Nov. 13, 1945. C. W. MORRISON 2,388,987

LOAD HANDLING MECHANISM

Filed April 6, 1944 3 Sheets-Sheet 1

Fig. 1.

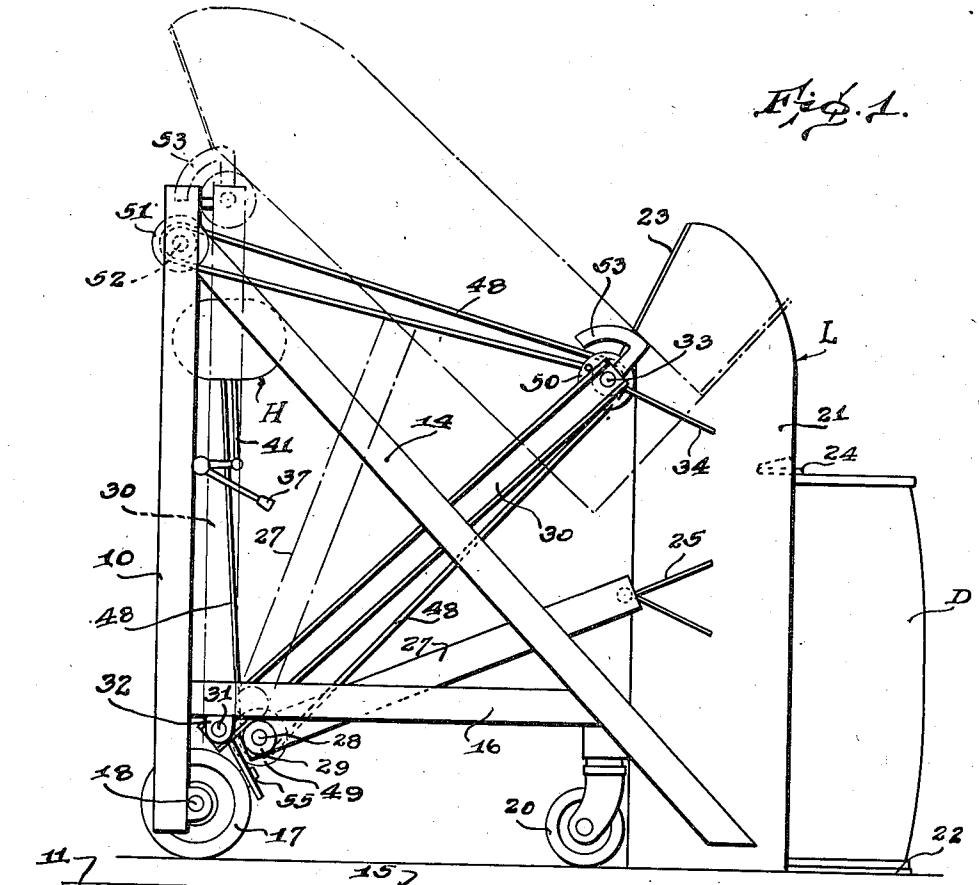
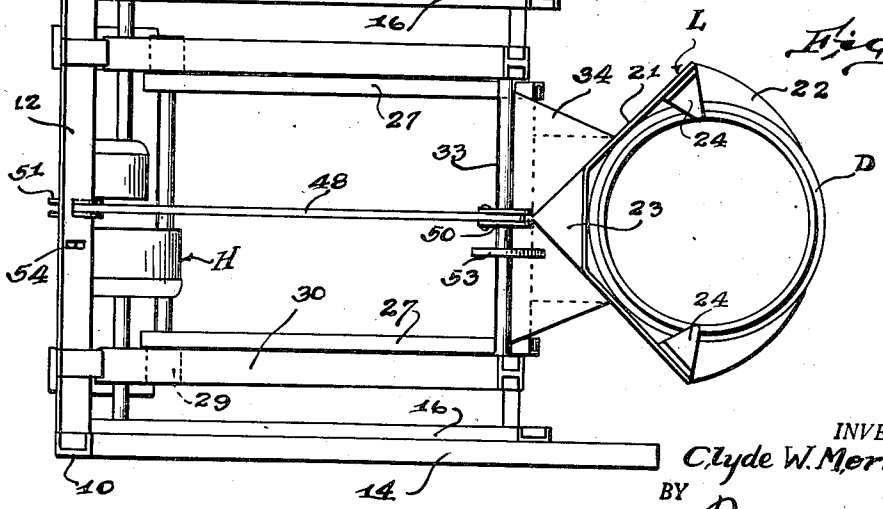


Fig. 2.



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LOAD HANDLING MECHANISM

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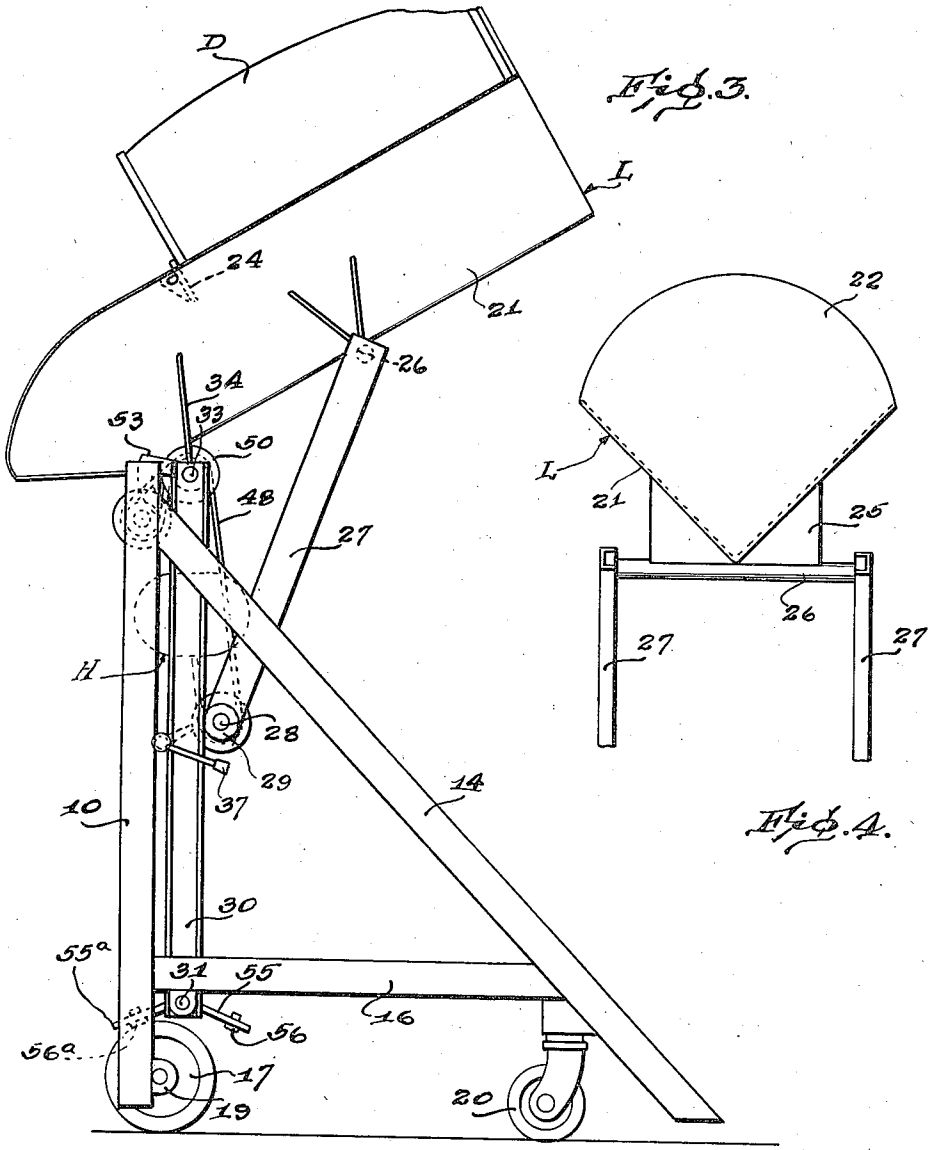


Fig. 3.

Fig. 4.

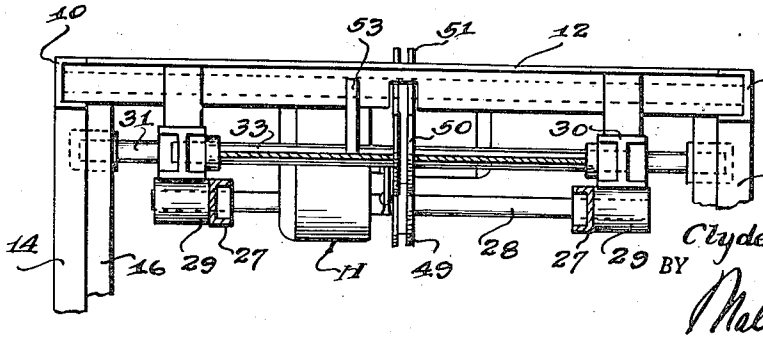


Fig. 5.

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LOAD HANDLING MECHANISM

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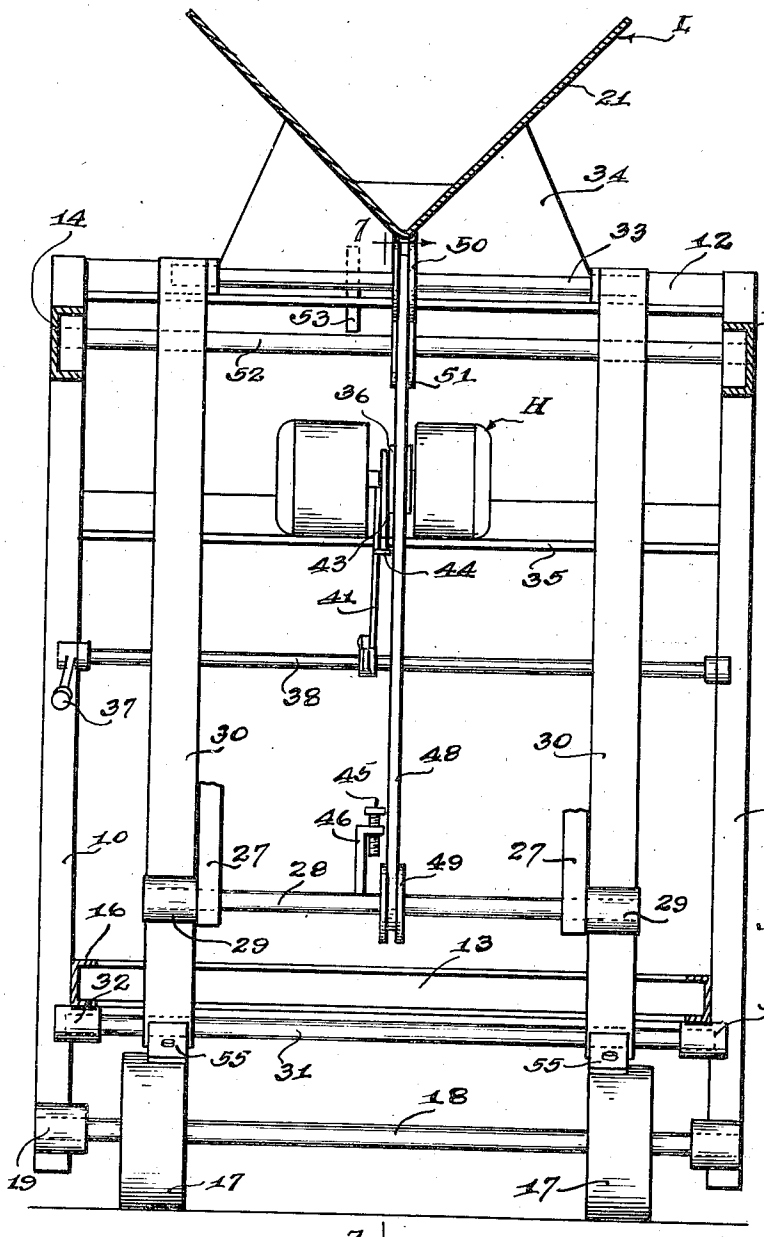


Fig. 6.

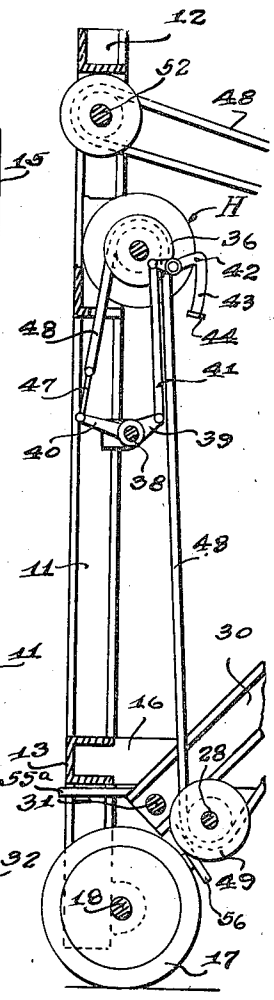


Fig. 7.

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UNITED STATES PATENT OFFICE

2,388,987

LOAD HANDLING MECHANISM

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Application April 6, 1944, Serial No. 529,771

13 Claims. (Cl. 214—1.1)

This invention relates to material handling devices but particularly to a mechanism for handling drums containing fabricated or partially fabricated metal parts and the like, such for example as lifting and tilting same for discharging or delivering same to a desired location.

An object is to produce a new and improved mechanism of the above character by which a drum or other similar container may be mounted thereon and swung upwardly and forwardly to tilting position to enable the contents thereof to be conveniently discharged.

Another object is to produce a load handling apparatus of the above character by which a load supporting carrier can be readily and conveniently swung upwardly and thereafter tilted to discharge the load by new and improved mechanism employing a cable and lever system for the desired purpose.

A still further object is to produce an ambulatory machine of the above character which is adapted to receive a drum or the like and is equipped with a suitable hoist mechanism employing a cable or the like by which the load may be conveniently raised or lowered to the desired position of use.

A still further object is to produce a simple and efficient mechanism of the above character which lends itself particularly for use in industrial plants requiring the handling of heavy drums or the like, the contents of which are required to be discharged onto conveyors, etc. thereby greatly to expedite operations and reduce to a minimum the requirement for manual labor.

Other objects and advantages will hereinafter appear and for purposes of illustration but not of limitation, an embodiment of the invention is shown in the accompanying drawings in which

Figure 1 is a side elevation of a load handling mechanism in accordance with this invention, showing in broken lines the carrier in partially elevated position;

Figure 2 is a top plan view of the mechanism shown in Figure 1;

Figure 3 is a side elevation similar to Figure 1 but showing the carrier in tilting position for discharging the contents thereof;

Figure 4 is a fragmentary rear or bottom end view of the carrier;

Figure 5 is a fragmentary top plan view of the mechanism with the parts in the position shown in Figure 3, the same being partly in section and showing the relative arrangement of the parts when the carrier is in discharging position;

Figure 6 is an enlarged rear end view partly in section of the machine showing the position of the parts when the carrier is in its partially elevated position; and

Figure 7 is a vertical sectional view substantially on the line 7—7 of Figure 6.

The illustrated embodiment of the invention comprises a load handling mechanism of particular use in industrial plants for handling drums filled with relatively heavy parts which it is desired to transport from place to place within the plant and to discharge onto a conveyor, into bins, etc. The ordinary steel drums are so heavy when filled with metal parts that ordinarily the services of several workmen are required to handle them. To obviate such manual labor, various mechanical apparatus and mechanisms have been devised for the purpose, but in the main they are of such complicated nature or so expensive as to militate against their use as a practical matter in the ordinary industrial plant. The load handling mechanism hereinafter described is relatively inexpensive to manufacture and is simple to operate and therefore, lends itself particularly to use in the average plant requiring a device of this nature.

The illustrated embodiment of the invention comprises a frame consisting of a pair of spaced upright beams or channel irons 10 and 11 which are connected adjacent their upper ends by a cross beam or angle iron 12 and at the lower portions by a cross beam or channel iron 13. Inclining diagonally downward from the upper end of each of the uprights 10 and 11 are side beams or channel irons 14 and 15 respectively. Each of the beams 14 and 15 are secured to the uprights 10 and 11 respectively by a horizontal beam 16.

The frame above described is mounted for ambulatory movements and, for this purpose, secured to each of the uprights 10 and 11 are ground engaging rollers 17, which are mounted on a transverse shaft 18, the ends of which are carried by brackets 19 secured to the uprights respectively. The rear end portion of the frame is supported by swivelly mounted castors 20, thereby facilitating the turning movements of the frame from one position to another.

The load carrier L is composed of a body 21 which is substantially V-shaped in cross section, as indicated on Figure 6, the lower end portion having a sector shaped plate 22 which, when the carrier is upright or in its normal position shown in Figure 1, rests upon the supporting surface so that a drum D may be conveniently placed thereon with the inner side walls engaging the inner sides of the body portion 21. The front

or upper end of the load carrier has a relatively short end wall 23 which is upwardly inclined and facilitates discharging the contents of the drum when the carrier L has been shifted to discharging position, such as indicated in Figure 3. The drum may be held from forward sliding movements by stops 24, which may be suitably mounted on the carrier so as to hold the drum against forward sliding movement when in its upwardly tilted position.

Welded to the outer walls of an intermediate portion of the load carrier L are metallic plates 25 which are arranged in V formation. The opposite edges of the plates are fixed to a rod 26, the end portions of which are pivotally mounted respectively in parallel arms 27. The lower ends of the arms 27 are connected by a shaft 28 on the outer ends of which are mounted rollers 29 which are disposed on the outer sides of the arms.

The rollers 29 respectively engage a pair of upwardly extending levers or beams 30, the lower ends of which are mounted on a shaft 31 having its ends pivoted respectively in brackets 32 fixed to and depending from the front end portion of the horizontal side beams 16. Pivoted to the upper ends of the beams 30 is a shaft 33, to which is fixed a metallic plate 34. The plate 34 is welded to the upper or forward end portion of the load carrier L. As will hereinafter appear, the rollers 29 roll along the rear faces of the lever beams 30 during the tilting movements of the load carrier L.

A cross beam 35 is fixed at its ends to the uprights 10 and 11 respectively and is spaced a short distance beneath the cross beam 12. This beam forms a support for an electric hoist H of the reversible type. Hoists of this character are well-known in the art and detail description thereof is not considered necessary. Suffice it to say that the hoist H has a cable receiving drum 36 which can be rotated in one direction or the other as desired.

The direction of rotation of the hoist drum 36 is controlled by a manually operated handle 37, which is fixed to one end portion of a transverse shaft 38, the latter being attached at its ends to the frame uprights 10 and 11. Fixed to an intermediate portion of the shaft 38 is a rearwardly projecting arm 39 (Figure 7) and a forwardly projecting arm 40. The arm 39 is connected by a link 41 to a pivotally mounted lever 42, which has a downwardly extending portion 43 provided with a contact pad 44 at its lower end. The pad 44 is engaged by an adjustable screw 45 carried by a bracket 46 secured to the shaft 28, when the carrier L has been swung to its discharging position, the head of the screw 45 having engaged the pad 44 and rocked the lever 42 sufficiently to stop the lifting operation of the hoist H. The arm 40 on the shaft 38 is connected by a link 47 to one end of a cable 48, the arrangement being such that when the load carrier L is in its normal position, such as shown in Figure 1, a pull will be exerted on the end of the cable 48 sufficient to rock the lever arm 40 to stop the lowering operation of the hoist H. Also, while the carrier is being raised, the increased portion of the cable between the drums 36 and the arm 40 is permitted to loop freely downward.

Particularly as shown in Figure 7, the cable 48 extends downwardly from the cable receiving drum 36 and passes around a freely revolving sheave between a pair of washers 49 attached to the shaft 28. The cable 48 extends upwardly and backwardly and passes around a freely revolving sheave between a pair of washers 50 attached to the shaft 33. The cable 48 then extends forwardly and passes around a freely revolving sheave between a pair of washers 51 attached to the shaft 52. The cable 48 extends backwardly to dead end at one of the washers 50. In the form shown, the cable 48 comprises a chain, links of which engage a sprocket forming a part of the hoist H as will be readily understood by those skilled in the art.

In order to insure that the carrier L will remain in its fully raised position, an arcuate latch or hook 53 is mounted on the shaft 33 and when the carrier is in its fully raised position, as indicated on Figure 3, the latch enters an aperture 54 in the cross beam 12. It will be understood that the latch 53 rocks with the shaft 33 so when the carrier L is in its upwardly tilted position, as shown on Figure 3, the latch 53 is rocked to enter the opening 54 in the beam 12 and when in this position, it will be evident that the carrier can not accidently rock rearwardly. However, when the carrier L tilts downwardly to approximately a horizontal position, the latch will then have been rocked upwardly out of engagement with the hole 54.

When the carrier L is in its intermediate position, as shown in broken lines in Figure 1, the machine is held non-ambulatory by brake arms 55*a* which are attached to the lower end of each beam 30 and are provided with brake pads 56*a*. The brake pads 56*a* are forced against the wheels 17 as the arms 55*a* revolve about the axle 31 and act as friction brakes to keep the machine from moving or rolling on its wheels when the load shifts and is dumped from the carrier L.

When the carrier L is in its normal position or the position shown on Figure 1, it is desirable that the machine be held stationary to facilitate the loading of the carrier L. For this purpose, a brake arm 55 is fixed to the lower end of each of the beams 30 and each arm is provided with a brake pad 56, which is brought automatically into engagement with the peripheral surface of the adjacent wheel 17 when the beams 30 are in the downwardly inclined position. These arms thus serve as friction brakes for the wheels 17 and hold them against turning movements, when the load carrier L is in position to receive its load.

In operation it will be understood that the carrier L is in the first instance disposed in upright position such as shown in Figure 1, and a drum D or the like is delivered thereto to rest upon the bottom plate 22. By moving the control handle 37 in one direction, the electric hoist H is operated to wind the cable 48 about the drum 36. In the first movement of the parts, the beams 30 are swung in a counterclockwise direction (Figure 1) to assume a substantially up and down position substantially parallel with the frame uprights 10 and 11, as indicated by the broken lines on Figure 1. Continued operation of the hoist H causes the rollers 29 carried by the lower ends of the arms 27 to roll upwardly along the adjacent face of the beams 30. The outer end portion of the carrier L is thus gradually elevated above the front portion until it attains the inclined position as shown on Figure 3. When the carrier L has been tilted to its discharging position, the adjustable contact screw 45 will have engaged the pad 44 and rocked the lever 42 sufficiently to stop the operation of the hoist H. By adjusting the position of the screw 45, the point at which the electric hoist will be

deenergized can be regulated within reasonable limits. As above pointed out, when the carrier L is in its discharging position, the latch **53** will have entered the aperture **54** in the cross beam **12** for holding the parts in such position.

By actuating the control arm **37** in the opposite direction, the rotation of the electric hoist H will be reversed causing the carrier L to return to its normal position, the first movement of the parts being the downward movement of the rollers **29** along the beams **30** causing the rear end of the carrier to tilt downwardly and thereafter the beams **30** are enabled to rock in a clockwise direction and return to the full line position shown on Figure 1. In this latter position, the rollers **17** are securely braked so that the machine is securely held stationary.

While a machine of the above description can be used to advantage in a variety of places and for many uses, it is particularly useful in industrial plants for handling ordinary steel drums containing metal parts which must be delivered to chutes, conveyors, vats and the like and which ordinarily require several men to handle. The above described machine can readily and conveniently handle much more efficiently heavy containers or articles and employ only one man for the job. The machine is simple in construction which lends itself admirably to manufacturing operations and is easy to operate so that it does not necessitate the employment of skilled labor for the purpose. No special form of hoist is required since hoists of the character described are well-known in the art and available on the market and can be adapted without substantial alteration.

It is to be understood that changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claims.

What I claim is:

1. A load handling mechanism comprising a frame including an upright support, a load carrier, a mounting for said carrier enabling same to rock toward said support from a substantially vertical position adjacent the floor to a downwardly inclined position with the rearward end disposed above the forward end, said mounting including main lever means connected to one end portion of said carrier and secondary lever means connected to an intermediate portion of said carrier and having ambulatory engagement with said main lever after the latter has completed its rocking movement, thereby to obtain such downwardly inclined positioning of said carrier, and means for effecting such carrier movement.

2. Load handling mechanism comprising a frame, a carrier normally disposed in vertically arranged position with the lower end resting on a supporting surface, lever means providing a connection between the carrier and frame enabling the carrier to be swung upwardly and forwardly and at a predetermined point tilted to discharging position with the lower end elevated above the opposite end, said lever means including a lever member to convey said carrier upwardly and forwardly to a downwardly inclined position, and a separate lever member to elevate the back portion of the carrier relative to the front portion thereof and a power driven flexible drive for actuating said lever means.

3. Load handling mechanism comprising a frame, a carrier normally disposed in vertically arranged position with the lower end resting on the supporting surface, lever means pivoted at its ends to said frame and the upper end portion of said carrier respectively, an arm pivotally connected at one end to an intermediate portion of said carrier, inclining downwardly therefrom, and having its opposite end position in juxtaposed relation to said lever means, flexible actuating means including a portion operating against the opposite end of said arm for successively rocking said carrier upwardly and then tilting same forwardly to discharging position, and means for operating said actuating means.

4. Load handling mechanism comprising a frame, a carrier normally disposed in position resting adjacent a supporting surface, means establishing an articulated connection between said carrier and said frame, said connection including lever means pivoted at its ends to said frame and the upper end portion to said carrier respectively and an arm pivotally connected at one end to an intermediate portion of said carrier inclining downwardly therefrom, and having its opposite end juxtaposed in relation to said lever means, said arm having ambulatory movement along said lever means after predetermined movement of said carrier, and flexible cable means for actuating said carrier to cause upward and forward swinging movement controlled by said lever means and upward and forward tilting movement in response to ambulatory movement of said arm.

5. Load handling mechanism comprising an upright frame, a carrier normally disposed in position resting adjacent a supporting surface, lever means pivoted at one end to a lower portion of said frame and at its opposite end to said carrier, an arm pivoted at one end to said carrier, antifriction means at the opposite end of said arm engageable with and movable along said lever means, a cable cooperating with said frame, arm and lever means for effecting upward swinging movement of said lever means and subsequently upward movement of said antifriction means along said lever means, and power means operatively connected to said cable for actuating same.

6. Load handling mechanism comprising an upright frame, a carrier normally disposed in position resting adjacent a supporting surface, lever means pivoted at one end to a lower portion of said frame and at its opposite end to said carrier, an arm pivoted at one end to said carrier, antifriction means at the opposite end of said arm engageable with and movable along said lever means, a hoist mechanism, a sheave on the upper portion of said frame, a sheave on the outer end of said lever means adjacent said carrier, a sheave carried by said arm and disposed in the region of said antifriction means, and a cable extending from said hoist mechanism about the sheave on said arm, thence about the sheave on said lever means, thence about the frame sheave and dead ending in the region of the sheave on the lever means.

7. Load handling mechanism as claimed in claim 6, in which said hoist mechanism comprises a reversible mechanism for controlling the elevating and lowering of said carrier.

8. Load handling mechanism as claimed in claim 6, comprising means for securing said lever means in vertical position, said securing means being automatically operable to secure said lever means in position and release same

upon commencement of downward swinging movement of said lever means.

9. Load handling mechanism comprising an upright frame, a carrier normally disposed in position resting adjacent a supporting surface, a lever pivoted at one end to a lower portion of said frame and at its opposite end to an end portion of said carrier, said lever being rockable to an upright position into engagement with said frame, an arm pivoted to an intermediate portion of said carrier at one end, a roller on the opposite end of said arm adapted to roll along said lever when the latter is in upright position, a sheave adjacent the outer end of said lever, a sheave on said arm adjacent said roller, a sheave on the upper portion of said frame, a cable passing successively around the sheave adjacent said roller, said lever sheave and said frame sheave, one end of said cable dead ending adjacent said frame sheave and a hoist for the opposite end of said cable.

10. Load handling mechanism as claimed in claim 9, comprising a reversible electric hoist, and means for automatically rendering said hoist ineffective when the carrier has reached predetermined upper and lower positions.

11. Load handling mechanism as claimed in claim 9, comprising a latch for holding said lever in upright position, said latch being automatically releasable upon initiating downward movement of said carrier, and means for holding said frame stationary when said carrier is in its normal position.

12. Load handling apparatus as claimed in claim 9, comprising rollers for supporting said frame, brake means for said rollers, and means to automatically apply said brake means when said carrier is in normal position.

13. Load handling apparatus as claimed in claim 9, comprising rollers for supporting said frame, brake means for said rollers, and means responsive to movement of said carrier for applying said brake means when the carrier is in normal and discharging positions and for releasing said brake means when the carrier is intermediate said positions.

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