

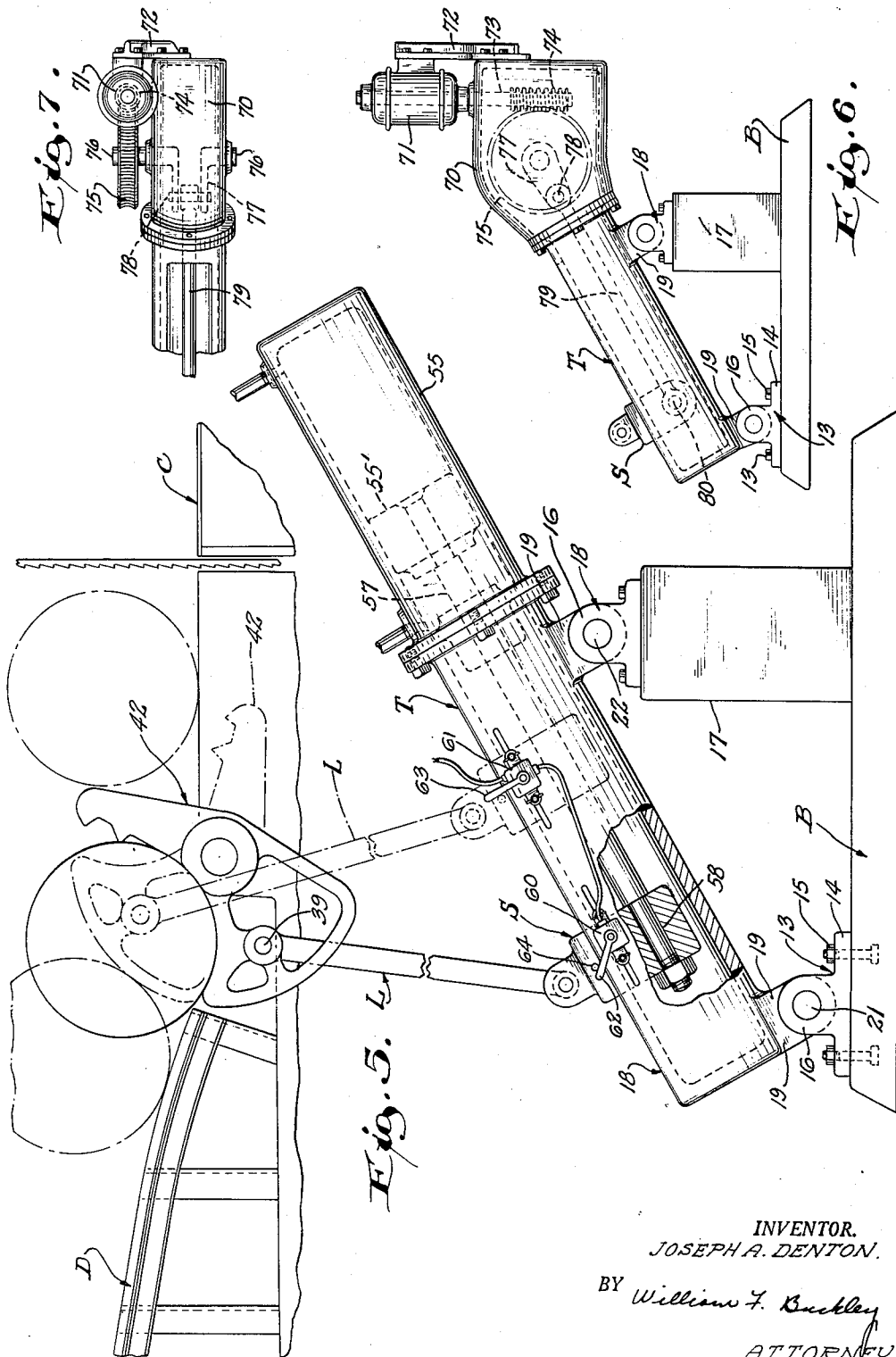
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J. A. DENTON
LIFT MECHANISM

2,514,314

Original Filed July 8, 1944

3 Sheets-Sheet 2



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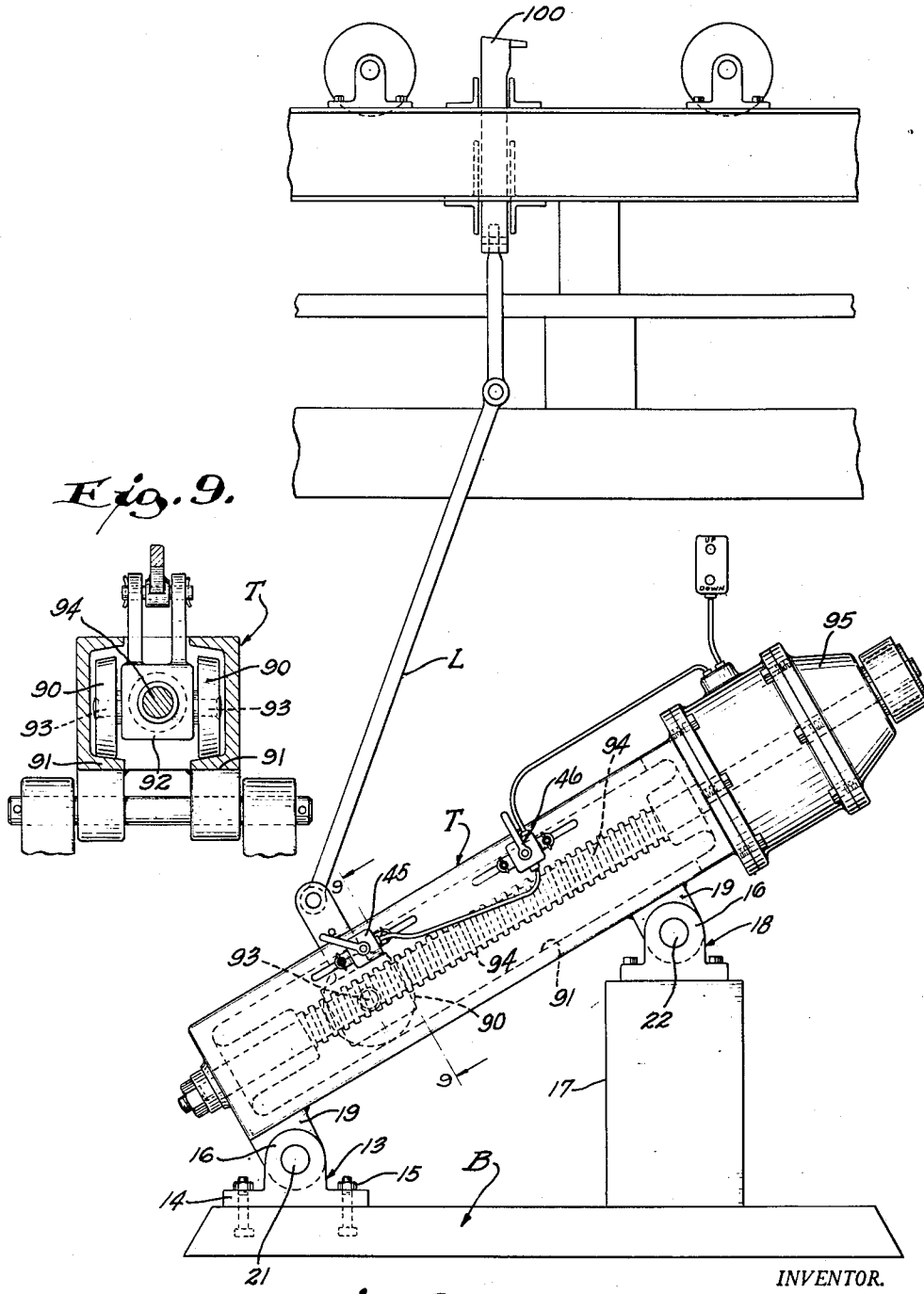


Fig. 9.

Fig. 8.

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2,514,314

LIFT MECHANISM

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6 Claims. (Cl. 74-89)

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This invention relates to an improvement in a lift mechanism especially designed and adapted for use with saw mill machinery. It may, for example, be advantageously embodied in a lift mechanism for a log loader or on a lift mechanism for the transfer chains or bumpers of lumber handling conveyors.

Heretofore, in the most widely used type of lift mechanism, a steam or air motor of the piston and cylinder type, has been used as the power unit of the lift mechanism. Electric motors have also been employed as a source of power.

Different installations require that their respective lift mechanism have different strokes. With prior constructions the lift mechanism must be built to fit the requirements of the particular installation. Where a steam engine or fluid pressure motor of the piston and cylinder type is employed, the manufacturer must produce or have on hand cylinders of various lengths to meet the requirement of different strokes.

The object of the present invention is to so constitute a lift mechanism that irrespective of whether a fluid pressure motor of the cylinder and piston type, or an electric motor, is employed as a source of power, the stroke or range of lift of the lift mechanism may be conveniently and controllably varied and this within quite a wide range.

Another object of the invention is to provide a lift mechanism having the advantages and capacities mentioned and which is simple, durable, and rugged in construction, compact and close in its organization, and easy and comparatively inexpensive to manufacture, install, and maintain, and also readily adjustable.

These objects of the invention and other ancillary advantages are attained by the mechanism, construction, and arrangement illustrated in the accompanying drawings forming part hereof, in which:

Fig. 1 is a view in side elevation with parts broken away and shown in section, and illustrating a lift mechanism embodying the present invention, the lift mechanism being driven by an electric motor and associated with a transfer chain, the latter, however, being only diagrammatically illustrated;

Fig. 2 is a view in transverse cross section in the plane of line 2-2 of Fig. 1 and looking in the direction of the arrows;

Fig. 3 is a fragmentary view in top plan illustrating the track and saddle of the above mentioned embodiment;

Fig. 4 is a fragmentary view in vertical cross

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section showing diagrammatically how anti-friction means may be employed between the slide and track;

Fig. 5 is a view in side elevation showing another embodiment of the invention wherein the lift mechanism is actuated by a fluid pressure motor and is combined with an oscillating cradle type of log loader;

Fig. 6 is a view in side elevation on a reduced scale showing a further modification of the invention;

Fig. 7 is a view in top plan of the structure shown in Fig. 6;

Fig. 8 is a view in side elevation illustrating a lift mechanism embodying the present invention and shown as operatively associated with a bumper, and also of the type wherein the carriage is a wheeled or rolling structure; and

Fig. 9 is a view in transverse cross section taken on line 9-9 of Fig. 8.

In carrying out the present invention, an inclined track or way is supported on a suitable base in such a manner that its angle or inclination with respect of the horizontal may be readily figured. The track or way is preferably an elongated box-like structure of rectangular cross section and has its top wall provided with a longitudinally extending slot centrally disposed with respect to its major axis.

A carriage is supported on the inclined track for longitudinal movement thereon and with respect thereto. The carriage may take various forms. It may be a slide or saddle suitably supported and guided on the inclined track or way. It may be a rolling or wheeled structure appropriately mounted on and correlated to the track or way. In the form of the invention where the carriage is in the nature of a slide or saddle, the top wall of the track is provided on the opposite sides of its longitudinal slots with undercut guide ways. The slide or carriage has suitable guides interfitted with the guide ways on the opposite sides of the track. Where the carriage is in the form of a wheeled or rolling structure, a pair of wheels or rollers are provided within the track or way and ride on the inturned lower flanges thereof.

In two embodiments of the invention the carriage is equipped with a nut interthreaded with a screw extending longitudinally and axially of the track or way. The screw is constrained against axial movement so that when it is rotated the nut is advanced along it in one direction or the other depending upon the direction of the rotation of the screw.

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Several forms of power drives are contemplated by the present invention. In one form of power drive an electric motor is securely fastened to the upper end of the track and its armature shaft is coupled to and drives a screw which extends axially through the enclosure afforded by the track. In this embodiment of the invention the portion of the slide or saddle, which projects through the slot of the track, is fashioned or machined to constitute a nut which is threadedly intermeshed with the threads of the screw. With this type of drive, when the motor is running the screw causes the nut to move axially with the result that the lift mechanism may be raised and lowered depending upon the direction of the rotation of the motor.

In a second form of power drive a cylinder is securely fastened to the upper end of the track. A piston is reciprocable in the cylinder under the influence of a suitable motive fluid, such as air or steam. The piston rod projects beyond the cylinder and extends axially through the enclosure afforded by the track. Its outer end is securely fixed to the portion of the slide or saddle that projects through the slot of the track. In this embodiment of the invention the portion of the slide or saddle that projects through the slot of the track need only be an apertured lug integral with or otherwise suitably fixed to the slide or saddle.

In a third form of power drive a housing is securely fixed to the upper end of the track. An electric motor is mounted on the housing and its armature shaft has a worm fixed thereto and meshing with a worm wheel. A crank is constrained to rotate with the worm wheel. The pin of the crank is pivotally interconnected with one end of a connecting rod or link, the opposite end of which is pivotally connected to the lug or portion of the slide or saddle that projects through the slot of the track.

Referring to the drawings, it will be seen that in all embodiments of the invention illustrated there is included a suitable foundation B, an inclined track, designated generally at T, supported on the base in some suitable manner so that its angle or inclination with respect to the horizontal may be conveniently varied. In the forms of the invention shown in Figs. 1 to 4, a carriage in the form of a slide block or saddle, designated generally at S, is supported on the track T for movement longitudinally thereof. A thrust bar or link L has its lower end pivotally connected to the slide block or saddle S and its upper end connected to the mechanism to be rocked or lifted.

The track T may be in the form of an elongated box-like structure of rectangular cross section (see Fig. 2). Usually the track T is a casting, but it may be made up of separate pieces or fabricated in any desired way. The top wall of the box-like structure constitutes the track proper and is provided, in the embodiments shown in Figs. 1 to 7, with undercut guide grooves 10 extending longitudinally thereof adjacent each side (see Figs. 2 and 3).

The means for supporting the track T on the base B, so that inclination may be varied, may take any suitable form. One practical way of accomplishing this is shown in the drawings and is the same in all embodiments. In the construction shown, a bearing bracket, designated generally at 13, is supported directly on the base B. The bracket 13 includes an attaching portion 14 securely bolted, as at 15, to the base B. Integral with the attaching portion 14 of the bracket 15

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is a pair of upstanding, transversely spaced bearing lugs 16. These lugs 16 are provided with aligned pivot or bearing openings. Also mounted on and secured to the base B in spaced relation to the bearing bracket 13 is a bearing block 17, the upper end of which provides a flat supporting surface located at the desired distance above the base 10. A bearing bracket 18, similar in construction to the bearing bracket 13, is mounted on the supporting surface of the bearing block 17 and is securely bolted thereto. By providing bearing blocks of different heights, as shown in full and dotted lines in Fig. 1, the angle or inclination of the track T to the horizontal may be changed and the stroke of the thrust link L correspondingly varied.

Integral with the bottom wall of the box-like structure, which constitutes the track T, and located adjacent the ends thereof, are downwardly directed supporting lugs 19. These lugs 19 are of rugged or heavy construction, as may be seen in Fig. 2. They are transversely apertured and in the assembly are interfitted with the lugs 16 of the bearing brackets 13 and 18. Pivot pins 21 and 22 pass through the aligned apertures of the lugs 16 and 19 to appropriately interconnect, support, and mount the track T on the base.

The saddle or slide block S has integral depending guide ribs 11 corresponding in cross-sectional formation to and interfitted with the guide grooves 10 (see Fig. 2). In between the guide grooves 10 the top wall of the casting, which constitutes the track proper, is provided with a longitudinal slot 12. As shown in Fig. 4, the present invention also contemplates the provision of suitable anti-friction means between the slide block or saddle S and the track T. This may readily be accomplished by providing raceways 10' in the floor of each guide groove 10, corresponding raceways 11' in the underside of each guide rib 11, and interposing ball bearings b between these raceways.

In the embodiment illustrated in Fig. 1, an electric motor 25 is utilized as the power unit. This motor 25 is securely fastened to the upper end of the track T. The armature shaft 26 of the motor 25 projects beyond the upper end of the motor and is combined with a suitable type of electro-magnetic brake 27. The opposite end of the shaft 25 is journaled in a bearing 28 provided within the track T, and is suitably coupled to a screw 29. The screw 29 extends throughout the length of and axially of the track T, and at its lower end is rotatably supported in a bearing 30 provided in the track T.

A nut 31 has its internal threads meshed with the screw 29. The nut is integral with the slide block or saddle S and projects downwardly therefrom through the slot 12. With such a construction, when the screw is rotated the nut is constrained to travel rectilinearly up and down the length of the track T.

Integral with the top of the slide block or saddle S are upstanding apertured lugs 36 which support a pivot pin 37. The pivot pin 37 pivotally interconnects the lower end of a thrust link L to the slide block or saddle S. As the nut moves back and forth it travels up and down the inclined plane provided by the track T. The link L moves up and down as clearly illustrated by the full and the dot and dash showing thereof in Figs. 1 and 5. The upper end of the thrust link L is pivotally connected as at 39 to the mechanism to be lifted or oscillated.

In Fig. 1 this mechanism is shown in dia-

grammatic fashion as a transfer chain 40. The pivot pin 39, in this instance, pivotally interconnects the upper end of the thrust link L with the carrier frame 41 of the transfer chain by which material is lifted to a conveyor indicated at C'. Such transfers are well known and widely used, and as the transfer construction per se forms no part of the present invention, it need not be shown or described in detail. In Fig. 5 the mechanism actuated by the thrust link L is shown as a log loader 42 employed between the log deck D and the sawmill carriage C. In this instance, the pivot pin 39 pivotally interconnects the thrust link L with one of the arms of the loader 42. As the thrust link L moves up and down, the loader 42 oscillates from its full to its dotted line position, and vice versa.

The extent of travel of the slide block or saddle S in either direction is limited by means of limit switches 45 and 46. These may be adjustably mounted in slots 47 and 48 provided in a side wall of the box-like structure constituting the track T. The limit switches have operating arms 49 and 50 located in the line of travel of a trip pin 51 mounted on the saddle. They are combined in any appropriate way with the circuit for the motor 25 which is also under the control of a manually operable switch 52. Since the electrical system forms no part of the present invention, it will not be described in detail.

In lieu of the electric motor and screw and nut mechanism illustrated in Fig. 1 as the power drive, a fluid pressure motor may be employed, as illustrated in Fig. 5, in which a cylinder 55 is securely fastened to the upper end of the box-like structure constituting the track. A piston 55' is slidably mounted in the cylinder 55. A piston rod 57 is fixed to the piston and projects beyond the cylinder and is securely fixed to the projecting portion of the slide S, as indicated at 58. As shown in the drawings, it is not necessary in the construction of Fig. 5 that the slide be formed with a nut. An apertured lug is all that is necessary since the conventional shoulder and nut are sufficient to connect the piston rod to the slide.

Fluid under pressure is of course applied to one end of the cylinder and is exhausted from the other to cause the piston to move first in one direction and then in the other. This action of the cylinder shifts the thrust link L from the full line position to the dotted line position shown in Fig. 5, and of course upon reverse of the motor the action or movement of the thrust link is reversed. Suitable control valves diagrammatically shown at 60 and 61 are provided on a side wall of the track and have operating arms 62 and 63 located in the line of travel of a trip pin 64 mounted on the slide lug. These valves are similar in their action to the limit switches 50 and 51, although of course the valves function to regulate the distribution of the fluid pressure medium rather than the flow of an electric current. Any conventional valve structure and fluid distributing arrangement may be utilized as, here again, this feature per se forms no part of the present invention.

In Figs. 6 and 7 a housing 70 is mounted and secured to the upper end of the track T. An electric motor 71 is supported on this housing by means of a bracket 72. The armature shaft 73 of the electric motor has a worm 74 fixed thereto. The worm 74 meshes with a worm wheel 75 fixed to a shaft 76 journaled for rotation in suitable bearings provided therefor on

the housing 70. Within the housing a bifurcated crank 77 is fixed to the shaft 76. This crank is pivotally connected by crank pin 78 with one end of a connecting rod 79, the opposite end of which is pivotally connected, as at 80, to the projecting portion of the slide S.

The embodiment of the invention illustrated in Figs. 8 and 9 is identical in many respects with the embodiments previously described, particularly in that an inclined track or way T is provided and is adjustably supported in the manner previously described.

The carriage in this form of the invention is a wheeled or rolling structure and as it moves up and down the inclined track or way it actuates a thrust link L in the same way the saddle or slide of the other embodiments is actuated by the other thrust links. As shown in Fig. 8 the thrust link may be utilized to raise and lower a bumper or stop 100.

The carriage of the embodiment shown in Figs. 8 and 9 includes a pair of wheels 90 which roll on inturned flanges 91 provided at the bottom of the inclined track or way. In between the wheels a nut 92 is disposed. The nut 92 has outwardly extending trunnions 93 on which the wheels are rotatably mounted. An operating screw 94, similar in all respects to the operating screw 29, is threaded through the nut. The screw 94 is constrained against axial movement and is driven by an electric motor 95 similar to the motor 25. The control instrumentalities, namely the limit switches 45 and 46, are provided and function in the manner previously described.

This application is substituted for an application Serial No. 544,066, filed July 8, 1944, and abandoned by failure to make a response due on September 13, 1945.

While I have shown and described several constructions in which the invention may be advantageously embodied, it is to be understood that the constructions shown have been selected merely for the purpose of illustration or example and that various changes in the size, shape, and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A lift mechanism for lifting a device through selectable predetermined distances comprising a supporting base, an inclined track mounted on said base and swingable relative thereto to assume a predetermined selected angle of inclination to horizontal, said track having parallel guideways extending lengthwise thereof adjacent its sides and also having a lengthwise slot intermediate said guideways, a slide supported on said track for movement lengthwise thereof and having cooperating guiding means on its underside slidably interfitted with said guideways and having a depending portion intermediate said guiding means projecting through said slot, said projecting portion having an internally threaded opening providing a nut, a screw carried by said track in threaded engagement with said nut, and an electric motor mounted on the track and connected to the screw for driving the same whereby said track may be placed in a selected one of a variety of inclined to horizontal positions without disturbing said motor and screw.

2. A lift mechanism for lifting a device through selectable predetermined distances comprising a supporting base, an inclined track mounted on said base and swingable relative thereto to as-

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sume a predetermined selected angle of inclination to horizontal, said track having parallel guideways extending lengthwise thereof adjacent its sides and also having a lengthwise slot intermediate said guideways, a slide supported on said track for movement lengthwise thereof and having cooperable guiding means on its underside slidably interfitted with said guideways and having a depending portion intermediate said guiding means projecting through said slot, a fluid pressure motor having its cylinder mounted on the upper end of the track, and a piston in said cylinder having its piston rod connected to the projecting portion of the slide whereby said track may be placed in a selected one of a variety of inclined to horizontal positions without disturbing said cylinder and piston rod.

3. A lift mechanism for lifting a device through selectable predetermined distances comprising a supporting base, an inclined track mounted on said base and swingable relative thereto to assume a predetermined selected angle of inclination to horizontal, said track having parallel guideways extending lengthwise thereof adjacent its sides and also having a lengthwise slot intermediate said guideways, a slide supported on said track for movement lengthwise thereof and having cooperable guiding means on its underside slidably interfitted with said guide ways and having a depending portion intermediate said guiding means projecting through said slot, a motor mounted on the upper end of said track, gearing driven by the motor, a crank actuated by the gearing and a connecting rod between said crank and said projecting portion of the slide block whereby said track may be placed in a selected one of a variety of inclined to horizontal positions without disturbing said motor, gearing, crank, and connecting rod.

4. A lift mechanism comprising a base, an inclined track having its lower end pivoted to the base, means supporting the upper end of the track at different distances above the base to vary the angle of inclination of the track with respect to the horizontal, a slide supported on the track for movement longitudinally thereof, a power drive carried by said track and operatively connected with said slide, and a thrust link having one end connected to the slide and its other end adapted to be connected to a device to be lifted.

5. In a mechanism for lifting a device through selectable predetermined distances, a supporting base, a track mounted on said base and swingable relative thereto to assume a predetermined se-

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lected angle of inclination to horizontal, a carriage reciprocally movable on said track between selected positions, a motor carried on said track for movement therewith, means also carried by said track interconnecting said motor and said carriage whereby said track may be placed in a selected one of a variety of positions without disturbing said motor and said means, and a thrust link extending between said carriage and said device whereby reciprocal movement of said slide through a predetermined distance lifts and lowers said device through a predetermined distance dependent upon the selected angle of inclination of said track.

6. In a mechanism for lifting a device through selectable predetermined distances, a supporting base, a track mounted on said base and swingable relative thereto to assume a predetermined selected angle of inclination to horizontal, a carriage reciprocally movable on said track between selected positions, a motor carried on said track for movement therewith, means also carried by said track interconnecting said motor and said carriage whereby said track may be placed in a selected one of a variety of positions without disturbing said motor and said means, a pair of switches adjustably positioned on said track between said selected positions, said switches being connected to said motor to control operation thereof and actuated by said carriage to stop said carriage at selected places between said selected positions, and a thrust link extending between said carriage and said device whereby reciprocal movement of said slide through a predetermined distance lifts and lowers said device through a predetermined distance dependent upon the selected angle of inclination of said track.

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