Oct. 6, 1931. E. J. ABBE 1,826,490

INDUSTRIAL TRUCK

Filed May 28, 1928 3 Sheets-Sheet 1

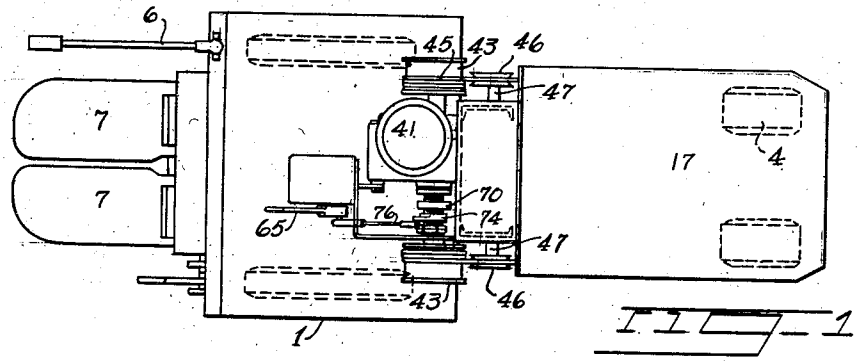

FIG 1

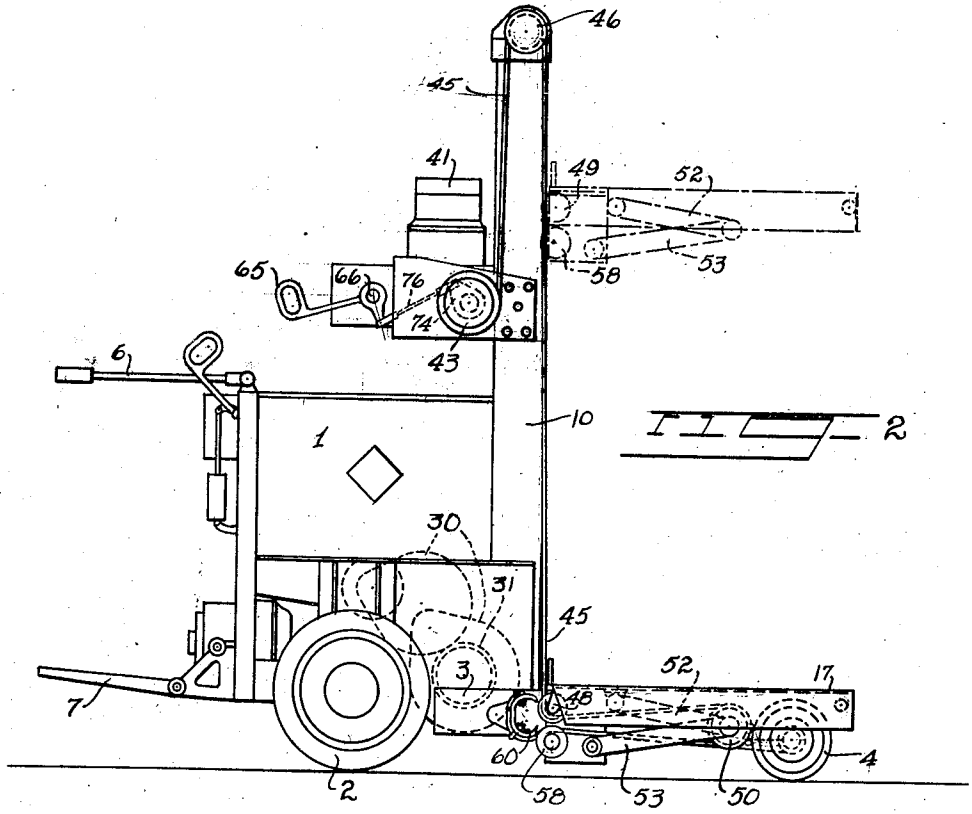

FIG 2

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INDUSTRIAL TRUCK

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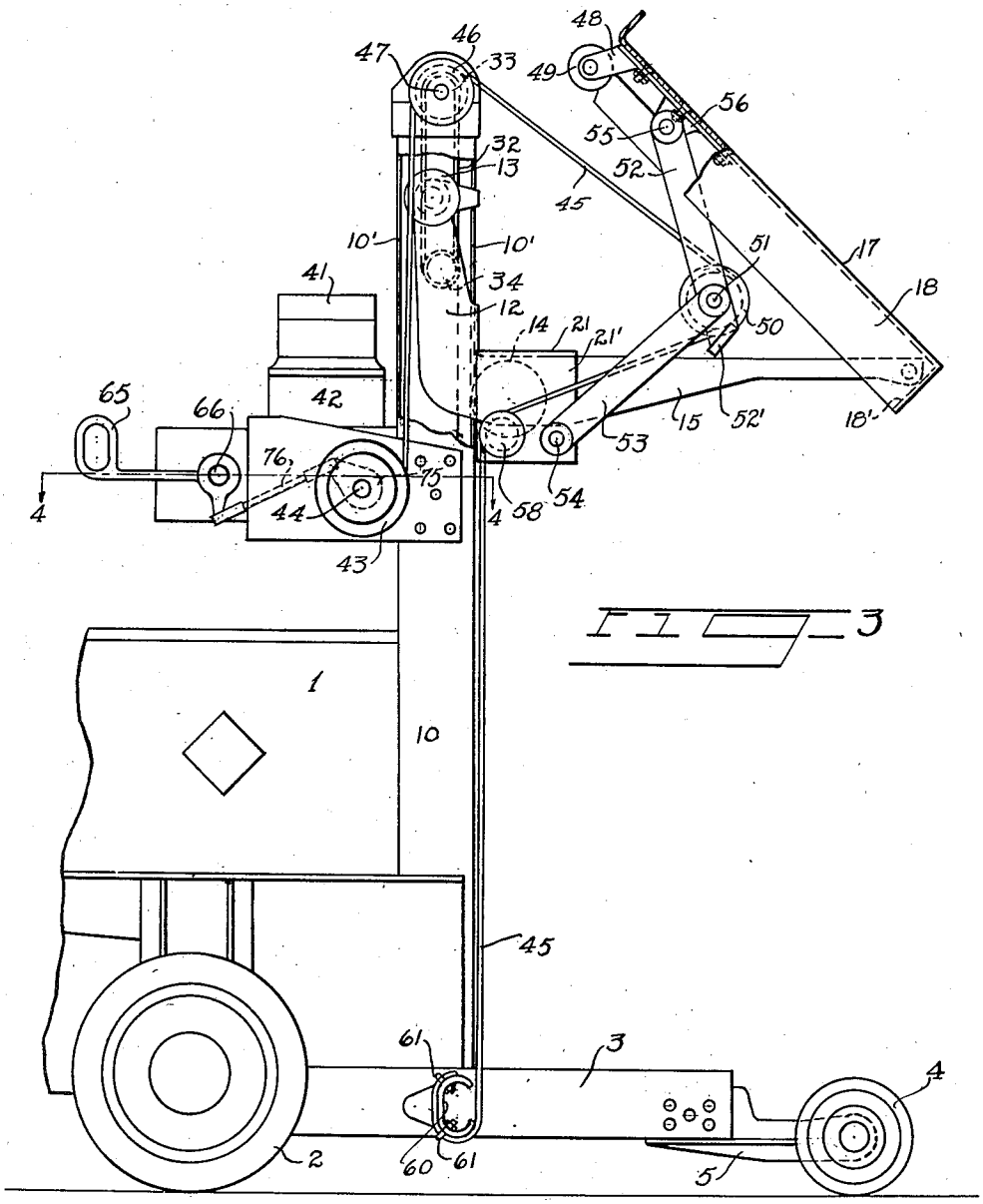

FIG. 3

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INDUSTRIAL TRUCK

Filed May 28, 1928 3 Sheets-Sheet 3

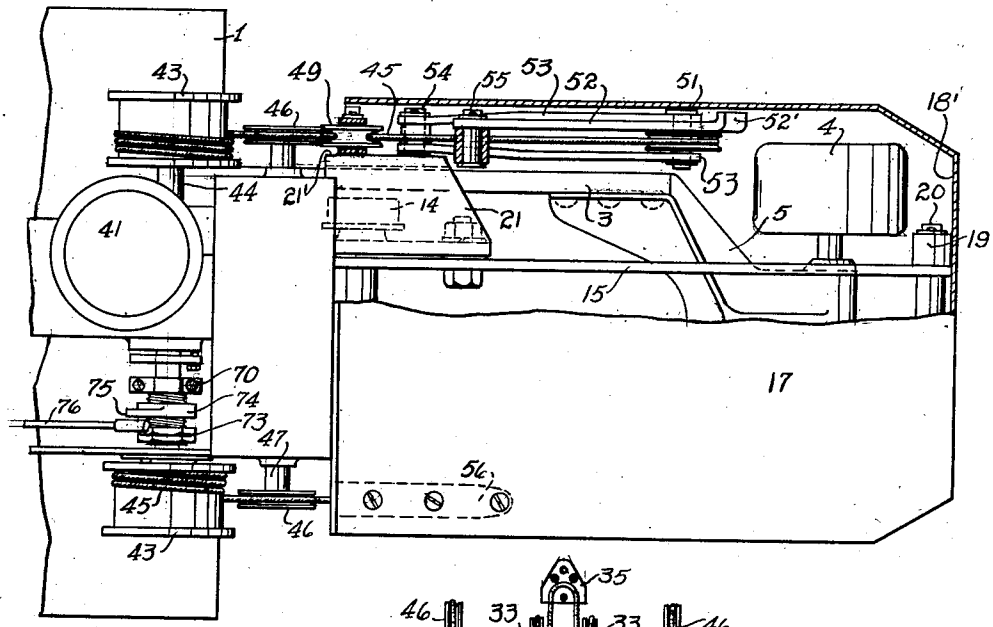

FIG 5

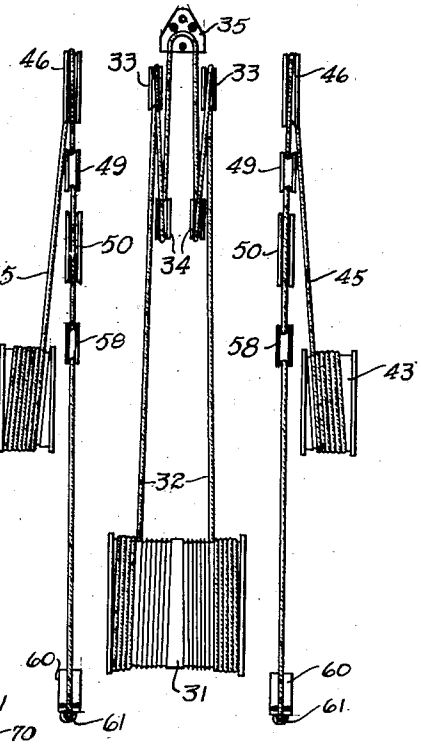

FIG 6

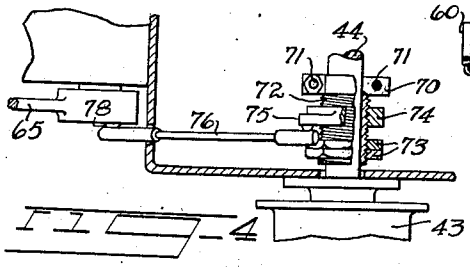

FIG 4

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UNITED STATES PATENT OFFICE

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INDUSTRIAL TRUCK

Application filed May 28, 1928. Serial No. 281,178.

This invention relates to load handling mechanism, and specifically to an industrial truck of the tier lift type. The primary object is to provide an improved and simplified platform or container tilting mechanism.

A further object is to provide a simple mechanism by which a platform or container may be tilted with a comparatively small expenditure of power.

A further specific object is to provide an improved mechanism by which a liftable platform or load carrying body may be tilted in any desired lifted position, that is to say, independently of the raising and lowering of such platform or body.

A further specific object is to provide a load carrier tilting mechanism in which power may be manually applied to tilt the carrier, and wherein such power is automatically cut off at any desired limit of tilting movement of the carrier.

Other objects and features of the invention will become apparent from the following description relating to the accompanying drawing. The essential characteristics are summarized in the claims.

In the drawings, Fig. 1 shows a plan view of an industrial truck incorporating my invention; Fig. 2 is a side elevation of the truck shown in Fig. 1, and showing a load carrying platform in normal position, that is to say, untilted; Fig. 3 is a fragmentary side elevation of the forward portion of the truck showing the relative position of various parts of the platform tilting mechanism in platform tilting position; Fig. 4 is a detail sectional plan view of a power throw-off device, as indicated by the line 4—4 on Fig. 3; Fig. 5 is a fragmentary plan view of the forward portion of the truck with the platform broken away to show the arrangement of certain of the parts of the tilting mechanism; and Fig. 6 is a diagrammatic illustration of separate cable arrangements for lifting and tilting the platform.

In the use of industrial trucks of the type above mentioned, it is desirable to tilt the platform while at varying heights from the ground, for example, the height of the surface onto which the load is to be discharged from the platform may vary from ground height to the maximum lift provided for by the truck. It follows that it is desirable to control the platform tilting independently of the raising and lowering operation of the platform. Accordingly, I have provided an arrangement by which the above conditions may be met, and by which the provision of a separate load tilting power appliance shall not in any way interfere with or impose additional burdens on the load lifting arrangement. A feature of the device is that considerable tilting movement of a platform or the like may be effected quickly and with a small amount of power.

I have shown the present embodiment of my invention associated with an industrial truck of the general type shown in the prior patent to C. E. Cochran, No. 1,399,543, issued December 6, 1921, but it is to be understood that the novel arrangement of elements herein described and claimed may be adapted for employment in any analogous use.

The truck herein shown comprises a body portion forming a battery housing 1, this housing being formed in part by structural members which afford a bracing frame work, and which support a power drive including a pair of traction wheels 2. The frame work has a forwardly extending low slung forward extension 3 at the end of which are a pair of dirigible wheels 4 mounted on brackets 5. A suitable controlling arrangement for the usual traction wheel controlling linkage includes a steering arm 6 (see Figs. 1 and 2) which is in reach of the operator as he stands on a pair of pivoted platform members 7. These members, incidently, form part of the truck control. At the forward portion of the battery housing 1 there is a rigid upright structural frame 10 which may be suitably braced and which affords a trackway for a carriage 12 (see Fig. 3). The carriage in turn supports the platform.

The carriage has a vertically extending portion partially housed by the side members forming the structure 10, and which is provided with pairs of rollers 13 and 14, these rollers being guided by flanges, such as 10′, on the side structural members of the frame

10. The platform support is directly afforded by horizontal forward extensions of the carriage 12, shown at 15, and comprising a pair of rigid bars, one being shown in plan in Fig. 4. The platform is designated 17 and has downwardly formed side flanges 18 continuing around the front edge of the platform as at 18'. The flange 18' carries a pair of brackets 19, one being shown in Fig. 5, and the brackets in turn carry a hinge bar extending through and supported by the horizontal bars 15. At its rear edge the platform rests on a pair of brackets 21 secured to the members 15 and extending outwardly therefrom, as suggested in Fig. 5. These members 21 are U-shaped and inverted to provide depending side flanges 21' at each side of the platform.

The platform may be raised and lowered by means of a cable hoist, the primary power element of which may comprise an electric motor (not shown), suitably controlled from the operator's position, and reduction gearing, diagrammatically shown at 30, which transmits power to a drum 31 near the base of a truck, and within the main housing. The drum carries a pair of cable stretches 32 which pass upwardly over sheaves 33, then downwardly over sheaves 34 which move with the carriage 12, and then upwardly to an anchor 35 suspended from a top of the frame 10. Any suitable safety devices may be used to cut off the power to the motor which drives the drum 31 whenever the carriage has reached its uppermost and lowermost positions.

For tilting the platform 18, I provide a power hoist indicated generally at 40, supported on the backside of the frame 10. This includes a motor 41, reduction gearing in a housing 42, and a pair of drums 43, mounted on a common shaft 44 driven by the reduction gearing. Suitably fastened to the drums are cable stretches 45 which pass upwardly over sheaves 46 carried on a shaft 47 at the top of the structure 10. The cable stretches then pass downwardly, first underneath a pair of flanged guides in the nature of sheaves, indicated at 49, secured in brackets 48, the brackets, as shown, being fastened to the rear edge of the platform, (see Fig. 3). The cables 45 then pass forwardly over guides or idlers 50 which are turnably mounted on pivot bars 51 which from the connection between respective toggle pairs comprising rigid links 52 and 53. The links 53 are in pairs, one pair at each side of the platform, and there is a single link 52 at each side.

The links 53 are paired, mainly to provide an ample bearing support at each end of the pivot bars 51. The links 53 are pivotally anchored on studs 54 carried on the depending flanges 21', and the links 52 are pivotally anchored at 55 to brackets 56 rigidly secured on the lowerside of the platform.

From the guides 50, the cables 45 pass forwardly over guiding idlers 58, mounted for free rotation on the flanges 21', and then downwardly to anchoring brackets 60 carried by the frame members 3 of the truck. The anchorage at 60 includes C-shaped flanges extending laterally from the truck about which the ends of the cables are passed and secured as by means of eye-bolts 61.

In Figs. 3 and 4, particularly, I have shown a controller arrangement which may be of any suitable construction, as, for example, the usual drum type, controllable as by means of a handle 65 rigid with the controller drum shaft 66. The handle is shown in its neutral position in Fig. 3, that is to say, in this position the power to the motor 41 is cut off. Movement of the handle may be such that when the shaft 66 is rotated clockwise the motor may be started to rotate the drum clockwise. This causes the cables to pull upwardly, the pull being first transmitted to the guides 49, thereby directly raising the rear end of the platform, the idlers 50 acting for the time substantially as anchors. After the platform has been thus tilted somewhat about its pivot 20, the toggles are spread sufficiently to allow the direct rearward pull of the cables to effectively act on the idlers 50, to further spread the toggles, thus further raising the platform, as will be understood from Fig. 3.

Suitable stops 52' are provided on the toggle links 52 which extend outwardly to engage the underside of the links 53, to thereby positively prevent overthrow of the platform in its tilting movement.

In order to effectively govern the motor 41, so that after the operator has started its movement in either direction, it will be stopped automatically when the platform has reached the desired tilted position, and again before it has completely settled into normal position, I provide a power cut-off arrangement, such as shown in Figs. 3 and 4. In Fig. 4 particularly, I show one end of the shaft 44 as provided with an adjustable clamping collar 70 arranged to be clamped onto the shaft, as by bolts 71, the collar having a threaded sleeve at 72 surrounding the shaft. At the outward end of the sleeve are a pair of jam nuts 73 which, as will be understood, are normally rigid, but adjustable on the sleeve. Positioned between the jam nuts and the clamping collar 70 is a nut member 74 which carries an arm 75 pivotally attached to a link 76, the link being in turn pivotally attached to the controlling arm 65 at 78.

In operation, the arm 65, we will suppose, is manually turned clockwise (as viewed in Fig. 3) to start the motor in operation to tilt the platform, thus giving the nut member 74 a partial rotation, counterclockwise, on the threads of the sleeve 72. The direc-

tion of the threads is such as to cause the nut member 74 to then travel toward the collar 70 as the shaft is rotated, the travel being such as to allow the platform to be tilted the desired amount before the nut reaches the collar.

When the collar is reached, the nut 74 will jam, and then be rotated clockwise with the collar, thus restoring the handle 65 to neutral position, thereby stopping the motor. When the handle 65 is turned counterclockwise to cause the restoring of the platform to horizontal position, then the nut member 74 will travel in the reverse direction, namely, outwardly toward the innermost jam nut 73, and when the platform is substantially completely lowered the nut member 74 engages the jam nut, and is carried counterclockwise to again restore the controller to neutral position.

In order to vary the angle of tilting the platform, it is simply necessary to adjust the distance between the jam nuts and collar 70, the collar being freed by releasing the clamp to effect the proper adjustment.

I claim:

1. In a load handling mechanism, the combination of an elevator and a tiltable load carrier thereon, a cable having a running connection with the elevator and load carrier so arranged that raising movement of the carrier does not affect the cable to move any part thereof lengthwise, said running connection comprising horizontally spaced guides for the cable respectively carried by the elevator and load carrier, whereby a predetermined pull on the cable causes the carrier to tilt irrespective of its raised or lowered position, a power hoist arranged to pull on the cable, manually controlled means to initiate the operation of the hoist, and means governed by a predetermined period of operation of the power hoist to automatically stop the hoist.

2. In a load handling apparatus, the combination of an upright guideway, a carriage movably mounted on the guideway, a tiltable load carrier mounted on the carriage, raising means to raise and lower the carriage on the guideway, means including a power operated mechanism arranged to tilt the load carrier, means to initiate the operation of said mechanism, and means governed by a pre-determined period of operation of the mechanism to automatically stop the operation of such mechanism.

3. In a load handling mechanism, the combination of an upright guideway, a carriage mounted on the guideway, a tiltable load carrier mounted on the carriage, raising means to raise and lower the carriage on the guideway, power operated mechanism arranged to tilt the load carrier, means governed by a pre-determined period of operation of the power mechanism to automatically stop the tilting movement, and means to vary the period of operation and thereby control the angle of tilt imparted to the load carrier.

In testimony whereof, I hereunto affix my signature.

EDWARD J. ABBE.