March 11, 1941. C. L. SLUYTER 2,234,287

MATERIAL HANDLING APPARATUS

Filed Sept. 14, 1938 3 Sheets-Sheet 1

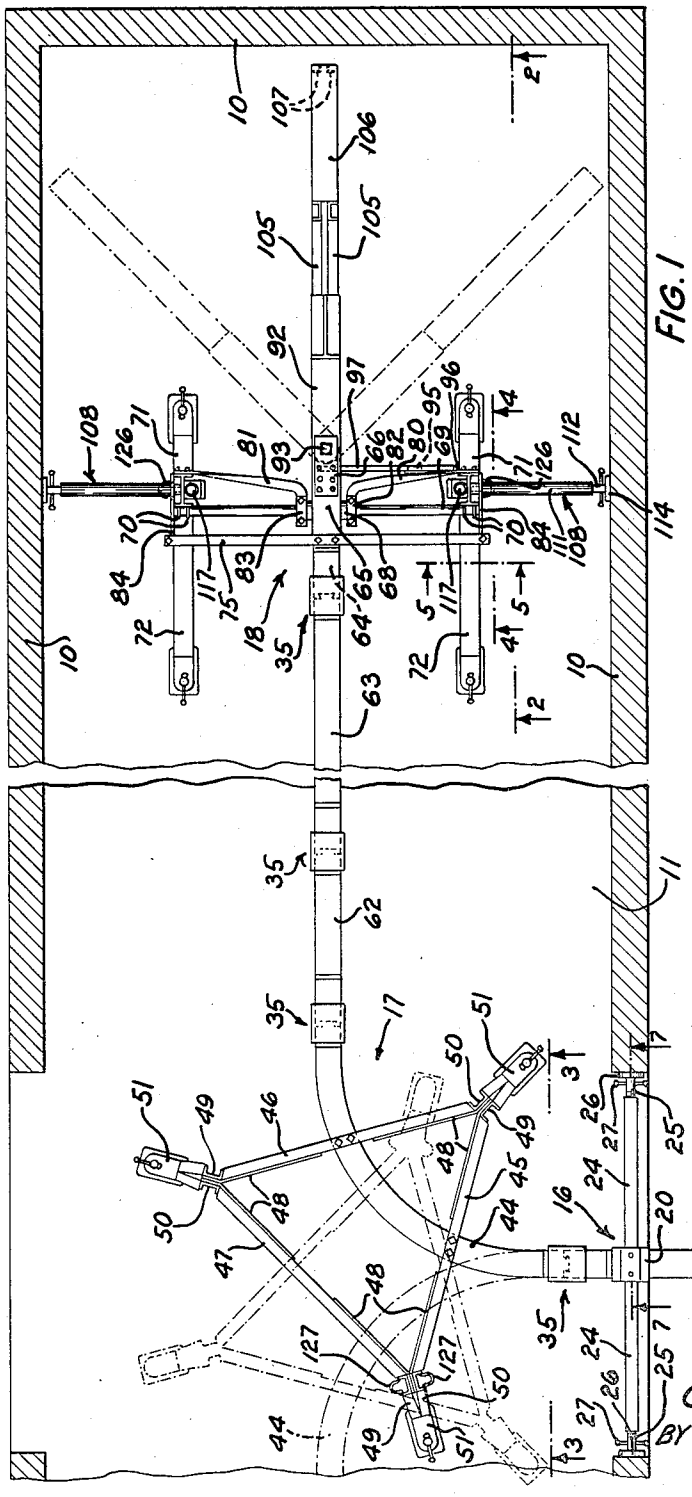


FIG. 1

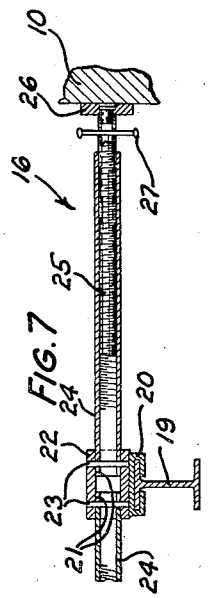


FIG. 7

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MATERIAL HANDLING APPARATUS

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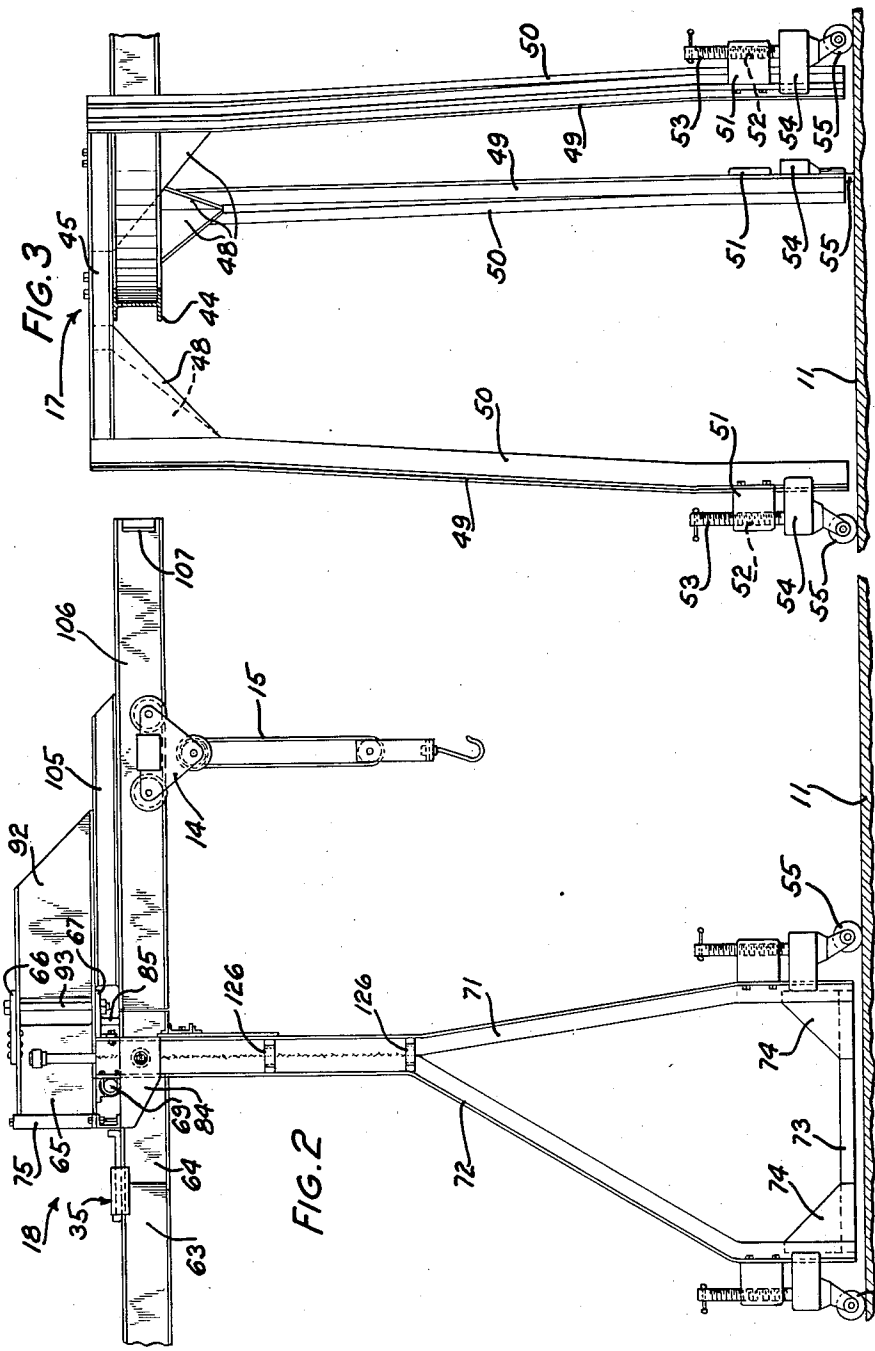


FIG. 2

FIG. 3

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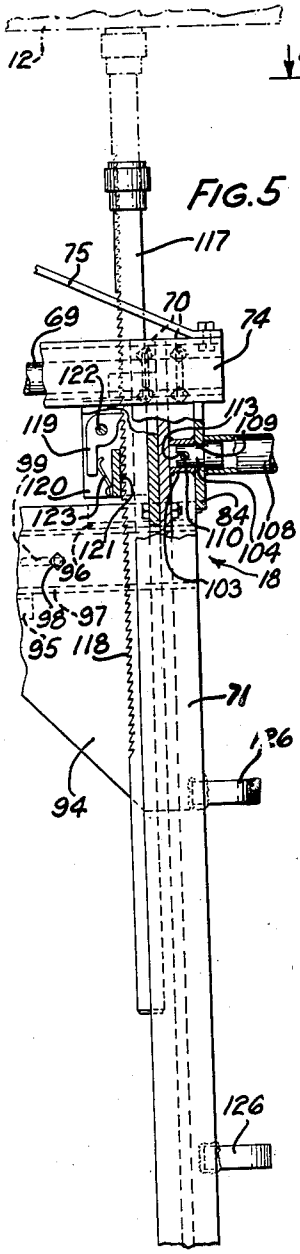


FIG. 5

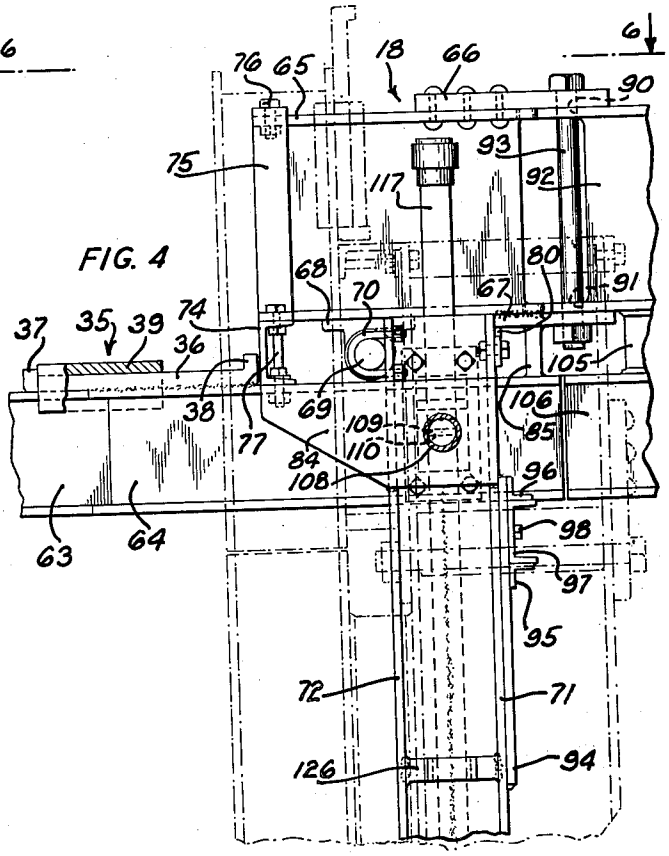


FIG. 4

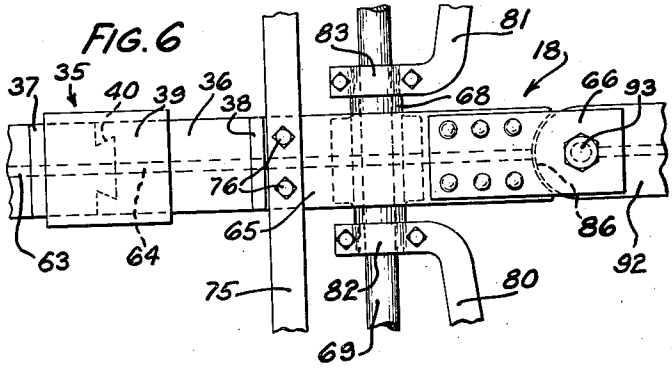


FIG. 6

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UNITED STATES PATENT OFFICE

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MATERIAL HANDLING APPARATUS

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Application September 14, 1938, Serial No. 229,923

6 Claims. (Cl. 104—92)

This invention relates to material handling apparatus and more particularly to car-loading apparatus.

It is an object of the present invention to simplify and mechanize the handling of material.

In accordance with one embodiment of the invention, a car-loading apparatus is provided for loading heavy articles into box cars, comprising a load-supporting trolley movable on a monorail system, composed of a plurality of interconnected elements, the terminal element being in the form of a boom, whereby the material being handled may be directed to the desired position in the car, said boom being mounted on a wheeled framework which may be moved to any one of a plurality of positions in a box car and braced in position. The sections of monorail are removable so that upon removal of the sections of monorail one at a time, all of the interior of the car is brought within the range of the boom on the carriage. A reversible carriage carrying an interconnecting section of monorail is provided for use adjacent the door of the car, whereby the material being handled may be loaded in the car and stacked therein from the ends thereof to the center and when the ends of the car are loaded, the center portion may be loaded by removing the reversible carriage and connecting the boom supporting carriage adjacent the door of the car.

Other objects and advantages of the invention will be more apparent from the following detailed description when considered in conjunction with the accompanying drawings, wherein

Fig. 1 is a plan view of a box car, the sides being broken away to more clearly illustrate the material handling apparatus positioned therein;

Fig. 2 is an enlarged side elevational view of the terminal of the monorail system and the wheeled carriage or support therefor taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged side elevational view, taken substantially along the line 3—3 of Fig. 1 in the direction of the arrows, showing the reversible carriage;

Fig. 4 is an enlarged fragmentary elevational view taken along the line 4—4 of Fig. 1 in the direction of the arrows on a larger scale than Fig. 2;

Fig. 5 is an enlarged fragmentary elevational view taken along the line 5—5 of Fig. 1 in the direction of the arrows on the same scale as Fig. 4;

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 4 in the direction of the arrows, and

Fig. 7 is an enlarged fragmentary sectional view taken along the line 7—7 of Fig. 1 in the direction of the arrows.

Referring to the drawings, wherein like reference characters designate the same parts throughout the several views, the numeral 10 designates generally the side and end walls of a box car having a floor 11, shown in Figs. 1, 2 and 3, and a roof 12, shown in dot and dash lines in Fig. 5. The present invention is adapted to cooperate with a monorail system, shown in dot and dash lines at 13 (Fig. 1), whereby articles to be shipped are carried by means of a trolley 14 and a block and tackle 15 to a box car for shipment. As will be apparent, the material to be stacked in the box car may be transported over the monorail system 13 to the entrance of the box car. The present invention relates to mechanism for handling the material between the end of the monorail system 13 and the various interior portions of the box car and includes three major portions, designated generally by the numerals 16, 17 and 18.

The portion of the material handling apparatus designated generally by the numeral 16 comprises a rail 19 (Figs. 1 and 7) having slidably mounted thereon a clamp plate 20, which may be shifted longitudinally of the rail 19. The plate 20 has suitably fixed thereto a tubular member 22 having a pair of pins 23 fixed therein for engaging in slots 21—21 formed in the ends of a pair of steel pipes 24. The pipes 24 are provided with internal threads for receiving externally threaded tubes 25, having rotatably mounted on their extending ends a door-post-engaging member 26 and having an actuating rod 27 extending therethrough whereby the tube 25 may be rotated with respect to its associated pipe 24 to wedge the section of rail 19 in position in the door of a freight car, after the section 19 has been connected to the main monorail system 13 and the handling apparatus to be described hereinafter.

A locking mechanism, designated generally by the numeral 35, is mounted on the rail 19 for securing the rail 19 to the end rail of the monorail system 13. There are a number of these locking mechanisms 35, all of exactly the same construction, used throughout the apparatus, one of them being shown in detail in Figs. 4 and 6. The locking mechanism 35 comprises a clevis plate 36 welded to the upper surface of one section of monorail adjacent its end and having upwardly bent ends 37 and 38 for preventing a clevis 39 from slipping off the plate 36. The

clevis 39 is formed to surround the clevis plate 36 and to engage the underside of the top flange of the monorail section, upon which it is mounted. The clevis 39 may be moved along the plate 36, which extends out over the adjoining section of monorail to lock the two sections in position after they have been joined together by means of the dovetail configuration of the abutting sections, as shown at 40 (Fig. 6). A clevis plate 36 and clevis 39 are mounted on one end of the rail 19 and other similar rails and after two rails have been placed in abutting relation with the dovetails thereon interlocked, the clevis 39 may be moved to the free end of the clevis plate, thereby to lock two sections of rail together.

Connected to the section of rail 19 is a curved section of rail 44 which is locked to the rail 19 by one of the locking mechanisms 35 and which is mounted on the underside of the flanges of a pair of channel members 45 and 46. The channel members 45 and 46, together with a channel member 47, form a triangular framework, secured, by means of gusset plates 48—48, to upwardly extending channel members 49—49 and 50—50, each pair of channel members 49 and 50 constituting a leg of the reversible portion 17 of the apparatus. As will be noted by reference to Figs. 1 and 3, the gusset plates 48 are substantially triangular in shape and extend along the web of the channel members 45, 46 and 47 and between the webs of the channel members 49 and 50. The gusset plates, at their abutting edges, are secured together; for example, by welding, and are also secured to the channel members 49 and 50 in any suitable manner; for example, by welding. It will also be noted, by reference to Figs. 1 and 3, that the channel members 49 and 50 are spaced apart at their upper ends by the thickness of the gusset plates, which are interposed between them and are joined together at their lower ends to receive brackets 51. The brackets 51 are rigidly secured to the legs of the framework comprising the channel members 49 and 50 and are threaded at 52 to receive the caster adjusting screw 53. The caster adjusting screw is rotatably mounted in a caster support 54, slidable upon the outer flanges of the channel members and carry casters 55, whereby the entire framework may be rolled into any desired position with the framework and casters in the position shown in Fig. 3 and after reaching that position, the entire framework may be lowered by manipulating the screws 53.

At the beginning of a loading operation, that is, when articles are being loaded in the end of a box car, a short section of rail 62 is connected to the end of the curved section 44 by means of the locking mechanism 35 mounted on one end of the section 62. This short section of rail is joined to a second and somewhat longer section of rail 63, which also carries a locking mechanism whereby it is locked to the section 62, and the section 63 is dovetailed for connection to a carriage supported rail 64. Other rail sections may be connected between the sections 62 and 63 so that the entire area of the box car comes within the range of the apparatus when larger cars than the one shown are being loaded.

The carriage supported rail 64 forms a part of the portion 18 of the apparatus and is secured (Figs. 2, 4 and 6) to the underside of an I-beam 65, which serves to support a pair of hinge plates 66 and 67. These hinge plates may be secured to the I-beam 65 in any suitable manner and in the present embodiment of the invention the upper plate 66 is shown riveted to the I-beam whereas the lower plate is shown welded to the I-beam. Fixed to the underside of the I-beam 65 is a bearing 68, which, in the present embodiment of the invention, is welded to the I-beam 65 and serves to support the I-beam and the parts permanently connected thereto. This bearing is rotatable about a spindle 69, which extends outwardly from the bearing a substantial distance and is mounted by means of U-bolts 70—70 on a pair of standards comprised of interconnected T-beams 71 and 72. These T-beams are, in the present embodiment of the invention, welded together throughout a substantial part of their length, as shown in Fig. 2, and are then bent apart at their lower ends to form a framework on which casters 55 are mounted in the same manner that they are mounted on the lower ends of the channel members 49 and 50. The lower ends of the T-beams 71 and 72 are interconnected by a bar 73, suitable gusset plates 74 being provided for strengthening the junction of the bars with the lower ends of the T-beams. A pair of brackets 80 and 81 are fixed to the T-beams 71 adjacent the upper ends thereof and at their inner ends are provided with clamps 82 and 83, respectively, which surround the spindle 69 and serve to position the bearing 68. A strengthening member in the form of a channel member 74 is bolted to the I-beam 65 and extends out over the T-beams 72. This channel member 74 has a strap 75 fixed to it at its outer ends and the strap 75 passes upwardly over the top of the I-beam 65 and is secured to it by means of the bolts 76. Another set of bolts 77 pass through the lower flanges of the I-beam 65 and serve to secure the left end of the carriage supported rail 64 to the I-beam 65. When the carriage supported rail is in the position shown in full lines in Fig. 4, the outer ends of the channel member 74 are bolted to a pair of support plates 84. These support plates 84 are in turn secured; for example, by welding, to the edges of the webs of the T-beams 71 and 72. Adjacent the right end (Fig. 4) of the carriage supported rail 64, a strengthening web 85 is secured to the lower hinge plate 67 and the rail 64 in any suitable manner; for example, by welding it to them.

Extending through the hinge plates 66 and 67 and through a pair of apertures 90 and 91 formed in the upper and lower flanges of an I-beam 92, is a king bolt 93 for hingedly supporting the I-beam 92 on the I-beam 65, the I-beams 65 and 92 being formed, as shown at 86 (Fig. 6), to permit rotation of one with respect to the other. Fixed to one of the T-beams 72; for example, by welding, is a gusset plate 94 on which are mounted a pair of angle members 95 and 96, which slidably support a channel member 97, having bolts 98 passing through slots 99 therein. The channel member 97 may be moved to position where its end is under the rail 64 to support it temporarily in horizontal position until the channel 74 is bolted to the support plates 84. The channel member 97 is then moved out of the path of the trolley so it can be moved to the outer end of the boom 106.

Secured to the underside of the I-beam are a pair of channel members 105, which, in the present embodiment of the invention are welded to the I-beam and in turn are welded to a rail 106, constituting a boom for supporting the trolley 14 and which may be swung with the channel members 105 and I-beam 92 so that articles carried by the trolley may be directed to the sides of the

box car. A pair of angle members 107 are welded to the web of the rail 106 and serve as a stop against which the trolley 14 will abut when it reaches the end of its travel.

Each of the support plates 84 has an aperture 109 therein into which a reduced portion 104 (Fig. 5) of a telescoping brace 108 may be inserted. A pin 110, similar to the pin 23, is fixed in a tubular member 103 welded to the support 84 and the T-beams 71 and 72 and communicating with the aperture 109 to engage in a cooperating slot 113 formed in a tubular member 111 forming a part of the telescoping brace. An externally threaded member 112 is provided for threadedly engaging the tubular member 111 and may be adjusted similarly to the tube 25 to move a wall-engaging member 114 into engagement with the walls of the box car. In this manner, the carriage portion 18 of the apparatus may be braced between the side walls of the box car and rigidly held in place.

Cooperating with the telescoping braces 108 to rigidly secure the portion 18 of the apparatus in the box car are a pair of vertically slidable braces 117, one of which is mounted upon each of the pairs of T-beams 71 and 72. As is most clearly shown in Fig. 5, the brace 117 is provided with a series of teeth 118 adapted to be engaged by a pawl 119 mounted upon the joined-together portions of the T-beams 71 and 72 by means of a bracket 120, which is fixed to the T-beams and is provided with a vertically extending passage 121 for slidably receiving the brace 117. The pawl 119 is mounted upon a pivot 122 and is normally urged into engagement with the teeth 118 by a leaf spring 123. It will thus be apparent that after the portion 18 of the apparatus has been placed in position in the box car, it may be braced in that position by braces 108 and 117, which may be moved into engagement with the walls and roof, respectively, of the car. The T-beams 71 and 72 have a pair of straps 126 for receiving the side braces 108 when the braces are not in use and similar straps 127 are mounted on one pair of the channel members 49 and 50 for receiving the door braces when they are not in use.

It is believed that the advantages of the invention will be more apparent from the following brief description of the method of using the apparatus to load box cars. The portion 18 of the apparatus, which is normally stored with the rails 64 and 106, in the position shown in dot and dash lines in Fig. 4, with the braces 117, as shown in solid lines, and with the braces 108 hung on the straps 126, may be rolled on the casters 55 into position adjacent the end of a box car and the portion 17 of the apparatus may then be moved to the center portion of the box car. After these two portions of the apparatus are in position, the rail 19 may be attached to the rail 13 by means of the locking mechanism 35, whereupon the rail 19 may be locked in position in the door by means of the braces or wedging members, after which the rail 19 may be connected by the locking mechanism 35 to the rail 44 in the position shown, wherein the portion 17 of the apparatus is so positioned as to direct articles over the rail 44 to the right end of the box car, as shown in full lines in Fig. 1. The rails 62, 63 and 64 may then be locked together by means of their locking mechanisms 35 and after the rails are thus in position, the braces 108 may be placed in position and manipulated to brace the portion 18 of the apparatus against the sides of the car and the braces 117 may be moved into engagement with the roof of the car, thereby to hold the portion 18 steady in the box car.

Material to be stowed in the car may then be transported over the monorail system 13 and then across the rails 19, 44, 62, 63 and 106 and deposited in the desired places in the end of the car. After the extreme right end of the car has been thus loaded, (Fig. 1) the rail 63 may be removed and the portion of the apparatus 18 moved back into a position where the rail 64 is connected directly to the rail 62 and after the area of the car within the range of the rail 106 has been loaded, the rail 62 may be removed and the rail 64 connected directly to the rail 44. After the area of the car within the range of the rail 106 in this position has been loaded, the portion 18 of the apparatus may be moved to the extreme left end of the car (not shown) and the portion 17 reversed to the position shown in dot and dash lines, whereupon the left end of the car (Fig. 1) may be loaded in the same manner as the right end thereof was loaded.

After the car has been loaded up to the portion adjacent the door in this manner, the portion 17 of the apparatus may be removed from the car and the portion 18 connected directly to the rail 19, thereby to load this portion of the car, whereupon the portion 18 may be removed from the car, after which the rail 19 will be removed and the portion 18 may be connected to the monorail system 13 to finish loading the car.

Although a specific embodiment of the invention has been described hereinbefore, it will be understood that it is subject to modifications without departing from the scope of the invention, which is to be limited only by the appended claims.

What is claimed is:

1. A material handling apparatus, a monorail whereon material may be carried, a wheeled carriage for supporting a section of said monorail, a boom mounted on the carriage for pivotally supporting a part of said monorail on said carriage, and means for bracing said carriage in a vehicle during the loading of said vehicle with said material.

2. A material handling apparatus including a monorail whereon material may be carried, said monorail being made up of a plurality of interconnectible sections, a wheeled reversible carriage for directing material on the monorail system in either of two directions and carrying a section of said monorail, a second wheeled carriage for supporting a section of said monorail, a boom pivotally attached to said second carriage for pivotally supporting a part of said monorail on said carriage, and means carried by said second carriage for fixing it in position in a vehicle to be loaded.

3. A material handling apparatus for use in conjunction with a monorail system whereon material may be carried including a section of monorail connectible directly to said monorail system, means for bracing said section in position in the door of a box car, a reversible wheeled carriage for supporting a section of monorail and connectible to said section positioned in the door of the box car, a plurality of removable sections connectible to said reversible carriage, a boom for supporting a section of monorail, and a boom supporting carriage connectible selectively to said sections or the reversible carriage or the section positioned in the door of the box car.

4. A material handling apparatus for use in conjunction with a monorail system whereon material may be carried including a section of monorail connectible directly to said monorail system, means for bracing said section in position in the door of a box car, a reversible wheeled carriage for supporting a section of monorail and connectible to said section positioned in the door of the box car, a plurality of removable sections connectible to said reversible carriage, or boom for supporting a section of monorail, and a boom supporting carriage connectible selectively to said sections or the reversible carriage or the section positioned in the door of the box car, each of said carriages having means thereon whereby they may be moved with respect to their wheels to a position where they rest on the floor of the box car.

5. In a material handling apparatus for use in connection with a monorail system, a wheeled carriage, a section of monorail supported by said wheeled carriage and connectible to the monorail system, said section of monorail being divided in two parts, one of which is pivoted with respect to the other, and a bearing and spindle for pivotally supporting said section whereby the entire section may be moved to a position at right angles to its operative position during transportation of the carriage on its wheels.

6. In a material handling apparatus for use in connection with a monorail system, a wheeled carriage, a section of monorail supported by said wheeled carriage and connectible to said system, said section of monorail being divided in two parts, one of which is pivoted with respect to the other, means for pivotally supporting said section whereby the entire section may be moved to a position at right angles to its operative position during transportation of the carriage, the means for pivotally supporting said section of rail comprising a rod extending across said carriage, and a bearing member mounted on said rod at its mid portion and fixed to said section of rail.

CHARLES L. SLUYTER.

CERTIFICATE OF CORRECTION.

Patent No. 2,234,287. March 11, 1941.

CHARLES L. SLUYTER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 10, claim 4, for the word "or" read --a--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of July, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)