

Sept. 8, 1953

B. A. DICKSON

2,651,428

LIFT TRUCK AND ATTACHMENT THEREFOR

Filed March 2, 1950

5 Sheets-Sheet 1

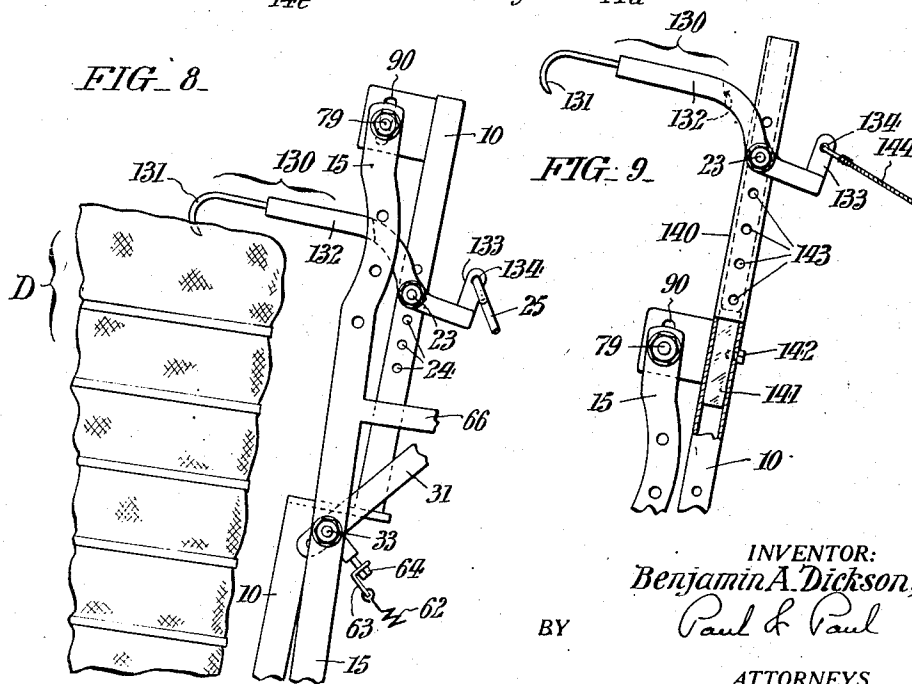
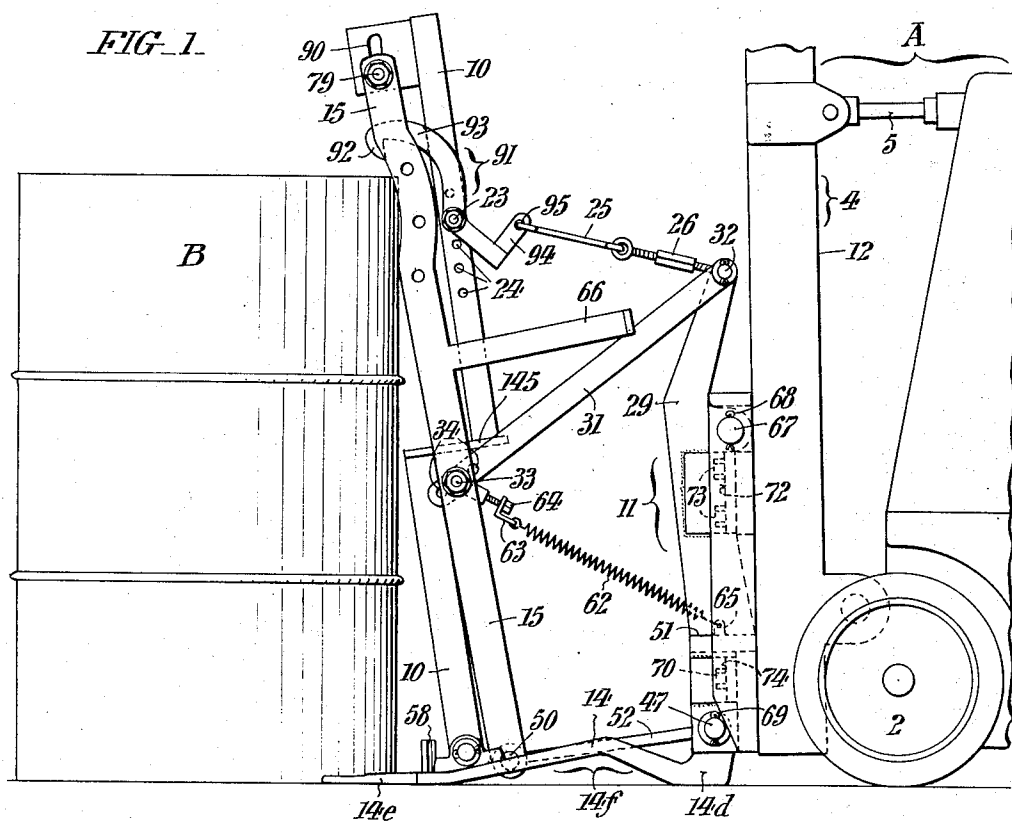


FIG. 9.

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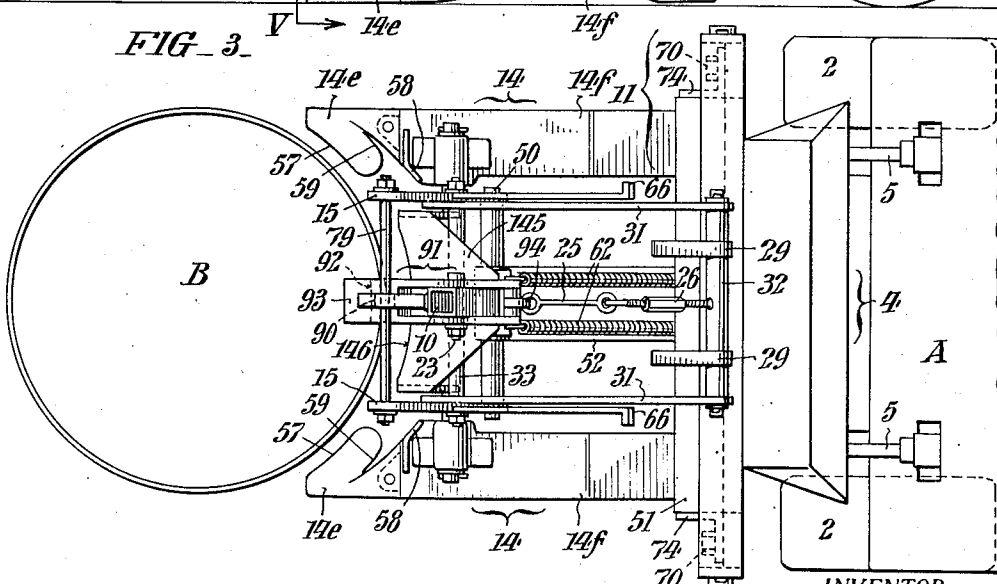
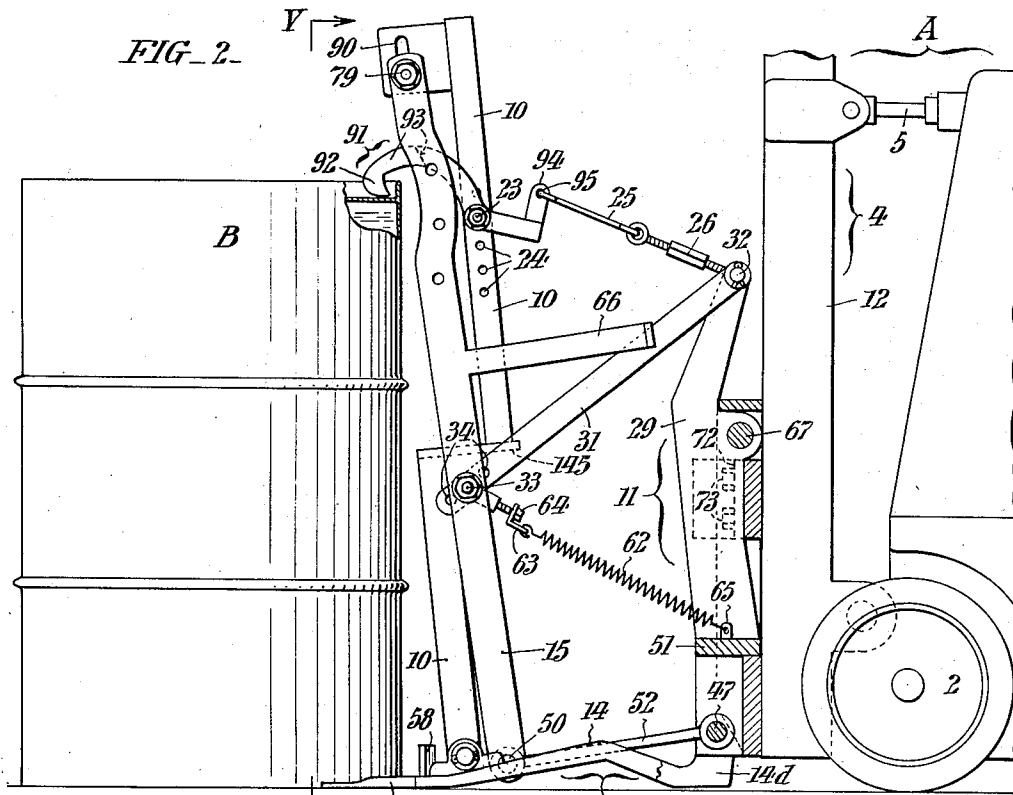
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5 Sheets-Sheet 2



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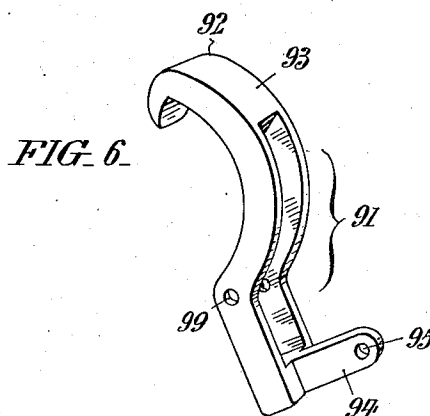
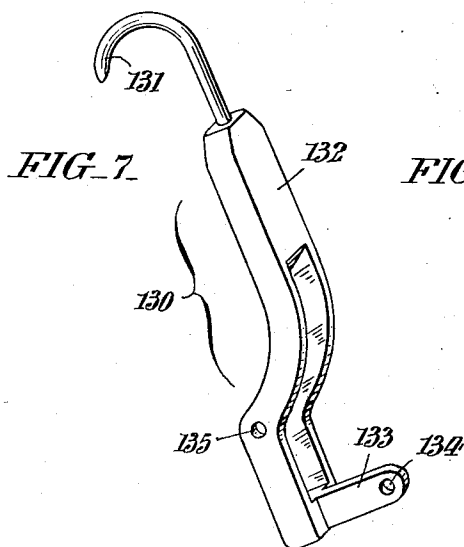
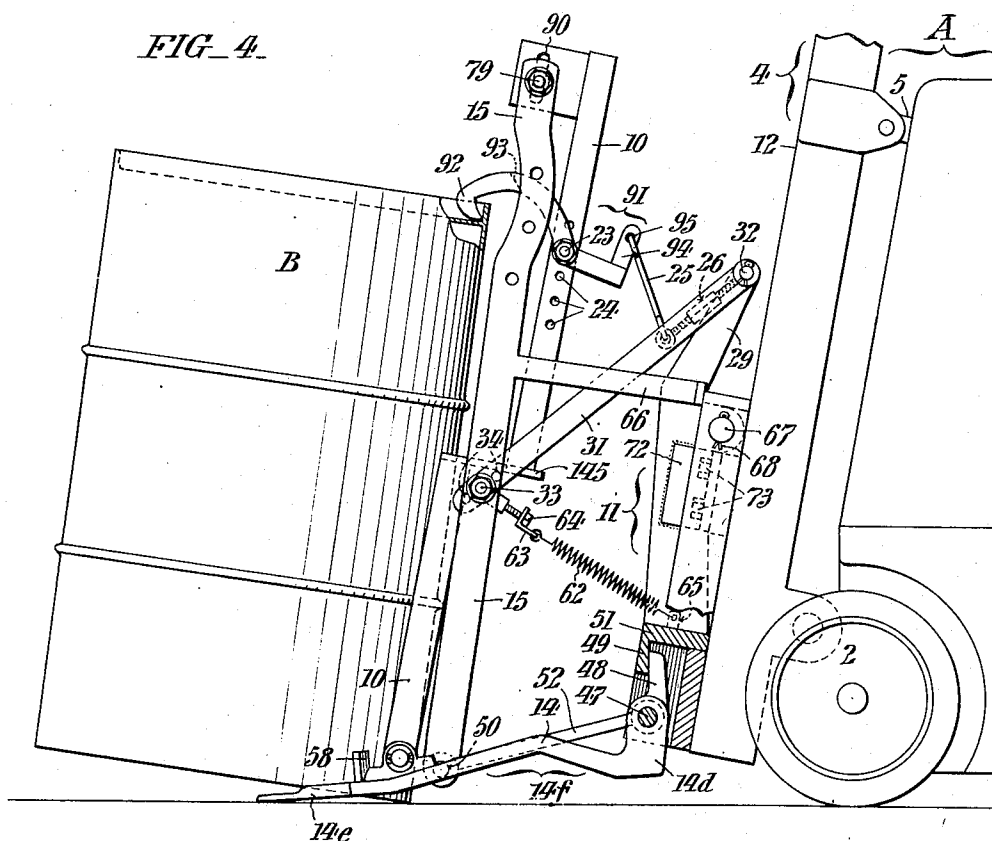
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5 Sheets-Sheet 3



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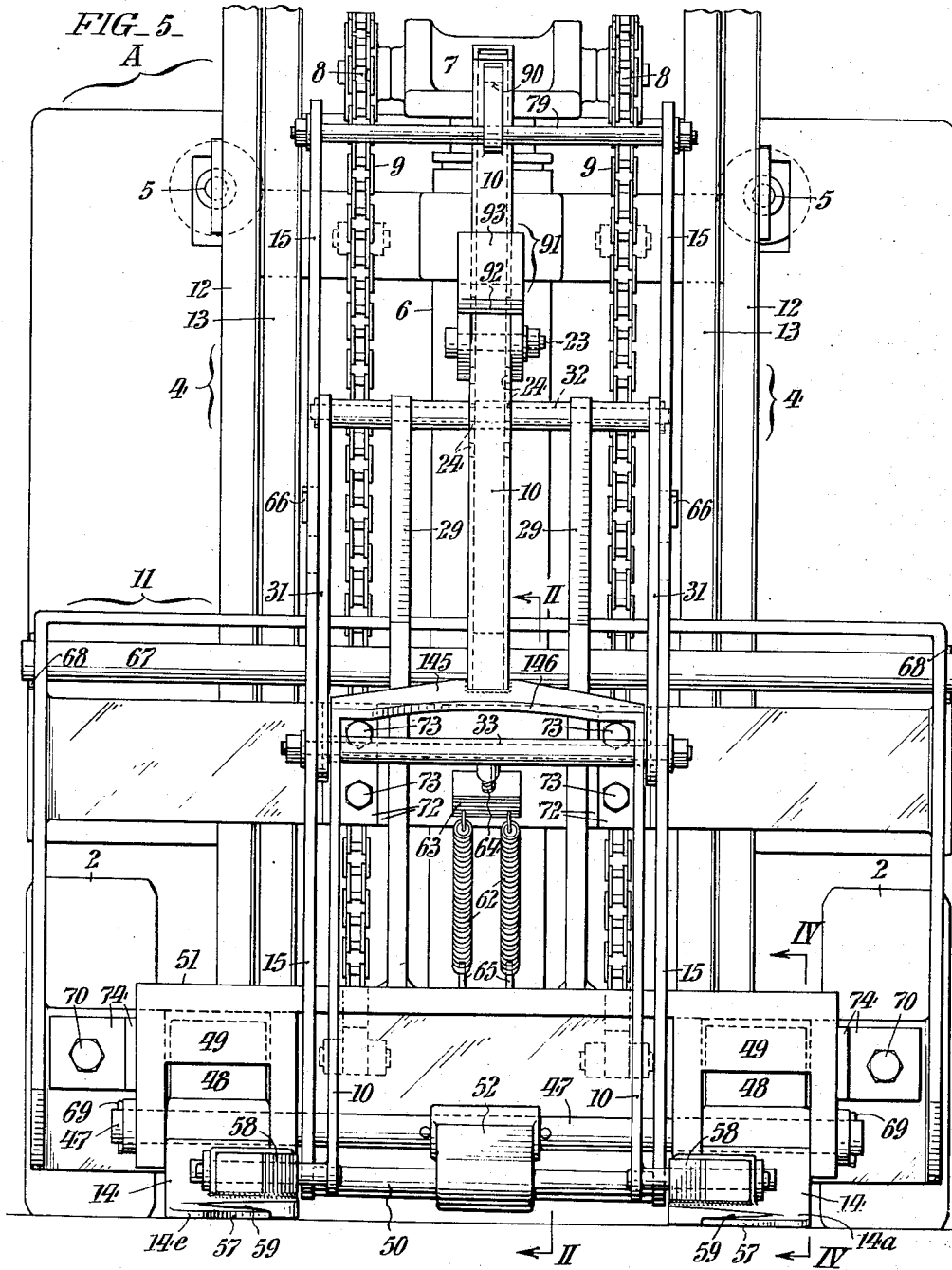
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LIFT TRUCK AND ATTACHMENT THEREFOR

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5 Sheets-Sheet 4



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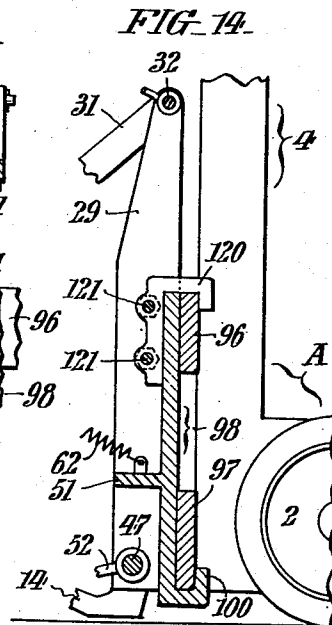
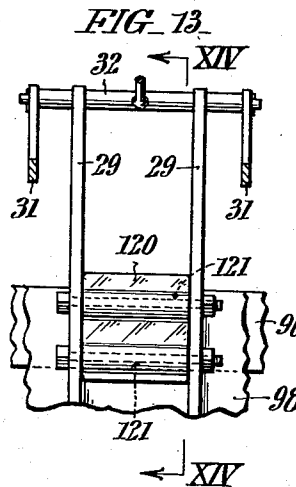
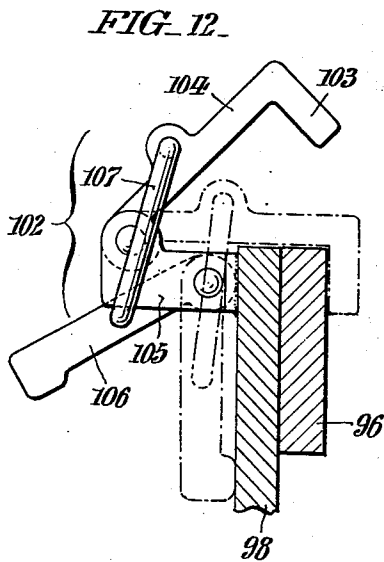
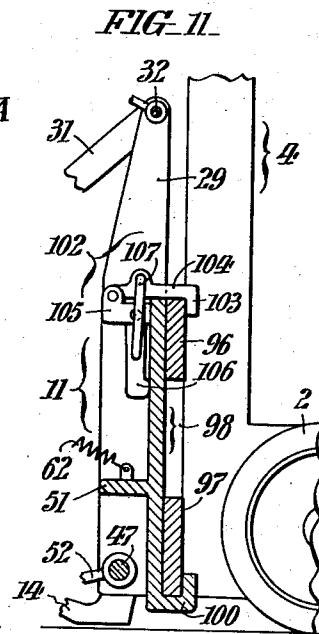
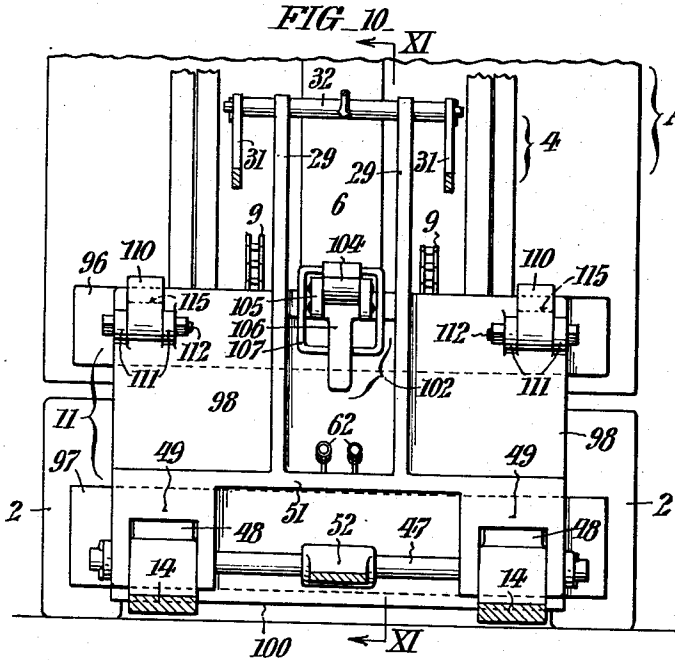
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LIFT TRUCK AND ATTACHMENT THEREFOR

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,651,428

LIFT TRUCK AND ATTACHMENT THEREFOR

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Application March 2, 1950, Serial No. 147,310

8 Claims. (Cl. 214—654)

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This invention relates to lift trucks and attachments therefor and is particularly applicable to a lift truck having a tiltable mast and a load carrying member, such as a pair of forks, movable vertically on the mast.

This application is a continuation-in-part of my copending applications, Serial Number 24,706, filed May 3, 1948, now Patent #2,539,233, granted January 23, 1951, and Serial Number 60,606, filed November 17, 1948, and now Patent No. 2,598,515, in which I have described and claimed inventions in a Lift Truck each of which overcomes difficulties encountered in handling large heavy objects such as drums, barrels, bales, rolls, etc. My present invention satisfies all of the objects set forth in the specifications of my previously filed applications and additionally possesses certain advantages which are more particularly described herein.

In operating lift devices of the character described in my aforementioned applications, in which the load is inclined to permit the forks or other load carrying members of the truck to be inserted beneath the load, the rearward tilting of the mast exerts a force upwardly and rearwardly upon the tool holding arm, with the result that the forks, when connected to the tool holding arm, tend to be raised above the floor thereby occasionally interfering with the insertion of the forks under the edges of the tilted load. While in my application which bears Serial No. 60,606, filed November 17, 1948, I have disclosed one method for overcoming these difficulties, in which the support for the load gripping device has capacity for swinging and vertical movement independently of the load carrying member, the present invention has similar advantages and is further beneficial in that the distance between the forks and the load gripping device remains substantially constant thereby providing new and effective means for grasping the load.

In accordance with this invention, provision is further made of readily interchangeable article engaging devices and for interchanging or substituting entire article engaging linkages on a lift truck of the character previously described, thereby broadening the range of application of lift trucks equipped with such attachments.

In picking up objects from irregular supporting surfaces, such as the floors of freight cars and the like, difficulty is sometimes encountered in holding the forks of a lift truck against the floor while they are being slid under the load. It is accordingly another object of the invention to provide a lift truck of the character herein de-

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scribed having fork means substantially unaffected by irregularities in existing floor surfaces for sliding under the load prior to and during the period in which the load is tilted preparatory to lifting on the fork lift truck.

Other objects and advantages, including those derived from simplicity and economy, will become more fully apparent from a description of one embodiment of the invention which follows hereinafter, having reference to the accompanying drawings, whereof:

Fig. 1 represents in side elevation a portion of the forward end of a conventional lift truck equipped with a load carrying attachment of this invention, showing the same in the position which it assumes when about to engage a drum, the mast of the truck being tilted forwardly;

Fig. 2 represents a similar side elevation of said apparatus, showing the position which the attachment assumes when it grips the drum, the mast being then in a vertical position and the rear portion of the frame being broken away as indicated by the lines and arrows II—II which appear in Fig. 5;

Fig. 3 represents a plan view of the same;

Fig. 4 represents a view similar to Figs. 1 and 2, showing the position which the attachment assumes when it inclines the drum preparatory to lifting it, the mast of the truck being rearwardly tilted and a portion of the frame being broken away as indicated by the lines and arrows IV—IV which appear in Fig. 5;

Fig. 5 represents an enlarged front view of the truck, taken as indicated by the arrows V—V of Fig. 2;

Fig. 6 represents a view in perspective of a hook comprising a load engaging element of the lift truck attachment;

Fig. 7 represents a view in perspective of a bale hook comprising another load engaging element of the lift truck attachment;

Fig. 8 represents a fragmentary elevation showing the operation of the load engaging bale hook in engaging and tilting a bale preparatory to lifting;

Fig. 9 represents a fragmentary elevation of the load engaging portion of the device including an extension arm support for handling articles of different heights;

Fig. 10 represents a front view of a portion of the lift truck and the attachment including readily demountable means for securing the attachment to the lift truck;

Fig. 11 represents a sectional view taken as

indicated by the lines and arrows XI—XI which appear in Fig. 10;

Fig. 12 represents an enlarged fragmentary view of the mounting clamp which appears in Fig. 11;

Fig. 13 represents a fragmentary front view of an alternate structure for mounting the attachment on the truck; and

Fig. 14 represents a fragmentary side elevation taken as indicated by the lines and arrows XIV—XIV which appear in Fig. 13.

With specific reference to Figs. 1 to 5 there is shown an example of the invention as applied to a well known type of lift truck, comprehensively designated at A. The particular truck selected for illustration is mounted upon wheels 2 and includes a tiltable mast 4 of a conventional type which may be tilted forwardly to an angle of about two degrees from the vertical position and may be tilted rearwardly to an angle of about ten degrees from the vertical position. Such tilting is effected by movement of power operated rods 5.

To raise and lower the load carrying attachment a hydraulic cylinder 6, see Fig. 5, is employed. This cylinder actuates a ram 7 having sprocket wheels 8 which serve to raise and lower chains 9 having their lower ends fixed to a carriage 11 movable up and down on the mast 4 and guided in such movement by columns 12 and 13. It may be assumed that the truck A is self propelled and that there are available to the operator suitable controls for advancing or reversing, for steering, for operating the ram 7 to raise and lower the carriage, and for tilting the mast forwardly or rearwardly, as desired. Such controls and other details of the truck are not herein described as they are well known in the art and form no part of this invention.

Upon a transverse shaft 47 of the movable carriage 11 there is pivotally mounted a pair of forks 14 which project forwardly from the mast and constitute the load carrying members. The forks 14 have capacity for limited angular movement with respect to the carriage 11, each fork being formed with an upstanding arm 48, see Fig. 4, which is adapted to abut against a block 49 depending from a ledge 51 of the carriage to limit relative angular movement between the fork and the carriage. It will be observed that forks 14, when the carriage 11 is lowered to the bottom of the mast, will rest on the floor. In this position they can adjust themselves to any irregularities in the floor surface so that they can readily slide beneath the base of the load, but when the carriage 11 moves upwardly on the mast, the abutment of the arm 48 against the block 49 prevents the forks from swinging downwardly below the position represented in Fig. 4.

Forks 14 have heels 14d and toes 14e, each having flat bottom surfaces. Heel 14d and toe 14e are both adapted to contact the floor when the mast 4 is in its forward position, see Fig. 1. Each fork 14 has a raised tine portion 14f intermediate heel 14d and toe 14e. The function of the forks in engaging, bracing and holding the load is unaffected by irregularities in the floor or by other small obstructions on the floor since these are easily bridged by the raised tine portions 14f of forks 14.

Toes 14e of forks 14 comprise removable tips made of wear resistant material, and are affixed to tine portions 14f by means of bolts.

Each fork 14 has an arcuately shaped forward edge 57 (Fig. 3) and to the rear thereof is pro-

vided with a V-shaped notch 59 and an upstanding flange 58, the latter being adapted to abut against the bottom edge of a drum or the like when the drum is inclined and the fork ends are slid beneath it, as shown in Fig. 4. Thus the load is not only engaged from beneath by the forks 14 but it is seated in a set position in engagement with the upstanding flanges 58 preparatory to raising the carriage 11 on the mast 4. Projecting forwardly from the carriage 11 between the forks 14 is a supporting leg 52 which is also pivoted on the shaft 47 but independently of the forks 14. A pair of parallel rocker arms 15 is pivotally connected to the shaft 50 at the forward end of leg 52. Trunnioned on forks 14 is a tool holder arm 18 having at its upper end a vertical slot 90 slidably accommodating a transverse shaft 79 for attaching rocker arm 15 to tool holder arm 10. Tool holder arm 10 also has a shelf 145 including a concave forward edge portion 146 for reception of the drum B when the mast 4 is tilted rearwardly. Arms 15 are free to slide independently of arm 10 along the longitudinal axis of the slot 90. The rocker arms 15 have capacity for vertical movement independently of the tool holder arm 18 and for actuating the swinging movement of tool holder arm 10 forward and backward in front of the mast 4.

Tool holder arm 18 serves to support a load engaging device in the form of hook 91 which engages the inner portion of the top rim of the drum B, or whatever object is to be transported, and grips or releases the near edge of same according to whether its hook end 92 is swung downwardly or upwardly.

For the handling of drums or like objects having upward projections such as rims and the like the load engaging device 91 having hook end 92 is pivotally supported on tool holder arm 10 by means of pivot pin 23 which passes through apertures 99 and through two of the series of aligned holes 24 in the upper ends of the tool holder arms 10, and is held in place by nuts and washers.

Load engaging device 91 has a weight 93 at its hook end 92, see particularly Fig. 6, which serves to lower the hook end 92 by gravity while revolving load engaging device 91 about its pivot pin 23. Formed integrally with the opposite end of load engaging device 91 is an upstanding lug 94 having an aperture 95 suitable for connection to a pulling device, further to be described in detail, for rotating the load engaging device 91 in the opposite direction and lifting the hook end 92 to a position above the load B.

To effect the desired swinging and rocking movements of the load engaging device 91 several extensible and retractable linkages are employed. Swinging of the load engaging device 91 about its pivotal connection with the tool holder arm 10 is accomplished by a link rod 25 linked at one end to aperture 95 of lug 94, and linked at the other end to a turnbuckle 26 which is in turn linked to a horizontal bar 32. Horizontal bar 32 bridges between a pair of pedestals 29 extending upwardly from the shelf 51 of the movable carriage 11. The bar 32 turns freely within the upper ends of the pedestals 29. The linkage consisting of link rod 25 and turnbuckle 26 serves to swing the load engaging device 91 upwardly prior to its engagement with the load and incident to its release from the load, such upward swinging being accomplished by and in response to the forward tilting of the mast. The backward tilting movement of the mast slackens the link rod 25-turnbuckle 26 linkage, permitting load engag-

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ing device 91 to swing downwardly by reason of weight 93.

The linkage for rocking the load engaging device 91 forward and backward in front of the mast comprises a pair of parallel links 31 which at their inner ends are pivotally connected to the bar 32 and at their outer ends are pivotally connected to the rocker arms 15 by means of a pivot pin 33. To render the links 31 adjustable and thus provide for loads of varying shapes and sizes, the outer end of each link 31 has a number of holes 34 into any one of which the pivot pin 33 may be fitted. To vary the effective length of the links 31 simply involves removal and re-setting of the pivot pin into the appropriate aligned holes 34 at the end of the links 31. Pedestals 29 are attached to carriage 11 by means of angle irons 72 and bolts 73. Similarly shelf 51 is formed integrally with pedestals 29 and is attached to angle irons 74 which are attached by means of bolts 70 to the lower portion of carriage 11. It will be apparent that the entire linkage attachment, including pedestals 29 and shelf 51, may be removed by unscrewing bolts 70 and 73 and withdrawing shaft 67.

Shaft 50 upon which the rocker arms 15 are mounted for swinging movement, as shown in Fig. 3, terminates at both ends inside the inner edges of the forks 14 and is free to move up and down between the forks. Inasmuch as the rocker arms 15 are pivotally connected to the leg 52, independently of the forks 14, the forks 14 are free to follow surface irregularities in the floor and cannot be raised off the floor by an upward movement of the rocker arms. At the same time the rocker arms 15 are slidably connected to the tool holder arm 10 with capacity for free vertical movement relative to tool holder arm 10, but are constructed and arranged to transmit a substantially horizontal force to actuate the swinging motions of the tool holder arm 10 in response to the tilt of the mast while moving up and down independently of the tool holder arm 10. Tool holder arm 10 is desirably pivotally attached to forks 14, thereby holding the article engaging device 91 at a fixed distance from fork 14 for maximum load engaging effectiveness in which the vertical position of the tool is entirely unaffected by vertical lifting components of the forces exerted by links 31 in swinging and rocking the load engaging device 91.

In order to render the apparatus more positive in its operation tension springs 62 are preferably provided. The outer ends of springs 62 are affixed to a bracket 63 which is secured by an adjusting screw 64 to the pivot pin 33 near the lower ends of links 31. The inner ends of springs 62 are affixed to arms 65 (Fig. 2) integral with the ledge 51. In an obvious manner the force of springs 62 tends to retract or collapse the various linkages and draw the parts thereof to the relative positions in which they are represented in Fig. 4. The degree of tension exerted by the springs 62 may be varied by means of the adjusting screws 64. In the fully collapsed condition of the apparatus as shown in Fig. 4, rearwardly extending spacer bars 66 on the rocker arms 15 strike the pedestals 29, limiting the extent to which the rocker arms 15 may swing rearwardly about shaft 50. Similar means for accomplishing the same result may of course be substituted for spacer bars 66.

The movable carriage 11 near the top thereof includes a removable bar 67 which passes through

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holes in the pedestals 29 and is held in place by cotter pins 68 (Fig. 5).

In Figs. 10-14 of the drawings, the apparatus of this invention is shown in combination with readily demountable means for joining together the lift truck and the attachment. Referring to Figs. 10 and 11, it will be apparent that upper and lower transverse supports 96 and 97 are mounted on chains 9 for movement up and down the mast, as previously disclosed. Affixed to the linkage mechanism including pedestals 29 is carriage piece 98 which serves to support the entire attachment including links 31, pedestals 29 and forks 14. Formed integrally with carriage piece 98 is a channel member 100 closely interfitted with lower transverse support 97. Attached to the upper end of carriage plate 98 is a clamp comprehensively designated as 102. Clamp 102 is constructed to engage the back surface of transverse support 96 thereby holding the entire attachment on the mast. While clamp 102 is illustrated in position at the top of carriage piece 98, it is permissible to interchange clamp 102 and channel 100.

Having reference to Fig. 12, the clamp 102 has a clasp flange 103, a top plate 104 integral therewith, a base plate 105 affixed to carriage plate 98, and a lever arm 106 pivotally attached to the base plate 105. A rigid strap 107 is pivotally mounted near the centers of both the lever arm 106 and the top plate 104 and serves to hold the top plate 104 and clasp flange 103 in engagement with transverse support 96 when lever arm 106 is swung about its pivot point toward transverse support 96.

The linkage device is attached to the truck by tilting the mast 4 rearwardly, thereby raising transverse member 97 slightly, positioning channel 100 thereunder, and tilting mast 4 forwardly, thereby fitting member 97 into channel 100. Clamp 102 is then tightened around transverse member 96 securing the entire attachment in place.

Another demountable clamp 110, see Fig. 10, extends over top of carriage plate 98, hooks over transverse support 96 and has a hook edge 115 in contact with the back surface of transverse support 96. Clamp 110 is secured to carriage plate 96, which has integral eye members 111, by means of a shaft 112 which penetrates aligned apertures in eye members 111 and clamp 110 and is held in place by means of conventional nuts and washers. Such clamps may be used independently or in combination with clamp 102 or a similar clamping device.

Referring to Figs. 13 and 14 wherein another attaching means is represented, channel member 100 is formed integrally with carriage piece 98 and serves to engage the lower transverse support 97. Clamps 120 are separate channels gripping transverse member 96 and carriage piece 98. Shafts 121 project through aligned apertures in pedestals 29 and clamps 120 and are held in place by means of conventional nuts and washers. The entire linkage assembly may readily be removed from the truck by withdrawing shafts 121 from the assembly and tilting the mast rearwardly thereby lifting transverse member 97 and permitting the entire assembly including pedestals 29 and attached carriage piece 98 to slide downwardly relative to transverse member 97, disengaging channel member 100 from transverse member 97.

In Fig. 7 of the drawings there appears an article engaging device in the form of a bale hook

130 which has a sharp hook end 131 having capacity to penetrate into a package of fibrous or other material such as a bale of cotton, for example. Bale hook 130 has an integral weight 132 near its hook end 131, an upstanding lug 133 having an aperture 134 suitable for accommodating a hook pulling device, and apertures 135 for accommodation of a pivot shaft 23, see Figs. 4 and 8. Bale hook 130 is preferably dimensioned for ready interchangeability with other article engaging means such as load engaging device 91 which appears in Fig. 6. By having on hand numerous interchangeable load engaging devices the operator of the machine may handle many different kinds of loads with speed and convenience.

In Fig. 8 there is represented the upper portion of the attachment including bale D and bale hook 130 penetrating the top surface of bale D. The linkage is in its retracted position and the bale D is tilted rearwardly in a manner similar to drum B as represented in Fig. 4. In response to the forward tilt of the mast, link shaft 25 pulls on lug 133 thereby lifting hook end 131 and removing hook 130 from bale D.

For handling loads of different heights extension arm 140, see Fig. 9, is fitted on the top of tool holder arm 18. Filler piece 141 is held in adjustable position inside hollow tool holder arm 19 by means of set screw 142. A top portion of filler piece 141 protrudes above the top of tool holder arm 19 thereby providing a base upon which extension arm 140 is fitted and aligned for support by tool holder arm 19. Extension arm 140 has a series of pairs of holes 143 through any of which the pivot pin 23 may be fitted to support the bale hook 130.

In Fig. 9, the device for lifting the bale hook 130 in response to the forward tilt of the mast is an ordinary piece of twine or other strong flexible line 144. Line 144 when connected to bar 32, or when passed over a pulley on bar 32, under a pulley on transverse shaft 47 and anchored on the lift truck A, serves to operate the load engaging device to produce the required movements in response to the tilt of the mast. Other means also having the capacity to pull and to slacken in response to the tilt of the mast are likewise effective in practicing the invention.

The operation of the apparatus of this invention is as follows. Upon the assumption that it is desired to employ the truck for the handling of a drum, such as represented at B in the drawings, the various parts of the apparatus are first adjusted to suit the particular size of the drum to be handled. In this connection it may be noted that the apparatus is capable of handling other objects of various sizes and shapes. The truck A is driven to a position adjacent to the drum B, such as represented in Fig. 1, the mast 4 being forwardly tilted so that the gripping device 91 is swung upwardly, and the ends of the forks 14 being brought to a position close to the base of the drum B. Thereupon the mast 4 is swung to the vertical position, as represented in Fig. 2. The resulting movement of the various linkages causes the rocker arms 15, tool holder arm 18, and the load engaging device 91 to assume the positions there shown. The drum B is firmly engaged at the top thereof by load engaging device 91 and is ready to be inclined rearwardly.

Next, the operator tilts the mast 4 rearwardly, causing the drum to be inclined from its normal upright position, as represented in Fig. 4. It will

be observed that the drum may be so approached by the truck and gripped by the apparatus of this invention that it may be readily separated from a group of similar drums even though they are nested closely together, either alongside each other or one on top of the other. Incident to the advancement of the forward ends of the forks 14 and the inclination of the drum B the forks 14 slide under the raised bottom edges of the drum and cause such edges to be seated adjacent to the upstanding flanges 58. In this manner the base of the drum is steadied and restrained against sliding rearwardly on the forks. At the same time the V-shaped notches 59 restrain the drum against sliding forwardly on the forks.

The operator then by means of cylinder 6 and ram 7 raises the movable carriage 11 with the load thereon. The drum may then be transported to its destination firmly held at top and bottom by the load carrying attachment. The operations involved in releasing and discharging the drum are substantially the reverse of the operations which have been described, the drum being brought to the floor by lowering the carriage on the mast and being uprighted and released by swinging the mast to its forwardly tilted position.

It will further be observed that the various linkages which control the angular position of the gripping device are so related to the carriage and to the forks projecting forwardly therefrom that the operator may at certain times actuate the gripping device by a movement of the carriage downwardly or upwardly, either in conjunction with a tilting of the mast or without such tilting. This gives the operator two separate means of effecting movements of the gripping device which results in a substantially increased measure of control over the apparatus, particularly when stacking or unstacking drums above the floor level.

Although I have described in considerable detail one example of my invention together with modifications thereof, it will be apparent that the apparatus is capable of a wide variety of applications and uses and that certain features thereof may be used to advantage without the use of other features. It is to be understood that the specific mechanisms referred to and claimed herein are intended to comprehend all mechanical equivalents and reversals of parts which function in a similar manner to accomplish the same result.

I claim:

1. In a lift truck, a truck body, a tiltable mast thereon, a carriage movable up and down on said mast, a load carrying member supported by said carriage, a tool for gripping the load, a support for the load gripping device including a tool holder arm mounted for forward and backward swinging movement on said load carrying member, an independently mounted rocker arm, a slotted connection attaching said rocker arm to said tool holder arm, said rocker arm being effective to actuate forward and backward swinging movement of said tool holder arm but movable up and down independently of said tool holder arm, and mechanism connected to said mast and to said rocker arm for swinging said rocker arm with respect to said carriage in response to the tilt of the mast, whereby said gripping device is adapted to incline the load preparatory to its being lifted by said load carrying member.

2. In a lift truck for handling an article hav-

ing an upper rim, a tiltable mast, an article carrying member movable up and down on said mast, a weighted hook for gripping the upper rim of the article, and mechanism connecting said hook with the mast and supporting it forwardly of the mast in spaced relation thereto, including means whereby the rearward tilting of the mast releases the hook for engagement by gravity with said upper rim and retracts the hook to incline the article at an angle and bring the top rim thereof closer to the mast, and means whereby the forward tilting of the mast returns the article to its original upright position and incidentally releases said hook from its engagement with the article.

3. In a lift truck for handling an article having an upper rim, a tiltable mast, a weighted hook for gripping the upper rim of the article at its near edge, and mechanism connecting said hook and mast and pivotally supporting the hook forwardly of the mast in spaced relation thereto, including a carriage movable up and down on said mast, a load carrying member supported by said carriage, a support for the weighted hook including a hook holder arm mounted for forward and backward swinging movement on said load carrying member, mechanism connected to said hook holder arm and to said carriage for actuating swinging movement of said hook holder arm in response to the tilt of the mast, and mechanism also responsive to the tilt of the mast for releasing said hook, causing it to swing under the influence of gravity about its pivot for engagement with said article.

4. In a lift truck for handling a bale, a tiltable mast, a bale carrying member movable up and down on said mast, a weighted bale hook having a sharp point for piercing the upper surface of the bale, and mechanism connecting said bale hook with the mast and supporting it forwardly of the mast in spaced relation thereto, including means whereby the rearward tilting of the mast releases the bale hook for swinging movement under the influence of gravity to engage the bale, and retracts the bale hook after said engagement to incline the bale at an angle and bring the top thereof closer to the mast, and means whereby the forward tilting of the mast returns the bale to its original upright position and incidentally withdraws the bale hook from its engagement with the bale.

5. In a lift truck, a truck body, a tiltable mast thereon, a carriage movable up and down on said mast, a load carrying member supported by said carriage, a device for gripping the load, a support for said load gripping device connected to said load carrying member with capacity for forward and backward swinging movement on said load carrying member, a removable extension arm at the top of said support, said extension arm holding said gripping device above said support, an independently mounted rocker arm slidably connected to said support to effect the forward and backward swinging motions of the support with capacity to move vertically independently of said support, and mechanical linkage connecting said rocker arm to said mast to swing the support in response to the tilt of the mast.

6. In a lift truck for operation on a supporting surface such as a floor or the like, a truck body, a tiltable mast thereon, a carriage member movable up and down on said mast, a load carrying member in the form of a fork on said carriage,

said fork having end portions adapted to contact the supporting surface and raised portions intermediate the ends, a support pivotally mounted on said fork, a load engaging device supported on said fork, and mechanism connecting said carriage and said support for swinging the support forward and backward and connecting and disconnecting the load and the load engaging device all in response to the tilting motion of the mast, said mechanism having capacity to move vertically independently of said support, whereby the lifting force exerted by said mechanism on said support being thereby limited to a value insufficient to raise the ends of the fork above their original positions on the supporting surface.

7. In a lift truck for operation on a supporting surface such as a floor or the like, a truck body, a tiltable mast thereon, a carriage member movable up and down on said mast, a load carrying member in the form of a fork having end portions adapted to engage said supporting surface and raised portions intermediate its ends for bridging irregularities in said supporting surface, said load carrying member being pivotally mounted for limited vertical swinging movement on said carriage, a device for gripping the load, a support for said load gripping device pivotally mounted on said load carrying fork and having capacity to swing forward and backward in front of the mast, a mechanical linkage connected to said mast and to said support to actuate the swinging movement of said support in response to the tilt of the mast, said linkage being constructed and arranged to transmit the forces actuating the swinging motions of the support and having capacity to move vertically independently of said support, whereby the ends of the fork remain in contact with the supporting surface while the mast is being tilted.

8. In a lift truck, a truck body, a tiltable mast thereon, a carriage member movable up and down on said mast, a load carrying member, means for attaching said load carrying member on said carriage, a device for gripping the load, a support for said load gripping device pivotally attached to said load carrying member with capacity to swing forward and backward in front of the mast, means for mounting said load gripping device on said support, a mechanical linkage connected to said mast and to said support to actuate the swinging movement of said support in response to the tilt of the mast, connecting means including a drive element and a driven element slidable up and down relative to one another, said drive element being operated by the linkage and said driven element attached to said support, said connecting means being constructed and arranged to transmit to said support a force sufficient to actuate the swinging motions of the support, the linkage having capacity to move vertically independently of said support.

BENJAMIN A. DICKSON.

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