

June 19, 1951

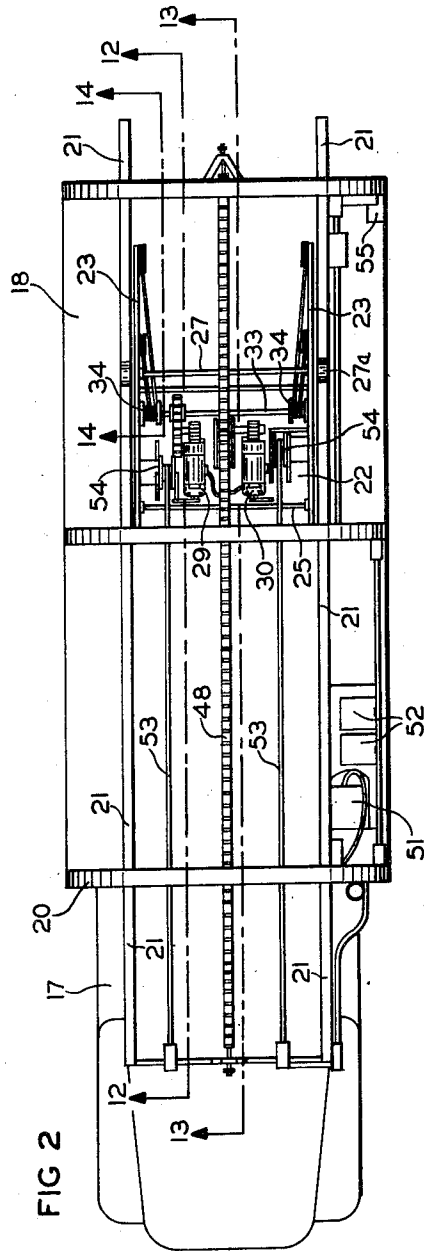
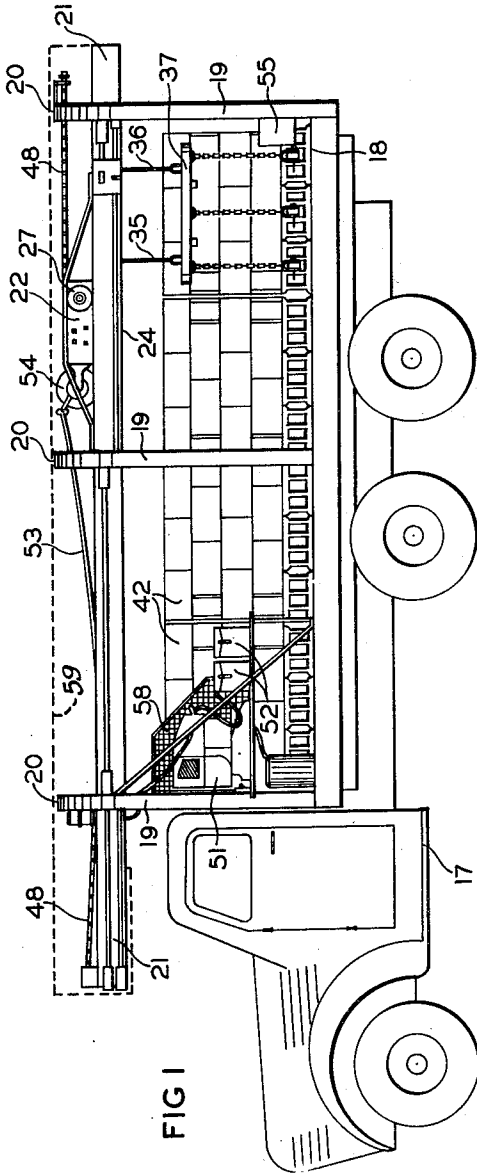
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2,557,253

TRUCK LOADING AND UNLOADING MECHANISM

Filed Oct. 5, 1949

4 Sheets-Sheet 1



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TRUCK LOADING AND UNLOADING MECHANISM

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4 Sheets-Sheet 2

FIG 3

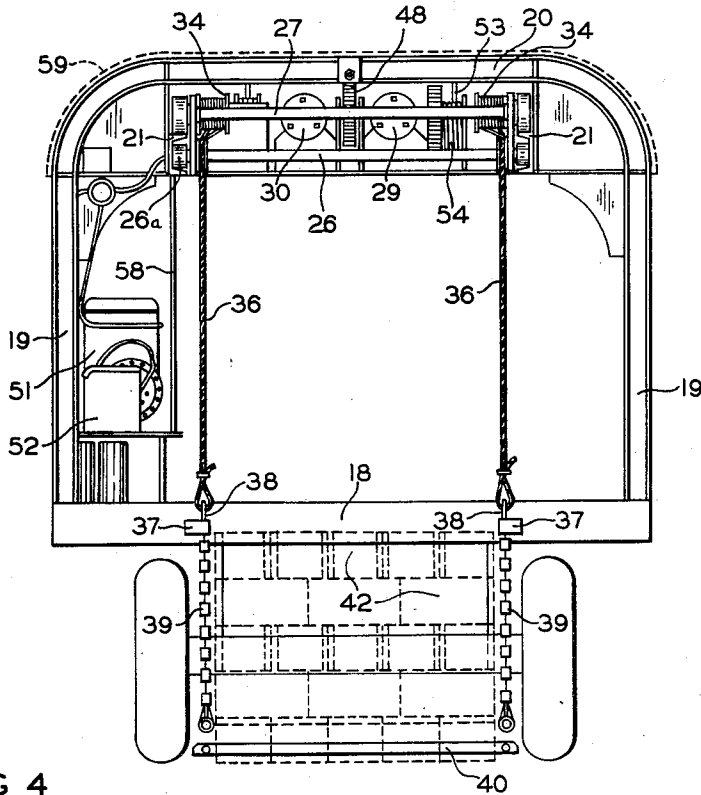


FIG 4

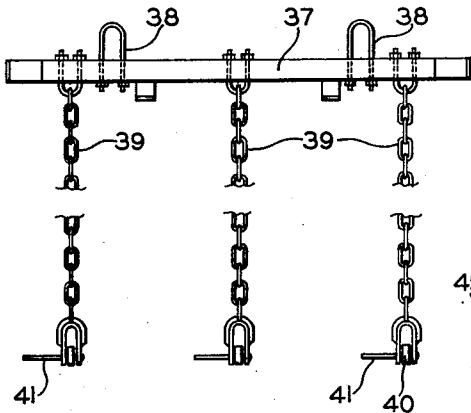


FIG 8

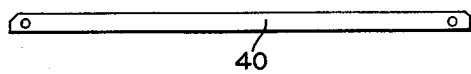


FIG 5

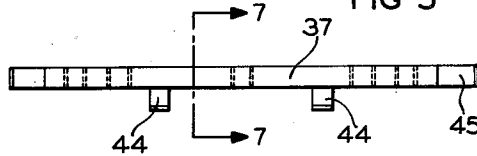


FIG 6

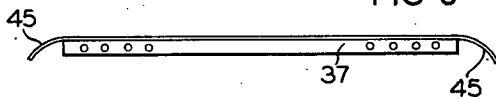
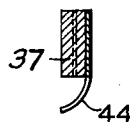


FIG 7



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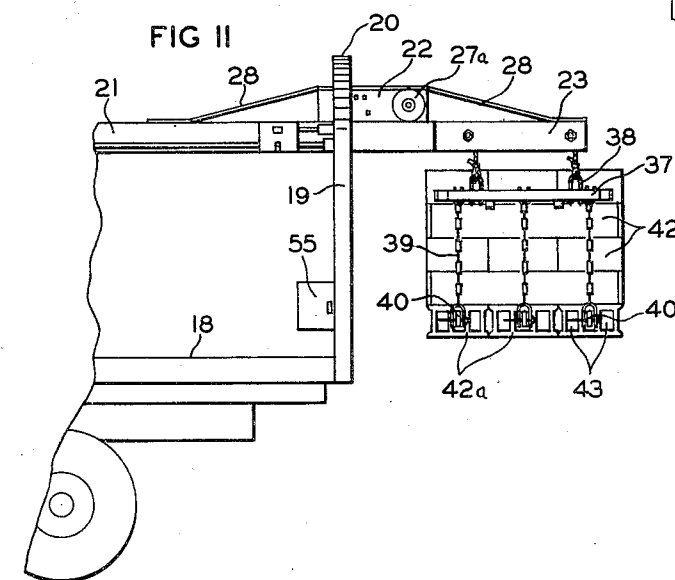
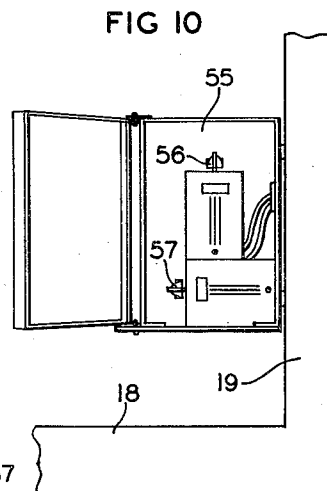
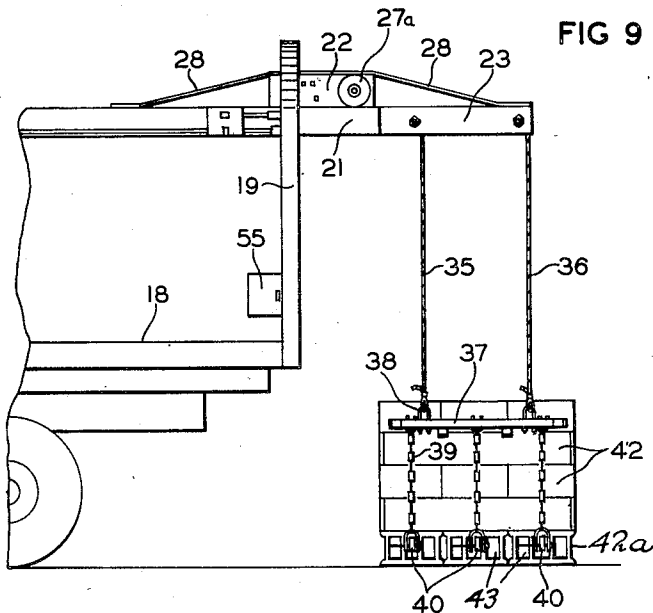
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TRUCK LOADING AND UNLOADING MECHANISM

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4 Sheets-Sheet 3



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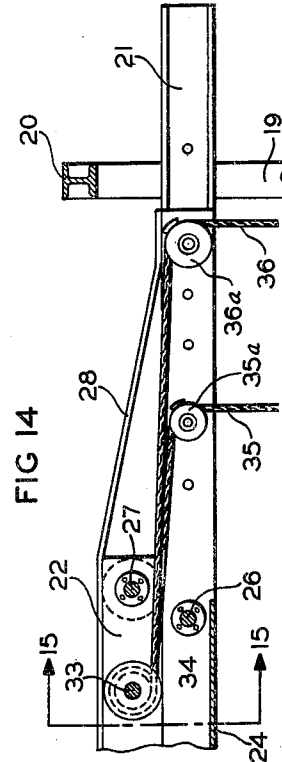
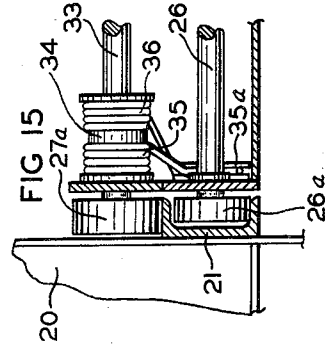
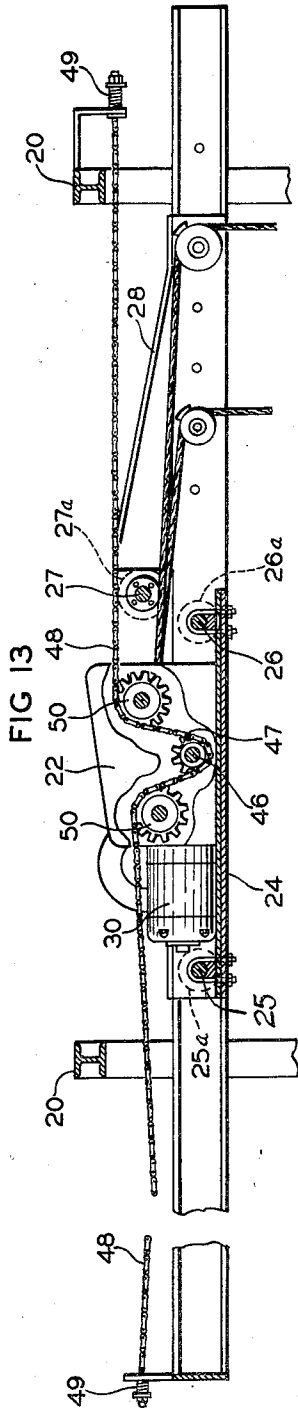
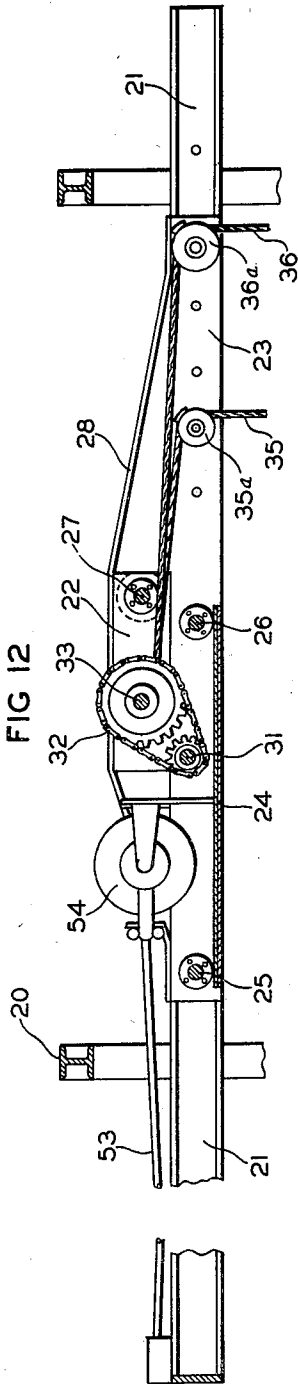
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TRUCK LOADING AND UNLOADING MECHANISM

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4 Sheets-Sheet 4



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TRUCK LOADING AND UNLOADING
MECHANISM

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Application October 5, 1949, Serial No. 119,651

6 Claims. (Cl. 212-74)

1

This invention relates to power actuated mechanism which is mounted on an automotive truck and operative to load and unload, quickly and with a minimum of manual labor, various kinds of load units which are ordinarily placed on and removed from the trucks manually.

It is an object of my invention to provide mechanism of the class described which is particularly, although not exclusively, adapted to load and unload building materials such as cement building blocks, hollow tile and brick which are piled in rectangular groups adapted to be moved as units to and from the platform of a truck, whereby the cost of transporting such materials to the sites of building operations is greatly reduced.

A particular object is to provide a truck mounted crane with novel and efficient mechanism for lifting and carrying large groups of building blocks or the like arranged in rows and tiers, the mechanism including a plurality of horizontally extending members for severally engaging rows of hollow load units, such load engaging members being severally suspended from hoist members which are actuated to move in unison during the loading and unloading operation, the entire mechanism being operative to move the load units rapidly to and from selected positions on the truck platform while preventing them from tilting.

The invention also includes the construction and arrangement of a power actuated crane for moving the load units to and from selected positions on the platform of the truck on which the crane is mounted.

The invention will be best understood by reference to the accompanying drawings which illustrate, by way of example and not for the purpose of limitation, a preferred embodiment of the invention.

In the drawings:

Figure 1 is a side elevation view showing a truck equipped with my invention, a load of building blocks being shown on the truck;

Fig. 2 is a top plan view of the truck and crane mechanism;

Fig. 3 is a rear end elevational view of the crane mechanism and with portions of the truck shown diagrammatically;

Fig. 4 is a detail side elevational view showing certain of the load supporting members;

Fig. 5 is a side elevational view of one of the hoist beams;

Fig. 6 is a top plan view of the beam shown in Fig. 5;

Fig. 7 is a cross section taken on the line 7-7 of Fig. 5;

2

Fig. 8 is a rear elevational view of one of the load engaging bars;

Fig. 9 is a side elevational view showing the hoist carriage in rearwardly extended position and with the load engaging members in operative relation to a load unit resting on the ground at the rear of the truck;

Fig. 10 is a side elevational view showing the manually operable electric controls for the carriage and hoist motors;

Fig. 11 is a side elevational view showing a load unit in elevated position to the rear of the truck platform;

Figs. 12, 13 and 14 are cross sectional views taken respectively on the lines 12-12, 13-13 and 14-14 of Fig. 2; and

Fig. 15 is a fragmentary section taken on the line 15-15 of Fig. 14.

In the drawings the numeral 17 indicates an automotive truck providing a platform 18 upon which the load units are to be placed and from which they may be unloaded by means of the mechanism constituting the subject matter of my invention. Mounted on the platform 18 is a rigid frame comprising a plurality of pairs of upright members 19 rising from the longitudinal sides of the platform and connected by bridge members 20 extending across the platform at a suitable elevation above it so that the "pay-load" may be carried beneath the bridge structure. Rigidly supported on the bridge structure and extending longitudinally of the platform 18 are rails 21 for supporting a traveling crane carriage indicated generally by the numeral 22. This carriage has a pair of parallel arms 23 extending along the inner sides of the rails 21, and rigidly connected together by a carriage floor plate 24 and by fixed cross shafts 25, 26 and 27, as best shown in Figs. 12 and 13. Revolvably mounted on the ends of the shafts 25, 26 and 27 are pairs of rollers 25a, 26a and 27a for movably supporting the carriage on the rails 21. Each of the rails 21 has upper and lower flanges disposed substantially horizontally and the rollers 25a and 26a operate between the flanges of the rails while the rollers 27a rest on the top of the upper flange. Truss rods 28 extend from the ends of the arms 23 to the upper central portion of the carriage 22 for reinforcing it.

Mounted on the plate 24 of the carriage 22 is an electric motor 29 for operating hoist mechanism and a second electric motor 30 for actuating the carriage longitudinally of the rails 21. Through suitable speed reducing mechanism, the motor 29 is operatively connected to a shaft 31 and the latter is connected by a chain 32 (Fig.

3

12) and suitable sprocket wheels to a shaft 33 extending across the carriage and having hoist drums 34 fixed thereon for operating flexible hoist cables 35 and 36 at each side. As best shown on Figs. 12, 14 and 15, these cables are trained over guide pulleys 35a and 36a carried by each of the arms 23 and are operated in unison to raise or lower load units upon operation of the shaft 33 carrying the drums 34.

The carriage arms 23 are spaced apart one from the other laterally of the truck a distance somewhat greater than the width of the load units to be handled, as indicated in Fig. 3. A beam 37, shown in detail in Figs. 4-7 inclusive, is adapted to be suspended in substantially horizontal position from U-shaped members 38 to which the cables 35 and 36 are connected. To suspend the load units from the beam 37, each of the latter are provided with pendant chains 39 and a series of load engaging bars 40 are adapted to be connected to the lower ends of the chains 39, each bar being perforated at each end to receive a pin 41 for removably connecting the lower end of a chain 39 to the bar.

These load engaging and suspending members are particularly adapted for lifting groups of hollow building blocks 42 arranged in rectangular groups, as best shown in Figs. 3, 9 and 11. Each of the blocks has a plurality of cored openings 43 and are arranged in rows and tiers, as shown, with break joints. The blocks 42a at the bottom of the group are arranged in rows with the cored openings 43 of each row aligned to receive the lifting bars 40, one of these being provided for each row of the bottom tier. When thus arranged, the entire group of blocks may be lifted as a unit after placing the bars 40 in the cored openings 43 and connecting a pair of the chains 39 to the ends of each bar 40. To facilitate the movement of the beams 37 to proper positions at opposite sides of a group of blocks, each beam is provided with guide fingers 44 projecting from its inner side outward and downward, and projecting from the ends of each beam is an outwardly curved runner member 45.

To actuate the carriage 22 longitudinally of the rails 21, the electric motor 30 is connected through suitable speed reducing gearing to a shaft 46 (Fig. 13) upon which is fixed a toothed pinion 47 for engaging a sprocket chain 48. This chain extends longitudinally of the center plane of the truck, along the top of the bridge frame, and has its ends anchored on suitable brackets which project from the bridge structure near its front and rear ends. The chain is held under suitable tension by means of coiled springs 49 which are interposed between its ends respectively and the supporting brackets. Intermediate its ends the chain 48 is trained over guide sprocket wheels 50 carried by the carriage 22 at opposite sides of the power driven pinion 47. Thus, when the motor 30 is operated the carriage is actuated longitudinally of the rails and in a direction dependent upon the direction of operation of the motor. This motor 30, like the motor 29, is of the reversible type.

Electric current for operating the motors 29 and 30 is preferably supplied from a motor generator set 51 which may be mounted on the truck at any convenient or available location. This motor generator set comprises an internal combustion engine adapted to be operated independently of the main truck engine and operatively connected to an electric generator for charging storage batteries 52. Current is supplied from

4

the generator and/or batteries 52 to the motors 29 and 30 through suitable conductors including a pair of electric cables 53 which are supported near the front end of the bridge structure and extend rearwardly to reels 54 mounted on the carriage 22. These reels are preferably spring actuated to take up slack in the cables 53 and permit relative movement of the carriage and fixed end of the cables.

Suitable control circuits for the electric motors 29 and 30 are extended to a switch box 55 mounted near the rear end of the truck, at one side, so that an operator stationed within convenient reach of the control switches in switch box 55 is enabled to operate them in proper sequence while observing the operation of raising and lowering the load units to and from the truck platform and the traversing of the loads along the platform to selected positions. As shown in Fig. 10, the switch box 55 contains independently operable switches 56 and 57 for stopping, starting and reversing the motors. Automatically operating limit switches are also provided for stopping the hoist motor 29 at the upper and lower limits of movement of the hoist mechanism and for stopping the carriage motor 30 at the front and rear limits of movement of the carriage 22 along the rails 21.

A suitable guard screen 58 is provided to separate the motor generator unit 51 from the area of the platform 18 to be occupied by the pay load.

Operation

At the start of a loading operation, the carriage 22 is moved along the rails 21 to a position where the arms 23 project rearwardly from the truck platform, as indicated in Figs. 9 and 11, and then the hoist is operated to lower beams 37 to the extent necessary to pick up a load unit. To make the necessary connection with load units comprising building blocks piled in rows and tiers, as indicated in Figs. 3 and 9, the required number of bars 40 are passed through aligned openings in the lower rows of blocks 42a and then the lower ends of the chains 39 are connected to the ends of the several bars 40 by inserting the pins 41. Thereafter the load unit comprising the rectangular group of blocks 42 may be lifted to a suitable elevation above the level of the truck platform 18, as indicated in Fig. 11. This is followed by operating the carriage 22 along the rails 21 to carry the load unit to any desired or available position on the truck platform, whereupon the load is lowered and supported on the platform. The bars 40 are then disconnected from the load and the operation is repeated with successive load units to load the truck, as indicated in Fig. 1. Upon arrival at the site where the blocks are to be delivered the loading operation is reversed to unload the truck quickly and with a minimum of effort on the part of the operator. The load supporting cables 35 and 36 are long enough so that the load units may be lowered into a basement or other excavation below the grade of the ground on which the truck is supported. It will be evident that while my apparatus is particularly adapted for handling hollow building blocks and tile, it may also be used to load and unload many other kinds of load units including brick or other materials carried on pallets or otherwise. In any case, the load units are maintained in substantially horizontal or level position during the loading and unloading operation, and no heavy or tedious work is required on the part of the operator.

By locating the crane mechanism, including the hoist and the power drive therefor, entirely above the truck platform on the bridge structure, I not only conserve space for the pay load on the truck platform, but also avoid damage to the traveling crane mechanism which might otherwise be caused by contact with the pay load materials. My entire carriage 22 and the crane operating mechanism may be enclosed within a protective casing or cover 59 supported on the outer surface of the bridge members 20. It will be evident that by the use of the bars 40 adapted to engage hollow blocks as described, I make it unnecessary to pile such blocks on pallets or in containers for handling in groups, and thereby effect substantial economies in the cost of handling them.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. For an automotive truck providing a load carrying platform, substantially horizontally disposed rails mounted above said platform and extending longitudinally thereof, a carriage movable along said rails and having a pair of arms adapted to project rearwardly beyond and above the rear end of said platform, power driven means for actuating said carriage along said rails, a hoist mounted on said carriage to move therewith, said hoist having a pair of flexible members depending from each of said arms, means carried by the lower ends of said flexible members for connecting a load unit thereto, and power-driven means mounted on said carriage and operatively connected to said flexible members for lifting said load units to an elevation above said platform, said hoist being operative and movable with said carriage to deposit load units in selected positions on said platform.

2. For an automotive truck providing a load carrying platform, substantially horizontally disposed rails mounted above said platform and extending longitudinally thereof, a carriage movable along said rails and having a pair of arms adapted to project rearwardly beyond an end of said platform, an electric motor mounted on said carriage, means operatively connected to said motor for actuating said carriage along said rails, a hoist mounted on said carriage, a second electric motor mounted on said carriage and operatively connected to said hoist, said hoist having flexible members depending from said arms, means carried by the lower ends of said flexible members for connecting a load unit thereto, and electric controls for said motors for effecting the lifting of load units to an elevation above said platform and depositing them in selected positions on said platform.

3. For an automotive truck providing a load carrying platform, substantially horizontally disposed rails mounted above said platform and extending longitudinally thereof, a carriage movable along said rails and having a pair of arms adapted to project substantially horizontally beyond an end of said platform, an electric motor mounted in said carriage, means operatively connected to said motor for actuating said carriage along said rails, a hoist mounted on said carriage, a second electric motor mounted on said carriage and operatively connected to said hoist, means for supplying electric current to said motors including flexible conductors extending substantially horizontally between said rails, spring biased means for taking up slack in said conductors during the movement of carriage along said rails, said hoist having flexible members

depending from said arms for supporting and lifting load units, means carried by the lower ends of said flexible members for supporting a load unit thereon and manually operable electric controls for said motors for effecting the lifting of load units to an elevation above said platform and depositing them in selected positions on said platform.

4. For an automotive truck providing a load carrying platform, a pair of rails mounted above said platform, and each having a pair of substantially horizontally disposed flanges extending longitudinally thereof, a carriage movable along said rails and having at each side an arm extending along and adjacent to one of said rails, rollers spaced along each of said arms and projecting between the flanges of the adjacent rail for rolling engagement therewith and for supporting the carriage on the rails, means for actuating said carriage along said rails, a hoist mounted on said carriage to move therewith, said hoist having flexible load carrying members depending from each of said arms, means for suspending load units on the lower ends of said flexible members and power actuated means for operating said hoist to raise and lower load units carried by said flexible members.

5. For an automotive truck providing a load carrying platform, substantially horizontally disposed rails mounted above said platform and extending longitudinally thereof, a carriage supported on and movable along said rails and having a pair of arms adapted to project substantially horizontally from an end of said rails, a sprocket chain extending in substantially parallel relation to said rails between the same and having ends secured to the truck, power driven means mounted on said carriage and engaging said sprocket chain for actuating said carriage along said rails, a hoist mounted on said carriage to move therewith, said hoist having flexible members depending from said arms and power driven means for actuating said hoist to raise and lower load units carried by said flexible members.

6. For an automotive truck providing a load carrying platform and having an overhead frame extending above said platform, substantially horizontally disposed rails carried by said frame and extending longitudinally of said platform, a carriage supported on and movable along said rails and having arms adapted to project rearwardly from said rails, a sprocket chain extending in substantially parallel relation to said rails, resilient means connecting opposite ends of said chain to said overhead frame, power-driven means mounted on said carriage and engaging said sprocket chain for actuating said carriage along said rails, a hoist mounted on said carriage to move therewith, said hoist having flexible members depending from said arms and power-driven means for actuating said hoist to raise and lower load units carried by said flexible members.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
916,324	Kastendike	Mar. 23, 1909
1,635,338	Otterson	July 12, 1927
1,749,107	Medairy	Mar. 4, 1930
2,156,424	Barnard	May 2, 1939