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BUSHING CONSTRUCTION FOR SIDE SHIFT CARRIAGE

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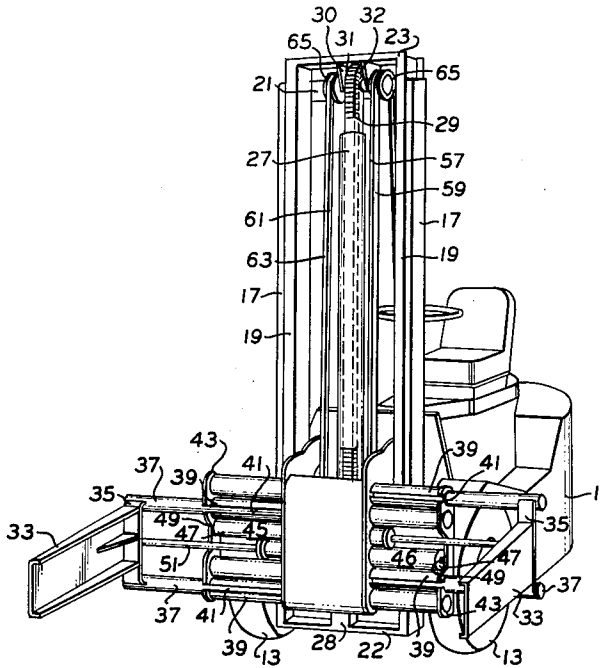


FIG. 1

FIG. 2

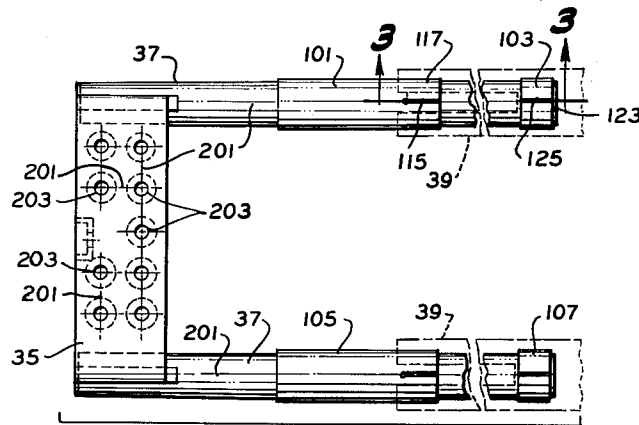
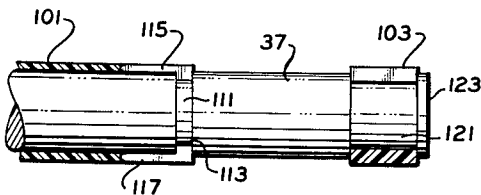


FIG. 3



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BUSHING CONSTRUCTION FOR SIDE SHIFT CARRIAGE

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This invention relates to material handling apparatus, and particularly to improvements in an industrial lift truck of the type having its load elevating carriage equipped with a pair of load engaging members, such as load grip or lift fork arms.

When operating lift trucks of the above type, it is very frequently necessary to maneuver a truck so as to bring the loading engaging members thereof into substantial registry with or in symmetrical disposition relative to a predetermined load pick-up or depositing location, such as, for instance, when removing loads from a stack of material, or stacking material, or conforming to a general predetermined load location pattern. Not infrequently the first attempt at attaining such registry or symmetrical disposition is not successful, necessitating a second or, in some instances, a third try. These extra maneuvering operations obviously add to the cost of handling the material.

The patent to Farmer 2,795,346 shows a lift truck of the type having a pair of load grip arms mounted for lateral movement on the truck and means for shifting the arms toward or away from one another to enable the arms to clamp a load therebetween, a mechanism operatively connected to the arms and operable after the arms have been brought into clamping engagement with a load to shift the arms laterally of the truck without increase or decrease of the pressure applied to the load by the arms, so that the load is neither dropped nor crushed by the arms, whereby among the advantages attained is the elimination of the extra maneuvering time above mentioned.

The present invention relates to and has for its object to provide a bushing arrangement for the slides of a truck of the above type to decrease friction and wear, and also to prevent binding between the slides and guides that might occur when handling heavy loads.

For consideration of what is believed novel and inventive, attention is directed to the following description taken in connection with the accompanying drawings, while the features of novelty will be pointed out with greater particularity in the appended claims.

In the drawings:

FIG. 1 is a perspective view taken from the front left of an industrial lift truck of the type in said patent;

FIG. 2 is an elevational view of an arm base and slides of the present invention;

FIG. 3 is a longitudinal sectional view through FIG. 2 on line 3-3 of FIG. 2.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, there is disclosed a lift truck including a weighted frame generally indicated at 11, which is supported by a pair of driven front wheels 13 and a single steerable rear wheel (not shown). Carried at the front end of the truck is a pair of outer, vertical guides 17 which are mounted on the frame for limited pivotal movement about their lower ends, in a manner not shown, which is of conventional construction. The outer guides telescopically receive a pair of movable, inner vertical guides 19, guides 17 being joined at their upper ends by a rearwardly offset crosspiece 21 and at their lower ends by a crosspiece 22, and guides 19 being joined at their upper ends by a crosspiece 23.

Guided by the inner guides is an elevator generally

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indicated at 25 having rollers (not shown) riding along the inner guides. A ram is provided for elevating elevator 25, said ram having a cylinder 27 which is mounted in a manner not shown on a block 28, fixed to crosspiece 22, the plunger 29 of the ram being connected at its upper end to a bracket 30 fixed to crosspiece 23. A chain 31 is trained over a sheave 32 rotatably carried by bracket 30 and is connected at one end to the elevator, in a manner not shown, and at its other end to the truck, in a manner not shown, both being conventional connections.

Mounted on elevator 25 is an assembly including a pair of load grip arms 33, each having a generally C-shaped base portion 35 secured at its ends to a pair of tubular slides 37 which are slidably received within tubular guides 39. The guides of one arm are interspaced with respect to the guides of the other arm, as shown, the arms being arranged on their bases to compensate for this arrangement of the guides, in a manner such that the arms are disposed at the same horizontal level. Tubular guides 39 extend through and are fixed to elevator 25. These tubular guides are slotted at 41 to accommodate the ends of C-shaped base portion 35, to thus allow for a considerable amount of travel of the arms and to enable the arms to be brought into fairly close proximity to one another. Each pair of adjacent ends of tubular guides 39 is connected by a crosspiece 43.

Associated with each arm 33 is a hydraulic actuator, the upper actuator in FIG. 1 being indicated by reference numeral 45 and the lower actuator being designated by reference numeral 46. Each actuator includes a cylinder 47 connected at 49 to the crosspiece 43 remote from the associated arm. Each cylinder guide contains a piston 50 (see FIG. 2) having a piston rod 51 extending from the cylinder and connected to the base portion 35 of the associated arm.

The structure so far described is old and shown in the patent to Ehmann, 2,571,550.

The hydraulic system includes a control valve unit (not shown) which is mounted on the truck body at a place (not shown) accessible to the operator of the truck, and has extending therefrom four flexible, hydraulic conduits 57, 59, 61 and 63 which are trained upwardly over sheaves 65 (see FIG. 1) said sheaves being rotatably supported by bracket 30, previously mentioned, and then led downwardly to elevator 25. Mounted behind elevator 25 in a manner not shown is a check valve unit (not shown).

The detailed construction of check valve unit 67 and the detailed construction of control valve unit 55 is set forth in the Farmer Patent 2,795,346.

In FIG. 1, the slides slidably engage the guides. In the present invention special bushings are provided to decrease friction and wear, and also to prevent binding that might occur under heavy loads.

Referring to FIG. 2, there is shown a base portion 35 and its two slides 37, the upper slide having a long nylon bushing 101 and a short nylon bushing 103, and the lower slide having similar bushings 105 and 107. Bushings 101 and 105 are identical and bushings 103 and 107 are identical.

The mounting of the bushings on the slides is identical and thus only one slide need be described. The upper slide is formed with a groove 111 to receive an inwardly projecting flange 113 formed on the inner end of the long bushing 101. Such inner end is longitudinally slotted at 115 to provide a number of flexible portions 117 (four in the embodiment shown) to enable the inner end of the bushing to be expanded so that the bushing may be slid onto the slide or removed from the slide. The groove 111 and the flange 113 prevent endwise movement of the long bushing.

The upper slide 37 has a reduced portion 121 next to

an end flange 123. The bushing 103 is split at 125 to enable it to be spread or expanded to fit over the flange 123 and onto the reduced portion 121.

The outer diameters of the bushings are the same, and the inner diameters are such that the inner walls of the bushings fit without substantial radial play on the slides.

As shown in FIG. 2, the slides are in their farthest extended or projected positions. In such positions, the inner portion of the long bushings and of course the short bushings are still within the guides to provide support for the slides.

In the contracted positions of the slides, the short bushings and the entire lengths of the long bushings provide support.

It is pointed out that the grooves 111 are at all times contained within the guides, to avoid the stresses that would result were they projected from the guides. Yet, substantial support for the slides is provided even when they are contracted because the long bushings commence at the grooves and extend outwardly therefrom.

Numerals 201 in FIG. 2 are center lines, and numerals 203 are bolt holes.

Having described the invention in what is considered to be the preferred embodiment thereof, it is desired that it be understood that the invention is not to be limited other than by the provisions of the following claims.

I claim:

1. In a device of the class described, a load carriage having at least one movable load engaging member shiftable back and forth relative to the carriage, means so mounting the load engaging member, said means including a tubular guide, a slide received by said guide and movable to a position projecting a substantial extent

from said guide, a pair of spaced removable tubular bushings on the inner portion of said slide and engaging the interior of said guide, one of the bushings being disposed at the inner end of said slide, the other bushing being spaced from said inner end of said slide, said other bushing having a portion that is slotted longitudinally to enable the slotted portion to be expanded, said slide having an annular recess formed therein in such spaced relation to the inner end of said slide that it is always contained within said guide during movement of said slide, said other bushing being arranged on said slide with the slotted portion thereof adjacent said inner end of said slide, the slotted portion of said other bushing having portions projecting into said recess, a portion of said other bushing being projected from said guide during movement of said slide, the projecting portion of said bushing being solid and unslotted so as to readily re-enter said guide.

2. A device as set forth in claim 1 in which said one bushing is slotted from end-to-end and said slide has a recess of an axial length equal to that of said one bushing to accommodate said one bushing, said one bushing being expandable to enable it to be arranged in the just-mentioned recessed part of said slide.

3. A device as set forth in claim 1 in which said one bushing is shorter than said other bushing.

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