Feb. 19, 1957 J. G. LORD 2,782,066

JAW CONSTRUCTION FOR LIFT TRUCKS

Filed July 8, 1955 4 Sheets-Sheet 1

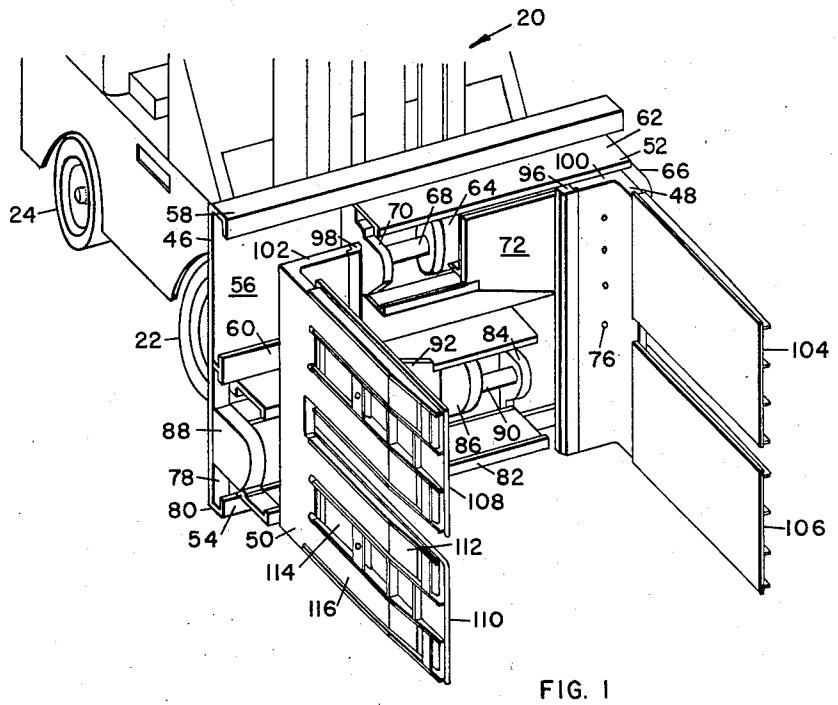


FIG. 1

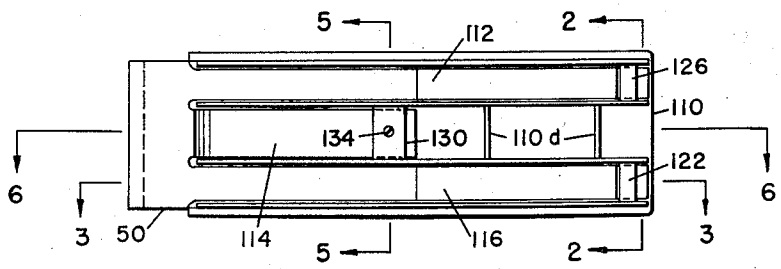


FIG. 8

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JAW CONSTRUCTION FOR LIFT TRUCKS

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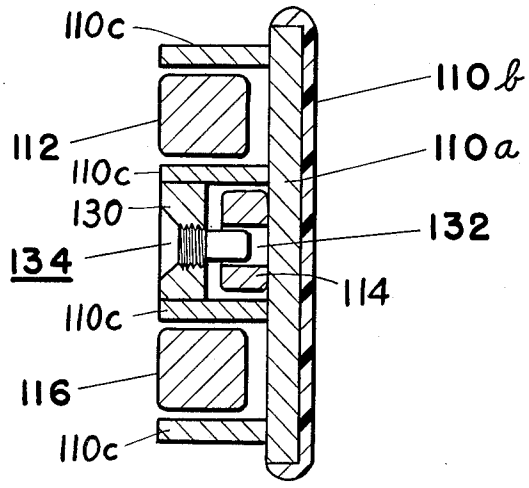


FIG. 5

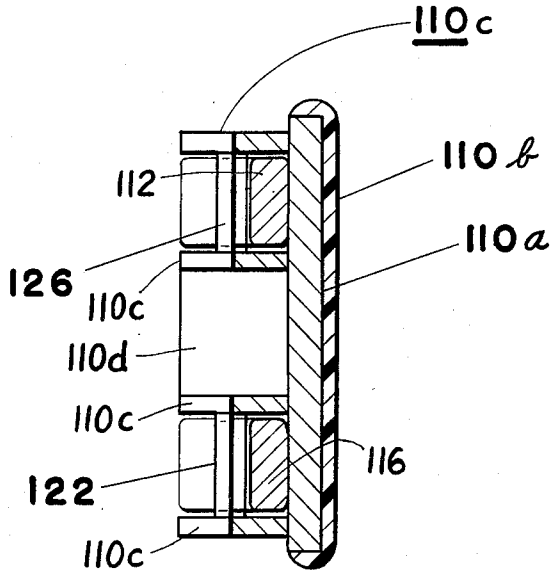


FIG. 2

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JAW CONSTRUCTION FOR LIFT TRUCKS

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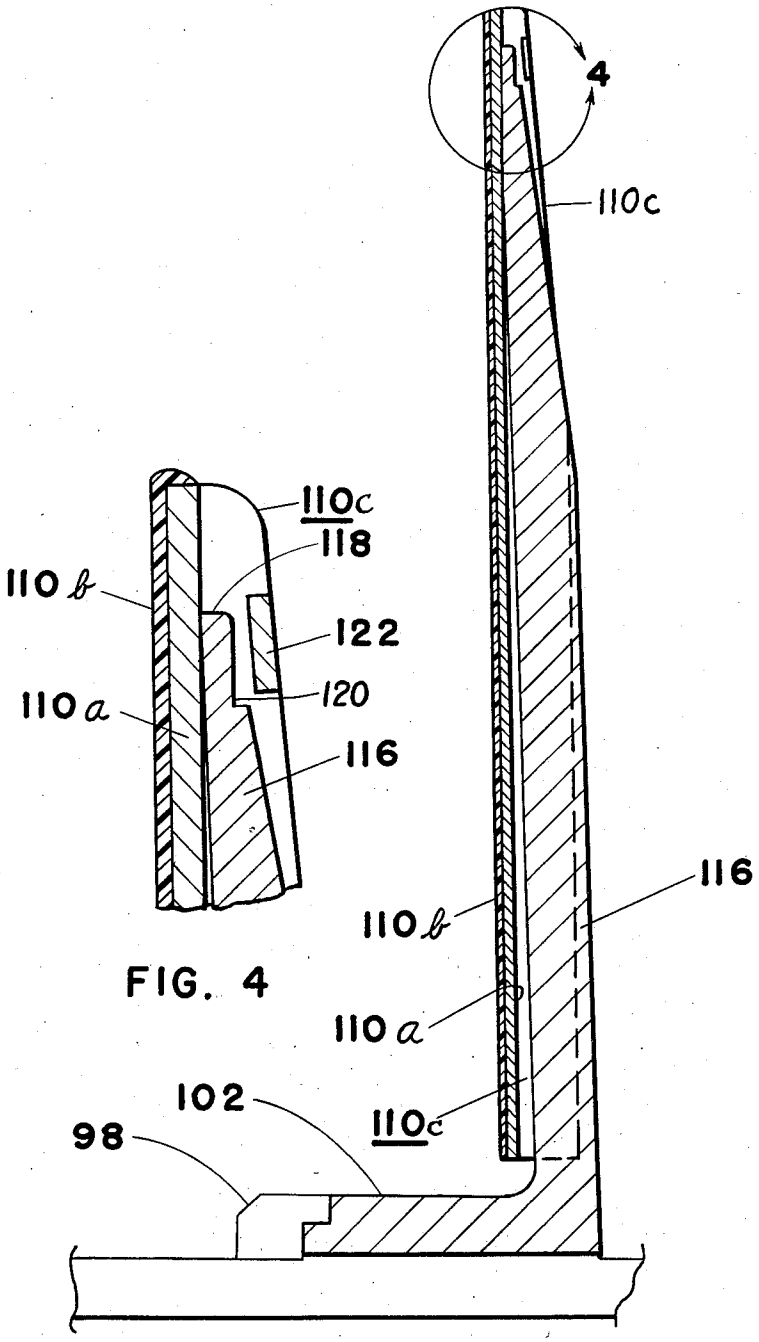


FIG. 4

FIG. 3

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JAW CONSTRUCTION FOR LIFT TRUCKS

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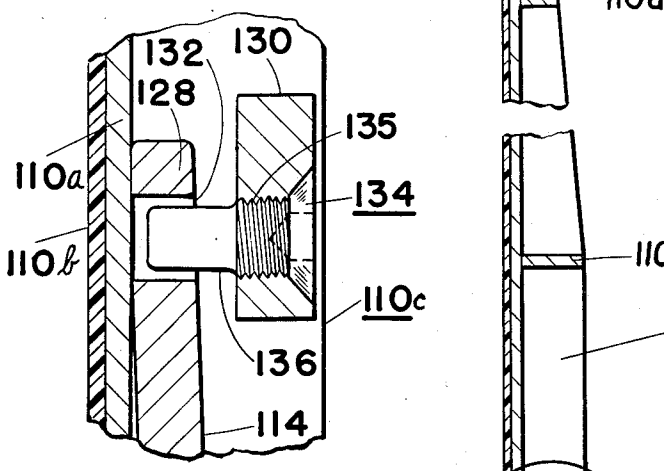


FIG. 7

FIG. 6

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2,782,066

JAW CONSTRUCTION FOR LIFT TRUCKS

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Application July 8, 1955, Serial No. 520,761

3 Claims. (Cl. 294—99)

This invention relates to improvements in load-handling mechanisms, and more particularly to an improved material-handling and load-gripping jaw for lift trucks and the like.

In lift trucks and other lift mechanisms having laterally movable jaws, the satisfactory gripping of load units whose dimensions are not quite uniform in a fore-and-aft direction or in an up-and-down direction has long presented a problem.

This invention has an object the provision of a load-handling mechanism having laterally moving jaws, which jaws are able to accommodate load units having somewhat irregular shapes.

A further object of the present invention is the provision of an improved lift truck.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the accompanying drawings one form thereof which is at present preferred, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized and that the invention is not limited to the precise arrangements and organizations of the instrumentalities as herein shown and described.

In the following drawings, like reference characters refer to like parts.

Figure 1 is a perspective view of a portion of a lift truck including one form of load-handling device of the present invention.

Figure 2 is a vertical sectional view taken on line 2—2 of Figure 1.

Figure 3 is a horizontal sectional view of one of the load-grasping jaws through the lowermost prong thereof.

Figure 4 is an enlarged view of the circled area designated 4—4 of Figure 3.

Figure 5 is a vertical sectional view on line 5—5 of Figure 1.

Figure 6 is a horizontal sectional view of one of the load-grasping jaws through the center prong thereof.

Figure 7 is an enlarged view of the circled area designated 7—7 of Figure 6.

Figure 8 is a side view showing the back of one of the load-grasping jaws.

Referring to the drawings, a portion of an industrial lift truck of type well-known in the art is indicated generally by reference numeral 20. This lift truck is provided with a pair of front wheels 22 and a pair of rear wheels 24.

A load-lifting carriage designated generally as 46 is secured to the front of lift truck.

Load-lifting carriage 46 comprises a pair of jaws designated 48 and 50, and individual jaw-actuating means designated 52 and 54 for actuating respective jaws 48 and 50.

The jaw-actuating means 52 and 54 form no part of the present invention, and other jaw-actuating means than those here shown may be substituted therefor. However, jaw-actuating means 52 and 54 are to be preferred.

Jaw-actuating means 52 comprises a guide or way 56 having guide tracks 58 and 60. A primary slider designated 62 is guided by guide tracks 58 and 60.

A cylinder 64 is fixedly joined by means of anchor plate 66 to the floor of guide or way 56. Piston rod 68 is connected to a thrust plate portion 70 of primary slider 62. Primary slider 62 does not contact cylinder 64 and its movement within guide or way 56 is not obstructed thereby.

A secondary slider 72 rides in a guide or way formed in primary slider 62. Secondary slider 72 is joined to primary slider 62 by means of chain-and-sprocket means 74, with one link on the front span of the chain in the chain-and-sprocket 74 being fixedly secured to the secondary slider 72 and a diametrically opposite link on the rear span of the chain in the chain-and-sprocket means 74 being fixedly secured to guide track 60. This permits a multiplication of the relative rate of movement of the secondary slider 72 in respect to the rate of movement of primary slider 62, to be achieved. Thus, an incremental movement of primary slider 62 in either direction will be doubled by secondary slider 72 in the same direction.

The movement of piston rod 68 either inwardly or outwardly causes primary slider 62 and secondary slider 72 to move in the same direction, the latter moving, as heretofore noted, at double the rate of the former. In this manner jaw 48 may be moved independently of jaw 50.

Jaw-actuating means 54 is similar to jaw-actuating means 52, and includes a guide or way 78 formed between guide tracks 60 and 80. A primary slider 82, having a thrust plate portion 84 is disposed within and guided by guide 78 in the same manner as primary slider 62 is disposed within and guided by guide 56. Similarly, a cylinder 86 having an anchor plate 88 is joined to guide 78 in the same fashion as cylinder 64 is joined to guide 56. Piston rod 90 extends from cylinder 86 to thrust plate portion 84 of primary slider 82.

A secondary slider 92 and a chain-and-sprocket means 94 constructed and arranged in identical fashion as secondary slider 72 and chain-and-sprocket means 74 are also provided.

Jaws 48 and 50 are secured to respective secondary sliders 72 and 92 in identical fashion. Thus, secondary sliders 72 and 92 are provided with respective L-shaped flanges 96 and 98, respectively, which have the base of the L directed outwardly and frontwardly disposed and the top of the L integral with the front surface of the secondary sliders. Flanges 96 and 98 are identical in height, extending generally from a point on the plane of the uppermost surface of primary slider 62 to a point on the plane of the lowermost surface of primary slider 82.

As seen most clearly in Figures 3 and 6, each of the L-shaped flanges (L-shaped flange 98 being shown in these figures) cooperates with the planar front surface of each of the secondary sliders 72 and 92 to effect rabbeted engagement with the back plate of the jaws. Thus, back plate 102 of jaw 50 is rabbeted with flange 96, and back plate 100 of jaw 48 is rabbeted with flange 98. Threaded bolts 76 serve to permanently anchor back plates 100 and 102 to secondary sliders 72 and 92.

Each of jaws 48 and 50 comprises a pair of cushion pads or members; jaw 48 comprising cushion pads or members 104 and 106, and jaw 50 comprising cushion pads or members 108 and 110.

Each of cushion pads 104, 106, 108 and 110 comprises an outer metal plate and an inner plastic liner or surfacing. Thus, in the case of cushion pad 110, the outer metal plate is designated 110*a*, and the inner plastic liner or surface is designated 110*b*. The plastic liner 110*b*, may be formed of any of the well-known plastics which possess resilient and durable properties.

The mounting of the cushion pads **104**, **106**, **108** and **110** on jaws **48** and **50**, achieves a high degree of flexibility. This is accomplished by having each of the cushion pads floatingly mounted on a unit of three jaw prongs. To illustrate this method of mounting, the mounting of cushion pad **110** on its jaw prongs will be described. However, each of the other cushion pads **104**, **106** and **108** are similarly mounted on their jaw prongs.

Cushion pad **110** is mounted on jaw prongs **112**, **114** and **116** which extend forwardly at right angles from back plate **102** of jaw **48**. Prongs **112**, **114** and **116** are integral with back plate **102**. Jaw prongs **112** and **116** are substantial mirror images of each other and comprise relatively thick prong members which extend forwardly almost to the end of cushion pad **110**. Jaw prongs **112** and **116** are of substantially uniform cross-sectional thickness for about two-thirds of their entire length. The frontmost third of jaw prongs **112** and **116** tapers inwardly on its outer surface to provide a relatively thin front portion. Jaw prongs **112** and **116** are not fixedly attached or otherwise permanently secured to the back of metal plate or layer **110***a* of cushion pad **110**; thus, the front tip **118** of jaw prong **116** is notched at **120** and is housed within a metal strap **122**, which is welded onto the back of metal plate **110***a* of cushion pad **110** (Figures 3 and 4). Strap **122** serves to prevent up-and-down dislodgement of jaw prong **116**. Jaw prong **112** is, as heretofore indicated, identical with, or a mirror image of, jaw prong **116** and lies closely adjacent metal layer **110***a* with its tip **124** disposed within strap **126**, which is welded to the back of metal plate **110***a*.

Center jaw prong **114** is appreciably thinner than jaw prongs **112** and **116**, and extends forwardly for but about a half or less than one half the length of jaw prongs **112** and **116**. Jaw prong **114** is not fixedly secured to the back of plate **110***a* but its tip portion **128** is retained in a strap **130** which is welded to the back surface of plate **110***a*. Tip **128** is provided with a circular aperture **132** in its central portion.

A bolt or pin **134** having a relatively wide threaded upper portion **135** and a relatively thin smooth-surfaced lower portion **136** is retained in threaded engagement within a threaded opening in strap **130**, with the lower portion **136** nested within aperture **132**. As aperture **132** is of somewhat larger diameter than the diameter of lower portion **136** of bolt **134**, there is some freedom for fore-and-aft and vertical movement. The nesting of the lower portion **136** of bolt **134** within aperture **132** coupled with the retention of tips **118** and **124** in their respective straps **122** and **126** serves to prevent dislodgement of cushion pad **110** from prongs **112**, **114** and **116**; yet as there is no fixed juncture between cushion pad **110** and prongs **112**, **114** and **116** a high degree of cushion pad flexibility both vertically and in a fore-and-aft direction may be achieved.

Several longitudinal webs on the back of each of the cushion pads **104**, **106**, **108** and **110** are provided to strengthen the cushion pads. These are indicated in relation to pad **110** as **110***c*. As will be seen, for example in Figures 2 and 8, the straps encasing the tips of the prongs bridge adjacent webs to form sockets for the prong tips. Vertical webs are also provided on the back of each cushion pad to further strengthen the cushion pads. These are indicated in relation to pad **110** as **110***d*.

Thus, if a load is gripped mainly in the center portion of the cushion pads, the center prong of each jaw prong unit will be pushed outwardly slightly causing the cushion pads to flex, with the end portions of the jaw disposed relatively inwardly, giving optimum gripping action. A similar flexing action is obtained where the maximum gripping pressure is exerted against the ends of the cushion pads. Thus, pressure on the frontmost end of the cushion members will cause the cushion members to fulcrum on the center prong.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having described the invention, the following is claimed:

1. A grip jaw for lift trucks and the like including a cushion pad, socketed retention members fixedly secured at spaced vertical distances from each other to the back of said cushion pad, a unit of three support prongs juxtaposed to the rear surface of said cushion pad, the rear end portion of each of said prongs joined together, the center support prong extending forwardly a lesser distance than the outer prongs, said socketed retention members positioned on the back of said cushion pad arranged to receive the tips of said support prongs, the tips of said support prongs disposed within the sockets of said retention members, but not fixedly joined thereto, whereby said cushion pad may be moved in respect to said support prongs, and means for preventing the disengagement of said cushion pad from said support prongs comprising a projection fixedly secured to the center recessed member with the free end portion of said projection disposed within an aperture in the front tip portion of said center prong.

2. A grip jaw for lift trucks and the like including a cushion pad, a unit of three support prongs juxtaposed to the rear surface of said cushion pad, socketed retention members secured at spaced vertical distances to the rear of said cushion pad, a back plate joined to said support prongs at the rear thereof, the outer two jaw prongs being relatively long and having their front-most tip portions disposed within the sockets of said retention members, the sockets within said retention members being substantially larger than the front-most tip portions of said outer prongs thereby permitting said outer prongs to move therewithin, the center-most prong of said support unit being both relatively short and relatively thin in cross-section compared with said outer prongs, the front tip portion of said center prong disposed within the socket of a retention member, an aperture in the front tip portion of said center prong, and a pin fixedly joined to the last-mentioned retention member having one end disposed within the aperture in said center prong.

3. A grip jaw for lift trucks and the like including a cushion pad, three socketed retention members secured at spaced vertical distances from each other to the rear surface of said cushion pad, three support prongs juxtaposed to the rear surface of said cushion pad, the rear end portion of said prongs joined together, the center support prong extending forwardly a lesser distance than the outer prongs and having a higher degree of flexibility than the outer prongs, said socketed retention members disposed on the rear surface of said cushion pad and arranged to receive the tips of said support prongs, and means for preventing the disengagement of said cushion pad from said support prongs comprising a projection fixedly secured to the center socketed retention member having a free end portion detachably disposed within an aperture in the front tip portion of said center support prong, whereby said cushion pad may be moved in respect to said support prongs and may flexingly accommodate irregularly-shaped load-units.

References Cited in the file of this patent

UNITED STATES PATENTS

166,599	Frederick	Aug. 10, 1875
590,747	Tidler	Sept. 28, 1897
2,681,162	Ehmann	June 15, 1954
2,704,167	Framhein	Mar. 15, 1955