July 23, 1940. S. WEISS 2,208,954

INDUSTRIAL TRUCK

Filed Nov. 6, 1939 2 Sheets-Sheet 1

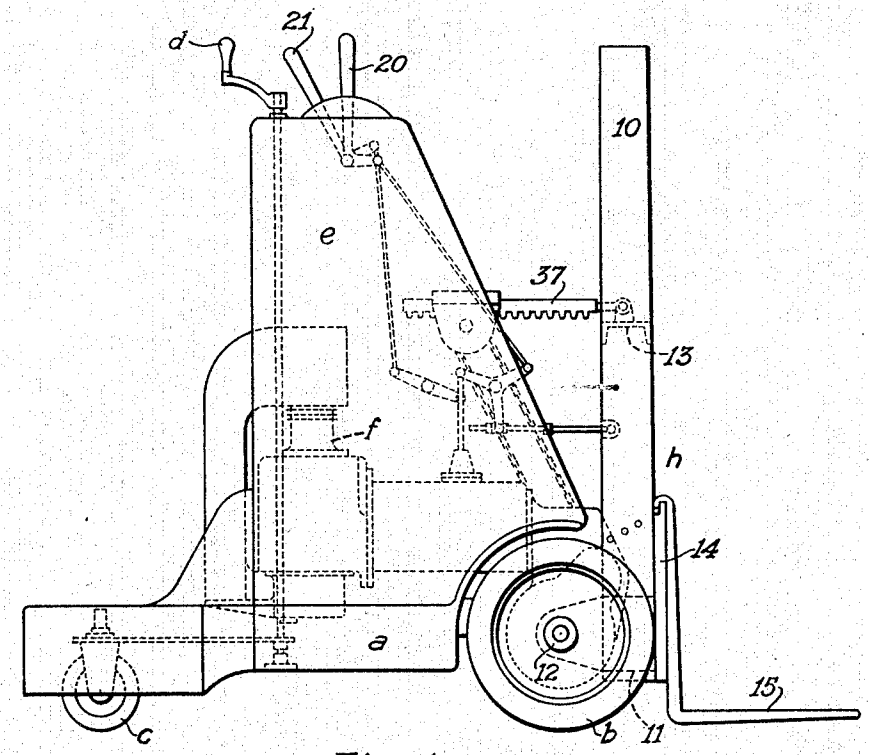


Fig. 1

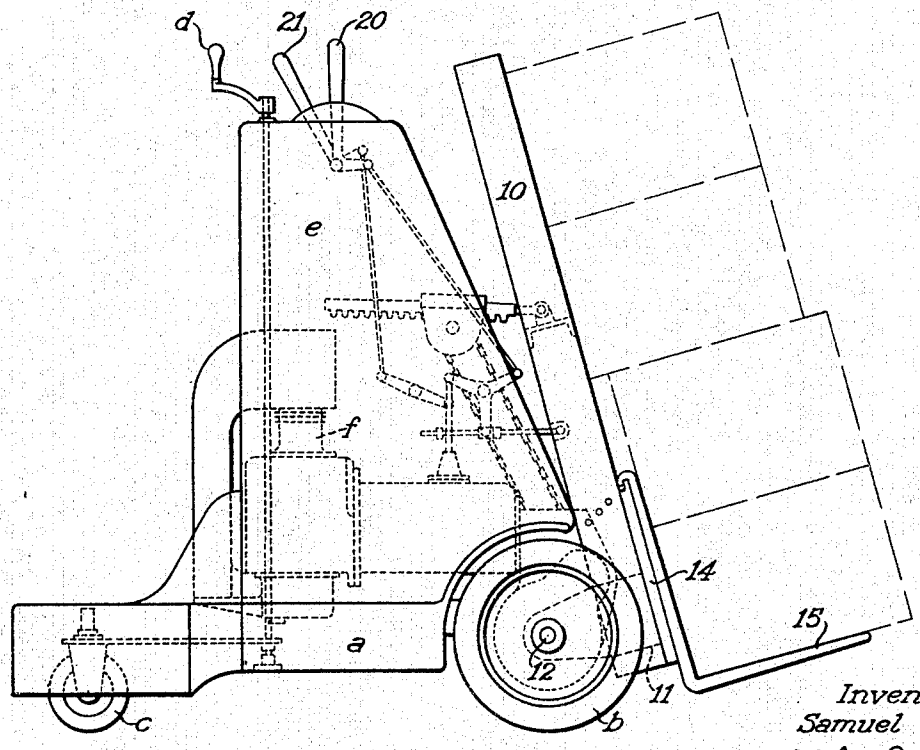


Fig. 2

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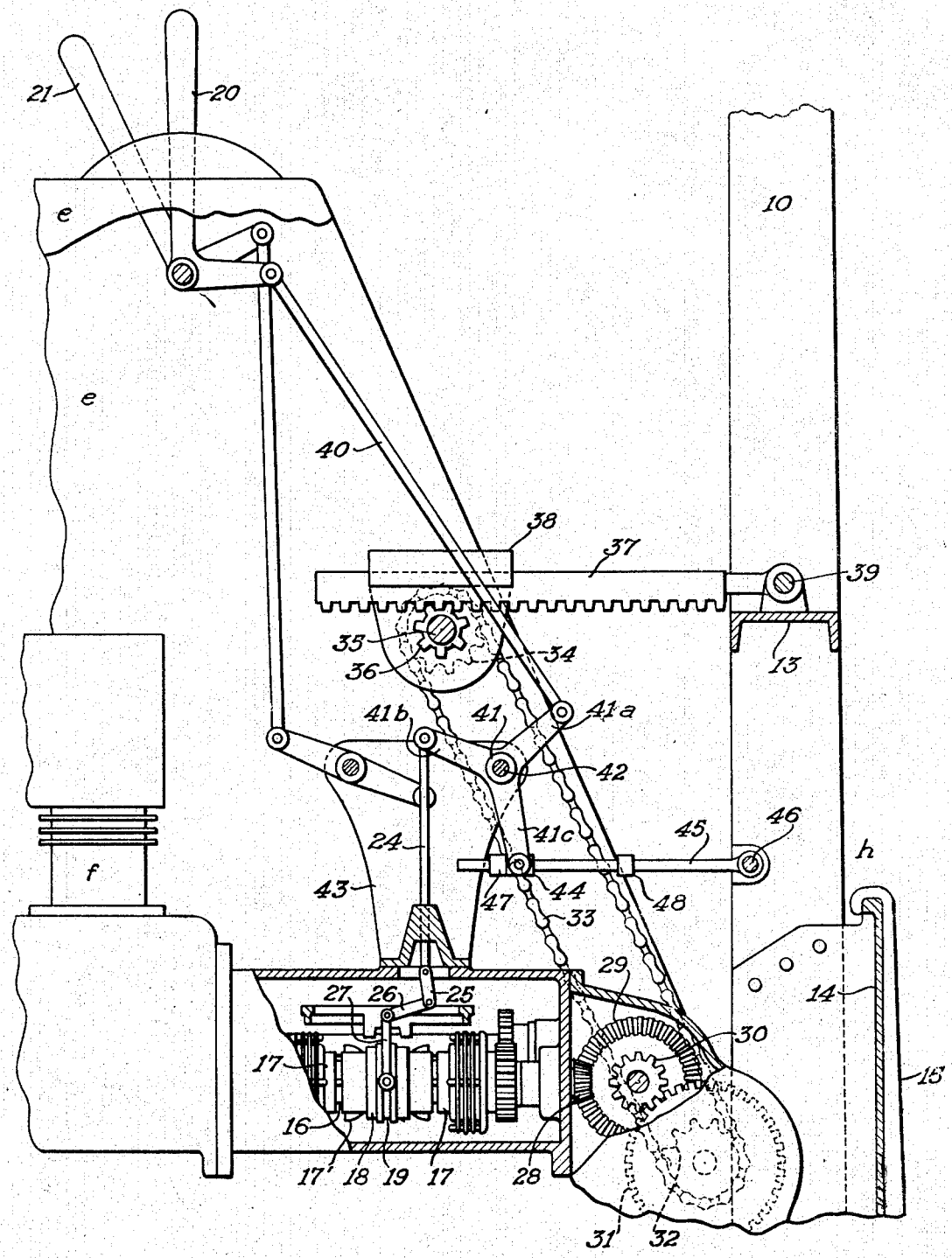


Fig. 3

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Patented July 23, 1940 2,208,954

UNITED STATES PATENT OFFICE

2,208,954

INDUSTRIAL TRUCK

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Application November 6, 1939, Serial No. 303,083

3 Claims. (Cl. 214—78)

This invention relates to industrial trucks of the type described in my United States Letters Patent, No. 2,169,440, issued under date of August 15, 1939, such trucks being suitable particularly for moving loads of freight about in warehouses and on docks; and this invention is concerned with certain changes or improvements in the industrial truck described in my above-mentioned patent.

In industrial end-lift trucks of the type in question, it is customary to provide means for operating the end-lift, so as to raise or lower the load carried by the truck, and also to provide means for tilting or adjusting the position of the frame for the end-lift or elevator in order to position the load with respect to the truck and prevent overbalancing of the truck.

In the industrial truck described in my United States Patent No. 2,169,440, the elevator or end-lift is operated from a clutch shaft driven by the main power shaft, and the tilting of the guide frame for the end-lift is performed by a manually-operated screw shaft and connecting mechanism.

It is possible with trucks of this type, however, to lift a load from its ground support, sufficiently to enable the load to be moved from one place to another, merely by tipping the end-frame and without using any other load raising means, the tipping of the end-frame causing the horizontally projecting portions of the engaging arms attached to the end-frame, when inserted under the load, to be tilted upwardly from the horizontal end, lifting the load with them. I have found that in ordinary uses of such industrial trucks, it is possible, by properly mounting the end-frame and providing suitable tilting means, to dispense with all other end-lifting or elevating means.

The object of this invention is to provide an improved industrial truck in which the load will be lifted merely by the tipping of the end-frame, dispensing with the elevating mechanism of the end-lift, and to substitute motor-driven means for tilting the frame and thereby lifting and tilting the load, in place of the customary manually-operated means for tilting the frame.

A further object of this invention is to provide improved mechanism for tilting the frame which will be operated by the main drive of the truck motor, thus without necessitating any second motor, and to arrange for such tilting mechanism to be operated independently of or simultaneously with the truck driving means.

Another object is to provide an automatic control for the mechanism for tilting the frame to prevent any possible moving or tilting of the frame too far in either direction.

The manner in which I attain these objects in my improved industrial truck will be described briefly with reference to the accompanying drawings.

In the drawings:

Figure 1 is a side elevation of my improved truck, showing the load-carrying element in vertical position ready for engaging the load to be carried;

Figure 2 is a corresponding side elevation of my truck showing the load on the truck and the load-carrying element in tilted position;

Figure 3 is an enlarged fragmentary side elevation, partly in vertical section, and drawn to a larger scale, illustrating the construction and manner of operation of the mechanism for tilting the frame.

The industrial truck illustrated, which in most respects is identical to that described in more detail in my United States Patent No. 2,169,440, includes a chassis *a*, supported at the forward end on a pair of driving wheels *b* and supported at the rear on a single caster wheel *c*. The truck is steered by the caster wheel *c* through the medium of the hand steering lever *d*. The truck housing consists mainly of a pair of spaced vertical plates *e*. Within the housing is the internal combustion engine *f*, which, through the medium of a pair of clutch shafts 16, parallel to the drive shaft of the motor, (one of which is shown in Fig. 3), not only furnishes the power for propelling the vehicle, but also furnishes the power for operating the load-carrying element *h* mounted in the forward end of the truck.

The arrangement of a clutch shaft on either side of a motor-driven shaft and the means, including gears, friction clutch discs, and control mechanism, whereby these parallel clutch shafts may be caused to be rotated independently of each other and in either direction by the motor-driven shaft, are the same as described in my United States Patent No. 2,169,440, above-mentioned, and, more particularly, in my United States Letters Patent No. 2,105,680, issued January 18, 1938. In my present invention one of the parallel clutch shafts is connected by suitable transmission gears (not shown) to a driving wheel *b* of the truck. The operation of this clutch shaft, and thus the driving of the truck, is controlled my means of the hand lever 21 in the manner shown and described in my two patents above-mentioned.

The other clutch shaft 16 (Fig. 3) is connected by bevel pinion 28, bevel gear 29, spur pinion 30, and spur gear 31, to a sprocket 32 which is connected by an endless chain 33 to sprocket wheel 34 keyed to a shaft 35 journaled in the housing side plates *e*. A pinion 36, also keyed to the shaft 35, meshes with a rackbar 37 which is held in engagement with said pinion by being slideably disposed in an angular rocker 38 freely mounted on the shaft 35.

The load-carrying element *h* comprises a rigid frame made up of a pair of side members 10, which are provided with brackets 11, (shown dotted in Fig. 1), rockably disposed on the housing of the vehicle axle 12, and of suitable cross members such as 13 which are made fast to the side members. A substantial plate 14 extends across the front of the spaced side members 10 at the bottom, and is made rigid therewith as shown in Fig. 3, the top edge of the plate being adapted to receive the hooked upper ends of a pair of angular load-engaging and supporting arms 15.

In conventional industrial end-lift trucks similar load-carrying arms are used as parts of a platform adapted to be raised and lowered in upstanding guide channels by hoisting mechanism, and, while such elevating platforms are useful in certain kinds of work, they are not an essential part of a truck designed merely to move goods from place to place in warehouses and the like. It is necessary for vehicles used in the latter-mentioned manner merely to have means for engaging the load, raising the load clear of the floor, supporting the load while in transit, and subsequently depositing the load.

The rackbar 37 (Fig. 3) is pivotally connected as at 39 to the cross bar 13 of the frame of the load-carrying element *h*. Thus, the rotary motion of the shaft 35 is converted to linear movement of the rackbar 37 with the result that the rigid frame *h* is tilted toward or away from the shaft 35, depending upon the direction of rotation of the clutch shaft 16, and this rotation in turn is selectively determined by the position of the hand lever 20. The hand lever 20 is connected by rod 40 to one arm 41*a* of a Y-shaped lever 41 disposed on a shaft 42 mounted in a bracket 43 on the clutch housing. Another arm 41*b* of the lever 41 is pivotally attached to the vertical rod 24, which rod is connected by link 25 to an arm 26 rigidly attached to a forked yoke 27.

The clutch shaft 16 carries a pair of rotatable sleeves driven in opposite directions from the power shaft. A series of friction clutch discs are slideably, but non-rotatably, mounted on each rotating sleeve and are adapted to engage interposed discs which are slideably, but non-rotatably, mounted on the clutch shaft, this construction being the same as that described more fully in my United States Patent No. 2,105,680. Adjacent each of the two engageable groups of friction discs is a pressure sleeve 17 slideably mounted on the clutch shaft, and between the pair of pressure sleeves 17 are Y-shaped pressure levers 17' adapted to be operated by the shifting collar 18. Pins carried by the extremities of the forked yoke 27 bear in the groove 19 of the shifting collar 18. Thus movement of the hand lever 20 controls the position of the shifting collar 18, and the position of this collar in turn controls the rotation of the clutch shaft 16. The rotation of the clutch shaft, through the medium of the rackbar 37 and associated means, causes the load-engaging element *h* to be tilted as desired.

An important feature of my invention resides in the provision of automatic means for disengaging the clutch when the load-carrying element *h* has been tilted to a predetermined limit in either direction and thus preventing further tilting in the same direction beyond such limit. The third arm 41*c* of the Y-shaped lever 41 is pivotally connected to a block 44 which is slideable on a rod 45. The rod 45 is pivoted to a shaft 46 mounted in the frame side members 10 as shown in Fig. 3. Adjustable stop collars 47 and 48 are fixed to the rod 45 in the proper locations at each side of the sliding block 44. Thus the Y-shaped lever 41 will be actuated so as to move the clutch control collar 18 to neutral position when either of the stops 47 or 48 engages the block 44 thereby causing rotation of the clutch shaft 16 temporarily to cease.

In operation, the load-carrying member or frame is tilted forwardly slightly from the position shown in Fig. 1, so that the outer ends of the lifting arms 15 may be inserted under the load, the vehicle being meanwhile slowly moved ahead until the plate 14 contacts the load. The position of the hand lever 20 is then reversed so as to cause the frame to be tilted backwardly and thereby raise the lifting arms 15 and the load clear of the floor as shown in Fig. 2. It is necessary only to set the hand lever 20 because the automatic stop will disengage the tilting mechanism at the predetermined limit, thus preventing the load being tipped backward too far and the operator's attention may at once be directed to setting the vehicle in motion and to steering the vehicle. Also the hand lever 20 when placed in the desired position will remain there until subsequently manipulated. Furthermore, since the two parallel clutch shafts work entirely independently of each other, the load frame may be tilted in either direction while the vehicle is traveling, thus materially increasing the efficiency in which goods may be carried from place to place in a warehouse. Finally, only a single engine or motor is required for driving the truck, tilting the frame, and lifting the load.

I claim:

1. In an industrial truck of the character described, a tiltable frame pivotally mounted at one end of said truck for movement in a vertical plane, a pair of load-engaging arms on said frame, a motor-driven shaft, a pair of parallel clutch shafts located near said motor-driven shaft, one of said clutch shafts connected to a driving wheel of said truck, means for positioning said frame connected to the second clutch shaft, whereby rotation of said second clutch shaft will cause tilting of said frame, loose gears on said clutch shafts rotated by said motor-driven shaft, longitudinally-slidable, friction clutch discs on each of said clutch shafts and co-operating slidable friction discs carried by said loose gears, means, including a control collar on each clutch shaft, for bringing said discs into frictional engagement, a pair of manually-operable lever controls connected to said control collars respectively for positioning said collars, whereby either or both of said clutch shafts can be caused to be rotated by said motor-driven shaft as desired, and means connecting said frame and the lever control for said second clutch shaft, said latter-mentioned means adapted to move said lever control and therewith said collar of said second clutch shaft into neutral position

to stop rotation of said second clutch shaft whenever said frame has reached predetermined limits of position.

2. In an industrial truck of the character described, a tiltable load-carrying element pivotally mounted at one end of said truck, for movement in a vertical plane, load-engaging means carried by said element, a motor-driven shaft, a pair of parallel clutch shafts located near said motor-driven shaft, one of said clutch shafts connected to a driving wheel of said truck, means for positioning said element connected to the second clutch shaft, whereby rotation of said second clutch shaft will cause tilting of said element, loose gears on said clutch shafts rotated by said motor-driven shaft, longitudinally-slidable, friction clutch discs on each of said clutch shafts and cooperating slidable friction discs carried by said loose gears, means, including a control collar on each clutch shaft, for bringing said discs into frictional engagement, a pair of manually-operable lever controls connected to said control collars respectively for positioning said collars, whereby either or both of said clutch shafts can be caused to be rotated by said motor-driven shaft as desired, and means connecting said element and the lever control for said second clutch shaft, said latter-mentioned means including stops automatically engaging said lever control whenever said element has been tilted a predetermined distance in either direction.

3. In an industrial truck of the character described, a tiltable frame pivotally mounted at one end of said truck for movement in a vertical plane, load-engaging means on said frame, a motor-driven shaft, a pair of parallel clutch shafts located near said motor-driven shaft, one of said clutch shafts connected to a driving wheel of said truck, means for positioning said frame connected to the second clutch shaft, whereby rotation of said second clutch shaft will cause tilting of said frame, loose gears on said clutch shafts rotated by said motor-driven shaft, longitudinally-slidable, friction clutch discs on each of said clutch shafts and cooperating slidable friction discs carried by said loose gears, means, including a rockable lever and control collar slidable over said lever on each clutch shaft, for bringing said discs into frictional engagement, a pair of manually-operable lever controls connected to said control collars respectively for positioning said collars, whereby either or both of said clutch shafts can be caused to be rotated by said motor-driven shaft as desired, a rod pivoted to said frame, an arm connected to the manual lever control for said second clutch shaft, said rod sliding through said arm, and stops on said rod adapted to engage and move said arm and therewith said lever control whenever said frame has been moved a predetermined distance in either direction.

SAMUEL WEISS.