

[54] **LIFTING APPARATUS**
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[51] Int. Cl.B60p 1/02, B60p 1/28
[58] Field of Search.....254/2 R, 2 C, 105, 148; 214/390; 280/47.2

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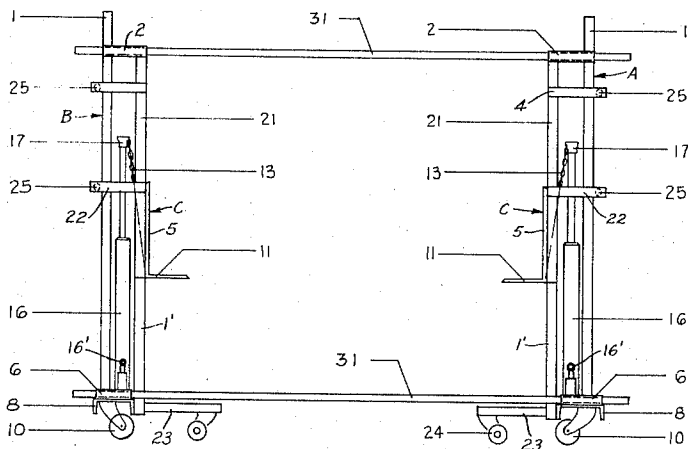
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Assistant Examiner—Roscoe V. Parker, Jr.
Attorney—Lawrence L. Colbert

[57] **ABSTRACT**

A load lifting and transporting apparatus comprises a pair of coacting units each having an upright main frame and a lifting or carriage frame. Hydraulic jacks on the two units of the apparatus raise and lower the carriage frame. The units have swiveled casters which may be locked in rigid positions. Ratchet controlled belts on the units are capable of encircling the load in two directions for safety and stability, and in another mode of use the two units may be rigidly coupled by connecting bars. The two units may be employed as a scaffold or table and a single unit of the apparatus is capable of forming a stable hand truck with load lifting capacity.

4 Claims, 13 Drawing Figures



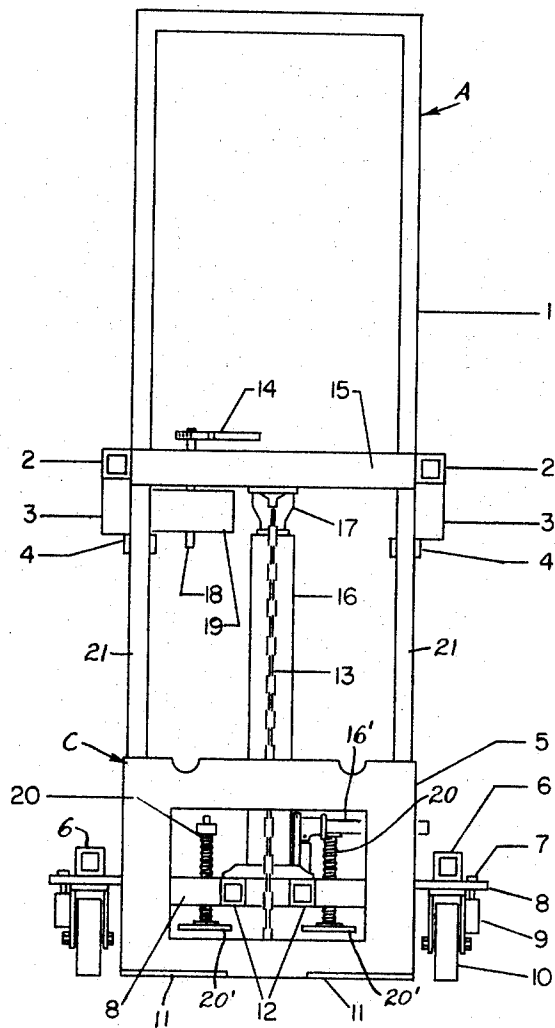


FIG. 1

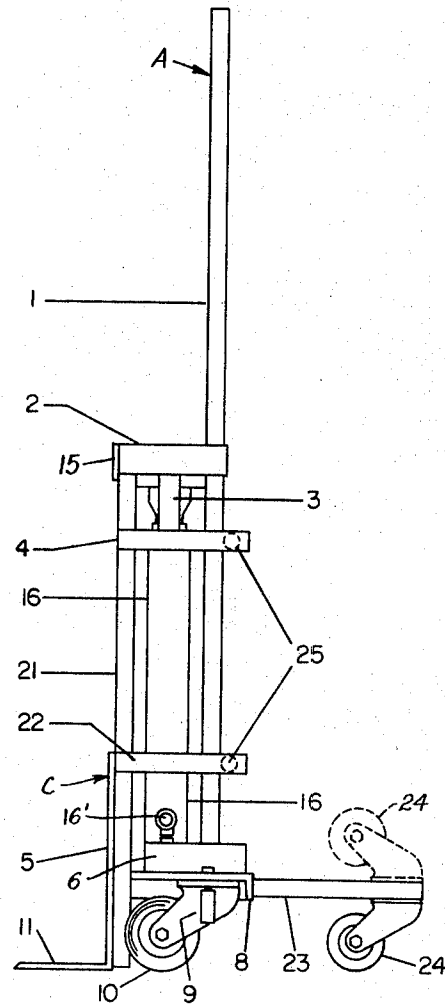


FIG. 2

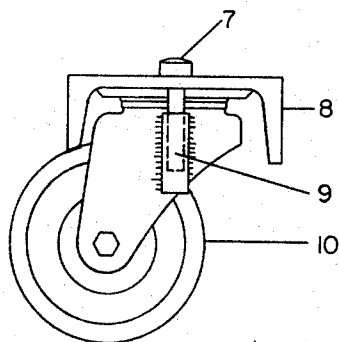


FIG. 3

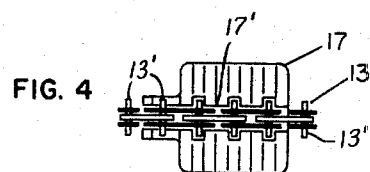


FIG. 4

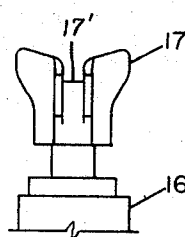


FIG. 4a

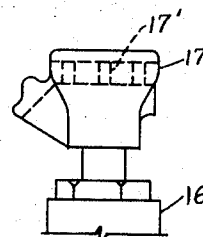


FIG. 4b

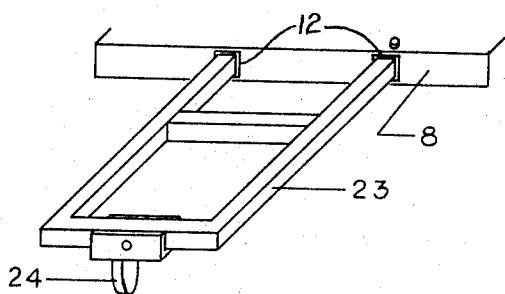


FIG. 5

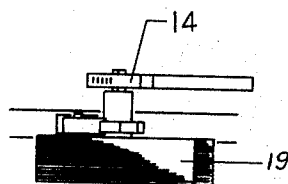


FIG. 6

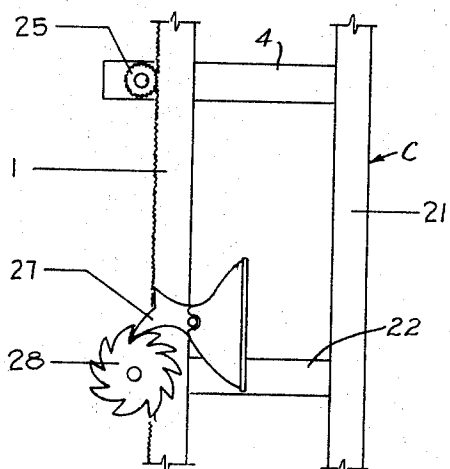


FIG. 7

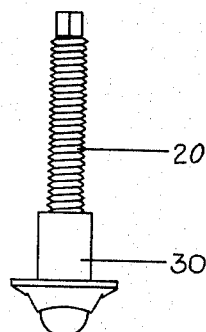


FIG. 8

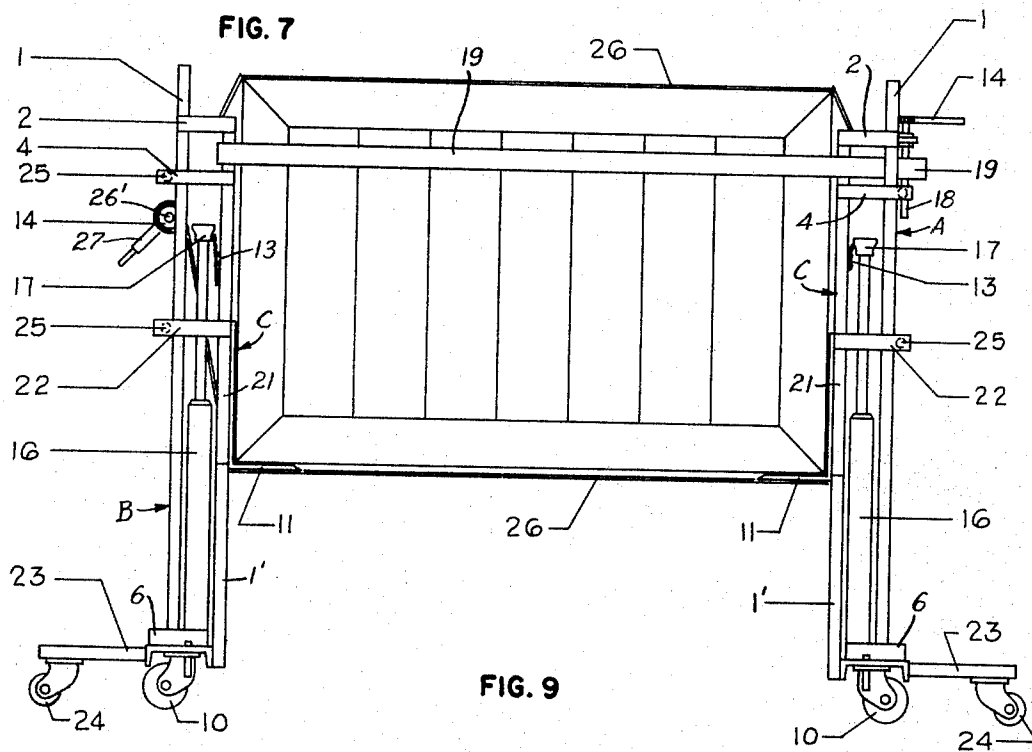


FIG. 9

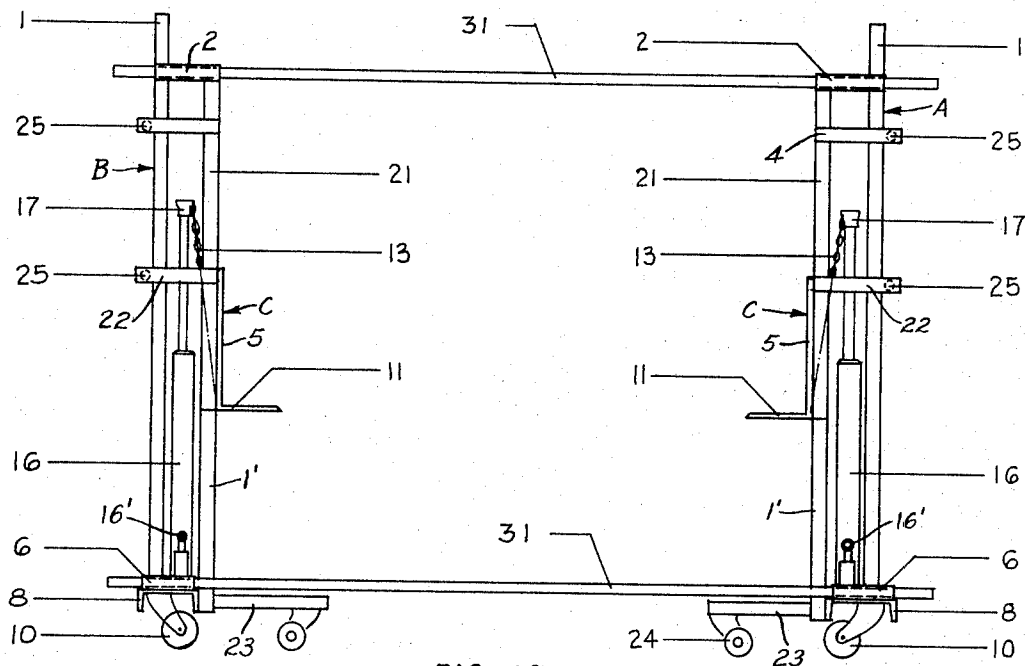


FIG. 10

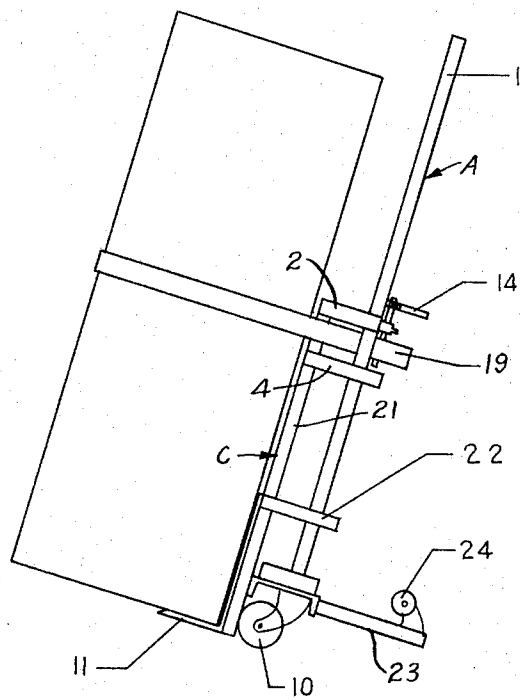


FIG. 11

LIFTING APPARATUS

This invention relates to new and useful improvements in lifting apparatus, in general, and more specifically to such an apparatus which is particularly well adapted for use to transport heavy objects which otherwise may be extremely difficult to handle.

Numerous attempts have heretofore been made to provide a lifting apparatus which may conveniently and quickly be positioned in operative position to a load, such as a packing crate and the like, whereby such a load, regardless of its size and weight or length may be quickly and readily moved about from one place to another with minimum of effort, and to the best of my knowledge, apparatus used at the present time has not proven entirely satisfactory.

It is therefore highly desirable that an improved apparatus, such as the one I have designed that can be readily and easily converted into a handcart, scaffolding frame or lift-dolly, be provided which shall embody all of the desirable features of such an apparatus and which is so constructed that it may be quickly moved into or out of operative engagement with a load, such as a large crate or box, large commercial refrigeration units, and household appliances, whereby when such a lifting apparatus is engaged with each end or sides of the crate or load, the entire load is lifted off the floor and is supported upon swivel casters, or my conversion to rigid casters, whereby it may easily be transported from one place to another with a minimum of labor and effort. The apparatus has been found to be particularly useful in railway freight houses, factories, shipping rooms, warehouses and in many other places where heavy objects or articles must be frequently moved about from one place to another, as when loading and unloading freight cars and trucks or storing or placing heavy machinery.

The inherent construction of the novel lifting apparatus herein disclosed is such that it may readily and quickly be applied to a load. When one such lifting apparatus is applied at each end of a load, such as a large shipping box or other article, such a load may be moved about with utmost ease as the large casters make it possible to "roll" the load over rough floors or other surfaces without effort, whereby the operation of handling such heavy merchandise may be greatly expedited and at a reduced cost, and with little danger of damaging the articles or the operator while shifting them about.

An object, of the present invention, therefore: is to provide an improved lifting apparatus of the class described comprising a main frame mounted on suitable swivel casters which can be converted to rigid casters and a secondary frame mounted for vertical sliding movement on the main frame and having forwardly extending load engaging elements which normally are positioned adjacent to the floor or higher suspended objects such as tables which are jacked from the recessed top of the pick up frame and cooperate with the casters to support the apparatus in an up-right position, and means being provided on the apparatus for vertically translating the secondary frame on the main frame, thereby to bodily lift the load off the floor and transfer its weight onto the casters of the main frame.

In the event of lifting objects that are round or triangular shape a pipe is inserted from one unit to the other unit into the square tubing at the top of the main frame for the purpose of making the lifting apparatus into a rigid vertical device to keep the load from falling off the lift fork at the bottom of the front frame.

A further object is to provide an improved lifting apparatus with the ability to lift a load not only from the floor, but from other heights within range of the front frame, of the class described, made of structural steel and all parts being suitably welded together to provide a very rugged and substantial apparatus. The construction and arrangement of the telescoping frames being such as to provide the utmost in simplicity whereby the apparatus may be manufactured at a low cost and with minimum of labor.

Other objects of the invention reside in the relative disposition of the swivel casters and the load engaging elements, whereby such parts cooperate to retain a lifting apparatus in an up-right position, and in the spacing of the swivel casters from the load engaging elements, whereby when the apparatus is operatively engaged with a load the center of gravity of the load will be located forwardly of the swivel or rigid caster. For means of reference, the locking device of the caster to the bottom of the main frame is by the method of pull-pin or swivel lock, and the use of a ratcheted belt tightener that goes around the load at the top of the load and at the bottom of the load to be lifted to hold the double jack load lifters against the load, and the use of the self-locking frame, so the load can be held suspended enabling the ram of the hydraulic jack to be lowered and chain engaged so the load to be lifted can be lifted three times the height of the hydraulic jack. This is done by changing the lifting power from the top of the lifting frame to the bottom of the lifting frame.

BRIEF DESCRIPTION OF DRAWING FIGURES:

FIG. 1 is a front elevation of a load lifting unit forming a part of the two unit apparatus.

FIG. 2 is a side elevation of the unit in FIG. 1.

FIG. 3 is a fragmentary side elevation of a caster and locking means.

FIG. 4 is a plan view of a lifting jack head and associated adjustable roller chain.

FIGS. 4a and 4b are side elevations of the lifting jack head taken at right angles to each other.

FIG. 5 is a fragmentary perspective view of a detachable dolly stand.

FIG. 6 is a fragmentary side elevation of a ratchet belt tightener and belt on the unit in FIGS. 1 and 2.

FIG. 7 is a fragmentary side elevation of an automatic locking means for the lifting carriage of the unit.

FIG. 8 is a side elevation of a jack screw employed to stabilize the unit.

FIG. 9 is a side elevation on a reduced scale of the unit in FIGS. 1 and 2 and a companion unit as employed together to lift a large object and illustrating the employment of the adjustable belts of the two units of the apparatus.

FIG. 10 is a similar side elevational view of the two units of the apparatus rigidly coupled to produce a scaffold or the like.

FIG. 11 is a further side elevation of the apparatus unit in FIGS. 1 and 2 during use as a hand cart or dolly.

DETAILED DESCRIPTION

Referring to the drawings in detail wherein like numerals designate like parts throughout, there is shown in FIGS. 1 and 2 a lifting unit A of the apparatus which also comprises a companion lifting unit B, FIGS. 9 and 10, employed with the unit A to facilitate certain modes of use of the apparatus.

The unit A comprises an upright rectangular main frame 1 formed preferably of welded square tubing. The main frame further comprises a foreshortened forward section 1' also consisting of two uprights spaced somewhat forwardly of the uprights in the taller section of the main frame and suitable structurally tied thereto. The bottom for the entire main frame is formed by a sturdy transverse horizontal channel member 8 welded to the main frame 1 and foreshortened forward section 1' to form a rigid unit.

The lifting unit A additionally comprises a lifting carriage assembly C which consists of upright bars 21 rigidly connected at their tops by a cross member 15. The lower portions of the carriage bars 21 are connected rigidly by a preferably padded plate 5 having rigid lifting forks or tines 11 projecting forwardly therefrom at their lower ends, at right angles, for engaging beneath a load to be lifted. The carriage assembly C additionally comprises upper and lower pairs of arms 4 and 22, rigid with the carriage bars 21 and projecting rearwardly at right angles thereto. The arms 4 and 22 carry rollers 25 which roll upon the rear vertical faces of the two uprights of main frame 1 to guide the carriage assembly C thereon.

The carriage assembly is raised and lowered by a conventional hydraulic jack 16 having a manual pump lever 16' for raising the head 17 of the jack. The head 17 is provided in its top with a notched groove or recess 17' adapted to interlock adjustably with a roller chain 13 whose lower end is permanently attached to the bottom edge of the plate 5 at the transverse center thereof. The chain 13 has cross pins 13' which may be selectively engaged in the notches of recess 17'. The arrangement is such that the jack 16 may be extended to raise the lifting carriage assembly C to a point where the carriage is self-locking and will maintain its elevation. The jack head 17 is then retracted and the chain 13 is engaged at another position with the head 17 and the jack is again extended to raise the carriage C to a higher elevation. This process may be continued until a load has been lifted to as much as three times the height of the jack. The base of the hydraulic jack 16 is seated upon and secured to the heavy channel member 8 near the center thereof, FIG. 1.

As best shown in FIG. 7, an automatic locking pawl 27 is provided on the lifting carriage assembly C for engagement with a ratchet wheel 28 on the rotary shaft of one of the lower rollers 25, the latter having toothed engagement with the frame 1 as indicated in FIG. 7. This enables the lifting carriage assembly to be self-locking at any given elevation until the pawl 27 is released from the ratchet wheel.

Side extensions of the channel member 8, FIG. 1, serve to mount a pair of swivel casters 10 having locking sleeves 9 on their outer sides to receive safety locking pins 7 which engage through openings in the channel 8 to lock the swivel casters rigidly at certain required times in their positions as shown in the drawings. The manner in which each caster 10 is locked by a pin 7 relative to the channel 8 is clearly illustrated in FIG. 3.

The unit A further comprises a heavy duty flexible belt 19 shown coiled up in FIG. 1 and extended into a loop surrounding a crate or load in FIG. 9. The deployment and rewinding of the belt 19 is accomplished by a conventional belt tightener mechanism having a vertical axis shaft 18 and ratchet handle 14.

The apparatus unit A further embodies a detachable extension or stand 23 whose side bars are adapted to telescope into a pair of square socket tubes 12 on the front of the channel member 8. This stand 23 carries a single caster wheel 24 to convert the unit A to a three wheeled truck when desirable. When the stand or extension 23 is removed from the sockets 12 and inverted so that the single caster 24 faces upwardly, FIG. 11, the unit A while serving as a two wheeled hand truck can be stabilized or rested while tilted rearwardly, as shown in FIG. 11. The extension 23 may be bodily removed from the unit A whenever desired but will normally be employed when the pair of units A and B are used together as in the situations illustrated in FIGS. 9 and 10.

The unit A may also be equipped with a pair of independently adjustable stabilizing screw shafts or jacks 20 having self-leveling pads or feet 20' to engage the ground and stabilize the unit. These screw shafts have threaded engagement with the rigid channel member 8. They serve as the braking means for the unit while a load is being secured with a belt and thus constitute a safety feature particularly on unlevel ground. They also stabilize the entire unit A when a pair of units A and B are being employed to produce a scaffold or the like, FIG. 10. As shown in FIG. 8, in lieu of the self-leveling feet 20', the screw shafts 20 may be equipped with ball casters.

Above the caster wheels 10 and mounted rigidly on top of the channel 8 outwardly of the sides of plate 5 is a pair of square socket tubes 6 adapted to receive square uniting bars 31, FIG. 10, which are employed to tie together the units A and B when the same are being used as a scaffold or table-like support. The uniting bars 31 are freely removable from the socket tubes 6 so that the units A and B may be used separately when desired. A similar pair of socket tubes 2 are provided at the top of each lifting carriage assembly C to receive additional uniting bars 31 removably at the top of the apparatus, FIG. 10, to make a rigid scaffold unit or the like. The socket tubes 2 are further supported by short brace bars 3 beneath

them and the elements 3 also serve to guide the belt 19 when it is deployed horizontally around a load as illustrated in FIGS. 9 or 11. The elements 5, 11, 21, 15, 2, 3, 4 and 22 all make up a rigid assembly unit which is the carriage assembly C and, as described, this carriage assembly moves vertically on the main frame of the lifting unit A.

The companion lifting unit B is virtually identical to the unit A and therefore need not be described in detail. It differs from the unit A only in that it employs a flexible belt 26, FIG. 9, which is adapted to encircle the load or crate in a vertical plane or at right angles to the belt loop 19. In facilitating this, the unit B having the belt 26 is equipped with a horizontal axis conventional belt tightener 26' having a ratchet handle 27' for manipulating the belt.

The apparatus may be used in several different ways illustrated in the drawings. For example, as shown in FIG. 9, the companion units A and B in opposed relationship may be employed to lift a large load or box while the two belts 19 and 26 of the respective units A and B are deployed around the load in two encircling loops while the load is resting on the forks 11. This not only stabilizes the heavy load on the two units of the apparatus but assures that the two units will not back apart and separate from the load.

When the units A and B are employed to make a scaffold or high table support, FIG. 10, the belts 19 and 26 may be reeled in and the interconnecting bars 31 are placed through the socket tubes 2 and 6 to integrate the apparatus into a rigid unit. At this time, the jack screws 20 may be lowered into contact with the ground so that the apparatus will not move. A suitable board or plank may be placed across the tops of the elevated carriage assemblies C to complete a scaffold structure. In this connection, it will be noted that the apparatus contains two lifting surfaces at two different elevations. A load may be engaged by the horizontal forks 11 at a low elevation or a load already at a higher elevation can be engaged and lifted by the tops of the carriage assemblies defined by the elements 2 and 15. Hence, the apparatus possess great versatility of usage.

As shown in FIG. 11, the unit A can be used as a two wheel or three wheel truck to handle a load, and the number of wheels depends upon the placement of the extension stand 23 with its caster wheel 24 either upwardly or downwardly. The horizontal belt 19 may be tightened about a load on the forks 11 of the unit A, FIG. 11, and if desired, this load may be elevated by utilizing the jack 16 as when placing a refrigerator or the like onto the tailgate of a truck. Numerous additional uses of the apparatus in terms of two units A and B or a single unit will occur to those skilled in the art without the necessity for any further description.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. A lifting apparatus comprising a companion pair of load lifting units, each unit having an upstanding main frame, a lifting carriage assembly movably mounted on said main frame, an extensible and retractable jack connected with the lifting carriage assembly to raise and lower it, cooperating means on said lifting carriage and main frame operable to automatically lock and hold each lifting carriage at an elevated position, a wheeled base for each unit, a flexible element interconnecting the bottom of each lifting carriage assembly with the top of the associated jack, means forming an adjustable connection between the top of each jack and the associated flexible element, whereby each jack may elevate its lifting carriage assembly a distance greater than the height of the jack, a horizontally extensible and retractable loop belt and tightener means on one lifting carriage assembly of one unit, and a vertically extensible and retractable loop belt and tightener means on the lifting carriage assembly of the other unit, said loop

belts adapted to encircle a load being lifted by said units in substantially right angular planes and serving to lash the two units together in opposing relationship.

2. A lifting apparatus comprising a companion pair of load lifting units, each unit having an upstanding main frame, a lifting carriage assembly movably mounted on said main frame, an extensible and retractable jack connected with the lifting carriage assembly to raise and lower it, pawl and ratchet means on each lifting carriage assembly operable to automatically lock and hold such assembly at a given elevated position on said main frame, a chain element adjustably interconnecting the top of each jack and the lower portion of each lifting carriage assembly, whereby each lifting carriage assembly can be raised to a self-sustaining level in relation to said pawl and ratchet means and can be further elevated to a higher level by connecting another portion of said chain element with the top of said jack on each unit, a horizontally extensible and retractable loop belt and tightener means on one lifting carriage assembly of one unit, and a vertically extensible and retractable loop belt and tightener means on the lifting carriage assembly of the other unit, said loop belts adapted to encircle a load being lifted by said units in substantially right angular planes and serving to lash the two units together in op-

posing relationship.

3. A load lifting unit comprising an upright main frame, a pair of caster wheels supporting the main frame and rendering it mobile, a lifting carriage assembly movably mounted upon the main frame including a load engaging element, a lifting jack secured to the base of the main frame and having a connection with said carriage assembly to raise and lower the same, said connection of the lifting jack with said carriage comprising a flexible element having spaced projections thereon, said element attached to the bottom of the carriage assembly and having adjustable engagement with the top of said jack, the top of said jack having recess means engageable with selected ones of said spaced projections, and means on the carriage assembly to releasably lock the same in any selected elevated position with respect to the main frame and to allow further elevation of the carriage assembly from such position.

4. The structure of claim 1, and said flexible element comprising a chain having cross pins, and said means forming an adjustable connection including a notched recess in the top of said jack adapted to receive said chain and pins adjustably and lockably anywhere along the length of said chain.

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