Feb. 2, 1932. E. H. REMDE 1,843,736

INDUSTRIAL TRUCK

Filed Sept. 30, 1926 3 Sheets-Sheet 1

Fig. 2

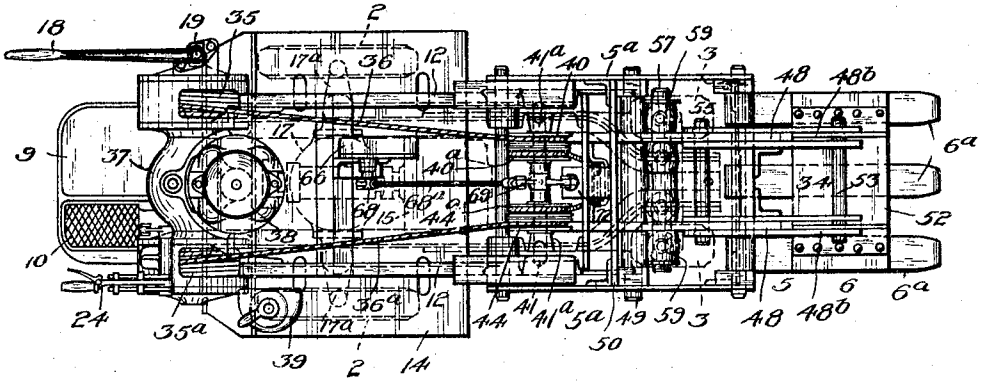
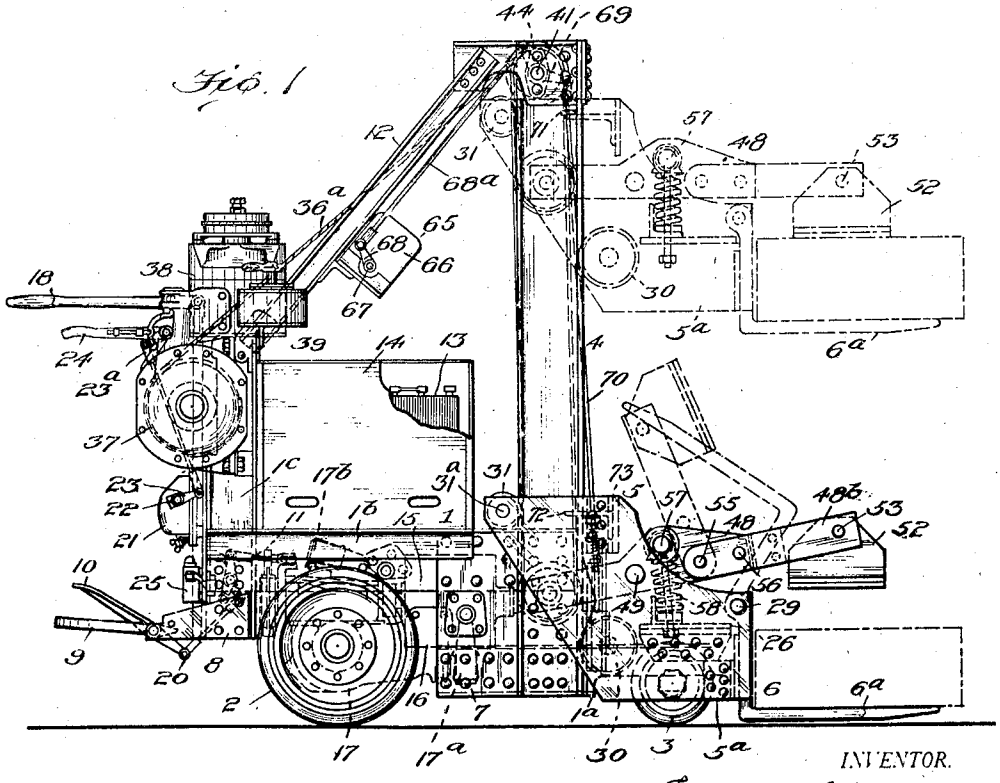


Fig. 1



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INDUSTRIAL TRUCK

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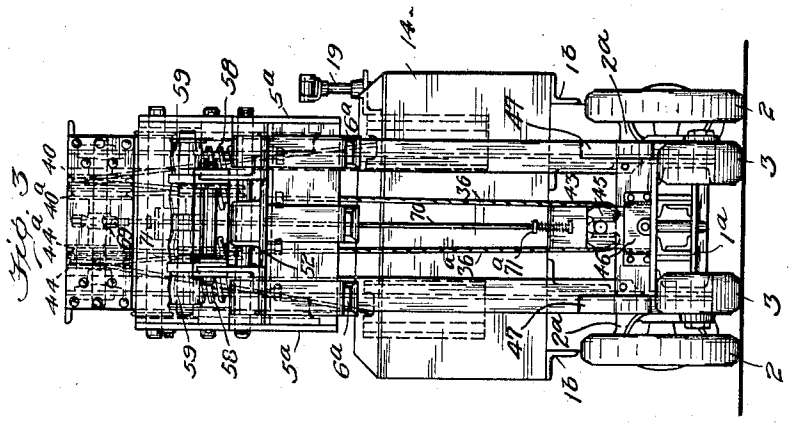


Fig. 3

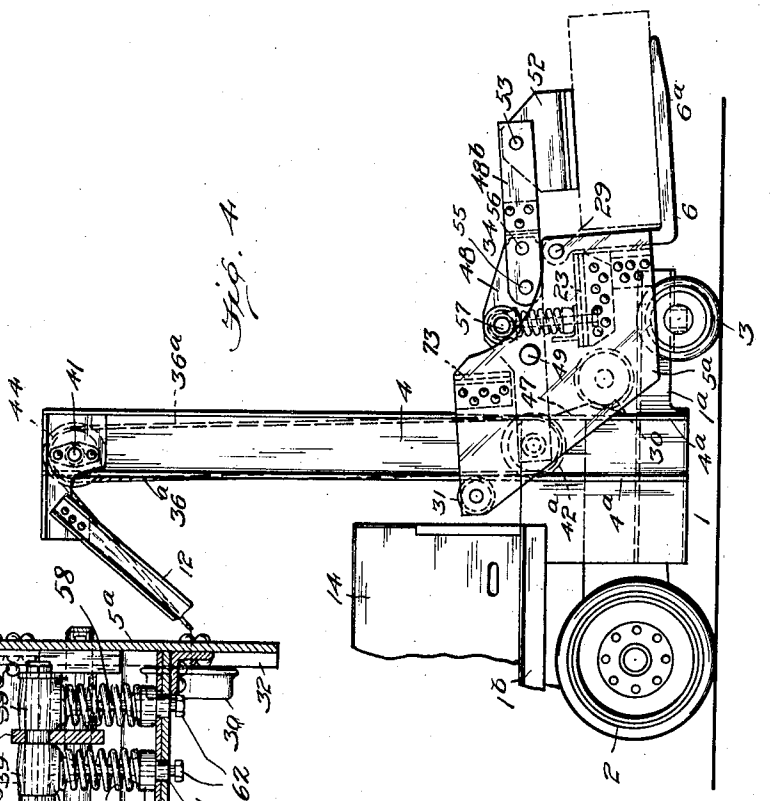


Fig. 4

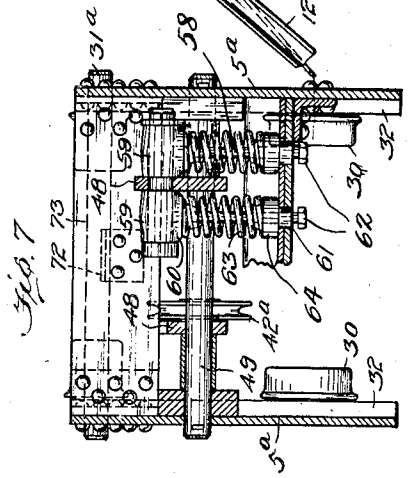


Fig. 7

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INDUSTRIAL TRUCK

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Fig. 5

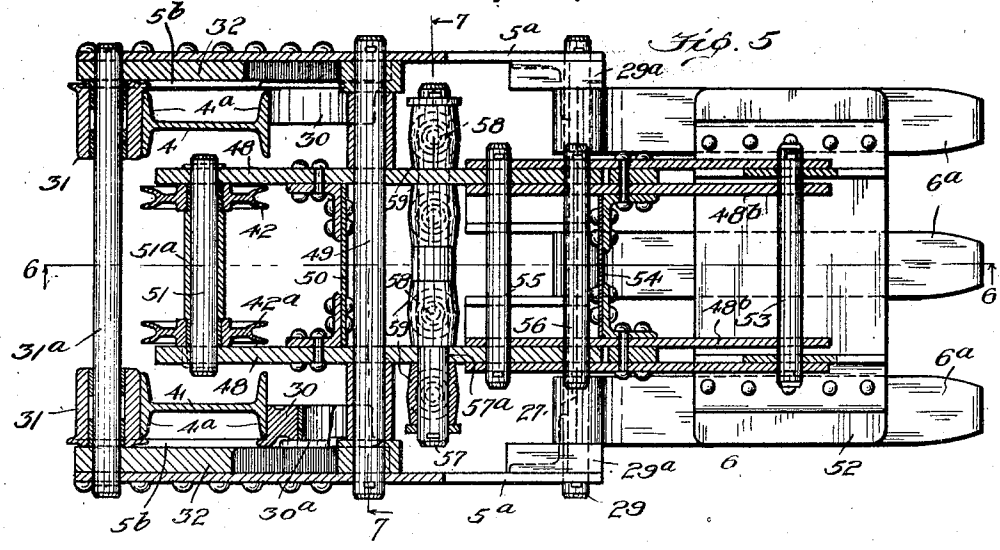
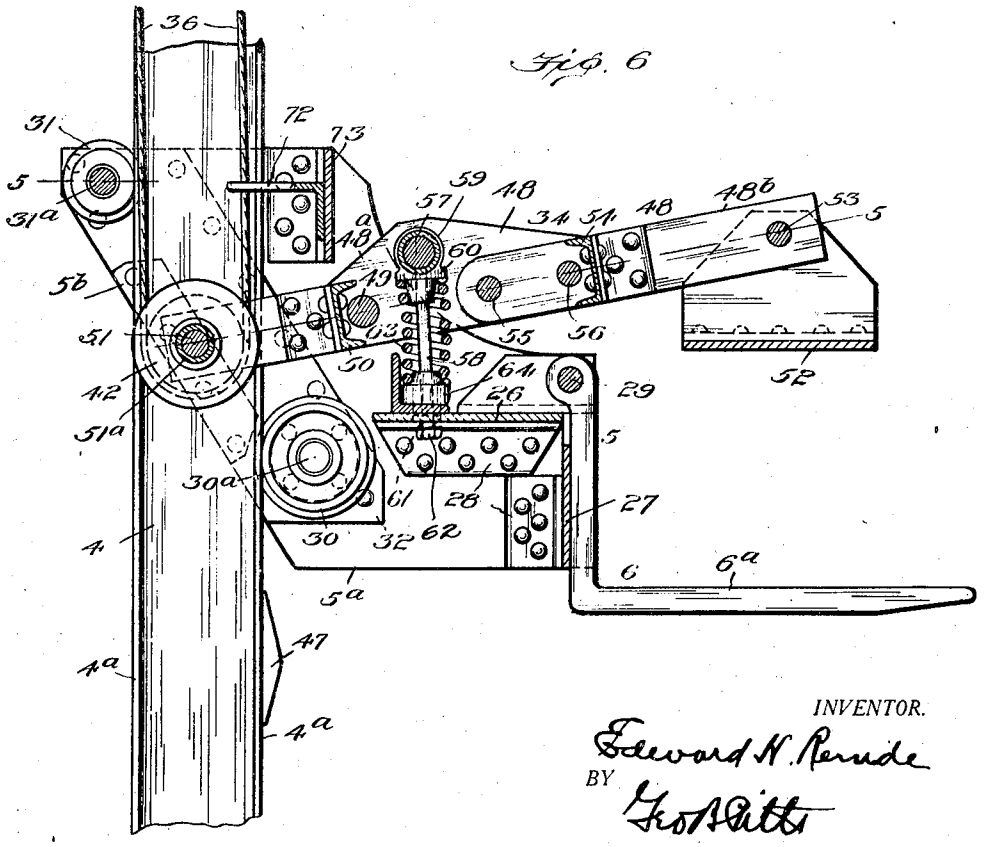


Fig. 6



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Patented Feb. 2, 1932 1,843,736

UNITED STATES PATENT OFFICE

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INDUSTRIAL TRUCK

Application filed September 30, 1926. Serial No. 136,763.

This invention relates to an industrial truck capable of lifting or elevating loads and transporting them from one place to another and tiering them.

In the illustrated form of construction I have applied the elevating and transporting mechanism for use in handling sheet material, such as metal sheets in piles, but such mechanism may be adapted to other kinds of loads.

One object of the invention is to provide, in an elevating type of truck, improved means capable of engaging the load to maintain it on the elevating member.

Another object of the invention is to provide in a truck having an elevating member, improved mechanism acted upon by the raising and lowering means for the elevating member for gripping the load thereon during its raising and lowering movements.

Other objects of the invention will be apparent to those skilled in the art to which this invention relates from the following description, taken in connection with the accompanying drawings, wherein

Fig. 1 is a side elevation of a truck embodying my invention.

Fig. 2 is a top plan view.

Fig. 3 is an end view.

Fig. 4 is a fragmentary view showing the load elevated and biased into its transporting position.

Fig. 5 is a fragmentary section on the line 5—5 of Fig. 6.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a section on the line 7—7 of Fig. 5.

In the drawings, 1 indicates a frame mounted on wheels 2, 3, there preferably being two wheels near each end of the frame 1. The form of elevating mechanism chosen for illustration comprises a guide frame 4 and an elevating and load carrying member 5 slidably mounted thereon, and the guide frame 4 is preferably arranged intermediate the ends of the frame 1. In this arrangement it is also preferable to construct the frame 1 with a relatively low section 1*a*, whereby the guide frame 4 may be extended to a point near the floor and the elevating and carrying section 6 of the member 5 may be moved into close relation to the floor (see Fig. 1) and disposed below loads when supported on standardized skids or other devices. The frame section 1*a* comprises a pair of channels having their outer portions bent inwardly so as to lie between the wheels 3. The inner ends of the channels are rigidly connected to a pair of longitudinal bars of the main frame 1*b* by drop plates 7. The guide frame 4 may comprise a pair of I-beams, each secured at and along its lower portion to the adjacent plate 7 and channel 1*a*, for which purposes the flanges on the inner side of the beam are cut away. The main section 1*b* of the frame 1 includes a pair of uprights 1*c* formed from angle bars, the lower ends of which support brackets 8, one being shown in Fig. 1. The brackets 8 support a platform 9 on which the operative stands and a brake pedal 10 for operating a brake mechanism 11 to which reference will later be made. The upper ends of the uprights 1*c* are connected by tie bars 12 to the upper end of the guide frame 4 to brace the latter.

13 indicates a source of power supply, that shown comprising electric batteries supported on the frame section 1*b*, and enclosed in a casing 14. 15 indicates an electric motor connected through a suitable power transmitting mechanism with driven axle sections suitably connected with the wheels 2 to drive them. The motor 15 is supported in and connected to a cradle 16 which is rigidly connected to a housing 17 (the cradle and housing may be formed integrally) for the power transmitting mechanism which is connected to driven axle sections for the wheels 2. The cradle 16 and housing 17 are preferably connected to the frame section 1*b* by a suspension mechanism (certain elements thereof being shown at 17*a*, 17*b*), which forms the subject-matter of an application filed by John H. Hertner, of Cleveland, Ohio, and myself, jointly (see Letters Patent No. 1,628,145). For that reason no claim is made herein to this subject-matter. The wheels 2 are preferably connected by suitable knuckles on arms 2*a* extending from the ends of the axle housing 17 and the spindles for the wheels 2 are connected in a well known man-

ner for steering, for which purpose a steering device 18 is connected to the upper portion of a column 19 (see Fig. 3) and the latter in turn is connected through suitable operating connections (not shown) with one of the wheels 2. The brake mechanism 11 comprises suitable elements arranged to engage a wheel connected to the propeller shaft that is driven by the shaft of the motor and these elements are connected through a linkage 20 with the pedal 10, a spring (not shown) being arranged and connected with the frame section 1*b* and linkage so that the latter will cause the braking elements to normally engage the brake wheel and hold the pedal 10 up, as shown in Fig. 1; accordingly, operation of the pedal downwardly will release the braking elements.

21 indicates a controller for the motor 15. The drum of the controller is geared to a shaft 22 carrying an arm 23, which is connected by a link 23*a* to an operating lever 24. 25 indicates a casing enclosing an automatic switch mechanism connected with the linkage 20, and so arranged that the circuit to the motor 15 will be closed when the pedal 10 is operated downwardly and opened when the pedal is released—that is, the brake elements are applied to the brake wheel.

The elevating member 5 preferably comprises a pair of spaced plates 5*a* connected by a horizontal member (such as a plate) 26 and also by a vertical member 27 and each of these members may be secured to the plates 5*a* by suitable angles 28. The load carrying section 6 may consists of a plurality of L-shaped arms 6*a* having horizontal and vertical portions and the latter are preferably pivoted loosely on a shaft or rod 29, whereby the arms 6*a* may be swung to the position shown in dotted lines in Fig. 1, when it is desired to connect a trailer to the frame sectian 1*a* or shorten the effective length of the truck. The opposite ends of the shaft 29 are removably mounted in openings formed in the plates 5*a* and in hollow bosses 29*a* aligned with the openings and suitably secured to the inner faces of the plates 5*a*. By removing the shaft 29, the load carrying section 6 may be removed and another one substituted according to the particular load to be handled. 30, 31, indicate pairs of rollers arranged to engage the opposite outer faces of the flanges 4*a* on the I-beams 4, whereby the elevating member 5 is slidably supported by and upon the guide beams 4; this arrangement also permits the elevating member 5 to move relative to the guides 4, that is, its lower portion to swing outwardly and upwardly substantially about the points of contact between the rollers 31 and guides 4 in the manner to be later set forth to bias the load carrying section 6 to the position shown in Fig. 4. The plates 5*a* are disposed on the outer sides of but in relatively close relation to the I-beams 4; this arrangement providing ample room for a load gripping mechanism indicated as an entirety at 34 and preventing displacement of the elevating member when biased as above described. By preference, the inner faces of the plates 5*a* are provided with shoes 5*b* of suitable material which engage the free edges of the flanges 4*a* when the plates 5*a* move relative thereto. The rollers 30, 31, may be flanged to insure their proper rolling on the guides. The rollers 30 are loosely mounted on stud shafts 30*a* supported by reinforcing plates 32 on the inner faces of the plates 5*a*, while the rollers 31 are loosely mounted on a shaft 31*a*, supported at its opposite ends in aligned openings formed in the plates 5*a* and 32.

The raising and lowering means may be of any desired construction, but preferably comprises one or more flexible members, such as wire cables operatively connected with the elevating member 5 so that by the winding of the cables on a drum or drums, the elevating member is raised or lowered. In the illustrated form of construction, I provide two drums 35, 35*a*, for two cables 36, 36*a*. The drums 35, 35*a*, are driven by a suitable power transmitting mechanism within a housing 37 and such mechanism receives its power from an electric motor 38 operated from the batteries 13, and controlled by a suitable controller 39. The cables 36, 36*a*, are arranged to operate in the following manner: From the drum 35 the cable 36 leads to and around a sheave 40 loosely mounted on a shaft 41 supported at its ends in bosses 41*a* secured to the upper ends of the guides 4 and aligned openings formed in the latter; from the sheave 40, the cable 36 extends to and around a sheave 42, supported on the elevating member 5 in the manner to be later set forth, and from this latter sheave the cable extends to and around a sheave 40*a* also loosely mounted on the shaft 41, its free end being connected with a take-up mechanism 43, the purpose of which is to take up any slack that may occur in the cables 36, 36*a*, particularly where the elevating member 5 engages an obstruction in its downward movement. The cable 36*a* extends from the drum 35*a* to and around a sheave 44 loosely mounted on the shaft 41, then to and around a sheave 42*a* (mounted similarly to the sheave 42) and then to and around a sheave 44*a* also mounted on the shaft 41, its free end being connected to the take-up mechanism 43.

The take-up mechanism 43 comprises a plate 45 mounted to slide in a guide 46. The plate 45 engages the guide 46 to be held against upward movement due to pull on the cables 36, 36*a*, but if slack occurs therein, the plate 45 (which is relatively heavy) is free to gravitate, thereby taking up the slack and preventing the cables from disengaging

any of the sheaves on which they reeve. In the arrangement shown, both drums 35, 35*a*, are rotated to either wind the cables thereon to effect raising of the elevating member 5 to any desired height for transporting a load or for elevating or for tiering loads, or pay-out the cables to lower the elevating member 5.

I provide means for biasing the load so that the carrying section 6 may serve as a cradle during and while the truck is being driven to transport a load to its place of discharge. When the load comprises sheet material, such biasing tends to maintain them in stacked or bundled relation due to vibrations resulting from movement of the truck. In the present form of construction the biasing movement is effected by causing the elevating member 5 to swing about the point of engagement between the rollers 31 and I-beams 4 to the position shown in Fig. 4. For effecting this biasing movement, I provide on the outer flange 4*a* of each I-beam 4 a projecting device 47 over or upon which the adjacent roller 30 must run when the elevating member 5 is operated. The devices 47 may be arranged near the upper portion of the guides 4 or at any position between the ends of travel of the rollers 30. However, the devices 47, in the preferred arrangement are disposed a short distance above the extreme lower position to which the rollers 30 may be moved, so that when the elevating member 5 is biased or inclined, (1) the load will be in the lowest position possible during its transportation to thereby insure a relatively low center of gravity and (2) the devices 47 will not affect the loading and unloading of loads mounted on skids or other supporting devices on the floor or on elevated supports. Where the loads to be handled are stacked one on the other, the devices 47 are arranged intermediate the loading or unloading positions of the elevating member for two adjoining loads preferably intermediate the loading and unloading positions for the load that rests on the floor and the load next above. Each device 47 is in effect a cam comprising a wall having reversely inclined contiguous surfaces in line with and forming continuations of the I-beam flange 4*a* and merge therewith at their opposite ends so that the roller 30 may run up one incline and down the other in a ready manner. The biasing devices are arranged in alignment with each other so that both rollers 30 engage therewith simultaneously. As will be understood, the loads may be picked up when the elevating member is positioned with the rollers 30 below or above the devices 47. After the load is picked up, the elevating member is moved upwardly or downwardly, as the case may be, to run the rollers up the adjacent inclines to a position adjacent the apex formed at their inner ends, and thus position the load as shown in Fig. 4. The elevating member 5 is held in this position, which may be termed the transporting position, while the truck is being driven to the unloading point, whereupon the elevating means is operated to move the elevating member in the same direction or in the reverse direction to the desired unloading position which movement first permits the elevating member to assume its horizontal position.

The load gripping mechanism 34 is preferably inter-connected with the raising and lowering means in such manner that the pull or tension on the cables 36, 36*a*, serves to operate this mechanism, whereby its presser or load engaging member is actuated into gripping relation with the load and maintained in such relation so long as the raising and lowering means is operating to raise or lower the elevating member; but upon the release of the pull or tension of the cables, such member will automatically disengage the load.

Of the load gripping mechanism 34, 48 indicates a frame trunnion on a shaft 49 which is supported at its opposite ends in the plates 5*a*. The frame 48 may consist of a pair of members connected in spaced relation by a channel 50. The members carry at their inner ends a shaft 51 on which the sheaves 42, 42*a*, are loosely mounted and carry at their outer ends a load gripping or engaging member 52, this member being pivoted by a cross rod 53 to the frame members, whereby it may accommodate itself to the upper surface of the load. The sheaves 42, 42*a*, may be held in spaced relation by a sleeve 51*a*. The frame members are preferably of sectional form, as shown at 48*a*, 48*b*, so that the outer sections 48*b*, together with the gripping member 52, may be swung to the position shown in dotted lines in Fig. 1. The sections 48*b* are connected for simultaneous movement when so operated by a channel 54, which also serves to brace the members together when the sections 48*a*, 48*b*, are in normal or operative relation as shown in full lines in Fig. 1. The sections are connected together by a pair of rods or pins 55, 56, one of which (preferably the latter) is removable and when removed the other pin may serve as a fulcrum for the sections 48*b* to swing on.

The rocker 48 is normally held in one position, that is, with its inner end down and its outer end up, so that the gripping member 52 will be free of the load when and during the time that the truck is operated to project the supporting and carrying section 6 therebelow preparatory to lifting or elevating it; then the rocker is operated, as will later appear, to move the gripping member 52 into engagement with the load to clamp it upon the section 6. As already set

forth, the gripping mechanism 34 is associated and inter-connected with the raising and lowering means, so that upon the operation thereof to elevate the member 5, the gripping member is moved into engagement with the load and the pull or tension on the cables 36, 36*a*, is utilized to effect this gripping or clamping operation. The outer end of the rocker 48 is preferably normally maintained in the up position, above referred to, by the following instrumentalities: 57 indicates a rod supported in and extending through aligned openings 57*a* formed in the rocker frame members; 58 indicates a plurality of rods carrying hollow bosses 59 at one end and removably and loosely fitting the rod 57 and provided with collars 60 adjacent the bosses. The lower ends of the rods 58 extend through and loosely fit openings 61 formed in the plate 26, one opening being provided for each rod, and permitting the rod to slide as well as swing due to the movement of the rocker about its trunnions. The free ends of the rods are screw threaded to support nuts 62, which are adapted to engage the lower face of the plate 26 to limit the movement of the rocker 48 and gripping member 52 in one direction. 63 indicates coiled springs, one surrounding each rod 58, and interposed between the collars 60 and collars 64 surrounding the lower portions of the rods and abutting the plate 26, which collars serve as abutments and seating devices for the opposite ends of the springs. The collars 64 may be provided with bosses fitting the openings 61 and the openings through the collars may be large enough to accommodate the rods 58. As will be understood, the springs 63 normally act to rock the rocker in one direction to maintain its outer end in the up position, as shown in Figs. 1 and 5. By preference, the springs 63 are strong enough to maintain the rocker in its normal position even when the frame 5, without a load thereon, is raised and lowered by the raising and lowering means, but when the weight of these elements is increased, as when the section 6 engages a load to raise it, preparatory to elevating or lowering it, the tension of the springs is overcome by the increased resistance to the pull on the cables, and as a result thereof the rocker is actuated by the raising and lowering means. By this arrangement and construction, it will be seen that the engaging and gripping member 52 may be moved vertically with the elevating member 5 to any position for engaging a load and the gripping member will remain in its normal position, so that the load can first be readily engaged and then clamped to the carrying section 6.

65 indicates as an entirety a limit switch mechanism for opening the circuit for the motor 38 when the elevating member 5 reaches the limit of its movement in either direction. Of this mechanism, 66 indicates a casing preferably secured to one of the tie bars 12 and enclosing two switches through either of which the circuit is completed when the motor is driven in one direction, the movable elements of these switches being controlled by a device secured to a rock shaft 67 suitably supported in the walls of the casing 66. 68 is an arm connected to the rock shaft 67 and pivotally connected to one end of a rod 68*a*. The other end of the rod 68*a* is pivotally connected to one arm of a lever 69 fulcrumed on the shaft 41 and serving to space the sheaves 40*a*, 44*a*, thereon. The other arm of the lever 69 is pivotally connected to a rod 70 disposed in substantially parallel relation to the guide beams 4 and extending longtiudinally thereof, being suitably guided by brackets in any well known manner. The rod 70 carries near its opposite ends adjustable collars 71, 71*a*, either of which is arranged to be engaged by an arm 72 secured to a cross plate 73 extending between the plates 5*a*. As will be understood from Figs. 1 and 2, the collars 71, 71*a*, are disposed in the path of movement of the arm 72, so that the latter will engage with one thereof when the elevating member 5 moves in either direction, and thus moves the rod 70 which in turn operates the rod 68*a*, arm 68 and rock shaft 67 to open one of the switches in the casing 66 and effect a stoppage of the motor 38. The take-up mechanism 43 is also, by preference, inter-connected with the rod 70 so that if the plate 45 moves downwardly to take up the slack in the cables 36, 36*a*, it will operate the rod 70 and stop the motor 38 relatively quickly.

The limit switch mechanism forms the subject-matter of a separate application filed by me and the take-up mechanism and its inter-connection with the limit switch mechanism forms the subject-matter of an application filed by A. G. Hutzley, Serial No. 722,125, (see Letters Patent No. 1,690,681) for which reason no claim is made herein to either of said mechanisms.

From the foregoing description it will be seen that the load gripping mechanism 34 is carried by the elevating member and as this member is bodily moved to an inclined position to effect biasing of the load, this gripping mechanism is maintained in gripping relation with the load when the elevating member is biased, as herein set forth.

To those skilled in the art to which my invention relates, many alterations and changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope thereof. My disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting

What I claim is:

1. In a truck construction, the combination of a frame, supporting wheels therefor, a guide on said frame, a load carrying member mounted for sliding movement on said guide, mechanism arranged to engage and grip or to disengage and release a load on said member, and operating means for said engaging mechanism, arranged to support said member during its sliding movement on said guide, said engaging and gripping mechanism comprising a rocker trunnioned on said member and connected at its inner end to said operating means, the outer portion of said rocker being swingably mounted on the remaining portion and detachably connected thereto, whereby the outer portion may be released and swung to an inoperative position.

2. In a load handling and elevating truck, an upwardly extending guide, a longitudinally extending load engaging member at one end of the truck, a load clamping member associated therewith, and means to support said members for movement on the guide, the clamping member being pivotally connected to the said means for vertical adjustment to clamp and release the load on the engaging member, and yielding means to normally hold the clamping member in a load disengaging position, the outer end portion of said clamping member being swingable upwardly and inwardly toward the truck to shorten the effective length thereof.

3. In a truck construction, the combination of a frame, supporting wheels therefor, a guide on said frame, a member slidably mounted on said guide, a load carrier extending beyond said frame and pivotally connected to said member and arranged to be swung upwardly into an inoperative position, a rocker trunnioned on said member and extending beyond said frame above said carrier and arranged to engage and disengage a load thereon, and raising and lowering means connected to the inner end of said rocker and operating therethrough to raise and lower said member, the outer portion of said rocker being swingably mounted on the remaining portion and detachably connected thereto, whereby said outer portion may be released and swung to an inoperative position.

4. In a truck, substantially upright means on the truck, means mounted to traverse the upright means, a load engaging member overhanging the front end of the truck and adapted to pass beneath the load to lift it, said member being pivoted to the second named means, a clamping member pivotally connected to the second named means and having a portion thereof disposed over the load engaging member and arranged to bear downwardly upon the load whenever the load is raised by means of the load engaging member, said load engaging member and clamping member being swingable about their pivot axes to respective positions close to the second named means, whereby the truck may be, in effect, shortened and therefore more easily manipulated when not carrying a load.

In testimony whereof, I have hereunto subscribed my name.

EDWARD H. REMDE.