

Dec. 16, 1941.

S. WEISS

2,266,348

INDUSTRIAL TRUCK

Filed Dec. 23, 1940

2 Sheets-Sheet 1

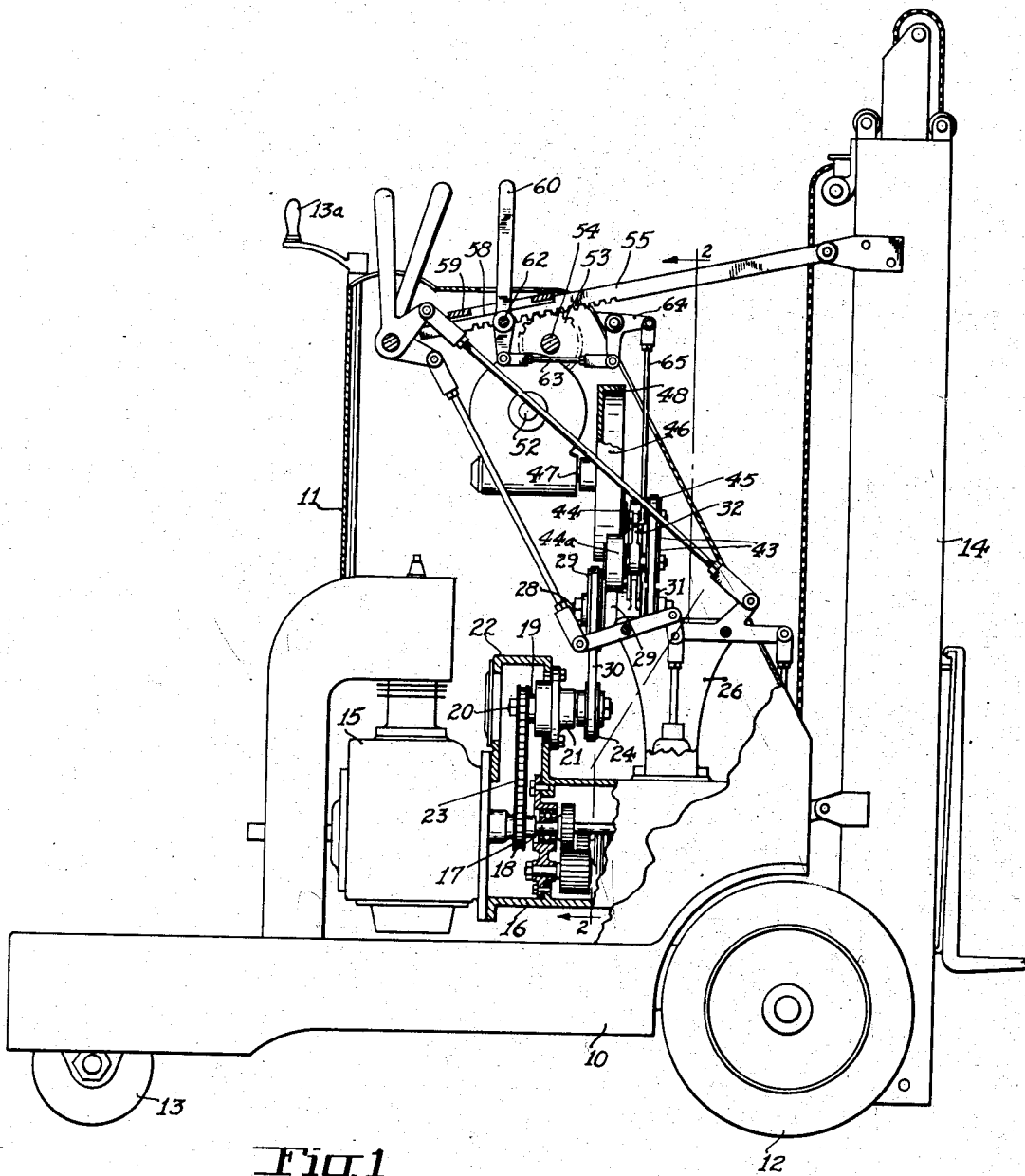


Fig. 1

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2 Sheets-Sheet 2

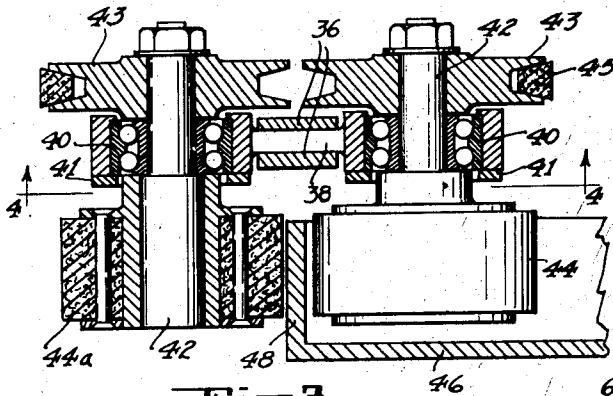


Fig 3

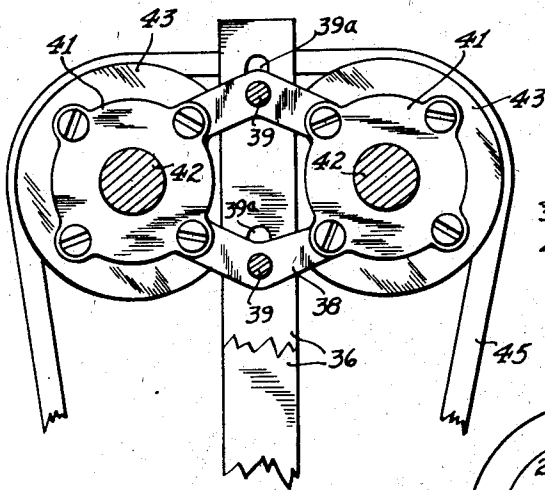


Fig 4

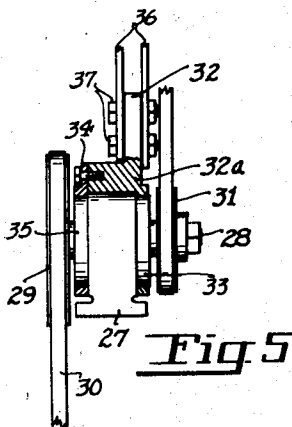


Fig 5

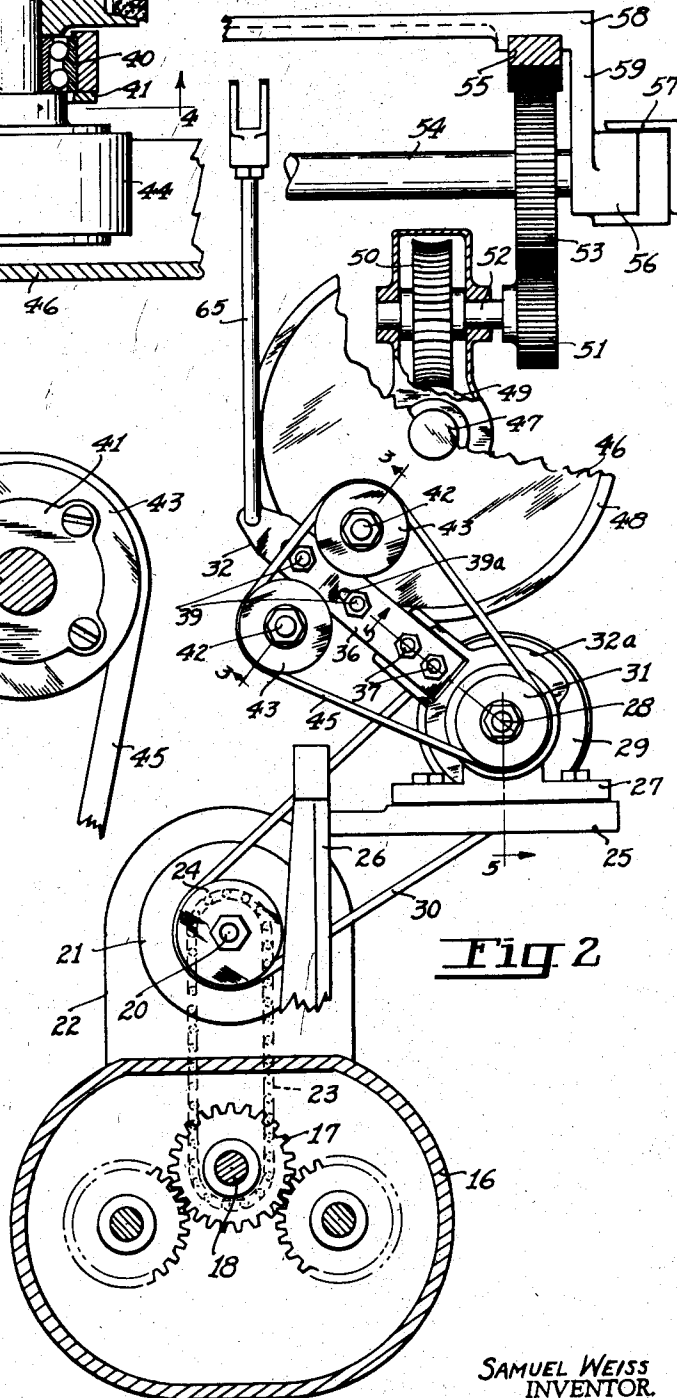


Fig 2

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UNITED STATES PATENT OFFICE

2,266,348

INDUSTRIAL TRUCK

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4 Claims. (Cl. 214—113)

This invention relates to industrial trucks such as those used in warehouses and on docks for lifting and moving freight.

More specifically, this invention is concerned with an industrial truck of the type described in my United States Letters Patent, No. 2,169,440, issued under date of August 15, 1939, to which reference is made. In this truck a pair of clutch shafts are provided parallel to the motor-driven shaft. One of the clutch shafts is connected to the end-lift or elevator on the truck and the other clutch shaft is connected to the driving wheels of the truck. Thus power from the motor-driven shaft can be applied simultaneously for operating the load-lifting means and for driving the truck.

In end-lift trucks of the type described in my above mentioned patent it is advisable and customary to provide means for tilting the guide frame of the end-lift or elevator to position the load carried further over the truck so as to prevent possible over-balancing of the truck by the load. In the truck described in my above-mentioned patent, No. 2,169,440, the tilting of the end-lift frame is done by means of a manually-operated hand wheel which produces rotation of a threaded shaft on which a nut is mounted, the lift frame being connected to the nut by suitable links and levers. There is a certain amount of inconvenience necessitated by the turning of such hand wheel on the part of the operator when it is desired to tilt the end-lift frame in one direction or the other, and during the time required for tilting the frame to the desired position the operator's hand cannot be used for operating any of the other controls of the truck.

The object of this invention is to provide additional motor-driven means, in place of the manually-operated means shown in the patent above mentioned, for producing the tilting of the end-lift or elevator frame.

A further object of this invention is to provide such a motor-driven tilting means which will operate independently of the two clutch shafts thus permitting the clutch shafts to be used exclusively for driving the truck and for operating the elevator or end-lift respectively.

A still further object of this invention is to provide such tilting means which will be operated directly by the motor-driven shaft but which can easily be controlled and adjusted so that the end-lift frame may thereby be moved in either direction or held without movement while the

motor-driven shaft nevertheless continues to rotate in one direction.

These objects I attain by certain improvements in my industrial truck including additional means connected to the motor-driven shaft and constructed and operated as hereinafter briefly described with reference to the accompanying drawings.

In the drawings:

Fig. 1 is a side view, partially in section, of my industrial or end-lift truck, showing in detail some of the elements which control the tilting of the elevator or end-lift frame;

Fig. 2 is a sectional elevation taken on line 2—2 of Fig. 1, and showing only the principal elements in the elevator-tilting mechanism, with all other parts of the truck removed for the sake of clarity;

Fig. 3 is a sectional elevation taken on line 3—3 of Fig. 2 looking in the direction indicated by the arrows;

Fig. 4 is a section corresponding to line 4—4 of Fig. 3; and

Fig. 5 is a section on line 5—5 of Fig. 2.

Referring first to Fig. 1, the industrial truck illustrated comprises a chassis 10, a housing 11 for the operating mechanism, driving wheels 12, steering wheel or caster 13, steering wheel control handle 13a, elevator or end-lift 14, motor 15, and transmission 16. The construction and operation of the truck as described thus far are explained fully in my United States Patent No. 2,169,440, to which reference should be had. The present invention is concerned specifically with the mechanism for tilting the elevator or end-lift in place of the hand-operated means shown in my Patent No. 2,169,440.

A sprocket 17 is secured to the main drive shaft or motor-driven shaft 18 between the motor 16 and the transmission or related actuating mechanism. A second sprocket 19 is mounted upon a shaft 20 supported in a suitable bearing retainer 21 above the drive shaft 18, the bearing retainer 21 being secured to an upwardly-extending portion 22 of the transmission housing 16 (Fig. 1). A sprocket chain 23 connects sprockets 17 and 19. A pulley 24 is secured to the opposite end of shaft 20.

Referring now to Fig. 2, a horizontal shaft 28 is journaled in a suitable bearing member 27 mounted on a support 25 which in turn is secured to a bracket 26 attached to the housing. A pulley 29 is secured to one end of the shaft 28 and an endless belt 30 passes around pulleys 24 and 29. A second pulley 31 is secured to the opposite end of shaft 28.

A friction-wheel-supporting arm 32 comprises a hub 32a, which is journaled upon a shoulder 33 of bearing member 27 (see Fig. 5), a retainer 34 which is secured to hub 32a and journaled upon an opposite shoulder 35 of bearing member 27, and a pair of parallel bars 36 secured to the hub 32a by bolts 37. Thus the pulley shaft 28 is rotatable within the bearing member 27 while the friction-wheel-supporting arm 32 may be rotated partially about bearing member 27.

A bracket 38 (see Fig. 4) is adjustably secured between the parallel bars 36 by means of bolts 39 passing through slots 39a in the bars 36. The bracket 38 supports bearings 40 (Fig. 3) which are held in place by retainer plates 41 and in which a pair of shouldered parallel shafts 42 are journaled. The shafts 42 are located an equal distance on each side of the friction-wheel-supporting arm. A pulley 43 is secured to one end of each shaft 42 and friction wheels 44 and 44a are secured to the opposite ends. An endless belt 45 is mounted on the pulleys 43 and the pulley 31 (Fig. 2). Thus, as apparent from Fig. 2, rotation of the motor-driven shaft 18 causes rotation of pulley 24, pulley 31, and friction wheels 44 and 44a, the rotation of all being in the same direction.

A circumferentially flanged wheel 46 (Figs. 1 and 2), secured to the end of a worm gear shaft 47 (Fig. 2), has its circumferential flange 48 disposed between the friction wheels 44 and 44a (Fig. 3). The worm gear 49 (Fig. 2) on the shaft 47 engages with worm wheel 50. A spur gear 51, secured to the same shaft 52 as worm wheel 50, engages a gear 53 which is secured to a shaft 54. Another gear, identical to gear 53 (but not shown in the drawings), is also rigidly mounted on shaft 54 near the opposite end. These gears act as pinions engaging a pair of rack-bars 55 (Fig. 1), the ends of which are pivotally-connected to sides of the frame of the end-lift 14. Thus movement of the rack-bars 55, produced by rotation of the gears or pinions 53, will cause the end-lift frame to tilt in a vertical plane. Each of the rack-bars 55 slides in a groove provided in a transversely-extending tiltably-mounted plate 58, which plate 58, is supported at each end by a pair of arms 59 converging in a rockable bearing 56 rotatably-mounted on a journal box 57 in which an end of the shaft 54 is supported. The journal boxes 57 are in turn supported by and secured to the housing of the truck.

The control for the tilting mechanism comprises a hand lever 60 (Fig. 1), pivoted at 62, connected by suitable means, including a bar 63, to one arm of the bell crank 64, and a connecting link, including rod 65, which connects the other arm of bell crank 64 with the friction-wheel-supporting arm 32 (Fig. 2).

In operation, the friction wheels 44 and 44a rotate continuously and in the same direction whenever the motor 15 is in operation, as previously explained. When the hand lever 60 is in neutral or vertical position the position of the friction wheels 44 and 44a with respect to the flange 48 of the wheel 46 will be as shown in Fig. 3, that is, the periphery of each friction wheel will be out of frictional engagement with the flange 48. When the lever 60 is pulled in one direction, that is, when it is pulled to the left as viewed in Fig. 1, the rod 65 will be pulled upwardly causing the friction wheel 44a (Fig. 2) to be pressed into frictional contact with the outside of the flange 48 of the wheel 46, rotating

wheel 46 in one direction. Similarly when lever 60 is pushed to the right, as viewed in Fig. 1, the other friction wheel 44 (Fig. 2) will be brought into frictional contact with the inside of the flange 48 of the wheel 46, resulting in rotation of wheel 46 in the opposite direction.

Consequently by moving the hand lever 60, the operator can cause wheel 46 to be moved in either direction or to remain at rest with the lever in neutral position. Movement of the wheel 46 produces pivotal movement, in a vertical plane, of the frame of the elevator or end-lift through the medium of the worm gears and ratchet means previously described.

Thus with the improvement provided by this present invention it is possible in an industrial truck of the type illustrated to use the motor-driven shaft not only for driving the truck and raising or lowering the elevator or end-lift but also simultaneously for tilting the end-lift. Minor changes might of course be made in parts of the mechanism by which the tilting is produced in my invention without departing from the principle of the invention as set forth in the attached claims.

I claim:

1. In an industrial truck of the character described, an end-lift, a tiltable frame pivotally mounted on said truck supporting said end-lift, a motor-driven shaft, a friction wheel-supporting arm mounted for movement in a vertical plane, a pair of spaced friction wheels rotatably supported on said arm, a pulley connected to each friction wheel, an endless belt passing around said pulleys, means connected with said motor-driven shaft for driving said belt, whereby said pulleys and therewith said friction wheels will be rotated with said motor-driven shaft, a flanged wheel having the circumferential flange extending between said spaced friction wheels, means operated by said flanged wheel for positioning said end-lift frame, a manual control for moving said friction wheel-supporting arm, whereby movement of said arm to the limit in one direction will cause one of said friction wheels to engage the outside surface of said flange to rotate said flanged wheel in one direction and movement of said arm to the limit in the opposite direction will cause the other friction wheel to engage the inside surface of said flange and rotate said flanged wheel in the reverse direction, and said flanged wheel will thus be caused to rotate in either direction to position the end-lift frame, or to remain at rest in neutral position, while the motor-driven shaft continues to rotate.

2. In an industrial truck of the character described, an end-lift, a tiltable frame pivotally mounted on said truck supporting said end-lift, a motor-driven shaft, a pair of clutch shafts located near said motor-driven shaft, one of said clutch shafts connected to a driving wheel of said truck, the other of said clutch shafts connected to the end-lift of said truck, means connecting said clutch shafts to said motor-driven shaft, a manually-operated control for the said means for each clutch shaft, whereby each clutch shaft may be rotated by said motor-driven shaft independently of the other clutch shaft, means directly connected to said motor-driven shaft for positioning said end-lift frame independently of the operation of said clutch shafts, said latter-mentioned means including a movable friction-wheel-supporting arm, a bracket mounted on said arm, a pair of parallel shafts supported for rotation in said bracket, a friction wheel and a

pulley carried by each of said parallel shafts, an endless belt passing around said pulleys, means connected with said motor-driven shaft for driving said belt, whereby said pulleys and therewith said friction wheels will be rotated with said motor-driven shaft, a flanged wheel having a circumferential flange extending between said spaced friction wheels, means operated by said flanged wheel for positioning said end-lift frame, and a manual control for moving said friction-wheel-supporting arm, whereby movement of said arm in one direction will cause one of said friction wheels to engage the outside surface of said flange to rotate said flanged wheel in one direction and movement of said arm to the limit in the opposite direction will cause the other friction wheel to engage the inside surface of said flange and rotate said flanged wheel in the reverse direction, and said flanged wheel can thus be caused to rotate in either direction to position the end-lift frame, or to remain at rest in neutral position, while the motor-driven shaft continues to rotate.

3. In an industrial truck of the character described, an end-lift, a tiltable frame pivotally-mounted on said truck supporting said end-lift, a motor-driven shaft, a pair of parallel clutch shafts located near to said motor-driven shaft, one of said clutch shafts connected to a driving wheel of said truck, the other of said clutch shafts connected to the end-lift of said truck, means directly connected to said motor-driven shaft for positioning said end-lift frame independently of the operation of said clutch-shafts, said means including, a friction-wheel-supporting arm mounted for movement in a vertical plane, a bracket slidably mounted on said arm, a pair of parallel shafts supported for rotation in said bracket, a friction wheel and a pulley carried by each of said parallel shafts, an endless belt passing around said pulleys, means connected with said motor-driven shaft for driving said belt, whereby said pulleys and therewith said friction wheels will be rotated with said motor-driven shaft, a flanged wheel having a circumferential flange extending between said spaced friction wheels, means operated by said flanged wheel for positioning said end-lift frame, and a

manual control lever for moving said friction-wheel-supporting arm, whereby movement of said arm in one direction will cause one of said friction wheels to engage the outside surface of said flange to rotate said flanged wheel in one direction and movement of said arm to the limit in the opposite direction will cause the other friction wheel to engage the inside surface of said flange and rotate said flanged wheel in the reverse direction, and said flanged wheel can thus be caused to rotate in either direction to position the end-lift frame, or to remain at rest in neutral position, while the motor-driven shaft continues to rotate.

4. In an industrial truck of the character described, an end-lift, a tiltable frame pivotally-mounted on said truck supporting said end-lift, a motor-driven shaft, means for positioning said end-lift frame including a movable friction-wheel-supporting arm, a bracket mounted on said arm, a pair of parallel shafts supported for rotation in said bracket, a friction wheel and a pulley carried by each of said parallel shafts, an endless belt passing around said pulleys, means connected with said motor-driven shaft for driving said belt, whereby said pulleys and therewith said friction wheels will be rotated with said motor-driven shaft, a flanged wheel having a circumferential flange extending between said spaced friction wheels, means operated by said flanged wheel for positioning said end-lift frame, and a manual control for moving said friction-wheel-supporting arm, whereby movement of said arm in one direction will cause one of said friction wheels to engage the outside surface of said flange to rotate said flanged wheel in one direction and movement of said arm to the limit in the opposite direction will cause the other friction wheel to engage the inside surface of said flange and rotate said flanged wheel in the reverse direction, and said flanged wheel can thus be caused to rotate in either direction to position the end-lift frame, or to remain at rest in neutral position, while the motor-driven shaft continues to rotate.

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