March 23, 1965 D. B. CHASE ETAL 3,174,639

LIFT TRUCK ATTACHMENT WITH UPPER AND LOWER CLAMPING ASSEMBLIES

Filed Oct. 24, 1961 3 Sheets-Sheet 1

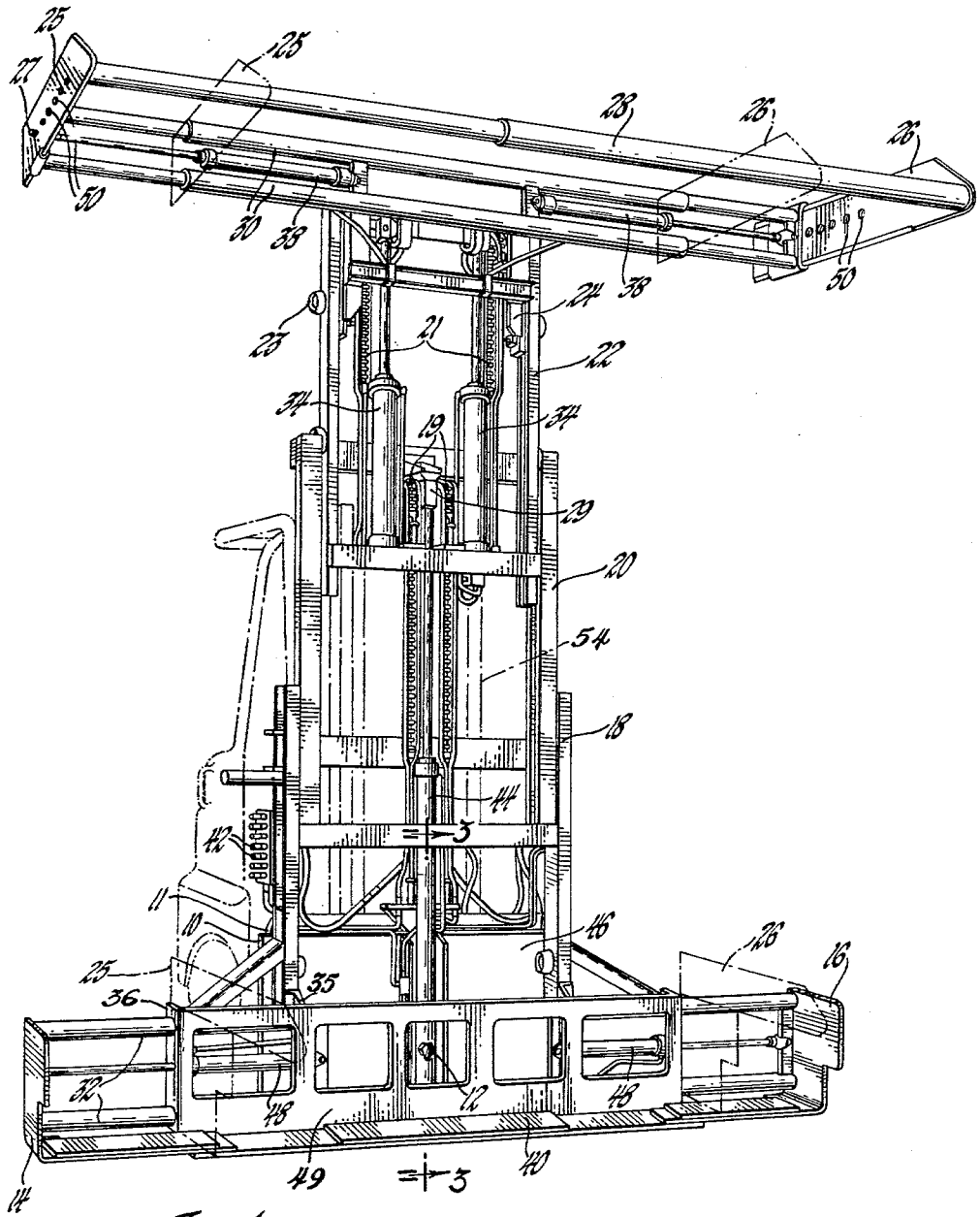


Fig. 1

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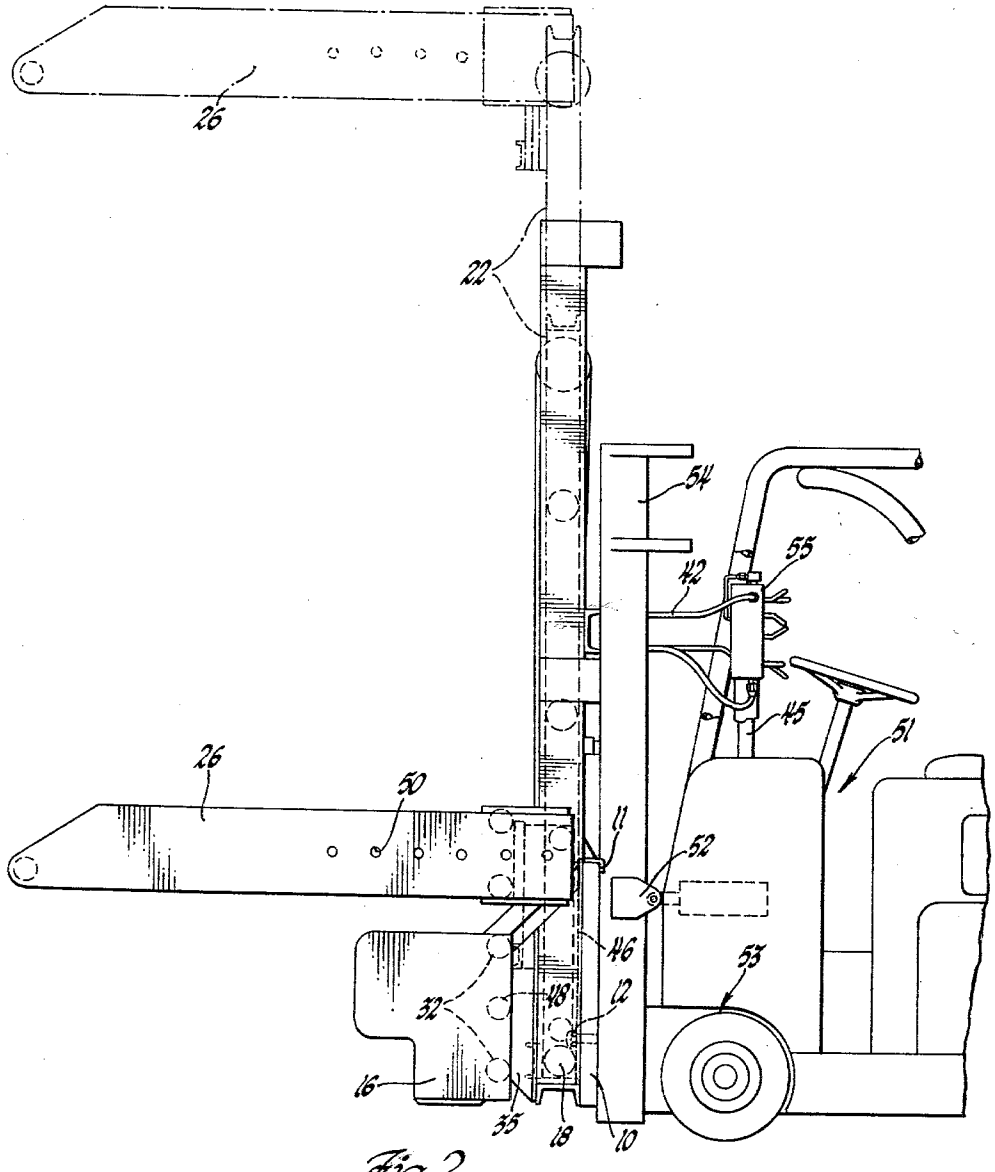


Fig. 2

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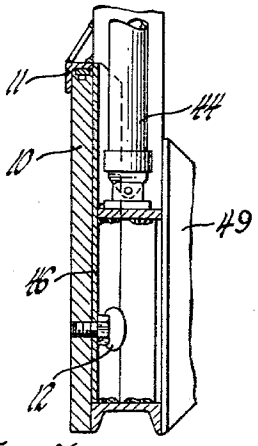


Fig. 3

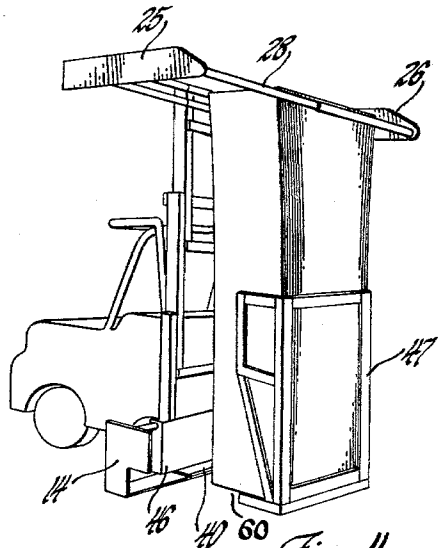


Fig. 4

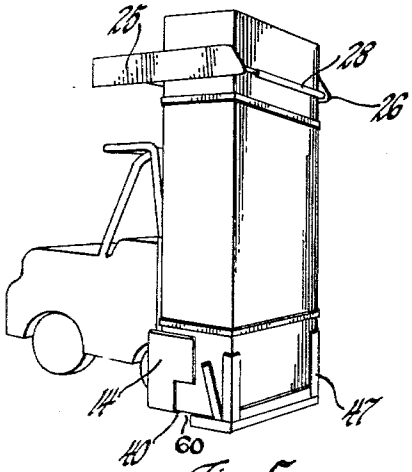


Fig. 5

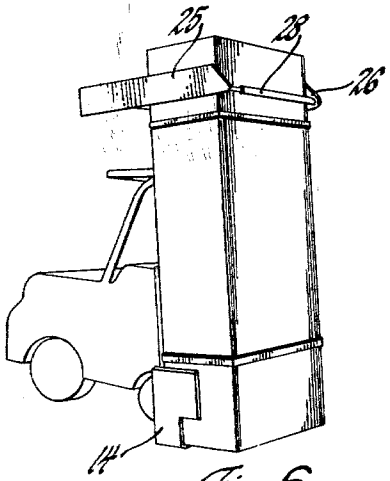


Fig. 6

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LIFT TRUCK ATTACHMENT WITH UPPER AND LOWER CLAMPING ASSEMBLIES

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5 Claims. (Cl. 214—653)

This invention relates to material handling, and more particularly to apparatus for transporting large panel sections in bundled fashion from one racked location to another.

In handling large automotive body panels for shipping, the past practice has been to transport them from racked positions in warehouses to box car loading sites. A large crew of workmen is required at the carloading dock to lift the individual panels from their racked position at ground level and pass them through the freight car door to other workmen inside who place the panels in appropriate elevated supports for shipping. This method is not only time consuming and wasteful of labor, but leads to damage of the metal panels by unavoidably scraping one against another during the loading process. When the box car arrives at its destination, the process must be reversed for unloading. Mechanical aids commonly used to transport and lift boxed or crated articles, such as industrial lift trucks, are not presently provided with attachments capable of handling a plurality of loose panel sections of the type contemplated. The present invention concerns such an attachment.

In accordance with the invention, a conventional industrial lift truck having lift and tilt capabilities is modified to the extent necessary to accommodate the inventive attachment. The hydraulic system of the attachment is coupled to the existing hydraulic system of the truck so that it cooperates with the tilt and lift mechanism thereof. A single bolt and lug arrangement locks the attachment onto the front of the truck mast. A separate control panel is mounted adjacent the driver's compartment of the lift truck which controls the three major movements of the attachment which may be made either individually or simultaneously to accommodate panels of various sizes.

Further, such panels are usually arranged serially in a steel rack which allows the unsupported upper portion to lean or fan out while the lower portion is held by the rack. This makes it difficult to band the panels into a bundle. Our invention allows the operator to straighten the panels to a vertical position and to transport them in such a condition, banded or unbanded, all as part of the lifting operation.

Other objects of the invention will be more apparent from the description of the apparatus and accompanying methods hereinafter related together with the drawings to which reference may be made for an embodiment of the present invention wherein:

FIGURE 1 is a perspective view showing the upper boom fully raised on the triple lift mast with both the upper and lower right and left grabs fully extended;

FIGURE 2 is a side view showing the upper boom in the lowered portion;

FIGURE 3 is a sectional view taken along the line 3—3 of FIGURE 1;

FIGURE 4 is a schematic showing the attachment approaching racked panels that are to be lifted;

FIGURE 5 shows the attachment in a secured position just prior to lifting a banded bundle; and

FIGURE 6 is a schematic showing the bandle lifted into a transporting position.

Referring now to FIGURE 1, the attachment includes an upper boom assembly having right and left grabs 25 and 26 mounted on telescopic members 30 for individual

actuation in a lateral direction by hydraulic cylinders 38. The telescopic tilt beam 28, functioning as hereinafter described, moves in conjunction with telescopic members 30. The upper boom assembly is raised and lowered by a triple lift mast assembly.

The mast assembly is constructed of channel H frames 18, 20 and 22 and carriage 24 arranged to slide on rollers 23 for raising and lowering the boom assembly. Carriage 24 carrying the boom assembly is powered by hydraulic cylinders 34 through a sprocket and chain arrangement 21 and is guided vertically by H frame 22 which in turn is powered by hydraulic cylinder 44 through a separate sprocket and chain arrangement 19. H frame 22 is guided in H frame 20 and the two are raised or lowered together by cylinder 44 which directly powers H frame 20 at juncture 29. H frame 18 guides the H frame 20 as well as providing support for the lower grab assembly and mounting face plate 46.

The lower grab assembly includes right and left grabs 14 and 16 mounted on the ends of telescopic members 32 which are secured at the other ends to the outwardly extending brackets 35 on H frame 18 and project laterally through rearwardly extending end flanges 36 on the backing plate 49. Hydraulic cylinders 48 are also mounted at one end on the brackets 35 with the piston rods projecting laterally through the end flanges 36 and operatively connecting with the grabs 14 and 16. A pick-up lip 40 extends outwardly from backing plate 49 and between the right and left grabs and may include platforms of rubber, or the like, to serve as a bearing surface for the panel edges. Right and left grabs 14 and 16 and the tilt beam face 28 may also be faced with rubber. The hydraulic lines 42 are broken away in FIGURE 1, but they extend to a control panel 55 mounted for easy access by the truck operator as shown in FIG. 2. Referring to FIGURE 2, the upper grab assembly is shown in the lowered position with the raised position being illustrated by dot-dash lines. The attachment is mounted on the mast 54 of an industrial truck 51. The truck mast 54 is shown in the vertical position but may be tilted forwardly or backwardly about a pivotal location on the truck frame, indicated generally by the reference numeral 53, by means of a conventional tilting mechanism 52. Mounted for vertical movement on the mast 54 is a conventional load supporting carriage mechanism, designated generally by the lift plate portion 10. Face plate 46 on H frame 18 has a downwardly extending lug 11 cooperating with the lift plate 10 to mount the attachment on the truck mast. Bolt 12 passes through the face plate 46 to threadably secure the attachment from shifting. The entire attachment is raised or lowered upon actuation of the carriage mechanism or tilted backwardly or forwardly with the truck mast by operating the normal truck mast controls. In addition, actuation of the attachment power cylinders 34, 44 to raise or lower the attachment mast and cylinders 38, 48 to extend or close the upper and lower grab assemblies is controlled by the control panel 55 mounted on post 45 adjacent the operation's compartment of the lift truck. It is intended that the existing hydraulic system of the truck be used to operate all of the hydraulic cylinders of the attachment as well as the normal lift and tilt mechanism of the truck itself. With the upper boom structure lowered in the position shown in FIGURE 2, the entire boom assembly is 22½ inches above the floor; while in the raised position, the upper boom structure is 122½ inches above the floor. With the upper and lower right and left grabs 14, 16, 25 and 26 in the collapsed position, a minimum dimension of 78 inches is obtained, while in the extended position, a maximum of 110 inches is possible. Such dimensions are not a delimitation of the apparatus to which critical significance is attached, but serve only to provide a general comparison. The hydraulic cylinders of the

attachment may be actuated selectively or together. Naturally, cylinders **34** are not actuated independently. In raising the boom, they may precede cylinder **44** until fully extended whereupon cylinder **44** lifts mast frames **20** and **22** until the boom is at maximum height.

In FIGURE 3 the mounting arrangement between the lift truck and attachment is illustrated in more detail. The assembly procedure is as follows. With the attachment standing freely in a floor position, the lift truck is brought up behind the plate **46**. The operator then tilts the truck mast forwardly until the upper edge of the lift plate **10** dips below the lug **11** or he lowers the carriage mechanism, whichever is convenient. Then by easing forward and simultaneously tipping the mast back to a more vertical position, or by simply raising the carriage mechanism, the weight of the attachment will be transferred from the floor to the truck. Bolt **12** is then inserted to secure the assembly as shown.

Assuming that the operator desires to transport a plurality of panels with the subject attachment as illustrated in FIGURE 4, the novel method used is as follows: By first approaching the panels, as shown, with the upper boom raised to a sufficient height to clear the top of the panels and with both the upper and lower right and left side grabs extended sufficiently to clear the sides of the panels, the fact that the top of the panels lean in one direction further than in the other, or that the base of the panels is confined in a rack, such as rack **47**, and the top is fanned out, or that the base is spread and the top is closed, will make no difference since the operator can easily compensate for any of these conditions by merely adjusting individually or in combination the right and left side grabs **14**, **16**, **25** and **26**, or the triple lift attachment mast. After the proper adjustments, the operator then positions the truck so that the pick-up lip **40** is beneath the exposed, overhanging edges of the racked panels which extend normal to the face plate **46**. The exposed edges are aligned and constitute a rearward pick-up surface, generally designated by numeral **60**, for cooperation with lip **40**. The boom is then in a position over the panels. At this stage, the panels are loosely situated and perhaps leaning, as before mentioned, in one direction or another. The operator then positions the lower right and left grabs **14** and **16** to secure the lower portion of the panels from lateral shifting. Next, he straightens the upper portion of the panels by lowering the boom around the group and by actuating the right and left side grabs **25** and **26**. With the panels held in a vertical position, shown in FIGURE 5, they may be banded if desired. The operator lifts the bundle from the racked position by actuating the conventional tilt mechanism of the lift truck thus tilting the truck mast rearwardly, swinging the attachment and bundle about the truck mast pivot **53** located to the rear of the mast.

The function of the tilt beam **28** in connection with the normal disposition of the panels becomes important here. With the boom collapsed, shown in FIGURE 5, the bundle is only lightly held by side grabs **14**, **16**, **25** and **26**, thus the rack **47** carries the entire weight. By actuating the truck mast tilting mechanism, the tilt beam **28** is pulled back against the front face of the bundle thereby tilting it rearwardly out of the rack and into full load bearing relationship with the pick-up lip **40** and into the transporting position shown in FIGURE 6. Hence, it is seen that the individual panels are lodged between the pick-up lip **40** and the confines of the upper boom and are prevented from slipping outwardly or becoming disarranged by the restraining action of the tilt beam. The bundle is then transported to a box car, or the like, and the above-outlined steps reversed for lowering into a shipping position.

If it is desirable to accommodate bundles of different size in a direction normal to face plate **46**, the upper right and left grabs **25** and **26** may be manually extended by relieving pins **27** in holes **50**, shown in FIGURES 1 and 2, and merely pulling the grabs **25** and **26** and tilt beam **28** outwardly. It has been found that bundles varying in thickness within a reasonable range may be picked up even though the above-described adjustment has not been made with a high degree of precision. For example, instead of tilting rearwardly with the truck mast, the whole attachment may be raised slightly by lifting the carriage mechanism of the truck. This movement will raise the entire attachment relative to the panels with lip **40** engaging on the pick-up surface **60** tilting the top of the bundle forwardly against the tilt beam **28** of the still surrounding upper boom assembly. The bundle may be carried in this slanting position, or carried upright if sufficient rearward travel is left in the truck mast. The rack **47** does not confine the bundles so tightly as to prevent a slight forward tilt. In any case, it is obvious that if necessary, the rack itself may be tilted.

While the preferred embodiment of the invention has been described in order to explain the principles of the invention, it is to be understood that modifications in structure may be made by the exercise of skill in the art within the scope of the invention which is not to be regarded as limited by the detailed description of the preferred embodiment.

We claim:

1. Apparatus for handling aligned racked articles comprising first means for forwardly engaging a rearward pick-up surface formed by the aligned lower edges of said articles when in racked position, laterally telescoping second means formed as a substantially rigid enclosure, third means for actuating said second means in a lateral direction for fully surrounding the upper ends of said articles, and fourth means for tilting said articles out of racked position and into supported position by said first and second mentioned means.

2. Apparatus as described in claim 1 wherein means are provided for causing said second means to move vertically relative to said first means.

3. A device of the character described adapted to be attached to an industrial truck or like vehicle having lift and tilt means comprising:

an upper boom assembly;

a mast assembly supporting said boom assembly for movement between raised and lowered positions;

a lower grab assembly secured to the lower portion of said mast assembly; and

said upper boom assembly having right and left grab members each having outwardly slidable extensions thereon, telescopic members secured to said mast assembly and movably mounting said grab members, means for actuating said telescopic members, and adjustable beam means extending between said right and left grab members for fully surrounding the upper portion of articles.

4. The device as described in claim 3 wherein said lower grab assembly comprises movable right and left grab members, telescopic members attached to said mast assembly and extending between said right and left grab members and providing movable support therefor, means for actuating said telescopic members, and forwardly extending lip means to provide a lower support surface for said articles.

5. A device of the character described, adapted to be attached to an industrial truck or like vehicle having lift and tilt means comprising:

an upper boom assembly;

a mast assembly supporting said boom assembly for movement between raised and lowered positions;

a lower grab assembly secured to the lower portion of said mast assembly;

said upper boom assembly having right and left grab members each having outwardly slidable extensions thereon, telescopic members secured to said mast assembly and movably mounting said grab members, means for actuating said telescopic members, and ad-

justable beam means extending between said right and left grab members for fully surrounding the upper portion of articles to be transported;

said mast assembly having an upper section supporting said boom assembly, a middle section slidably guiding said upper section in a vertical direction, a lower section slidably guiding said middle section in a vertical direction, first lifting means adapted to operate said middle section for raising and lowering, and second lifting means adapted to operate said upper section for raising and lowering; and

said lower grab assembly secured to said mast assembly and having movable right and left grab members, telescopic members extending between said right and left grab members and providing movable support therefor, means for actuating said telescopic members, and forwardly extending lip means to provide a lower support surface for said articles.

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