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MACHINE FOR LIFTING AND STACKING RECEPTACLES

Filed Oct. 14, 1944

2 Sheets-Sheet 1

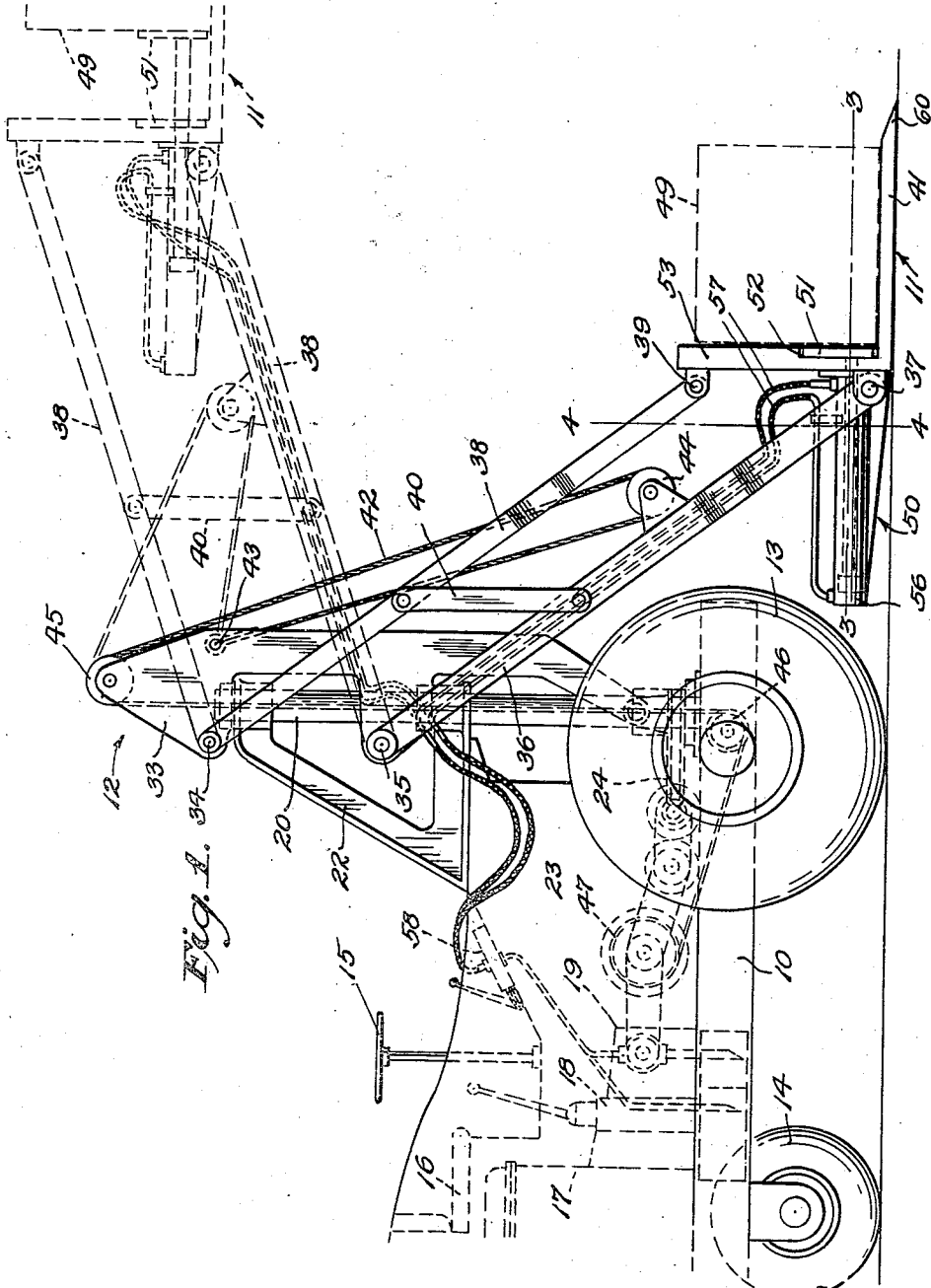


Fig. 1.

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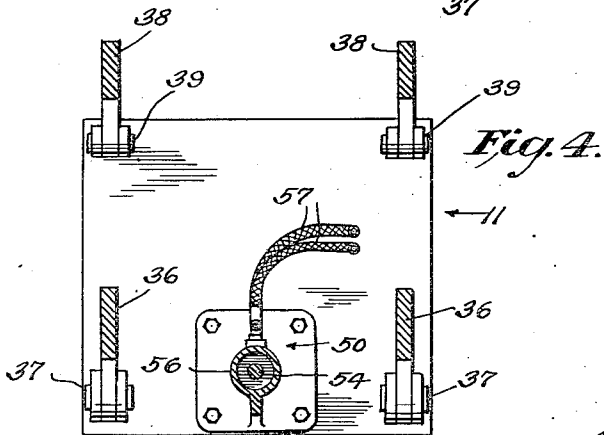
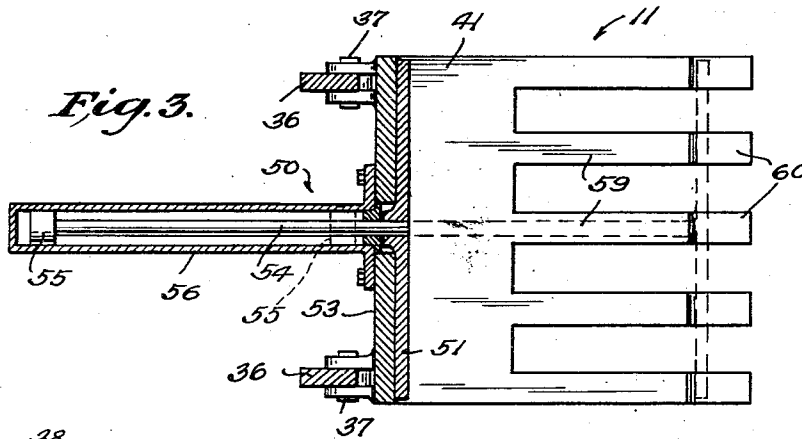
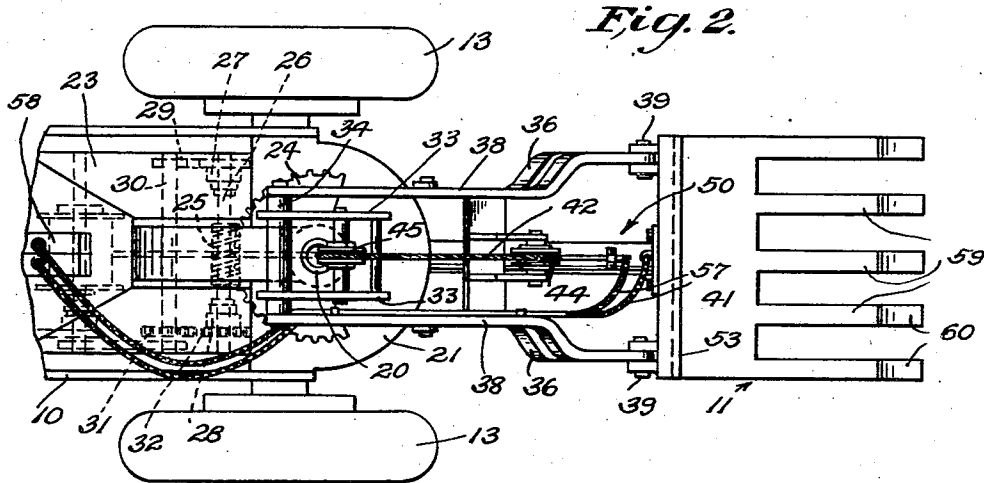
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MACHINE FOR LIFTING AND STACKING RECEPTACLES.

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2 Sheets-Sheet 2



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MACHINE FOR LIFTING AND STACKING RECEPTACLES

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2 Claims. (Cl. 214-132)

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This invention relates to loading machines and, more particularly, to loading machines of the type utilizing an automotive base vehicle having mounted at one end thereof a power actuated load receiver, the latter being supported by the base vehicle for swinging movement about vertical and horizontal axes for the purpose of raising and lowering and horizontally turning the load receiver to manipulate, eject and stack loads carried thereby.

It is an object of the invention to provide a loading machine of this character wherein improved power actuated means, under the convenient control of the machine operator, are provided for thrusting the load receiver when in a lowered position under loads such as boxes, barrels, bags and the like for the purpose of positioning such materials on the load receiver and thereafter raising the load receiver to a desired horizontal plane of material discharge, the receiver being provided with an ejector ram by which materials positioned on the receiver are forced from the latter when the receiver occupies an elevated position.

It is another object of the invention to provide a load-handling machine in which the automotive base vehicle is provided at one end with an upstanding mast turnable about a vertical axis, said mast carrying pivotally supported boom arms arranged in parallelogram order, the outer ends of the boom arms being pivotally connected with the load receiver, cable means being provided for raising and lowering said arms and the load receiver carried thereby, the arrangement of the boom arms being such as to maintain the base of the load receiver substantially horizontal while the receiver is being raised or lowered by the actuation of the boom arms and cable means, so that tilting of the load receiver and accidental discharge of materials positioned thereon are precluded.

It is another object of the invention to provide a loading machine of the type set forth characterized by the simplicity of its mechanical construction, the ease and convenience by which its operation may be governed, and by its compact and sturdy mechanical design, rendering the same adaptable for hard usage and extended service without mechanical failure.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawings, wherein:

Fig. 1 is a side elevational view of a loading machine formed in accordance with the present invention, the load receiver of the machine being

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shown in full lines in its lowered position and by broken lines in its elevated position of material discharge;

Fig. 2 is a top plan view of the forward end of the loading machine;

Fig. 3 is a horizontal sectional view taken through the load receiver and its ejector ring, the plane of the figure being indicated by the line 3-3 of Fig. 1;

Fig. 4 is a transverse vertical sectional view on the plane disclosed by the line 4-4 of Fig. 1.

Referring more particularly to the drawings, the numeral 10 designates the chassis or frame of an automotive base vehicle employed in the design of my improved loading machine; the numeral 11 designates the material-handling load receiver or carrier and the numeral 12 designates the mast employed on the base vehicle for use in the raising, lowering and turning of the load receiver between positions of material-reception and discharge.

The mast 12 is carried by the frame 10 at its forward or material-handling end, and is arranged immediately over a pair of engine propelled traction wheels 13 carried by the frame of the base vehicle. At its other end, the vehicle frame is provided with a ground engaging steering wheel or wheels 14, the operating positions of which being governed by the usual steering control 15 arranged adjacent to the operator's seat 16. Suitably supported by the frame of the base vehicle is a power plant 17, ordinarily an internal combustion engine, and associated with the same is the usual clutch and change-speed transmission 18 and differential 19, all of standard construction by means of which power may be applied to the traction wheels 13 through any suitable drive mechanism to effect their rotation.

The mast structure 12 includes an upright tubular column 20 which, at its lower end, is rotatably received in bearings provided on the bed plate 21 of the frame 10. Toward its upper end, the column is rotatably received within bearings formed in a bracket 22 carried by a machinery-encasing housing 23 mounted on the vehicle frame 10. Fixed to the lower end of the column 20 is a worm gear segment 24, the teeth of which mesh with a worm 25 carried by a cross shaft 26. To rotate the shaft 26, the same has associated therewith a pair of clutches 27 and 28. The clutch assembly 27 carries a sprocket around which passes an endless chain 29, the latter being also trained over a sprocket carried by a countershaft 30. The countershaft is driven by power derived from the engine 17 and also has

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fixed thereto a gear 31 which meshes with a gear 32 fixed to the clutch assembly 28.

By this arrangement and through selective operation of the clutches 27 and 28, the direction of rotation of the worm shaft may be readily controlled, thus turning the column 20 in the direction desired.

Turnable with the column 20 is a pair of mast plates 33. These plates carry upper and lower transversely extending shafts 34 and 35. A lower pair of boom arms, indicated at 36, have their rear ends pivotally positioned on the outer ends of the shaft 35, while the forward ends of the arms 36 are pivotally united, as at 37, with the lower rear portion of the load receiver 11. A second set of parallel boom arms 38 is employed above the arms 36. The arms 38 have their upper rear ends pivotally mounted on the shaft 34 of the mast frame and their forward ends pivotally connected as at 39 with the upper rear portion of the load receiver. The upper and lower sets of boom arms are further united by pivotally carried side links 40.

By this arrangement, and as shown in Fig. 1, during raising and lowering movement of the boom arms, the base portion 41 of the load receiver maintains in all positions a true horizontal plane, so that boxes, barrels, sacks or the like positioned on the load receiver will be maintained in stable positions and prevented from accidentally falling off the receiver. To raise and lower the boom arms and the receiver connected therewith, use is made of a cable 42. This cable at one end is anchored as at 43 to the mast frame. From its point of anchorage on the frame, the cable 42 extends to a sheave 44 carried by the lower set of boom arms 36.

After passing around the sheave 44, the cable extends upwardly and is passed over a sheave 45 rotatably mounted on the top of the mast frame formed by the plates 43. From the shaft 45, the cable 42 extends downwardly through the tubular column 20 and passes around a sheave 46 supported by the vehicle frame 10. From the sheave 46, the cable 42 extends to a drum 47 rotatably supported by the frame 10 within the housing 23 and to which drum the other end of the cable is connected.

The drum is provided with conventional clutch and brake controls and derives its power from a take-off shaft 48 projecting exteriorly from the transmission 18. Also, power from the shaft 48 is transmitted to the countershaft 30 employed in driving the clutches 27 and 28. Thus, through the rotation of the drum 47, the cable 42 may be wound about or withdrawn from the same so that the variations in the effective length of the cable will cause the raising and lowering of the boom arms and their associated load receiver.

Thus, by manipulation of the base vehicle, the load receiver may be advanced so that its base portion 41 will receive a box as indicated at 49. When the box is thus positioned on the load receiver, with the latter in its lowered position, the drum 47 is operated to shorten the effective length of the cable and thereby elevate the boom arms and load receiver while the same assume, for example, the positions indicated by broken lines in Fig. 1 of the drawings. If it is desired to swing the load receiver horizontally so that the same will be positioned laterally of the base vehicle, one or the other of the clutches 27 and 28 is operated to cause turning movement of the mast structure about its vertical axis, which results in swinging the load receiver to a desired lateral

position within the range limits of the machine.

To discharge the load, such as the box 49, from the load receiver, use is made of an ejector ram 50. This ram comprises a pusher bar 51 which, when retracted, occupies a recess 52 provided in the upright wall 53 of the load receiver. The bar 51 is connected with the forward end of a piston rod 54, the opposite or rear end of the rod being joined with a piston 55 which is slidably mounted in a cylinder 56, the latter being fixed to the rear of the wall 53 and is disposed in a horizontal position.

Fluid conducting lines 57 lead to opposite ends of the cylinder 56 and extend along the boom arms 36 to the column 20, leading from said column to a control valve 58 arranged in convenient reach of the machine operator. The engine 17 drives a pump which supplies fluid under pressure to the control valve and the lines 57 associated therewith so that fluid under pressure may be introduced selectively into one end or the other of said cylinder to control the movement and operational positions of the pusher bar 51. When this bar moves forwardly, the box 49, or other load carried by the receiver will be forced from the base portion 41 and deposited on an elevated support, thus simplifying the operation of stacking heavy boxes or the like in vertical order with one placed above another.

The base portion 41 may be formed with fingers 59 having beveled forward edges 60, which simplify the operation of forcing the load receiver beneath boxes or other containers to be handled thereby.

In view of the foregoing, it will be seen that the present invention provides an improved loading machine for use in many industrial capacities where boxes or containers of various kinds are required to be elevated or otherwise transferred from one location to another. A particular advantage which the machine possesses is found in constructing the boom arms in the form of a parallelogram so that the load receiver will, in all positions of operation, be maintained in a true horizontal plane and held against tipping or rocking. Another advantage is to be found in the employment of the pusher bar for discharging commodities from the load receiver while the latter is in an elevated position and other advantages are to be found in coordinating the cable control with the tubular mast so that the load receiver will be under the control of the machine operator when the latter occupies a position at the rear end of the machine.

While I have shown and described a preferred embodiment of the present invention, nevertheless, it will be understood that the same is subject to considerable variation and modification without departing from the scope of the following claims.

I claim:

1. A loading machine comprising a frame having steering and driving wheels at the opposite ends thereof, an operating engine supported by said frame and disposed over said steering wheels, means driven by said engine for imparting power to said driving wheels, a vertical mast structure supported by said frame at one end thereof and disposed over said driving wheels, reversible power-transmitting means driven by said engine for turning said mast structure about its vertical axis, spaced upper and lower pairs of boom arms having their inner ends pivotally connected in vertically aligned order with said mast structure, a load carrier having a substantially vertical rear

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wall and a horizontal bottom wall, vertically aligned means pivotally uniting the outer ends of said boom arms with the rear wall of said carrier, a drum driven by said engine and rotatably mounted on said frame between said mast structure and said engine, a cable connected at one end with said mast structure and trained around guides carried by said boom arms and said mast structure to said drum, whereby to raise and lower said boom arms and carrier, and a slidable ejector ram mounted on the rear wall of said carrier.

2. A loading machine comprising a frame having steering and driving wheels at the opposite ends thereof, an operating engine supported by said frame and disposed over said steering wheels, means driven by said engine for imparting power to said driving wheels, a vertical mast structure supported by said frame at one end thereof and disposed over said driving wheels, reversible power-transmitting means driven by said engine for turning said mast structure about its vertical

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axis, spaced upper and lower pairs of boom arms having their inner ends pivotally connected in vertically aligned order with said mast structure, a load carrier having a substantially vertical rear wall and a horizontal bottom wall, vertically aligned means pivotally uniting the outer ends of said boom arms with the rear wall of said carrier, a drum driven by said engine and rotatably mounted on said frame between said mast structure and said engine, a cable connected at one end with said mast structure and trained around guides carried by said boom arms and said mast structure to said drum, whereby to raise and lower said boom arms and carrier, a slidable ejector ram mounted on the rear wall of said carrier, said ram embodying a cylinder projecting horizontally from the rear wall of said carrier between the outer ends of the lower of said boom arms, and a fluid-actuated piston mounted in said cylinder and with which the ejector ram is connected.

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