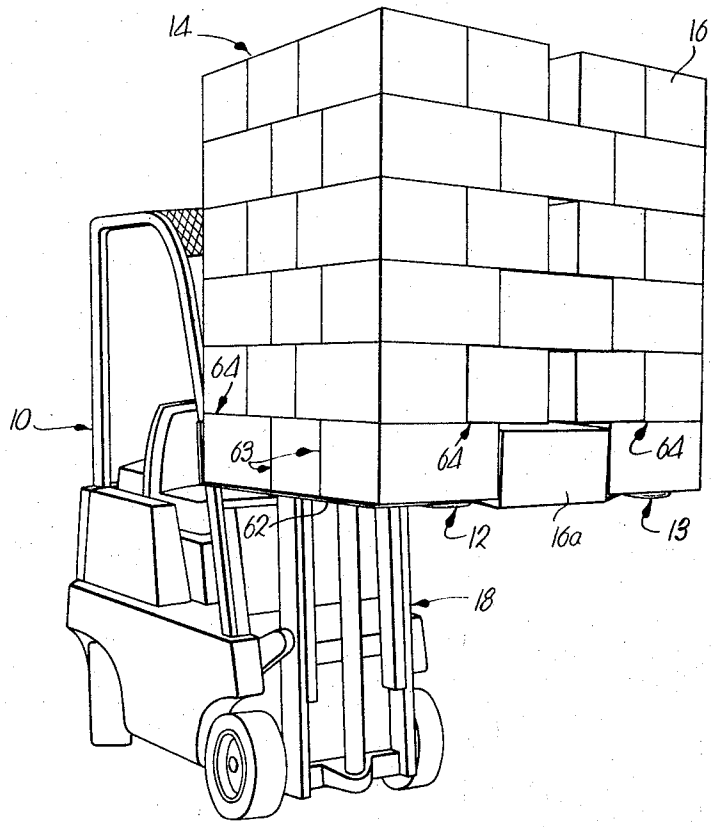
Nov. 21, 1967 W. E. MARTIN ET AL 3,353,697

FORK-LIFT FINGER CONSTRUCTION

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Fig. 1.



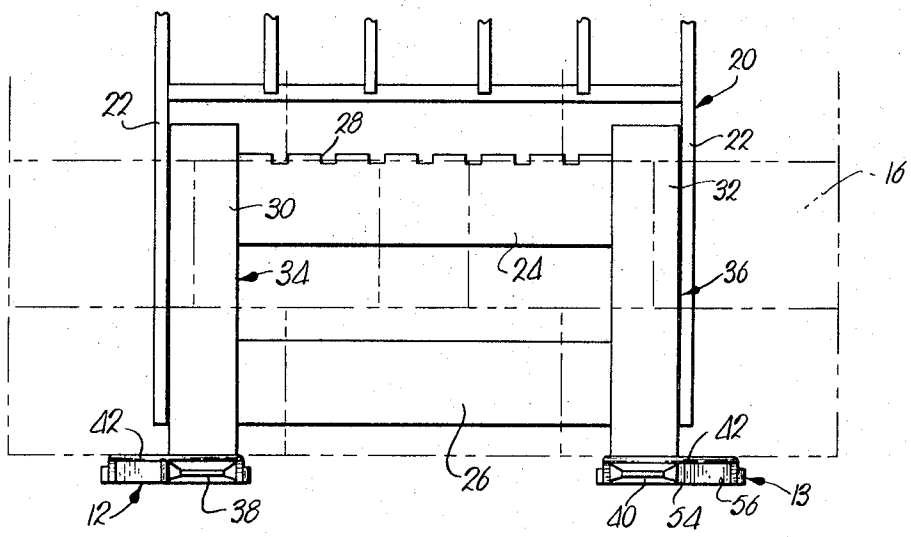


Fig. 2.

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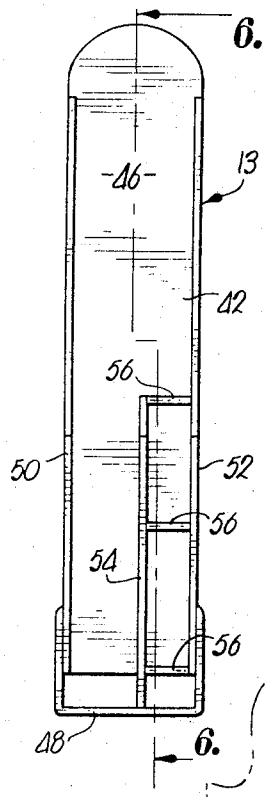


Fig.4.

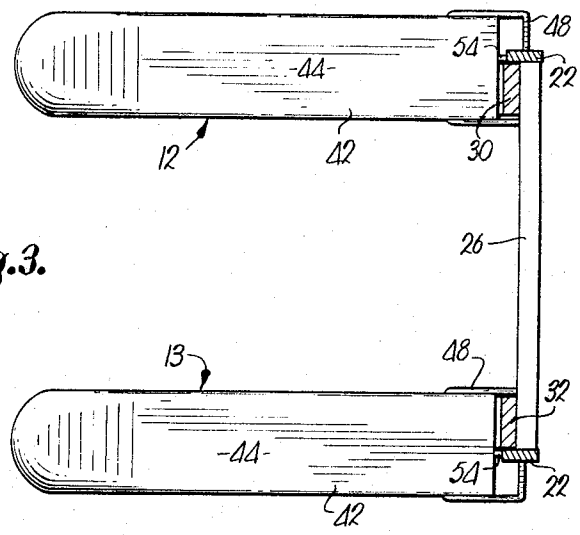


Fig.3.

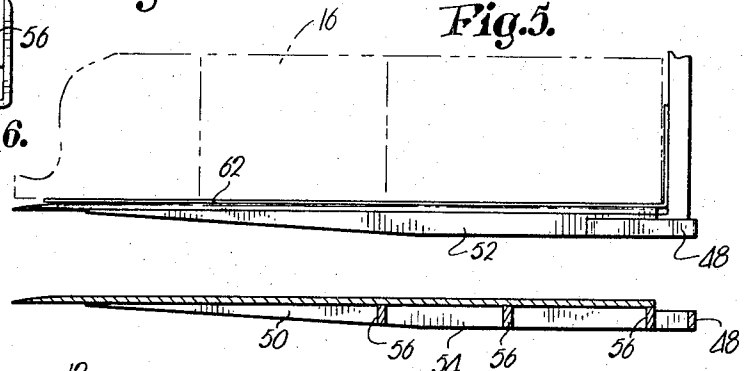


Fig.5.

Fig.6.

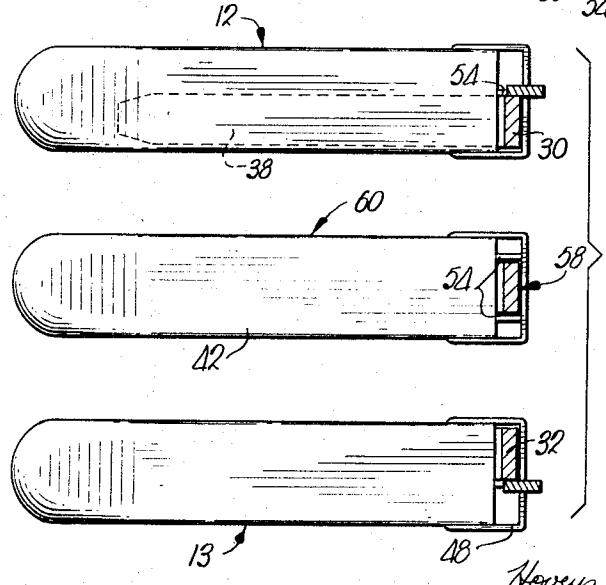


Fig.7.

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FORK-LIFT FINGER CONSTRUCTION

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2 Claims. (Cl. 214—620)

ABSTRACT OF THE DISCLOSURE

An extension for a fork-lift truck finger having a rounded, convex outermost edge and a loop member formed at the rear of the extension and adapted to receive the lift truck finger therethrough. A plurality of parallel, upwardly tapering flanges on the bottom surface of the extension cooperate with the lift truck finger to releasably support the extension on the finger.

This invention relates to hoisting apparatus, and more particularly, to a novel, removable extension for the fingers of lift trucks and the like.

It has come to be a general practice in large warehousing operations to employ highly maneuverable hoisting vehicles, commonly referred to as "lift trucks" for the purpose of loading and unloading cartons of merchandise from the cargo carriers and for stacking the merchandise in the warehouse. These lift trucks are conventionally provided with two or more forwardly projecting fingers which are adapted to be moved beneath a stack of cartons for hoisting the stack and moving it from one location to another.

In the past, it has been necessary to provide pallets of rigid construction for supporting the stack of cartons in spaced relationship from a supporting surface, such as the floor of a rail car, the floor of the warehouse, or the top of other stacks of merchandise. These pallets, usually constructed of wood, have been necessary to permit insertion of conventional forklift fingers beneath the stack and also to maintain the integrity of the stack on the fingers when the stack is hoisted by the lift ruck.

These wooden pallets, although heretofore thought essential to most warehousing operations, increase the cost of the operation by virtue of the costs of manufacturing the pallets themselves, storage and transportation space occupied by the pellets, and the sheer nuisance and labor expense involved in handling and collecting the individual pallets in the warehouse after the stacks of merchandise have been removed therefrom.

As an alternative to the use of wooden pallets in the shipping of merchandise, it has heretofore been necessary for each individual carton to be manually loaded onto a pallet or platform supported by the lift truck before the goods can be transported to the desired location. The time consumed and the labor expenses involved in such manual loading operations usually outweigh the expense which is involved in the use of wooden pallets throughout.

The principal object of this invention, therefore, is to provide an extension or attachment for use with conventional lift trucks so that the latter are capable of handling stacks of merchandise in cartons without need for the cartons to be stacked upon pallets.

Another object of the invention is to provide novel finger extensions which are capable of each and rapid installation or removal from conventional fork-lift trucks so that the latter may be utilized for handling both "palletized" and "non-palletized" shipments of merchandise.

A further object of the instant invention is to provide finger extensions constructed to permit rapid pickup of

non-palletized stacks of cartons through maneuver of the lift truck by the operator and without need for auxiliary workmen to assist in either loading or unloading the vehicle.

Still another object of this invention is to provide novel finger extensions as hereinabove set forth, yet which may be quickly and economically manufactured from commercially available materials.

These and additional objects of this invention will be further explained or will become apparent from the following specification and claims.

In the drawings:

FIGURE 1 is a perspective view on a reduced scale of a fork-lift equipped with the novel finger extensions of this invention and shown supporting a unitized stack of cartons;

FIG. 2 is a fragmentary, front elevational view of the lifting rack of a lift truck with the finger extensions mounted on the fingers, cartons of a stack of merchandise supported by the finger extensions appearing in dot and dash lines;

FIG. 3 is a horizontal, cross-sectional view through the rack, revealing a top plan view of the finger extensions;

FIG. 4 is a bottom plan view of a finger extension embodying the principles of this invention;

FIG. 5 is a side elevational view of the fork-lift rack and finger extensions of FIG. 3, a portion of the load appearing in dot and dash lines;

FIG. 6 is a cross-sectional view taken along irregular line **6—6** of FIG. 4; and

FIG. 7 is a view similar to FIG. 3 but with a third fork-lift finger and finger extension appearing in place on the rack.

Referring initially to FIGURE 1, a lift truck numerated **10** of well-known construction is provided with a pair of finger extensions **12** and **13** embodying the principles of the instant invention for hoisting a unitized stack **14** of cartons **16** containing merchandise or the like. Truck **10** is provided in conventional manner with an upright track broadly denoted by the numeral **18**. Truck **18** includes a movable rack **20** (FIG. 2) which is operably coupled with hoisting apparatus carried by truck **10** as is conventional, and rack **20** is shiftable along track **18** over an upright, reciprocable path of travel by the hoisting apparatus which is under the direct control of the operator of truck **10**.

Rack **20** is provided with a pair of outermost, upright members **22** which are interconnected at vertically spaced intervals by an uppermost cross member **24**, and a lower cross member **26**. Upper member **24** has a plurality of longitudinally spaced notches **28** in the upper marginal edge thereof. Notches **28** cooperate with projecting structure (not shown) on the upright portions **30** and **32** of generally L-shaped teeth or fingers **34** and **36** respectively, for securing the fingers to rack **20** as illustrated in FIG. 2.

Each of the fingers includes integral, forwardly extending, generally horizontally disposed finger portions numerated **38** and **40** respectively. Portions **38** and **40** project forwardly from rack **20** and are conventionally utilized for lifting loads along the reciprocable path of travel of track **18** after portions **38** and **40** have been inserted beneath the load. Manifestly, each of the fingers **34** and **36** are movable laterally along the members **24** and **26** to provide any selected horizontal spacing between the respective fingers.

When loads are lifted by use of fingers **38** and **40**, it has, in the past, been necessary to provide vertical spacing between the load and a supporting surface such as a floor or the like to permit insertion of the fingers beneath the load. Also, it has been common practice to utilize a rigid platform beneath the load and above the fingers

when loads comprised of a plurality of units such as cartons, are handled. Such vertical spacing and rigid platform is commonly provided by the wooden pallets mentioned above.

The finger extensions 12 and 13 capable of eliminating the necessity for such pallets comprise elongated, rigid, generally flat plates 42 having upper surfaces 44 and lower surfaces 46. It may be seen, particularly in FIG. 2, that extension 12 is similar to extension 13 with the exception that the supporting structure on the lower surface 46 of extension 13 is substantially a mirror image of the corresponding structure on extension 12. Thus, it is only necessary to describe the details of construction of extension 12 to explain the principles of the instant invention.

Plate 42 is substantially longer than the horizontal portions 38 and 40 of fingers 34 and 36, and the outwardly extending end of plate 42 projects beyond the outermost tip of the corresponding fingers. The upper surface 44 of each of the plates 42 is beveled downwardly as illustrated in FIGS. 3 and 6, with the extent of bevel increasing as the outermost end of the finger extension is approached.

An elogated strap member 48, having opposed ends thereof rigidly secured to plate 42, projects outwardly beyond the other end of the latter to define a loop extending in spaced relationship from said other end of each plate 42. The upright portions 30 and 32 of fingers 34 and 36 respectively, are received between the loop formed by member 48 and the proximal end of plate 42 as shown best in FIG. 3.

Elongated, downwardly extending flanges 50 and 52 integral with the bottom surface 46 of each plate 42 extend longitudinally of the latter at each marginal edge of plate 42. The outermost portions of flanges 50 and 52 are tapered upwardly as the outermost ends thereof are approached, as clearly shown in FIGS. 5 and 6. A medial flange 54 extends from the bight portion of member 48 in parallel relationship to flange 50 and in spaced relationship from flange 52 as shown best in FIG. 4.

A series of parallel cross bracing flanges 56 are welded to flanges 52 and 54 respectively, and extend therebetween for providing structural rigidity to flange 54. The spacing between the flanges 50 and 54 is chosen to accommodate therebetween the elongated, generally horizontally extending finger portion 38 or 40 when the finger extension is mounted on the corresponding finger. It should be noted at this juncture that the spacing between flanges 50 and 54 is not centrally located with respect to the corresponding extension 13. Accordingly, plate 42, which is substantially wider than the finger of the lift truck, projects outwardly beyond the outermost edge of the corresponding lift truck finger when the extensions are in place as clearly illustrated in FIG. 2. Therefore, with the fingers adjusted to the positions thereof of maximum horizontal spacing therebetween, as shown in FIG. 2, the finger extensions 12 and 13 extend a substantial distance horizontally outwardly beyond the fingers.

It may be desired for some lifting operations that a third finger 58 be utilized in conjunction with the outer fingers 34 and 36. Thus, a middle finger extension broadly designated 60 may be provided for the middle finger 58 a shown in FIG. 7. Manifestly, extension 60 is ordinarily disposed midway between extensions 12 and 13 in the manner illustrated. It should be noted that the middle extension 60 is provided with a pair of flanges 54 welded to the lowermost surface of plate 42. The flanges 54 are spaced apart a sufficient distance to accommodate the horizontally extending portion of the finger 58 therebetween when the extension 60 is in place on the finger. In the case of the middle extension 60, the latter projects on either side of finger 58 an equal distance.

In operation, the cartons 16 to be handled by equipment utilizing the principles of this invention, are stacked in what is commonly referred to as a "unitized" load. Such a load is illustrated in FIG. 1. The stack is generally

prismatic (and may or may not be cubical) with the cartons stacked in layers substantially oriented in the manner illustrated in FIG. 1.

Each layer includes two adjacent rows 63, of three cartons disposed in end to end relationship, and two groups 64 of two cartons each. The groups 64 comprise a pair of side-by-side cartons 16, the longitudinal axis of the cartons of the groups extending at right angles from the longitudinal axis of the cartons of the rows 63 of the same layer. The ends of the cartons of each group 64 abut the side of a proximal carton of a row 63. The cartons of the groups 64 and the rows 63 of one layer overlie the cartons of the rows 63 and groups 64 respectively of the next lowermost layer.

It should be noted that each carton has a longer length dimension than the width dimension thereof. When the extensions 12 and 13 are installed on truck 10 in the manner illustrated in FIG. 2, the outermost edges of the extensions are located along imaginary lines extending from front to rear along the stack and disposed at least as close as one-half of the length dimension of one carton from the outermost edges of the stack. This insures that the extensions underlie the centers of gravity of the outermost cartons of each row 63 and prevent the stack from tending to split or the cartons toppling outwardly when the load is lifted by the truck. On the contrary, the finger extensions are thereby disposed with respect to the structural make-up of the stack to insure integrity of the stack during transportation of the load. It has been found that each succeeding layer above the bottom layer of cartons is bound tightly by gravity to the lowermost layer as the stack is lifted when the extensions are in place as illustrated.

In utilizing the extensions of this invention, the shippers stack the unitized load on a relatively thin membrane or sheet 62, shown best in FIG. 5. The sheet 62 is ordinarily of cardboard, fiberboard or other semi-flexible material. The outwardly projecting and downwardly beveled, outermost portions of the finger extensions permit the operator of truck 10 to insert the extensions beneath sheet 62 by manipulation of the truck. This may be accomplished even though the sheet 62 rests on a floor or other supporting surface and it is not necessary when the finger extensions are utilized to provide vertical spacing between the bottom of the stack and the supporting surface.

The presence of the semi-flexible sheet or member 62 beneath the stack prevents the middle of the latter from capsizing when the stack is lifted. Thus, referring to FIG. 1, the middle carton 16*a* is held in supported position between the finger extensions inasmuch as member 62 is bound tightly by friction between the upper surfaces of the extensions and the adjacent cartons 16. Manifestly, the other cartons of the lowermost layer of the stack which are not directly supported by the relatively broad, long surfaces of the finger extensions are similarly supported by the member 62. However, when a central extension 60 is utilized, all of the cartons of the lowermost layer of the stack rest directly upon finger extensions.

The flanges on the lowermost surfaces 46 of plates 42 serve to stabilize the extensions in place on the corresponding fingers. However, when it is desired to remove the finger extensions so that the fingers of the fork-lift truck can be used with conventional "palletized" loads, it is only necessary that the outermost end of the extension be tipped upwardly. This frees the member 48 from engagement around the upright portion of the finger, whereupon the extension may be removed from the finger. Conversely, the extensions can be quickly and easily installed on the finger by inserting the latter through the loop formed by member 48 and sliding the extension on the rear of the finger so that the upright portion of the finger is received between the member and the proximal end of the plate 42.

The use of the finger extensions of this invention is somewhat enhanced if the upper surfaces **44** thereof are maintained in smooth condition. The surfaces may be polished and coated with wax or the like to permit ready insertion of the extensions beneath the flexible member upon which the load is stacked. Furthermore, these slick surfaces allow the load to disengage readily from the finger extensions when it is desired to remove the lift truck from the load. This is easily accomplished by the operator, particularly if he manipulates the load so that the forwardmost edge thereof comes into contact with the supporting surface upon which he desires to deposit the load and the truck **10** is then maneuvered away from the load while the latter is tipped slightly forwardly at a small angle.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. For use with an article-lifting apparatus having a mobile hoist provided with an L-shaped finger having an upright portion and a generally horizontally extending terminal portion shiftable through a generally upright, reciprocable path of travel, a finger extension comprising:

an elongated, rigid plate of greater length and width than said terminal portion of the finger;

an elongated strap member having opposed ends thereof secured to the plate adjacent one end of the latter, said member defining a loop adjacent said one end of the plate, the upright portion of the finger being received through said loop with the plate supported by said terminal portion of the finger disposed thereunder, the upper surface of said plate being provided with a downwardly extending bevel having a rounded, convex edge adjacent the other end of said plate; and

means on the plate engageable with the terminal portion of the finger for releasably holding the plate on the finger, said holding means including a pair of spaced, elongated, downwardly projecting flanges on said plate, said flanges extending longitudinally of the plate and disposed to oppositely engage the terminal portion of said finger, one of said flanges extending from the bight of said loop forwardly in parallelism with said other flange, a third flange extending in parallel relationship to said pair of flanges, and brace members secured to said plate and interconnecting said one flange with said third flange, said flanges tapering upwardly as the forwardmost ends thereof are approached.

2. In merchandising lifting and transporting apparatus, the combination of:

a mobile hoist having a pair of elevatable, spaced, L-shaped, lifting fingers each including an upright portion and a generally horizontally extending terminal portion;

a sheet of semi-flexible material;

a unitized load upon said sheet and formed of a plurality of individual cartons in stacked relationship; and

a finger extension for each of said fingers respectively, each of said extensions including an elongated, rigid plate of greater length and width than said terminal portion of the corresponding finger supported on top of the latter, means including an elongated strap member having opposed ends secured at one end of each plate and looped around said upright portion for releasably securing the same to said upright portion of the corresponding finger, and means on each plate engageable with said terminal portion of the corresponding finger for releasably holding said plate thereon, said holding means including a pair of downwardly extending flanges disposed at opposite marginal edges of said plate, a medial flange extending from the strap member forwardly in spaced parallelism with one of the pair of flanges to receive a corresponding lifting finger therebetween, and rigid brace means interconnecting said medial flange and said one flange, said flanges tapering upwardly as the forwardmost ends thereof are approached, each plate terminating in a thin, downwardly extending bevelled section having a rounded, convex edge to facilitate insertion of said extension under said sheet, the outermost edges of said extensions being spaced apart a distance sufficient for said extension to underlie at least a portion of the outermost lower cartons at a pair of opposite extremities of said stack.

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