April 26, 1949. T. A. GLEASON 2,468,326

MILK CAN INVERTING FORK TRUCK

Filed March 29, 1945 2 Sheets-Sheet 1

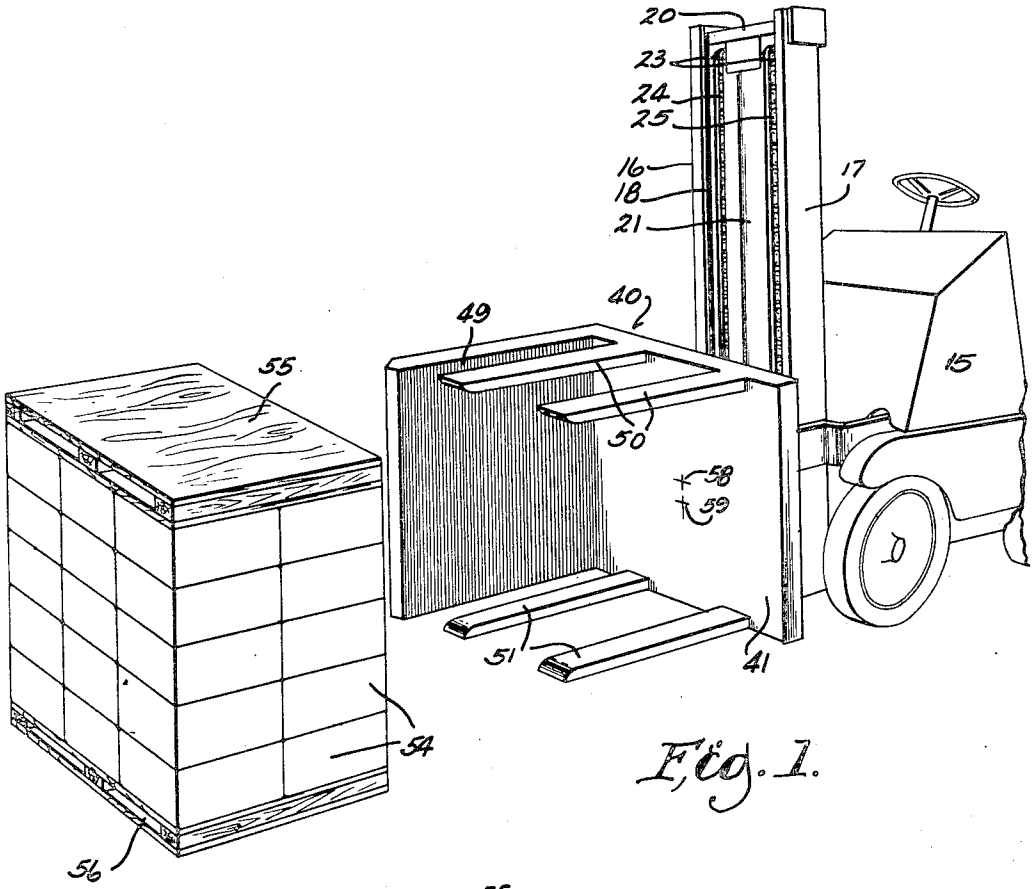


Fig. 1.

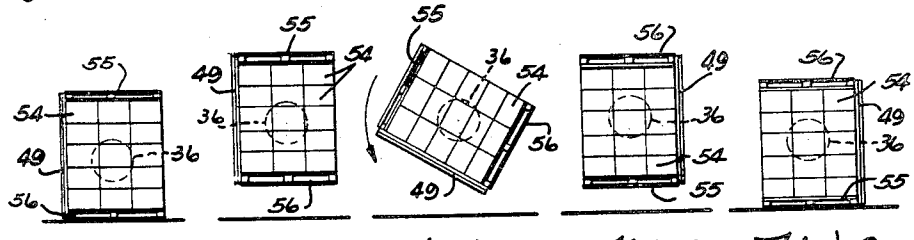


Fig. 5. Fig. 6 Fig. 7 Fig. 8. Fig. 9.

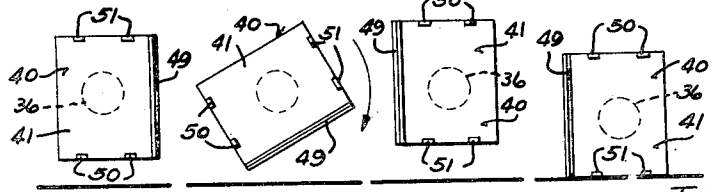


Fig. 10. Fig. 11. Fig. 12. Fig. 13.

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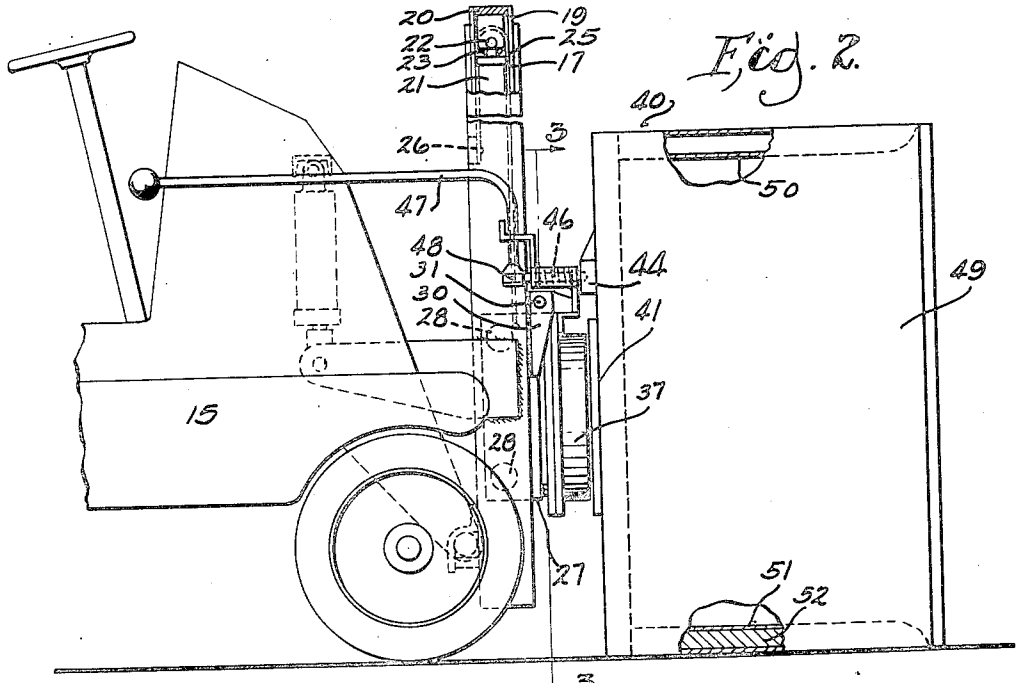


Fig. 2.

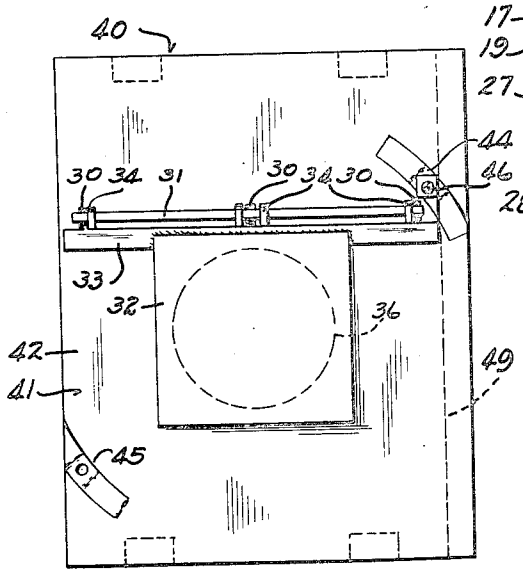


Fig. 3.

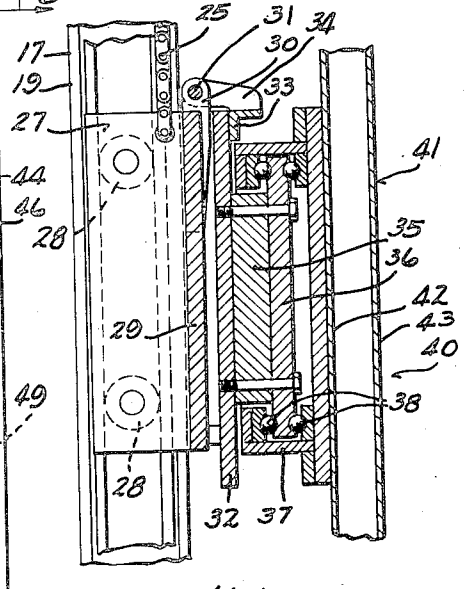


Fig. 4.

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MILK CAN INVERTING FORK TRUCK

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5 Claims. (Cl. 214—113)

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This invention relates to improvements in methods of inverting milk cans and apparatus therefor.

Canned milk cans should be inverted periodically to keep the contents from settling out. The turning is usually done by hand, a case at a time. The present invention is concerned with means whereby groups of cases may be lifted and turned mechanically.

In practicing the invention, I prefer to use a device known commercially as a fork lift truck with modifications in accordance with the present invention so that when such a truck has lifted a group of cases of canned milk, the turning may be effected automatically.

More specifically, it is the purpose of the invention to stack cases of canned milk between upper and lower pallets, lifting the upper and lower pallets and the intervening stacks of milk cases as a unit, inverting the unit and restoring the unit to the desired location in inverted position.

With respect to the apparatus whereby the invention is preferably practiced, it is an object of the invention to improve a fork lift truck and adapt it for inverting canned milk by providing it with a dual set of forks, a turntable whereby the forks may be swiveled for inversion, and latch mechanism for holding the turntable in each of two of its rotatable positions, the whole organization being so centered and weighted as to tend to turn by gravity to one position when unloaded and to an opposite position when loaded, upon release of the latch mechanism.

Other objects of the invention will appear more specifically following a disclosure thereof.

In the drawings:

Fig. 1 shows in perspective the front end portion of a fork lift truck modified in accordance with this invention and a unitary assembly of upper and lower pallets and stacks of cases of canned milk in position to be engaged by the fork lift truck.

Fig. 2 is a view in side elevation of the fork lift truck engaged with the pallet and case assembly, portions of the truck structure being broken away to expose interior parts.

Fig. 3 is a view taken on the line 3—3 of Fig. 2.

Fig. 4 is a transverse axial section through the turntable and associated mechanism of my improved fork lift truck.

Figs. 5 to 9, inclusive, are views in front elevation of the structure shown in Fig. 2 showing the

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parts in various successive positions incident to inversion.

Figs. 10 to 13 are views in front elevation of the fork lift device of the truck as it appears in various successive positions incident to its reinversion whereby it is restored to its original position.

The parts are referred to by the same reference characters throughout the several views.

The fork lift truck generally designated by reference character 15 comprises the usual wheeled vehicle carrying at its front end a mast which comprises parallel, upright channels 16, 17. These are conventionally tiltable unitarily from front to rear, although the ability to tilt is not required for the present invention.

The channels 16 and 17 provide ways in which inner channels 18, 19 are telescopically extensible vertically. These inner channels are cross connected at 20 to constitute a frame acted upon by the hydraulic ram 21. Carried by the frame is a transverse shaft 22 provided with sprockets 23 through which operate the chains 24, 25. The rear ends of the chains are anchored, as at 26, Fig. 2, while the forward ends connect to a wheel carriage 27, the wheels 28 of which are guided in the inner channels 18, 19. Thus, when the ram 21 is energized, the telescopic extension of the inner channels 18, 19 at a given rate lifts the carriage 27 at twice the rate at which the inner frame is extended. The parts thus far described are conventional.

Conventional, also, is the provision on the front of the carriage of a face plate 29 with brackets 30 carrying a pintle 31 on which is suspended any load to be lifted by the carriage.

According to the present invention, the parts immediately suspended upon the carriage comprise a turntable. The plate 32 has welded to it an angle iron 33 provided with ears 34 hung on the pintle 31. The spacer 35 carries the stationary disk 36 of the turntable, such disk being confined within an annular bearing channel 37 between which and the disk 36 I preferably employ antifriction bearings 38.

The fork structure generically designated by reference character 40 comprises a back 41 having dual walls 42, 43 and provided with apertured latch members 44, 45. A spring biased detent pin 46 is shown in Figs. 2 and 3 engaged in the aperture of latch member 44 to hold the fork assembly 40 in the indicated position of rotative adjustment on the turntable. The detent pin 46 is retractable by means of a lever 47 pivoted to the pin at 48 and projecting rearwardly to a

position where it may readily be manipulated by the truck operator, regardless of the position of the carriage 27.

The fork assembly comprises a side member 49, a pair of forks 50 and a pair of forks 51. The forks 50 and the forks 51 may both be made hollow, as shown in Fig. 2 but, in order to weight the device for operation as hereinafter described, the forks 51 are preferably loaded internally with lead or other weighting material, as indicated at 52. The weight of the side member 49 also contributes to the desired functioning of the device.

The cases 54 of canned milk are preferably arranged in stacks between upper and lower pallets 55, 56. As shown in Fig. 1, the stack comprises thirty cases which, with the pallets 55, 56 constitute a unit for manipulation. The fork truck approaches the unit in the manner shown in Fig. 1, the forks 50 entering the apertures of pallet 55 while the forks 51 enter the apertures of pallet 56. The parts are now in the position shown in Fig. 5.

The ram 21 is then operated to lift the stack unit as shown in Fig. 6.

The center of the fork device 40 is indicated in Fig. 1 at 58. However, the center of the turntable device upon which the fork assembly is rotatable is shown at 59. It will be evident that when the stack assembly is lifted as shown in Fig. 6, the stack assembly and fork organization are unbalanced and will tend to rotate about the center 59 of the turntable, such rotation being restrained only by the pin 46.

The operator now manipulates the lever 47 to retract the pin 46 thereby releasing the fork organization and stack assembly for rotation which, as viewed in Fig. 7, will be counterclockwise due to the off center weight of the side member 49. Such rotation will continue until arrested by engagement of pin 46 in latch element 45, in which position the parts will be completely inverted with the side member 49 now on the right as viewed in Fig. 8, the pallet 55 being below and the pallet 56 above. The hydraulic fluid is now exhausted from the ram 21 to lower the carriage whereby the pallet 55 is deposited on the floor as shown in Fig. 9. The truck 15 is then backed away from the work.

The carriage is now elevated so that the empty fork assembly will clear the floor as shown in Fig. 10. The weighted fork elements 51 are now at the top and the unweighted forks 50 are at the bottom. Consequently, the fork assembly, in and of itself, will tend to rotate clockwise. Upon withdrawal of the detent end 46, the fork assembly is allowed to rotate, as shown in Fig. 11, and such rotation continues until the detent end 46 reengages with the original latch member 44, at which time the fork assembly will have been restored to its original rotated position on the turntable. It is now ready to engage another stack of cases of canned milk and may be lowered for that purpose as shown in Fig. 5, thus completing the cycle of operations.

It will be observed that due to the weighting of the fork organization and its relation to the offset center of the turntable, the inverting movements are entirely automatic and depend on whether the fork organization is loaded or unloaded.

When the stack assembly comprising the pallets 55 and 56 and the cases 54 is loaded on to the skeletonized receptacle as shown in Fig. 6, the center of gravity of the entire load moves up toward the geometrical center 58 and is, therefore, above the axis of oscillation at 59, instead of being located therebeneath as was the case before load was imposed upon the fork organization. Consequently, the device is predisposed toward inversion as soon as the pin 46 is retracted. The direction of oscillation on the turntable is determined by the off center load of the side 49. It will be observed that as the fork organization rotates on its turntable to the position shown in Fig. 7, the side 49 keeps the cases from slipping out from between the pallets 55 and 56.

When the device reaches the position shown in Fig. 8, it is again at a position of unbalance due to the weight of the side 49. However, it reaches this position due to the momentum acquired in the movement indicated in Fig. 7. It is more nearly in balance in the Fig. 8 position than it was in the Fig. 6 position, since the center of gravity has now moved below the center of oscillation.

However, as soon as the load has been withdrawn and the carriage re-elevated, as shown in Fig. 10, the center of gravity is again above the center of oscillation. The center of gravity is now determined with reference to the loading of the forks 51, the weight of the work being eliminated. Therefore, as soon as the pin is retracted, the device again inserts itself automtically, the direction of oscillation being governed by the off center weight of the side 49. The momentum developed in the movement indicated in Fig. 11 will carry the fork organization to the position shown in Fig. 12 where it is re-engaged by the pin as already described.

It will be apparent that by stacking the cases between pallets in this manner, lifting the assembled cases and pallets as a unit which is out of balance about a horizontal axis, and subsequently releasing it for rotation, it is possible to accomplish inversion of milk cans quickly and economically and without manual labor. The fork organization may be regarded as a skeletonized receptacle, for this purpose, the forks 50 comprising the top, forks 51 the bottom, and the parts 41 and 49 the back and side.

While the method herein disclosed will be clear from the foregoing description, it may be summarized as follows:

The cases of milk cans are first stacked between pallets. The work is loaded on to a receptacle which is unbalanced when loaded and the receptacle is then permitted to rotate to an inverted position from which the work is unloaded. The lifting and lowering operations are incidental to the method to bring about the desired loading and inversion and unloading.

I claim:

1. The combination with a fork truck provided with a vertically movable carriage, of a bearing with a substantially horizontal axis mounted on the carriage, a receptacle oscillatory upon the bearing and supported thereby upon the carriage for vertical movement, said receptacle comprising upper and lower work engaging members and being loaded below said axis for return, when empty, toward a predetermined upright position, the geometrical center of said receptacle being disposed above said axis in the upright position thereof, and said receptacle being adapted to hold a load of such size and weight distribution as to overcome the aforesaid loading of the receptacle and tend to oscillate the receptacle toward an inverted position when loaded, together with latch means for releasably locking the receptacle to the carriage against oscillation about said axis.

2. The combination with a fork truck provided with a vertically movable carriage and means for effecting carriage movement, of a receptacle provided with upper and lower fork elements and provided with means connecting it with the carriage for support thereby and for oscillation about a substantially horizontal axis, latch means for connecting the receptacle releasably to the carriage against rotation about said axis, said latch means including diametrically opposite elements for holding the receptacle in upright and inverted positions respectively, said receptacle having its geometrical center located above its axis of oscillation in the upright position of the receptacle and being provided with counterweighting means disposed below its axis of oscillation in such position whereby the receptacle, when empty, tends to oscillate toward its upright position and when loaded tends to oscillate toward its inverted position.

3. The device of claim 2 in which the receptacle comprises a side element adapted to support the contents of the receptacle from lateral displacement during oscillation, said side element weighting said carriage in a manner determinative of the direction of oscillation between said positions.

4. The combination with a fork truck provided with hoisting ways, a carriage reciprocable upon the ways, and hoist means for effecting carriage movement, of a bearing with a horizontal axis mounted on the carriage, a fork receptacle having upper and lower fork elements and mounted

rotatably on said bearing for inversion and for movement with said carriage, the axis of said bearing being below the center of gravity of the loaded fork receptacle and above the center of gravity of the unloaded fork receptacle, and latch means for connecting the receptacle releasably to the carriage against rotation about said axis, said latch means including latch elements on the carriage and on the receptacle at diametrically opposite sides of said axis for holding the receptacle in upright and inverted positions respectively.

5. The combination set forth in claim 4 in which said receptacle comprises a side wall extending vertically in laterally offset relation to the upper and lower fork elements, whereby to support during inversion work pieces disposed between said elements.

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