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3,372,824

SELF-ADJUSTING FORK ATTACHMENT FOR A LIFT TRUCK

Filed June 27, 1966

2 Sheets-Sheet 1

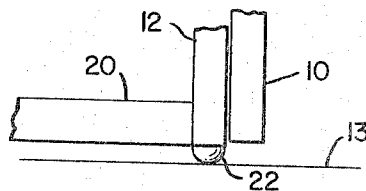
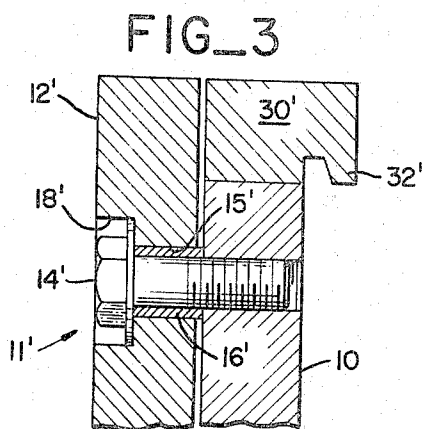
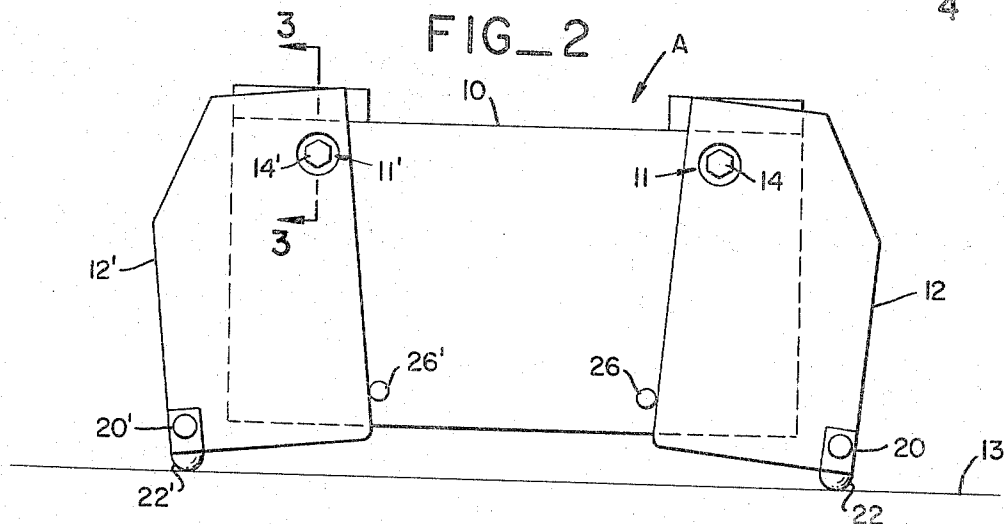
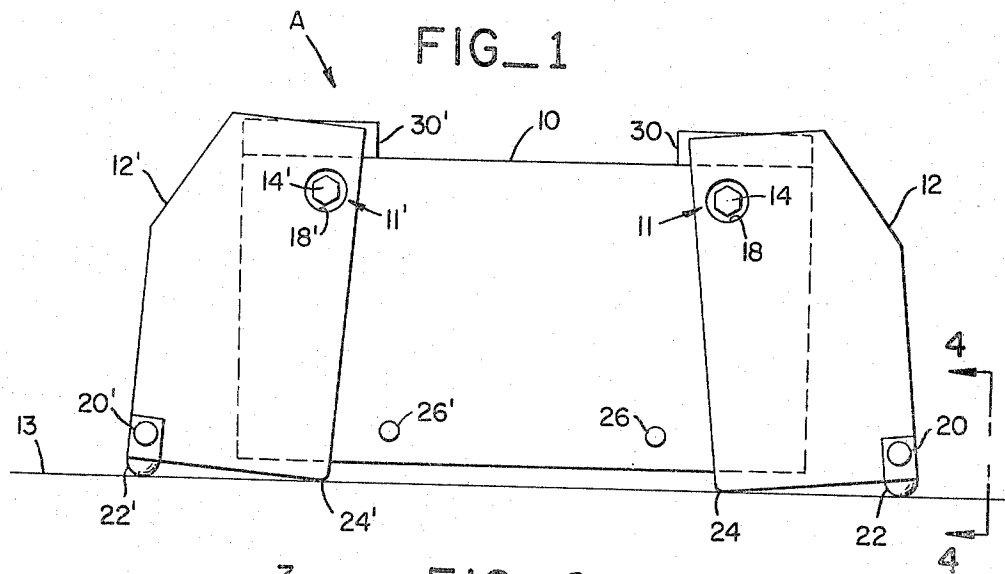


FIG_4

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2 Sheets-Sheet 2

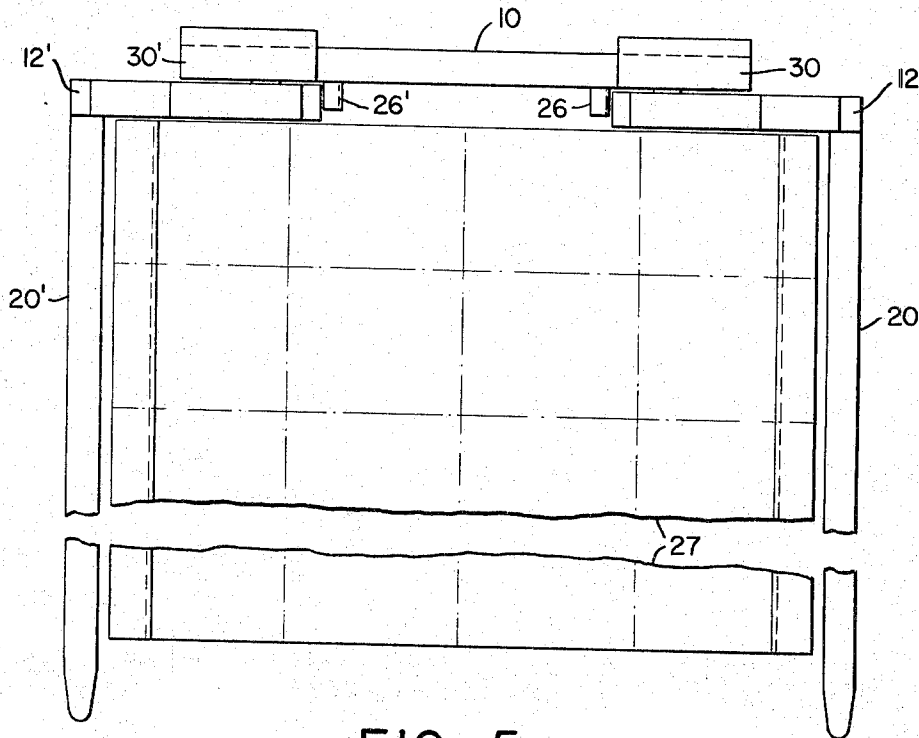


FIG_5

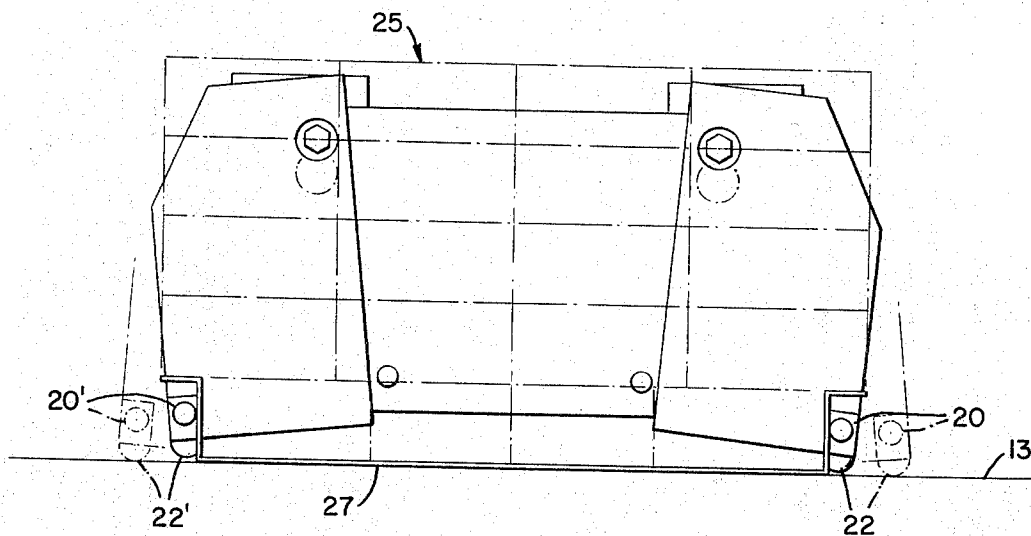


FIG_6

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3,372,824

SELF-ADJUSTING FORK ATTACHMENT FOR A LIFT TRUCK

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3 Claims. (Cl. 214—731)

This invention relates to an improved apparatus and method for handling unit loads, and in particular, it relates to a fork unit attachment for industrial trucks which is especially adapted to handle a self-palletized load.

It has heretofore been common practice to stack integrated loads on skids or pallets to facilitate handling with conventional lift truck devices. The skids or pallets enable the tines of the fork lift truck to be inserted below the stack so that the load can be transported as a unit. Of course such skids or pallets, in addition to being expensive, occupy valuable storage space which could be employed more effectively for actual storage.

An alternative which has been developed involves the use of the cartons themselves as the pallet, i.e., storing stacks of cartons as a self-palletized load. Under such circumstances, the stack of cases rests upon a first course or layer of cartons which is normally of lesser horizontal dimensions than the remainder of the stack. In this modification the tines of the fork-lift truck are forced against the first course under the remaining vertically-positioned courses, for example, hydraulically, so that vertical displacement of the entire stack may be accomplished. However, such a configuration of cartons necessitates that a large amount of horizontal pressure be applied through the tines to the sides of the first course so that the stack can be raised as a unit. Obviously, such a method of handling is ineffective when goods are packed in cardboard cartons since any substantial gripping force needed to support the entire load on the lower course of cartons will tend to crush the lower course, or damage the individual containers, particularly glass jars.

Other modifications have been developed to reduce or eliminate the amount of horizontal pressure required to elevate a self-palletized stack including turning the flaps of the lower carton layer outwardly in winglike attitude so as to lie directly beneath overlapping portions of the remainder of the load. For example, in U.S. Patent No. 2,996,205, issued Aug. 15, 1961 the forks of the lift truck are hydraulically disposed within the spaces between the supporting cartons and upon elevation engage the winglike flaps to lift the supporting cartons along with the remainder of the load.

More particularly, in what is commonly referred to as a Walsh unit, a large flat sheet such as a piece of cardboard is placed upon the supporting surface and under the first course of a self-palletized stack with sufficient overlap, i.e., width, to also cover the space directly below the other courses. However, as cartons are of generally non-uniform size, it has heretofore still been necessary when it is desired to transport stacks having variable pallet widths, to either employ a plurality of fork lifts or utilize expensive hydraulic or other similar power means to properly position the tines below various Walsh-type self-palletized stacks.

It is, therefore, a principal object of this invention to provide a fork attachment especially suitable for raising a Walsh-type self-palletized stack wherein the tines are gravity-positioned below the self-palletized load.

It is an especially important object of this invention to provide a fork attachment having tines which are simply and automatically adjustable to support Walsh-type self-palletized loads wherein the lower courses are of various non-uniform widths.

It is a feature and advantage of this invention to pro-

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vide a fork attachment for the elevating mechanism of a conventional fork lift truck which includes a pair of tine-holding arms pivotally secured to an upright backing plate. Each tine-holding arm forms a unit with its respective tine. The pivotal engagement of the pair of arm units with the backing plate is arranged so that when the fork attachment is resting on a supporting surface such as a floor, the centers of gravity of the tine-supporting arm units are spaced at a greater distance apart than the distance between their points of pivotal attachment. Therefore, when the lift truck is activated to cause the upright backing plate, tine-holding arms and tines to be elevated free of contact with the supporting surface, the location of the center of gravity of each arm will result in an inward pendulum movement of the arm units. Thus, the pair of tines, each attached to one of the arms, will be moved towards each other as the fork attachment is raised out of contact with the supporting surface. The arms and tines will continue to rotate about their respective mounting points on the backing plate until each center of gravity lies directly below the pivotal mounting point or until further pivotal movement of the arms is prevented as when the tines contact the supporting sheet covering the sides of the cartons in the lower course of the Walsh-type self-palletized stack.

In order to insure that tine-holding arm units will rotate outwardly about their pivotal mounting points when being lowered into contact with the supporting surface, the bottom edge of each arm unit is preferably provided with a projection which makes the initial physical contact with the supporting surface. As the fork attachment is lowered further, each of the arm units is forced to slide outwardly on the aforementioned projection and thus pivot about its mounting point. In this manner, the center of gravity of each of the arm units is displaced from its natural location below the pivotal mounting point.

When employed to lift and transport a stack of cartons, the fork attachment is first disposed in a lowered position on the supporting surface with the tines spaced outwardly alongside the lower course of cartons of a Walsh-type self-palletized stack, i.e., a stack of cartons which has been positioned upon a continuous sheet of a suitable material such as cardboard. Obviously, it is necessary for the sheet to be of sufficient surface area to cover substantially all of the lower surfaces of the self-palletized load so that the tines will support and raise all of the Walsh-type unit.

Then, by slowly elevating the fork attachment, the arms are elevated out of contact with the supporting surface and, as previously described, the location of the center of gravity of each arm produces an inward pendulum movement of the respective arm, until each of the tines occupies the desired position below the self-palletized stack, i.e., between the continuous sheet and the supporting surface. Continued lifting is then accomplished with the Walsh-type self-palletized stack supported upon the tines.

These objects, features and advantages of the invention will be better understood and others will become apparent when reference is made to the following disclosure, especially in view of the attached drawings wherein:

FIG. 1 is a front elevational view of the preferred embodiment of the invention positioned on a floor surface;

FIG. 2 is a front elevational view of the preferred embodiment of the invention which has been slightly raised from the floor surface;

FIG. 3 is a cross-sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is a top elevational view depicting the fork resting upon the floor surface; and

FIG. 6 is a front elevational view illustrating the positions for the arm units relative to a palletized load when the unit is both resting on a supporting surface and slightly raised therefrom.

Referring now to the drawings wherein similar characters of reference represent corresponding parts in each of the several views, there is shown a fork assembly A suitable for attachment to any conventional fork lift truck assembly (not shown).

Fork A includes upright backing plate 10 to which are pivotally mounted at points 11 and 11' tine-holding members 12 and 12', respectively. The pivotal mountings are accomplished through the use of bolts 14 and 14' which rotatably attach members 12 and 12' to upright plate 10. The point of pivotal mounting of both members 12 and 12' is positioned so that when the members are lowered to floor surface 13, their centers of gravity will be substantially outside of the pivotal mounting points 11 and 11', respectively, as will be more fully described, supra.

Referring to FIG. 3, bolt 14', including washer 19', is extended through aperture 15' in member 12' into threadable engagement with plate 10. Proximal to bolt 14' in aperture 15' is bushing 16' employed to secure a firm uniform pivotal mounting. The head of bolt 14' is countersunk into bore 18'. Of course, it will be obvious to one skilled in this art that other conventional attachment means can also be employed.

Tine-holding members 12 and 12' have fixedly coupled thereto below pivot points 11 and 11', tines 20 and 20', respectively. Positioned below the tines on the lower outer edge of members 12 and 12' are semi-spherical slidable surface bearings 22 and 22'. As the fork attachment is lowered onto supporting surface 13, bearings 22 and 22' will first contact the surface. As backing plate 10 is lowered further, its weight causes members 12 and 12' to pivot about mounting points 11 and 11', respectively, as illustrated most clearly in FIGS. 1 and 2. This pivotal movement of members 12 and 12' displaces tines 20 and 20', respectively, outwardly along surface 13. The weight of backing plate 10 causes continued outward pivotal movement until members 12 and 12' contact surface 13 at points 24 and 24', respectively. The members 12 and 12' then each have two fixed contact points with surface 13 and further downward movement of backing plate 10 and accompanying pivotal movement of members 12 and 12' is prevented.

By reversing this procedure and raising backing plate 10, members 12 and 12' pivot inwardly until movement is stopped either by the lower course of self-palletized stack 25 or by lugs 26 and 26'. Lugs 26 and 26' are positioned so that members 12 and 12' will be prevented from swinging to a position wherein the center of gravity is directly below the pivot point 11 and 11', respectively. Thus, by merely raising the fork attachment A a short distance, preferably merely a matter of an inch or two, members 12 and 12' are caused to rotate about pivotal mounting points 11 and 11', respectively, and thereby modify the position of the tines 20 and 20' with respect to each other.

As more clearly illustrated by FIG. 6, when the fork assembly A is raised from its resting position upon the floor surface, the tines are caused to swing inwardly, occupying a position next to and under the overlay of self-palletized stack 25. Along the lower surface of stack 25 is positioned a sheet 27, of a suitable thin flexible material such as cardboard. As previously described, raising upright plate 10 causes tines 20 and 20' to swing inwardly until they contact the lower course of the stack or until the inner edge of tine-holding members 12 and 12' abut, respectively, stop lugs 26 and 26'. In this manner, the lifting tines will be located in the most appropriate position to lift and transport stack 25, no matter what the width of the lower course may be.

Referring again to FIG. 3, upright plate 10 includes extensions 30 and 30' fixedly secured thereto by welding or in some other permanent manner. Members 30 and 30' include hook means 32 and 32', respectively, which can be quickly and easily coupled over the front upright plate of any conventional fork lift truck.

While one embodiment of the invention has been shown and described, it will be apparent that other adaptations and modifications can be made without departing from the true spirit and scope of the invention.

I claim:

1. In a lift truck, a fork attachment for raising a Walsh-type self-palletized load from a supporting surface, comprising: an upright support adapted to be raised and lowered; a pair of upright tine-holding arms; means for pivotally mounting said tine-holding arms on said upright support for rotation about respective horizontal axes; a pair of tines, each of said tines being rigidly attached to and projecting outwardly from a respective arm at a location below the corresponding pivot point; each of said arms and tines defining a unit having a lower edge adapted to engage said supporting surface to dispose said unit with its center of gravity displaced laterally and outwardly of its pivotal mounting means at least when said support is at its lowest position whereby said units are movable inwardly toward each other when said support is raised, to locate said pair of tines under said self-palletized load.

2. A fork attachment in accordance with claim 1 and further characterized by stop means on said upright support whereby each of said tine-supporting arms is limited in its inward rotational movement.

3. A fork attachment in accordance with claim 1 and further characterized by an extension upon the lower edge of each of said upright tine-holding arms whereby as said fork attachment is lowered said extensions will first contact said supporting surface and cause each of said arm units to rotate about its respective pivotal mounting means, thereby displacing said tines outwardly.

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