the opening is tedious and time consuming. The arrangement disclosed makes it possible to use but reasonable care in locating the elevator above apertures of various sizes. As shown in Figures 1, 2 and 3, removable flooring sections *a* are supported upon cross beams *b* as described in the Elliott patent previously mentioned. The removal of each flooring section provides an aperture through which the platform may operate.

The brow plates, interconnected at each end to the channel members 2, serve the structural purpose of rigidifying the lower portion of the frame and preventing the channel members from moving away from one another during extended usage of the apparatus. Utilizing structural members at the top of the structure sufficiently heavy to prevent separation of the channel member is avoided.

The latches 103 extend from the corner post 3 of the superstructure for holding the brow plates in raised position when the elevator is being moved into or out of position.

Ordinarily, the elevator apparatus is supported upon casters 104 which are carried pivotally, as at 105, beneath the channel members 2. With the brow plates in raised position, these casters enable the elevator to be rolled about at will until it is brought into proper position.

However, during the usage of the elevator, the frame is supported against movement upon jacks which are illustrated in Figure 4. These jacks are located adjacent the casters 104 and are raised and lowered through a toggle apparatus as follows: Each jack comprises a foot portion 107 carried upon a shaft 108. The shaft extends through a sleeve 109 which is welded to the channel 2, a supplementary channel 110 being used to rigidify the connection of the sleeve with the channel member. The upper portion of the member 108 is connected pivotally, as at 111, to a toggle link 112, and this link, in turn, is connected to another toggle link 113 which is pivotally supported from the fork portion 8 of support 7. The link 113 is bored for the reception of a lifting bar 114 in order that the toggle be thrown to press the foot against the floor, and thereby raise the elevator from its caster wheels. When the toggle links are in alignment with one another, the frame is in the elevated position and is supported upon the feet 107. In this position the elevator is mounted stationarily. Figure 4 illustrates the feet in the process of being operated.

At the inner edges of the side channels 2, the guide members 115 are provided, one pair for each side. These members are mounted pivotally upon the flanges of the channels, as at 116, and preferably are made as flanged bars which extend inwardly toward one another from the edges of the channels and then downwardly substantially beyond the casters, for instance, a distance approximately half-way to the lowermost position of the platform. The lower portions of the guide members are bent outwardly to receive therebetween the flanges 86 of the platform. These bars therefore guide the platform during its movement and prevent it from swaying as it is lowered and raised. When the elevator is being decommissioned the guide brackets are swung inwardly to rest upon the platform so that they are out of the way while the apparatus is being handled.

Having described my invention, I claim:

1. A portable elevator comprising a wheeled carriage delineating a platform passageway, a platform positioned within the passageway, means for hoisting the platform supported from the carriage, and guide means extensible from the carriage for guiding the platform when it is in positions below the passageway.

2. A portable elevator comprising a wheeled carriage delineating a platform passageway, a platform positioned within the passageway, electric drive means for hoisting the platform supported from the carriage, guide means extensible from the carriage for guiding the platform when it is in positions below the passageway, and electric controller means for controlling the hoisting mechanism when the platform is in predetermined positions relative to the carriage.

3. A portable elevator which is to be used in loading or unloading barges, comprising a chassis delineating a passageway, wheels carried by the chassis beyond the passageway, a platform adapted to be moved through the passageway in the chassis, means for moving the platform, and guide means extensible from the chassis for guiding the platform when it is in positions below the wheels of the chassis.

4. A portable elevator comprising a wheeled carriage delineating a platform passageway, a platform positioned within the passageway, electric drive means for hoisting the platform supported from the carriage, guide means extensible from the carriage for guiding the platform when it is in positions below the passageway, and electric controller means for controlling the hoisting mechanism when the platform is in predetermined positions relative to the carriage, including a threaded shaft rotatable in synchronism with said electric drive means, dog means movable by said threaded shaft, and electric switches positioned in the path of movement of said dog

means and actuable thereby for controlling said electric drive.

5. A portable elevator comprising a frame having supporting wheels therefor and adapted to be positioned over an aperture in a barge deck, a platform movable within the frame and below it, a hoisting mechanism carried by the frame for moving the platform, and guide means normally collapsed within the frame when the elevator is not in usage, but arranged to be extended below the frame for guiding the platform when the elevator is in usage.

6. A portable elevator which comprises platform members which extend in spaced parallel relationship, interconnected members supported from said platform members and extending upwardly therefrom to form a rigid frame which is of inverted U shape in cross section, wheel members for movably supporting said frame, sheave members supported at the upper part of the frame and at opposite ends thereof, a platform, cable support members therefor located within the frame with the cables passing over the sheaves, drive means for operating said cables, located at one side of the frame and comprising a motor and cable drums in spaced relationship with one another, but extending longitudinally of the frame, and an assembly for rotatably interconnecting said motor and said drums, including helical gears mounted on a shaft extending in a direction transversely of said frame.

7. A portable elevator for purposes of the type described, which comprises interconnected members forming supports of inverted U-shape which are spaced apart from one another, means interconnecting said inverted U-shaped members, and therewith forming a frame, wheel means for movably supporting said frame, a brow plate extending transversely across an end of said frame at a lower part thereof, and means hingedly connecting said brow with said frame, the brow plate serving as an entranceway to said platform, and the brow plate serving to interconnect the lower terminals of the members forming the said frame.

8. An elevator for purposes of the type described, comprising a frame including corner posts, means respectively interconnecting the corner posts at their upper terminals, a platform movably located within said corner posts, and means for interconnecting the lower terminals of the corner posts at opposite ends of the platform, comprising brow plate members and supporting means therefor hingedly mounted upon the lower terminals of the corner posts.

9. An elevator device of the type described, comprising a portable frame, a platform movable within said frame, wheels for transporting the frame, and means including toggle members and longitudinal support members, with the toggles interconnecting the frame and the longitudinally movable support members, the support members being adapted to be actuated by said toggles for stationarily supporting the frame of the elevator.

10. A portable elevator comprising corner post members interconnected at their upper extremities to form a frame, means respectively connecting lower portions of the corner posts at the opposite sides of the frame with one of said means providing a platform support, a drive motor mounted substantially longitudinally of said frame upon said platform, support hoisting drum means having an axis of rotation extending in the direction of the axis of the drive motor and rotatably supported upon said frame adjacent the drive motor, means for interconnecting said drive motor and said hoisting drum, including helical gear members and jack shaft (extending in a direction transverse the frame) for supporting one of said gear members, an elevator platform operable through said frame, and means for operating said platform from said hoisting drum means.

11. A portable elevator of the type described, which comprises corner post elements, means interconnecting the corner posts to one another at their upper extremities to form a frame, a platform supported from one pair of corner posts longitudinally of the frame, a motor supported on the platform and having a drive shaft extending longitudinally of the frame, a jack shaft extending transversely of the frame, helical gear members in meshing relationship mounted respectively upon said jack shaft and drive shaft, a shaft having cable drums and worm wheel means interconnecting said shaft having cable drums and said jack shaft with the shaft supporting the cable drum means extending longitudinally of the elevator frame, an elevator platform which is movable within said frame sheaves supported by said frame at an upper portion of it and cable means operated by said cable drums and extending over said sheaves into connection with said platform.

12. A portable elevator for purposes of the type described, comprising an elevator platform, a frame through which said platform is operable, a motor supported upon said frame at one side of said platform, cable drum means, cables actuated by said drum means for operating said elevator platform, gear means for operating said cable drum means from said motor, a shaft rotatable with said cable drum means and providing a spiral groove upon its surface, a control dog movable longitudinally of said shaft and having a member engaging said groove, and electrical switches for controlling said motor, said switches being positioned in spaced relationship in the path of movement of said control dog and adapted to be operated by said control dog for controlling said motor when said platform reaches predetermined portions.

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