

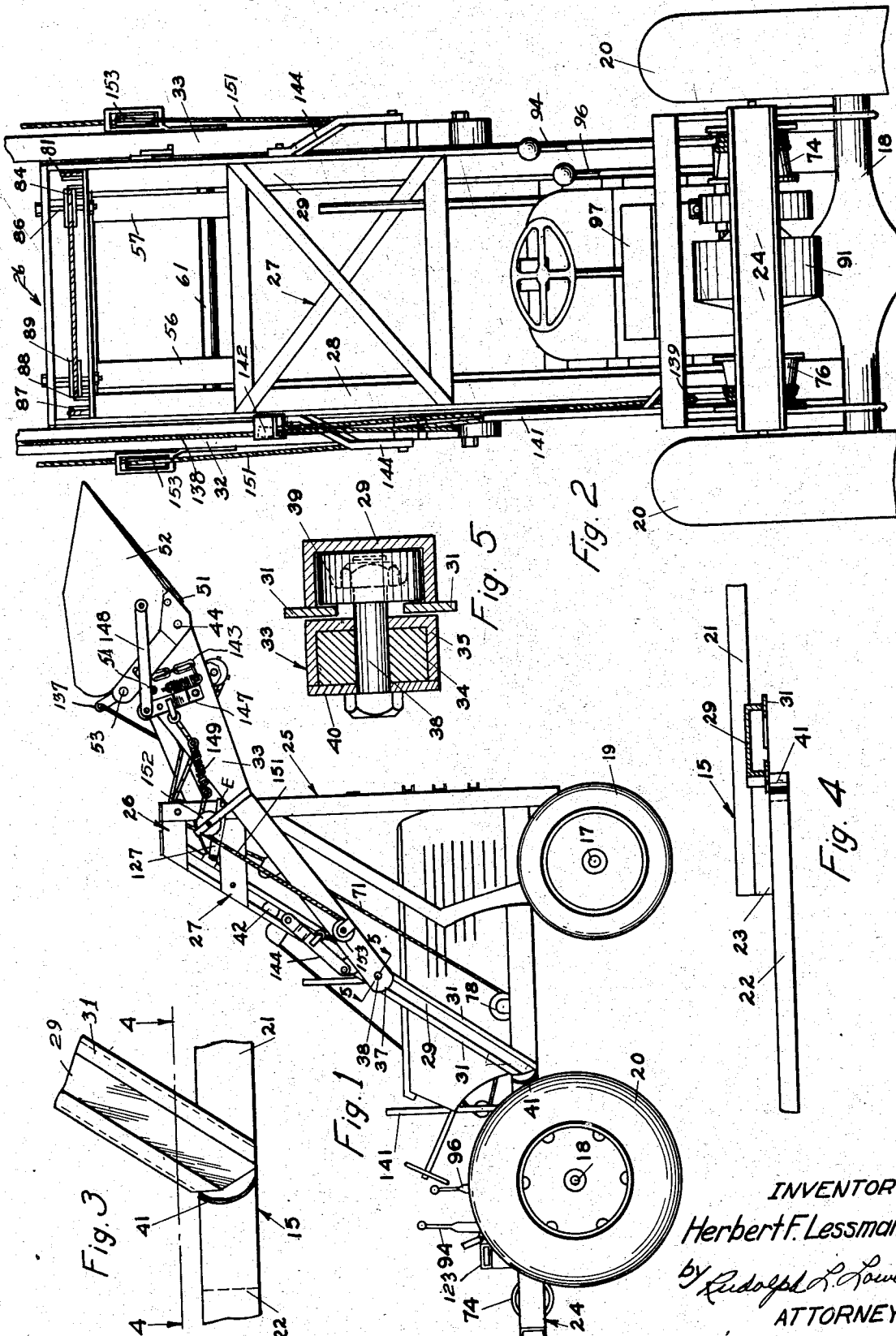
March 5, 1946.

H. F. LESSMANN

2,396,107

LOADING MACHINE
Filed May 29, 1944

4 Sheets-Sheet 1



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March 5, 1946.

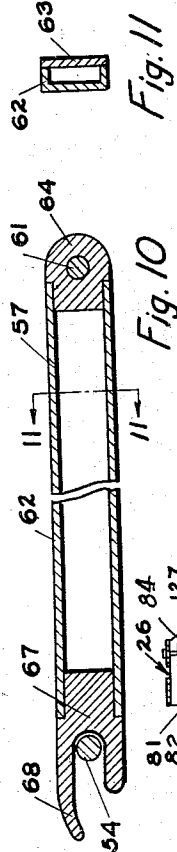
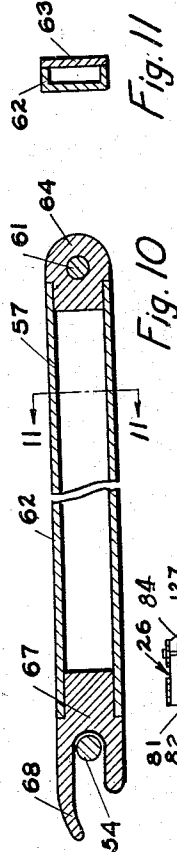
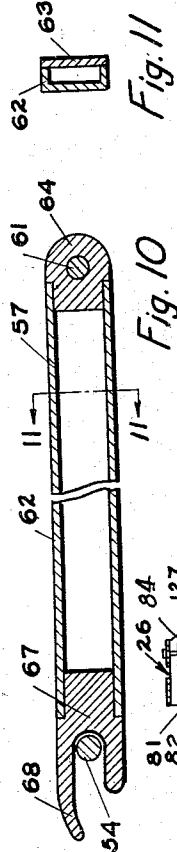
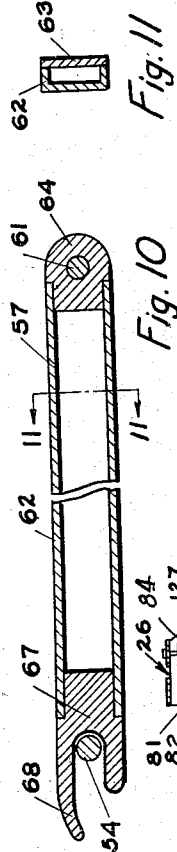
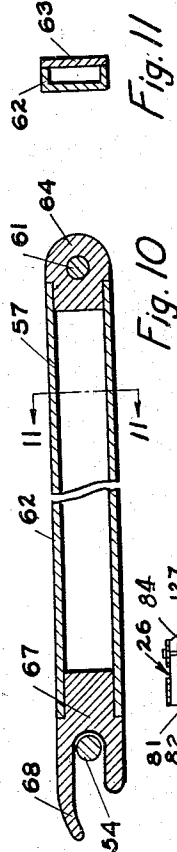
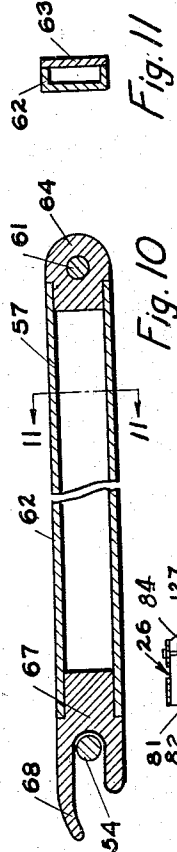
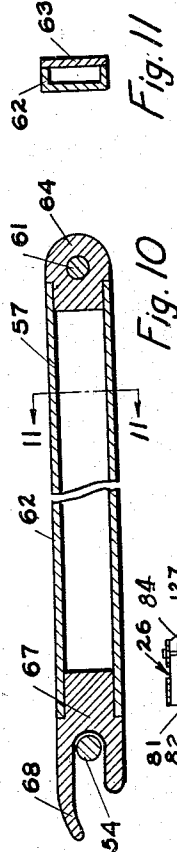
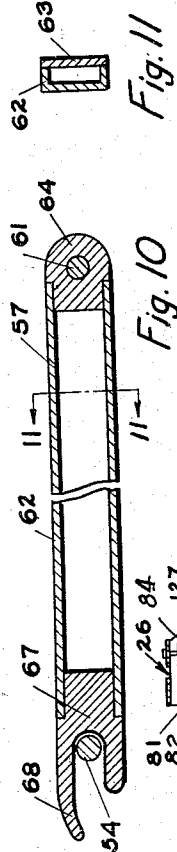
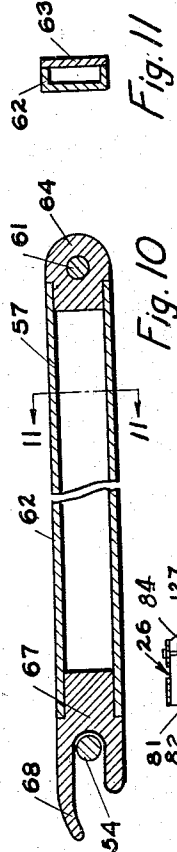
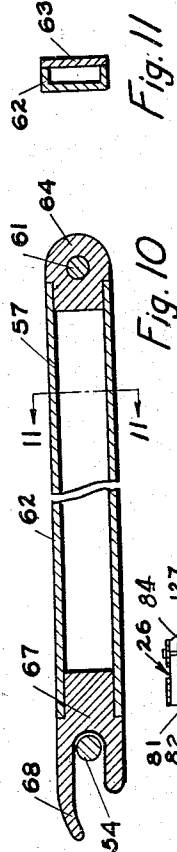
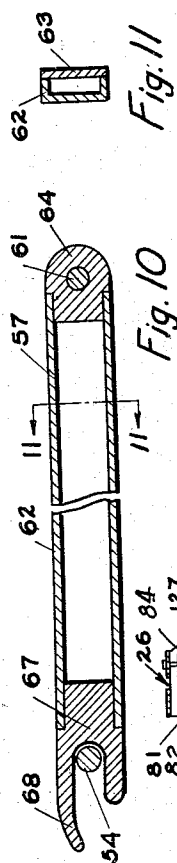
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2,396,107

4 Sheets-Sheet 2



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LOADING MACHINE

Filed May 29, 1944

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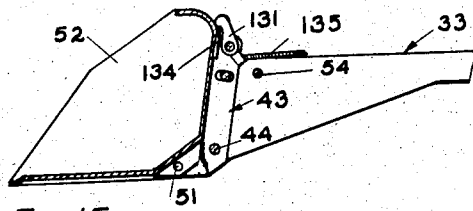


Fig. 15

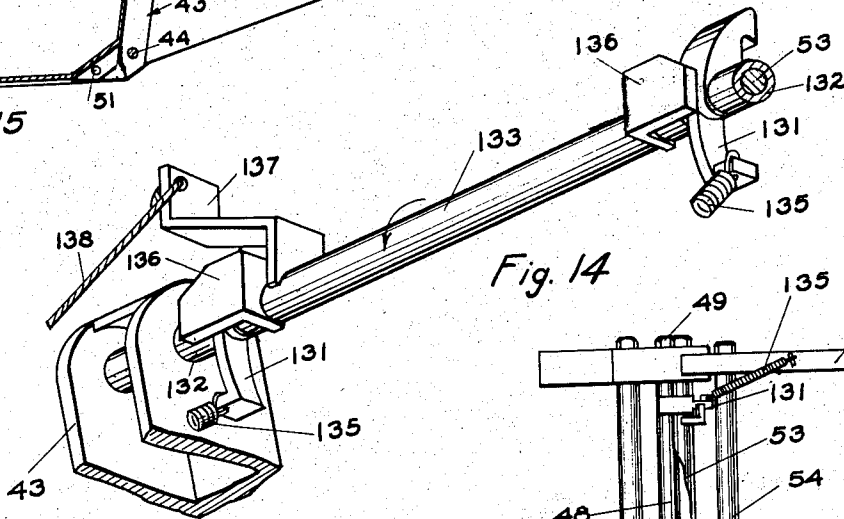


Fig. 14

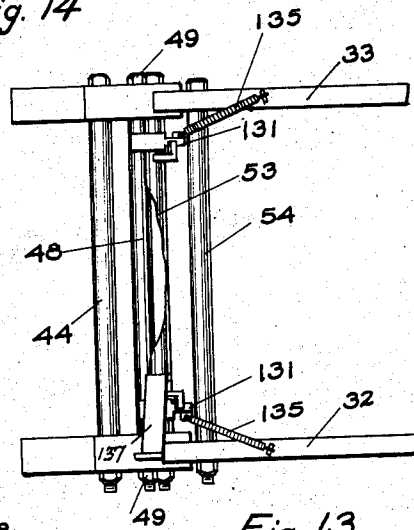


Fig. 13

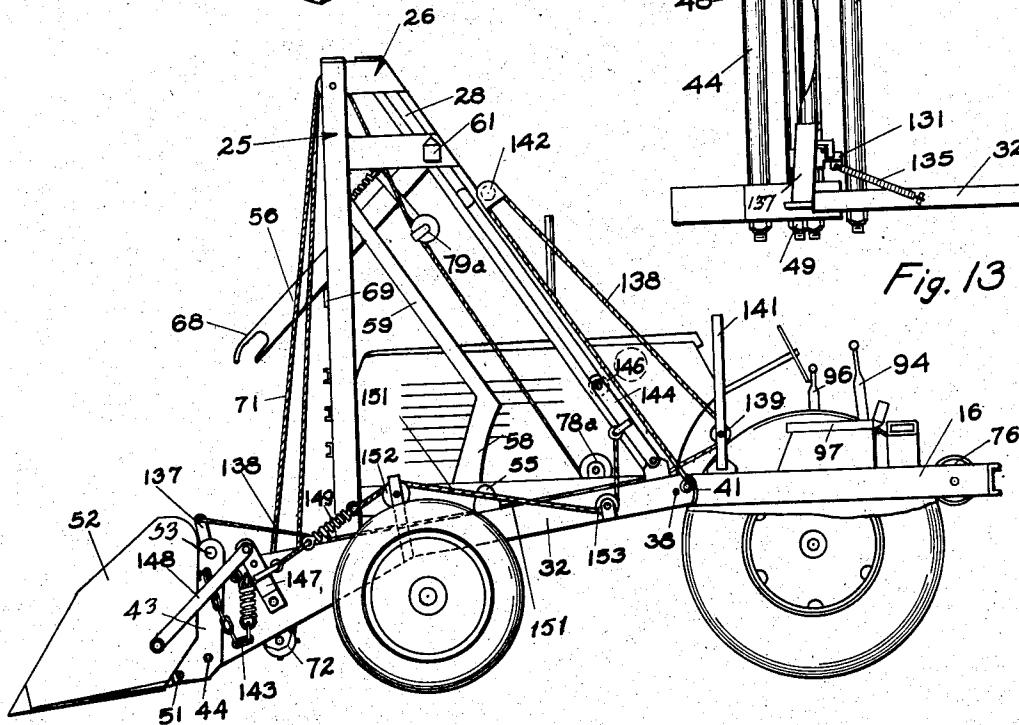


Fig. 12

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LOADING MACHINE

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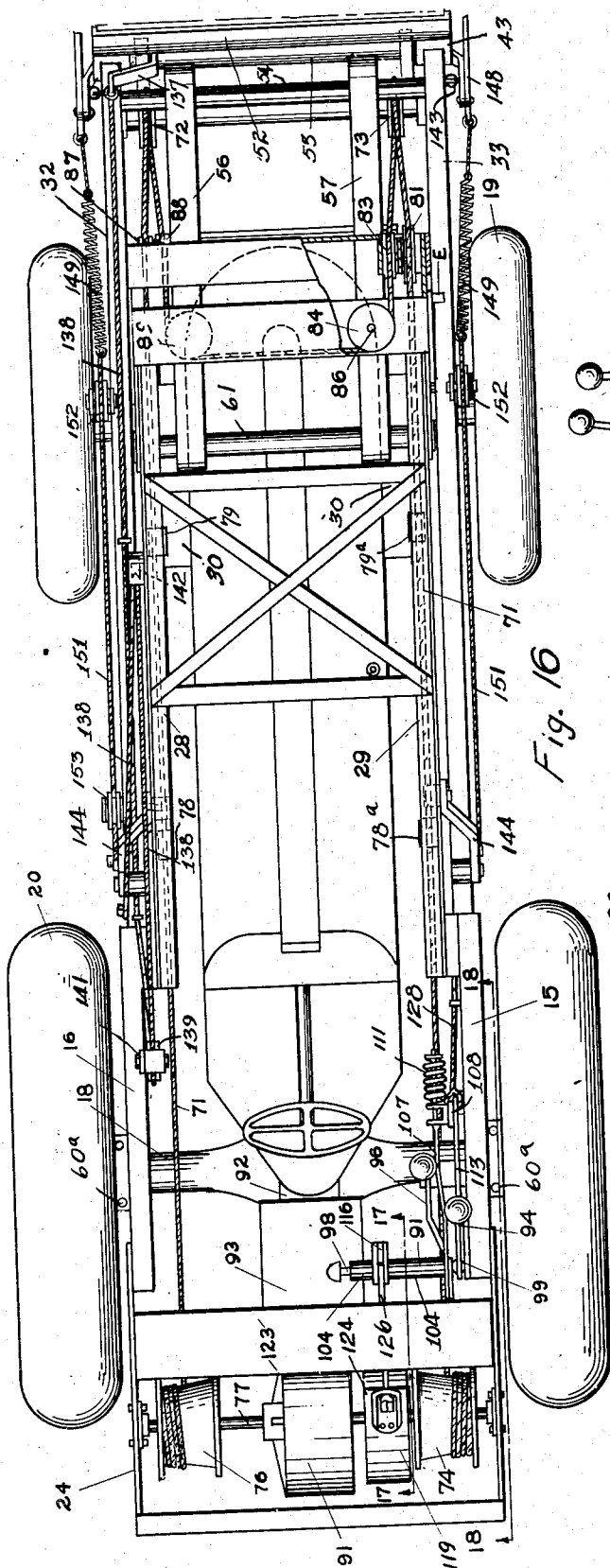


Fig. 16

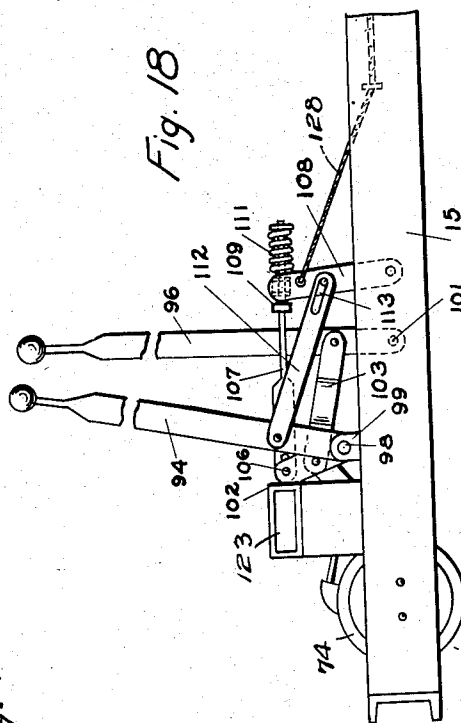


Fig. 18

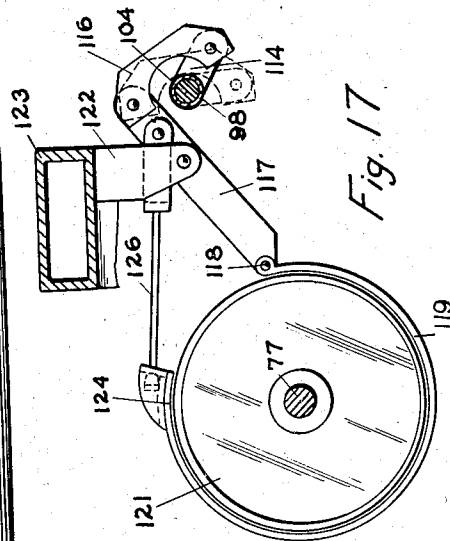


Fig. 17

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UNITED STATES PATENT OFFICE

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LOADING MACHINE

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Application May 29, 1944, Serial No. 537,846

12 Claims. (Cl. 214—139)

This invention relates generally to loading machines and in particular to a loading attachment for a tractor.

It is an object of this invention to provide a portable loading machine in which a load-carrying unit is elevated to a predetermined height adjacent an upright frame and then moved forwardly away from the upright frame to facilitate dumping the load in trucks and the like.

Another object of this invention is to provide a loading attachment for a tractor which is capable of being completely mounted on the tractor frame in a load-balancing arrangement with load hoisting means.

Yet another object of this invention is to provide a loading machine having a pair of pivoted arms, in which a shovel or scoop carried on the arms is automatically moved to a normal loading position on lowering of the arms from a dumping position for the shovel.

A further object of this invention is to provide a loading machine having a clutch operated hoisting means, and a brake for arresting the hoisting means in an operated position, in which a clutch lever and a brake lever are inter-connected for concurrent and complementary action whereby either the clutch mechanism or the brake mechanism is always in an operated position.

A feature of this invention is found in the provision of a tractor mounted loading attachment having an upright frame and a pair of pivoted lifting arms arranged at opposite sides of the frame, in which the front ends of the arms project forwardly of the frame and carry a shovel therebetween, and carry pivots at their rear ends movable longitudinally of frame members inclined rearwardly and downwardly from the upright frame. The arm pivots are releasably retained in a fixed position during the initial elevation of the shovel to a predetermined height, at which height the lifting arms are engaged by booster arms pivoted on the upright frame and adapted to move the lifting arms forwardly of the frame concurrently with the upward movement of the pivots longitudinally of the inclined frame members, whereby the shovel at a maximum elevated position is positioned forwardly and away from the upright frame.

Further objects, features and advantages of this invention will become apparent from the following description when taken in connection with the accompanying drawings in which:

Fig. 1 is a side elevational view of the loading attachment of this invention in assembly relation

with a tractor, with the load-carrying unit being shown in its uppermost position;

Fig. 2 is an enlarged rear elevational view of the loading attachment mounted on a tractor;

Fig. 3 is a fragmentary elevational view showing the assembly of the rear end of the upright frame of the loading attachment with the attachment frame;

Fig. 4 is a sectional view as seen along the line 4—4 in Fig. 3;

Fig. 5 is a sectional view taken along the line 5—5 in Fig. 1;

Fig. 6 is a longitudinal sectional view of the loading attachment showing the load-lifting arms in a partially elevated position, with the body of the tractor and the load-carrying unit being removed for the purpose of clarity;

Fig. 7 is an enlarged front elevational view of the loader attachment removed from the tractor frame;

Fig. 8 is a longitudinal sectional view of a load-lifting arm as seen along the line 8—8 in Fig. 7;

Fig. 9 is a transverse sectional view of a load-lifting arm taken along the line 9—9 in Fig. 8;

Fig. 10 is a longitudinal sectional view of a booster arm on the line 10—10 in Fig. 7;

Fig. 11 is a transverse sectional view of a booster arm as seen along the line 11—11 in Fig. 10;

Fig. 12 is a side elevational view of the loading attachment, shown in assembly relation with a tractor and with the load-carrying unit in a loading or lowermost position;

Fig. 13 is an enlarged plan view taken on the line 13—13 in Fig. 6 showing the assembly of forward ends of the lifting arms;

Fig. 14 is a detail rear perspective view of the latching mechanism for holding the load-carrying unit in a normal position;

Fig. 15 is a fragmentary side elevational view of the load-carrying unit, with the load-carrying unit shown in section and in a locked position;

Fig. 16 is a plan view of the loading attachment and tractor assembly shown in Fig. 6, with the scoop broken away and a part of the mechanism for automatically stopping the scoop at its maximum position omitted for the purpose of clarity;

Fig. 17 is a sectional view on the line 17—17 in Fig. 16 showing a part of the brake and clutch mechanism for the hoisting means; and

Fig. 18 is a sectional view along the line 18—18 in Fig. 16 showing a brake lever and a clutch lever for the hoisting means connected together for complementary operation by a lost motion mechanism.

The loading machine of this invention is illus-

trated in the drawings as applied to a usual industrial tractor and includes an upright frame carried at the forward end of a horizontal frame for the attachment, which horizontal or main frame is positioned about and secured to the tractor frame. A pair of pivoted lifting arms are positioned at opposite sides of the horizontal attachment frame and have pivot means at their rear ends movably supported on frame or guide members inclined downwardly and rearwardly from the upright frame to the attachment or main frame. The front or free ends of the lifting arms project forwardly of the upright frame and carry a load-carrying unit which is elevated and lowered by hoisting means including a cable suspended from the upright frame and operatively connected with the front ends of the lifting arms.

When the load-carrying unit is in a lowered position the pivot means at the rear ends of the lifting arms are at their lowermost positions of travel on the inclined guide members. At this position of the lifting arm pivot means, each lifting arm has a portion at its rear end in contacting engagement with a part of the attachment main frame so that when the load-carrying unit is being loaded, as by a usual bucking operation, the bucking force is applied through a lifting arm against the main frame. The pivot means are thus entirely free of the bucking force.

On an initial elevation of the load-carrying unit the pivot means are releasably retained in their lowermost positions by curved upright guides supported on the main frame and adapted for contacting engagement with the lifting arms. As a result the lifting arms are only pivotally movable upwardly to initially raise the load-carrying unit in a path adjacent the forward side of the upright frame to a predetermined elevation. On a continued raising of the load-carrying unit, above such predetermined elevation, the lifting arms are moved out of contacting engagement with the curved upright guides concurrently with the engagement of the lifting arms by the free ends of booster arms pivotally supported from a position adjacent the top of the upright frame. The booster arms act to move the lifting arms in a direction toward the front of the tractor, to in turn move the load-carrying unit forwardly away from the upright frame.

During this action of the booster arms the pivot means for the lifting arms are moved upwardly on the inclined guide members. The concurrent forward and pivotal movement of the lifting arms continues until the load-carrying unit is raised to its highest elevation. At this elevation the load-carrying unit is at a distance forwardly of the upright frame such that the loading machine is able to be readily driven adjacent a dump truck or the like with the loading unit positioned above the truck body, whereby the material in the load-carrying unit can be dumped directly into the truck.

It is seen, therefore, that the load-carrying unit is filled and initially raised while it is adjacent to the upright frame so as to appreciably reduce any tendency of the rear end of the tractor being lifted from the ground during these operations, and that the load-carrying unit is moved forwardly away from the upright frame only as it approaches its maximum elevation.

The tendency of the rear end of the tractor being tipped upwardly is further reduced by the arrangement of a hoisting means on the main attachment frame in a position rearwardly of the tractor rear axle. A cable winding means in the

hoisting means includes a pair of winding drums mounted adjacent opposite ends of a shaft rotatably supported on the main frame. A single cable has its opposite ends attached to the drums and is operatively associated with pulleys on the upright frame and at the free ends of the lifting arms so as to provide for an equalized or balanced pulling force on the lifting arms whereby the arms are positively lifted together.

The hoisting means also includes manually operated clutch and brake control levers for controlling the operation of the winding drums. These two levers are connected together by a lost motion mechanism to provide for a complementary action on manipulation of either one of the two levers. In other words the clutch lever on being operated also operates the brake lever so that the rotation of the winding drums is arrested or stopped when the clutch mechanism is disengaged, and the brake released when the clutch mechanism is engaged with the driving means for the winding drums. As a result the usual neutral position between the braking and clutching operations is eliminated, with a proper sequence of these operations taking place by virtue of the lost motion in the mechanism connecting the brake and clutch levers. The lost motion in the connecting mechanism also provides for a manipulation of the brake lever independently of the clutch lever between defined limits.

With reference to the drawings the invention is shown in Figs. 1, 6 and 12 in assembly relation with a tractor having a front axle 17, a rear axle 18, front wheels 19 and rear wheels 20. The loading attachment has a main frame, extended about and secured to the tractor frame, and including longitudinal frame members 15 and 16. The frame members 15 and 16 are mounted adjacent their forward ends on the tractor by means including connecting members 30, with the rear end portions of the members 15 and 16 being mounted on the tractor rear axle 18 on blocks 60 and secured to the axle by a usual U-clamp 60a (Figs. 6 and 16).

Each frame member 15 and 16 is comprised of a front portion or section 21 laterally offset from a rear section 22 (Figs. 3 and 4). At the offset the adjacent ends of the front section 21 and rear section 22 are in an overlapping relation and spaced apart from each other by a separating member 23, which is welded or otherwise secured between the overlapped ends in a parallel relation with the front and rear sections 21 and 22, respectively, so that each frame member 15 and 16 is of a unit construction. A rear frame extension, indicated generally at 24 (Figs. 2 and 16) is attached to and extended rearwardly from the frame members 15 and 16 for a purpose which will be later explained.

Mounted on the front ends of the members 15 and 16 is an upright frame section 25, including a horizontal top frame section 26 and a downwardly and rearwardly inclined frame section 27 (Figs. 1 and 2). The rear frame section 27 includes a pair of frame members 28 and 29 arranged at opposite sides of the upright frame 25 and having their lower ends terminated at the offset in the main frame members 15 and 16. As shown in Figs. 4 and 5 the frame members 28 and 29 are of a channel construction with a flat track section 31 extended laterally across the free end of each channel leg to constitute guides or track means for a pair of lifting arms 32 and 33. Each frame member 28 and 29 is located substantially

in the plane of a corresponding separating or spacing member 23 in the main frame members 16 and 15, respectively.

The lifting arms 32 and 33 are positioned at opposite sides of the tractor frame. Since each lifting arm is of a like construction and similarly assembled with a corresponding frame or guide member 28 and 29 only the arm 32 will be referred to in the following detailed description.

The arm 32 is of a box-like construction having a rounded rear end and an outwardly tapered front end and is comprised of a channel member 35 having a flat plate 40 welded on each side thereof (Figs. 6, 8 and 9). The top of the arm 32 is closed by the upper leg of the channel member 35, while the forward end of the bottom of the arm 32 is closed by a plate member 45 welded between the arm side members 40. As clearly appears in Fig. 8 the bottom of the arm 32 over its rear portion is closed by the lower leg of the channel member 35. The rear end of the arm 32 includes a bearing block 34 having a straight portion 36 adapted to be inserted within and welded to the rear end of the arm, and a rounded portion 37 which projects outwardly from the main body of the arm.

A pivot means 38 for each arm 32 and 33 is rotatably supported in a bearing block 34 (Figs. 5 and 8). Mounted at one end of the pivot 38 is a roller 39 receivable within the channel of a corresponding frame member 28 and 29 for movement longitudinally of such member. The roller 39 is guidably retained within the channel by the guide or retaining sections 31. With the rollers 39 in assembly relation with the frame members 28 and 29, the arms 32 and 33 are adjacent a corresponding frame member 28 and 29 and substantially in the plane of a rear section 22 in the main frame members 15 and 16. It is seen, therefore, that each lifting arm 32 and 33 is supported at its rear end for up and down pivotal movement, and for movement forwardly and rearwardly of the tractor by virtue of the support of the rollers 39 for movement longitudinally of the frame members 28 and 29.

As shown for the lifting arm 33 in Figs. 1 and 3 the downward movement of a pivot means 38 and in turn of an associated roller 39 is limited by the coacting engagement of the rounded portion 37 of the bearing block 34 with a mating curved stop member 41 welded to the front of the rear section 22 of the main frame member 15. The stop member 41 is extended below the lower end of the inclined guide or frame member 29 so that a mating engagement is accomplished when the pivot means 38 is moved to its lowermost position. When the pivot means 38 is at this position the arm 33 is capable of being pivotally moved by virtue of the rotational movement of the bearing block 34 relative to the stop member 41. To facilitate the assembly of the rollers 39 on the arms 32 and 33 with the inclined channel frame members 28 and 29 an opening 42 is provided in the sides of the guide members 28 and 29 of a size to freely receive the rollers 39. The opening 42 is adjacent the top of the frame members 28 and 29 at a position above the usual travel of the rollers 39 during a normal operation of the loading machine.

The front ends of the arms 32 and 33 are of an open construction, as shown for the arm 32 in Figs. 6 and 8, and each arm carries a like adjustable combination supporting and cover unit or shovel seat 43 of a substantially channel shape in cross section which are pivotally supported on

a rod 44 carried between the arms 32 and 33. The pivotal adjustment of the supporting units 43 about the rod 44, for a purpose to be later noted, is accomplished by the provision of aligned slots 46 and 47 in the arms 32 and 33, and supporting units 43, respectively, through which is inserted a rod 48 having adjusting nuts 49 (Figs. 6, 7 and 8).

The lower ends of the units 43 are extended forwardly from the arms 32 and 33 and carry pins 51 on which a scoop or load-carrying unit 52, shown in Figs. 1 and 13, is pivotally supported. The upper ends of the units 43 project above the top level of the arms 32 and 33. A shaft 53 for carrying a latch and trip mechanism for the scoop 52 is rotatably supported between the upper ends of the units 43. Supported between the front ends of the arms 32 and 33 rearwardly of the supporting units 43 and substantially behind the rod 48 is a rod 54 adapted to engage a pair of booster arms 56 and 57 (Fig. 7).

Substantially intermediate the ends of each arm 32 and 33 and supported on the top side thereof is a roller 55 adapted for rolling engagement with a corresponding upright curved guide 58. A guide 58 is supported on each of the main frame members 15 and 16 and has its upper end inclined upwardly and forwardly for connection with the upright frame 25 by a connecting member 59 integrally formed with a guide 58. The arc of curvature of the guide 58 corresponds to the arc of movement defined by a roller 55 on pivotal movement of a lifting arm with the pivot means 38 positioned at its lowermost position of travel relative to a frame member 28 and 29.

The booster arms 56 and 57 are pivotally supported at their upper or rear ends on a rod 61 mounted between the frame members 28 and 29 adjacent their top, and extend downwardly between the lifting arms 32 and 33 to a position forwardly of the upright frame 25. The booster arms 56 and 57 are of a like construction so that only the booster arm 57 will be described in detail.

As shown in Figs. 10 and 11 the booster arm 57 is of a box-like construction comprised of a channel member 62 having its open side closed by a plate member 63. A bearing block 64 is inserted within and welded to the rear end of the booster arm 57 and is provided with an opening for receiving the rod 61. Inserted within the front end of the booster arm 57 is a block member 67 having a bifurcated end portion 68 projected forwardly of the arm 57, with the bifurcations adapted to receive the shaft 54 therebetween.

In the operation of the loading machine assume the arms 32 and 33 to be in their lowermost position of travel as shown in Fig. 12. At this position of the lifting arms 32 and 33 the pivot means 38 are at their lowermost positions relative to the frame members 28 and 29, with the bearing blocks 34 in contacting engagement with the stop members 41. The rollers 55 in turn are in contacting engagement with the curved guides 58 adjacent the lower end of such guides. Since the booster arms 56 and 57 are freely pivotally supported on the rod 61 their front or free ends, when they are out of engagement with the shaft 54, are held in a position forwardly of the upright frame 25 by a cross member 69 extended laterally of the upright frame.

On initial raising of the lifting arms 32 and 33 by a single lifting cable 71 suspended from the upright frame 25 and operatively connected to the forward ends of the arms 32 and 33 at pulleys 72 and 73, respectively, the arms 32 and 33 are

only pivotally moved about the pivot means 38 by virtue of the guiding engagement of the rollers 55 with the curved guides 58. This engagement maintains the pivotal means 38 at their lowermost positions on the frame members 28 and 29.

The initial upward pivotal movement of the lifting arms 32 and 33 continues until the rollers 55 are moved upwardly to a position out of contacting engagement with the guides 58. As the rollers 55 approach this position the shaft 54 between the lifting arms 32 and 33 enters between the bifurcations at the front ends 68 of the booster arms 56 and 57. As the lifting arms 32 and 33 continue to move upwardly they are concurrently moved forwardly of the upright frame 25 by the travel of the booster arms 56 and 57 about their pivotal support 61. On a forward movement of the lifting arms 32 and 33 the pivot means 38 are moved upwardly on the frame members 28 and 29. The concurrent pivotal and forward movement of the lifting arms 32 and 33 provides for the scoop 52 being moved forwardly away from the upright frame 25 as it is raised to its maximum elevated position shown in Fig. 1. On dumping of the scoop 52 the lifting arms 32 and 33, on lowering of the cable 71, are returned to their lowermost positions, shown in Fig. 12, by the cooperating action of the booster arms 56 and 57 and the rollers 55 and guides 58.

It is seen, therefore, that the scoop 52 is initially elevated to a predetermined height along an arcuate path adjacent to the upright frame 25 so as to reduce the tendency of the rear tractor wheels 20 being raised from the ground. The predetermined height is such that a portion of the weight of the load in the scoop 52 is applied against the rear wheels 20 to maintain them in a grounded position prior to the operation of the booster arms 56 and 57 to move the scoop 52 forwardly away from the upright frame 25.

The loading of the scoop 52 is accomplished when the arms 32 and 33 are in their lowermost positions, shown in Fig. 12, by driving the tractor forwardly into the material to be loaded. For various materials, and for different elevations of the material with respect to the elevation of the tractor, it is necessary to have various positions of the scoop relative to the ground. Since the scoop 52 is pivoted on the supporting units 43 this adjustment is simply accomplished by loosening the nuts 49 on the shaft 48 and then pivoting the supporting units 43 about the shaft 44 until the scoop is at a desired angle relative to the ground. The nuts 49 are then tightened to hold the scoop in an adjusted position.

In a bucking operation it is apparent that an appreciable force is applied on the arms 32 and 33 in a rearward direction. In the present invention this force is transmitted from the arms 32 and 33 directly to the rear sections 22 of the main frame members 15 and 16 so as to be counteracted at all times by members capable of withstanding large strains. The transmission of the bucking force through the lifting arms to the frame members 15 and 16 takes place by virtue of the contacting engagement between the bearing blocks 34 at the rear ends of the lifting arms, with the stop members 41 at the front ends of the rear sections 22 of the frame members 15 and 16. No part of the bucking forces, therefore, is at any time applied to the pivot means 38 or rollers 39.

The hoisting means for elevating and lowering the arms 32 and 33 includes the single cable 71, previously mentioned, which has its opposite ends

attached to winding drums 74 and 76 mounted at opposite ends of a shaft 77 rotatably supported transversely of the rear frame unit 24 (Figs. 2, 6 and 16). The cable 71 from the winding drum 74 passes under a pulley 78, carried on the main frame member 15, and upwardly under a tensioning pulley 79 supported on an arm 80 pivoted on the upright frame 25 and acted upon by a tension spring 85. From the pulley 79 the cable 71 extends over a pulley 81 supported for rotation in a vertical plane on a shaft 82 carried in the top of the frame portion 26. Cable 71 extends downwardly from the pulley 81 (Fig. 7) about the pulley 73 at the forward end of the lifting arm 33 and then upwardly about a pulley 83 rotatably supported on the shaft 82 adjacent the pulley 81. From the pulley 83 the cable passes about a pulley 84 located rearwardly of the pulleys 81 and 83 and rotatably supported on a pin 86 in the top frame section 26 for rotation in a horizontal plane (Figs. 2 and 16).

An arrangement of pulleys 87, 88 and 89 similar to the pulley arrangement 81, 83 and 84, respectively, is operatively associated with the pulley 72 for the lifting arm 33, the cable 71 from the pulley 84 passing about the pulleys 89 and 88 downwardly to the pulley 72, upwardly about the pulley 87, and then downwardly under a tensioning pulley 79a and a pulley 78a to the winding drum 76, the pulleys 79a and 78a being constructed and assembled with the main frame member 16 and upright frame 25, respectively, in all respects similar to the construction and assembly of the pulleys 79 and 78 with the main frame member 15 and upright frame 25, respectively (Figs. 7, 12 and 16).

Thus by the use of a single cable 71 for elevating both of the lifting arms 32 and 33 the opposite ends of the cable 71 are concurrently acted upon by the winding drums 74 and 76. Any tendency of one of the lifting arms 32 and 33 to lag or lead the other arm during a lifting operation is thus entirely eliminated since any slipping or slack at one end of the cable 71 is immediately taken up at the other cable end.

The shaft 77 on which the winding drums 74 and 76 are mounted is connected through a transmission mechanism, indicated generally at 91, with a power take-off 92 for the tractor through a clutch mechanism 93 (Fig. 16). The winding drums, transmission 91, and clutch mechanism 93 are all supported on the rear frame unit 24 at positions rearwardly of the tractor rear axle 18. As a result of this arrangement of these parts, their weight counter-balances a portion of the load lifted by the arms 32 and 33 whereby to reduce the tendency of the rear end of the tractor being tipped upwardly when large loads are to be raised.

The elevating and lowering of the lifting arms by the cable 71 is controlled by a manually controlled clutch lever 94 and brake lever 96 (Figs. 16, 17 and 18), which are conveniently and accessibly located relative to the tractor operator's seat 97. A clutch shaft 98 arranged transversely of the tractor frame is rotatably supported in the housing for the clutch mechanism 93 and in a bracket 99 mounted on the main frame member 15. The clutch lever 94 is mounted on the clutch shaft 98 adjacent to the frame member 15. The clutch mechanism 93 is operated to connect and disconnect the transmission 91 with the power take-off 92 by merely moving the clutch lever 94 rearwardly and forwardly, respectively,

of the tractor, or to the left and right as viewed in Fig. 18, to in turn rotate the shaft 98.

The brake lever 96 is pivoted at 101 to the main frame member 15, and is pivotally connected to a rocker arm 102 through a link member 103. The rocker arm 102 is mounted on a sleeve 104 which is rotatable on the shaft 98, the free end of the rocker arm being slidably connected by a pin and slot connection 106 with a lever 107. The opposite end of the lever 107 is slidably connected with the free end of an arm 108 pivoted on the frame member 15 forwardly of the brake lever 96. A slidable movement of the lever 107 relative to the arm 108 is limited in one direction by a stop 109 and in the other direction by the action of a compression spring 111. The clutch control lever 94 is pivoted to one end of a lever 112 the opposite end of which is connected with the arm 108 through a pin and slot connection 113.

Mounted on the rotatable sleeve 104 is a second rocker arm 114 having its free end pivoted between the corresponding one ends of a double C-shaped toggle link 116. A lever 117 has one end pivoted between the opposite corresponding ends of the C link 116, while the other end of the lever 117 is pivoted to one end 118 of a brake band 119 operatively associated with a brake drum 121 mounted on the shaft 77. The lever 117 is pivotally supported intermediate its ends on a bracket 122 suspended from a frame member 123 extended laterally across the rear frame unit 24. The opposite end 124 of the brake band 119 is connected to a rod 126 having its free end pivoted to the lever 117 intermediate the pivotal connections of the lever 117 with the bracket 122 and the C link 116.

The rocker arm 114, link 116, lever 117, and rod 126 are shown in Fig. 17 in their relative positions providing for a release of the brake drum 121 by the brake band 119. On rotation of the sleeve 104 in a clockwise direction about the shaft 98, as viewed in Fig. 17, which rotation corresponds to a movement toward the right of the brake control lever 96, as viewed in Fig. 18, the C link 116 is moved to its dotted line position shown in Fig. 17 to provide for the brake band 119 being tightened around the brake drum 121. By virtue of the pivots at the opposite ends of the C link 116, when the brake is applied, being in a plane common with the axis of rotation of the sleeve 104 a toggle action is produced which locks the brake band 119 in its braking position. Because of the direct pivotal connection of the brake lever 96 with the rocker arm 102, through the link member 103, the above described brake releasing and applying operations are effected directly by manipulation of the brake lever 96 in opposite directions.

When the clutch lever 94 and brake lever 96 are individually operated in sequence it is apparent that a so-called neutral position will generally occur between the clutching and braking operations, at which neutral position the brake is released at the time the clutch mechanism is disconnected from the shaft 77. As a result when power is first disconnected from the winding drums 74 and 76 the drums will not be immediately held against rotation so that the load on the lifting arms 32 and 33 will fall a short distance before the brake is applied. Similarly when the brake is first released the load on the arms 32 and 33 will drop before power is applied to the winding drums 74 and 76. This neutral position is eliminated in the present invention by virtue of the lost motion mechanism connecting

together the clutch lever 94 and the brake lever 96.

Thus on movement of the clutch lever 94 toward the right, as viewed in Fig. 18, to disengage the power take-off 92 from the transmission 91, the brake lever 96 is concurrently moved toward the right to set the brake 119—121 through the co-operative action of the lever 112, arm 108, lever 107 and rocker arm 102. By virtue of the lost motion connection 113 between the lever 112 and arm 108 and the lost motion connection 106 between the lever 107 and the rocker arm 102, the brake lever 96 is operated only after the clutch mechanism 93 has been operated to its disengaged position. Likewise on operation of the brake lever 96 the clutch lever 94 is operated to disengage the clutch mechanism 93 when the brake 119—121 is applied, and to engage the clutch mechanism when the brake is released.

The slot and pin connections 106 and 113 provide for a limited movement of the brake lever 96 independently of the clutch lever 94 whereby the lowering of the arms 32—33 is controlled entirely by the manipulation of the brake lever. On a continued movement of the brake lever 96 beyond a brake-releasing position the clutch lever 94 is operated to engage the clutch mechanism 93.

An automatic operation of the clutch and brake levers 94 and 96 to stop and hold the scoop 52 at its highest elevated position is accomplished by means including an actuating lever 127 pivoted adjacent the top and to one side of the inclined frame member 29 (Figs. 1 and 6). The free end E of the lever 127 is bent outwardly from the frame member 29 into the path of movement of the lifting arm 33. A cable 128 is attached at one end to the arm 108, forming part of the lost motion mechanism connecting together the brake lever 96 and clutch lever 94, and is then guided by means including a pulley 129 on the main frame member 15, to the actuating lever 127 to which the opposite end of the cable 128 is attached.

As the arm approaches its highest elevated position it engages and pivotally moves the actuating lever 127 in a clockwise direction, as viewed in Fig. 6. This movement of the actuating lever 127, through the cable 128, moves the arm 108 forwardly of the tractor or to the left, as seen in Fig. 6 to disengage the clutch mechanism 93 and apply the brake 119—121, respectively. The brake is thus applied concurrently with the disengagement of the clutch mechanism, with the lost motion in the pin and slot connections 106 and 113 providing for the clutch mechanism being disengaged prior to the application of the brake. The scoop 52 is lowered from its maximum elevated position by the independent operation of the brake lever 96 in the manner described above.

The scoop 52 is held in a normal position by a pair of latching members 131 pivoted adjacent opposite ends of the shaft 53 and arranged inwardly of the supporting units 43 (Figs. 13, 14 and 15). The latches 131 are maintained in a spaced relation on the shaft 53 by end collars 132 and an intermediate sleeve 133. Each latch has one end movable into engagement with a corresponding upright catch 134 supported on the back of the scoop 52 and is yieldably held in engaging position by a spring 135 connected at one end to a corresponding lifting arm 32 and 33. Mounted on the intermediate sleeve 133, which is rotatable on the shaft 53, are a pair of trip

arms 136, corresponding to the latches 131, and a trip lever 137.

The trip lever is connected to one end of a cable 138 which is guided along the top of the lifting arm 32 to a pulley 139 rotatably supported in a dumping control lever 141 which is pivoted on the loader frame member 16 adjacent the rear end of the lifting arm 32 (Fig. 12). From the pulley 139 the cable 138 passes upwardly and about a pulley 142 supported on the inclined frame member 28, then downwardly for attachment to the rear end of the lifting arm 32.

By virtue of this arrangement of the cable 138 a normal slack is maintained in the cable which is substantially the same for all moved positions of the lifting arm 32 and in turn for all moved positions of the scoop 52. Thus when the arm 32 is only pivotally moved about its pivotal means 38, with the pivotal means at its lowermost position shown in Fig. 12, the cable length between the pulley 142 and the pulley 139 at the rear end of the lifting arm 32, and the length of the cable between the trip lever 137 and the pulley 139 remain substantially unchanged.

When the arm 32 is pivotally moved out of contacting engagement with the curved guide 58, and is then pivoted and concurrently forwardly moved by the action of the booster arms 56 and 57, the shortening of the cable length between the rear end of the arm 32 and the pulley 142 compensates for the increase in the cable length between the pulley 139 and the trip lever 137. As a result the movement of the control lever 141 rearwardly of the tractor, or toward the right as viewed in Fig. 12, is always effective at all moved positions of the scoop 52 to tighten the cable length between the control lever 141 and the trip lever 137 to pull the trip lever toward the right as also viewed in Fig. 12.

Since the intermediate sleeve 133 is rotatable on the shaft 53 movement of the trip lever 137 by the cable 128 takes place independently of any movement of the latches 131. Thus on rotation of the sleeve 133 in a counterclockwise direction, as indicated by the arrow in Fig. 14, the trips 136 engage and move the latches 131 out of an engaging position with the catch members 134 on the scoop 52.

The dumping movement of the scoop 52 is limited by a usual spring and chain assembly 143, in a well known manner, with the assembly being connected at one end to the back of the scoop 52 and at its opposite end to the front end of a lifting arm 32 and 33, a spring and chain assembly 143 being used at each side of the scoop 52.

The scoop 52 after being dumped is automatically returned to a normal position by the provision of like means arranged at opposite sides of the upright frame 25 and including a pivoted actuating arm 144 (Fig. 12). Since the scoop-returning means at each side of the upright frame are the same in construction and operation only the one associated with the lifting arm 32 will be fully described.

The actuating arm 144 is pivotally supported on the top of the lifting arm 32 adjacent its rear end and carries a roller 146 at its free end which is guidably supported in the frame member 28. A second arm 147 is pivoted at the front of the lifting arm 32 and on its outer side. With the arm 147 in an upright position its free end is pivoted to the free end of a link 148 which is fulcrumed on a side of the scoop forwardly of the pivotal support 51 for the scoop.

A tension spring 149 is connected in a cable

151 having one end attached to the arm 147, from which the cable 151 extends upwardly and rearwardly over a pulley 152, supported on the arm 32 in a spaced relation above the top of the arm 32, and then downwardly and rearwardly about a pulley 153 supported adjacent the bottom of the arm 32. From the pulley 153 the cable 151 travels upwardly for attachment to the arm 144 intermediate its ends.

In the operation of the scoop return means assume the scoop 52 to be in a normal position and the arms 32 and 33 in their lowermost positions as shown in Fig. 12. At these positions of the lifting arms 32 and 33, the cable 151, and in turn the spring 149 are under tension. By virtue of the pivotal support of the actuating arms 144 at the rear ends of the lifting arms 32 and 33, and the support of the rollers 146 in the frame members 28 and 29, the lifting arms 32 and 33 on initial upward pivotal movement, in the manner previously described, are angularly moved toward the actuating arms 144 to relative positions substantially parallel with the actuating arms 144 as illustrated in Fig. 1 for the arm 33. This relative position of a lifting arm with an actuating arm 144 takes place at the time the rollers 55 on the lifting arms 32 and 33 move out of contacting engagement with the curved guides 58, and is maintained during the forward movement of the lifting arms 32 and 33 by the booster arms 56 and 57.

As a result the tension in the spring 149 applied on the scoop 52 to pivot the scoop upwardly and rearwardly into engagement with the latches 131 is progressively decreased during the initial upward pivotal movement of the lifting arms 32 and 33 because of the progressive decrease in the length of the cable 151 between the pulley 153 and the actuating arm 144. Thus when the lifting arms 32 and 33 are moved forwardly by the booster arms 56 and 57 the cable 151 is slack and the spring 149 is without tension as shown in Fig. 1. The scoop 52, therefore, is dumped without opposition from the spring 149.

After the scoop 52 is dumped the spring 149 and cable 151 are placed under initial tension by the arm 148, pivoted on the scoop 52, moving the arm 147 in a clockwise direction as viewed in Fig. 1. This initial tension is maintained during the lowering of the arms 32 and 33 until the rollers 55 on these arms engage the curved guides 58.

With the rollers 55 in contacting engagement with the guides 58 the lifting arms 32 and 33 are pivotally moved downwardly away from the actuating arms 144 whereby to progressively increase the length of the cables 151 between the pulleys 153 and the actuating arms, whereby the initial tension in the spring 149 and the cable 151 is progressively increased. This progressive increase or building up a pressure in the spring 149 takes place until the spring pressure is sufficient to overcome the load of the scoop acting to retain the scoop in its dumped position. When this load is overcome, the stored up spring pressure is capable of quickly moving or snapping the scoop to its normal position in operative engagement with the latches 131.

From a consideration of the above description, therefore, it is seen that the invention provides a loading machine, which is simple and rugged in construction and capable of efficient performance under all operating conditions. The scoop 52 in a lowermost position and during its initial elevation is located adjacent the upright frame 25 so that the lifting force on the cable 71 is ap-

plied directly in a substantially straight line pull for lifting the load in the scoop 52. By the use of a single cable 11, for the lifting arms 32 and 33, having its opposite ends attached to winding drums 74 and 76 mounted on a common driving shaft 77, the lifting arms 32 and 33 are positively moved together so as to eliminate any tendency of one of the lifting arms leading or lagging the other lifting arm during their pivotal movement. Also the arrangement of the hoisting means rearwardly of the tractor rear axle in conjunction with the initial location of the scoop 52 adjacent the upright frame 25 acts to counter-balance a part of the load carried by the scoop 52 so as to reduce the tendency of the tractor rear wheels 20 being raised from the ground.

The entire loading attachment is carried completely on the tractor frame so as to facilitate its assembly on the tractor without requiring especially made tractor parts, or increasing the load on tractor parts supported on the tractor frame.

Lifting arms 32 and 33 are capable of pivotal movement, through a predetermined angular distance, to a desired elevation, and of concurrent pivotal and forward movement above such desired elevation, in response to the action of booster arms 56 and 57, to a maximum elevation to provide for the scoop 52 being positioned forwardly away from the tractor for loading trucks and the like. The pivot means or supports 38 at the rear ends of the lifting arms at no time carry the full load on the scoop 52, and are entirely free of the bucking force applied on the lifting arms 32 and 33 when the scoop is being loaded.

Although the invention has been described with respect to a preferred embodiment thereof it is to be understood that it is not to be so limited since modifications and changes can be made therein which are within the full intended scope of the invention as defined by the appended claims.

I claim:

1. A loading attachment for a tractor, comprising a main frame carried on said tractor and an upright frame supported adjacent one end of said main frame, a pair of lifting arms arranged at opposite sides of said main frame, means movably pivotally supporting the rear ends of said lifting arms on said upright frame, load-carrying means carried between the forward ends of said lifting arms, means for raising and lowering said lifting arms, a pair of pivoted booster arms arranged between said lifting arms, means pivotally supporting said booster arms on said upright frame, said lifting arms, when raised, being initially pivotally movable to a position for engaging said booster arms, with said booster arms acting to move said lifting arms upwardly and forwardly of said upright frame to provide for said load-carrying means being moved forwardly of said upright frame.

2. A loading machine comprising an upright frame having a pair of downwardly and rearwardly extended frame members, a pair of pivoted lifting arms positioned at opposite sides of said frame, pivot means at the rear ends of said arms movably supported on a corresponding frame member for movement longitudinally of a frame member, supporting means on said lifting arms rearwardly of said load-carrying means, a booster arm extended forwardly between said lifting arms, means pivotally supporting said booster arm adjacent the top of said frame, means for raising and lowering said lifting arms, and means

operatively engageable with said lifting arms to provide for their pivotal movement about a fixed position of said pivot means on initial raising of said lifting arms to a predetermined height, said booster arm at said predetermined height engaging said supporting means to provide for the front ends of said lifting arms being moved forwardly away from said frame concurrently with the movement of said pivot means longitudinally of said frame members.

3. A loader comprising an upright frame, a pair of pivoted lifting arms arranged at opposite sides of said frame, guide members extended downwardly and rearwardly from said frame, pivot means adjacent the rear ends of said lifting arms supported for movement longitudinally of said guide members, means for elevating and lowering said lifting arms, means for maintaining said pivot means against movement relative to said guide members during the initial elevation of said lifting arms to a predetermined height, and a pair of transversely spaced pivoted members on said frame for engaging and moving said arms in a direction forwardly of said upright frame as said arms are elevated above said predetermined height, with said pivot means being moved upwardly on said guide members during the elevation of said lifting arms above said predetermined height.

4. A loading machine comprising an upright frame and a pair of pivoted arms positioned at opposite sides of said frame, frame members extended downwardly and rearwardly from said frame, pivot means at the rear ends of said arms movably carried on said frame members for movement longitudinally thereof, means operatively associated with said arms to hold said pivot means against longitudinal movement on initial elevation of the forward ends of said arms to a predetermined height, a booster arm pivotally supported adjacent the top of said frame and normally suspended downwardly and forwardly from said frame, and means adjacent the front ends of said arms operatively engageable with said booster arm at said predetermined height of the lifting arms, said lifting arms, on a continued elevation thereof, being moved forwardly by said booster arm.

5. A loading machine comprising an upright frame, a pivoted lifting arm, movable pivot means at the rear end of said arm, a scoop pivotally supported at the front end of said arm, a frame member extended downwardly and rearwardly from said upright frame supporting said pivot means for movement longitudinally thereof, means providing for a pivotal movement of said lifting arm concurrently with a movement of said pivot means on said frame member, a lever pivoted on said lifting arm adjacent said pivot means having its free end movably supported on said frame member for movement longitudinally thereof, said lifting arm being angularly movable away from said lever during a pivotal movement of said arm to a lowered position, a first link fulcrumed adjacent the front end of said lifting arm, a second link pivoted to the free end of said first link and to said scoop forwardly of the pivotal support for said scoop, tension means, means connecting said tension means between said first link and said lever including a cable, with the relative movement between said lever and lifting arm, on a lowering of said lifting arm, providing for an increase in the pressure of said tension means such that said tension means acts

to automatically return said scoop to a normal position.

6. A loading attachment for a tractor comprising a main frame having a longitudinal frame member with a front portion offset laterally inwardly from a rear portion thereof, an upright frame carried at the forward end of said main frame, a guide member extended downwardly and rearwardly from said upright frame to the offset in said frame member, a pivoted lifting arm, a pivot means at the rear end of said lifting arm movably supported on said guide member for movement longitudinally thereof, with said lifting arm being pivotally movable in the plane of said rear portion, means providing for a movement of said pivot means on said guide member concurrently with a pivotal movement of said arm, with said pivot means being at said offset when said arm is in a lowered position, and coacting portions on the rear end of said lifting arm and on the front end of said rear portion adapted to be in contact engagement when said arm is in said lowered position, whereby to provide for said pivot means being free of any force applied rearwardly on said arm in a lowered position.

7. In a loading machine having a frame, hoisting means including a driven shaft rotatably supported on said frame, driving means for said driven shaft, a winding drum mounted on said shaft, clutch means for connecting and disconnecting said driving means with said shaft, a manually operated pivoted clutch control lever for said clutch means, brake means for selectively holding said shaft against rotation, a manually operated pivoted brake control lever for said brake means, and lost motion means connecting said two levers together for concurrent operation including a pivoted actuating arm for said brake means, a lever member pivoted at one end on said frame, a first link slidably supported between the free ends of said actuating arm and said lever member, a second link pivoted between said actuating arm and brake control lever, and a third link pivoted to said clutch control lever and slidably connected with said lever member, said lost motion means on movement of one of said two control levers providing for a complementary operation of the other of said levers so that only one of said brake means and clutch means is in an operated position.

8. A loading machine comprising a frame, a pair of pivoted lifting arms arranged at opposite sides of said frame with their rear ends pivoted on said frame and their front ends projected forwardly from one end of said frame, scoop supports adjustably carried on the front ends of said arms, and a scoop movably supported on said adjustable supports for movement relative to said supports to loading and dumping positions, with adjustment of said supports relative to said arms moving said scoop to an adjusted position relative to the ground surface.

9. A loading machine comprising a frame, a pair of lifting arms arranged at opposite sides of said frame, means pivoting said arms adjacent one end thereof on said frame, scoop supports pivoted on the free ends of said arms for adjust-

able pivotal movement in a plane longitudinally of said arms, means for holding said scoop supports in an adjusted position, and a movable scoop carried on said supports for adjustable movement therewith, with said scoop, at an adjusted position of said supports, being movable relative to said supports to loading and dumping positions.

10. A loading machine comprising a frame having an upright portion and a horizontal portion, a frame member extended downwardly and rearwardly from said upright portion to said horizontal portion, a pivoted lifting arm, a pivot means at the rear end of said arm movably supported for movement longitudinally of said frame member, a scoop pivoted adjacent the front end of said lifting arm, means releasably holding said scoop in a normal position, means for concurrently pivoting said lifting arm and moving said pivot means upwardly on said frame to lift said scoop to a dumping position forwardly away from said upright frame portion, a trip member operatively associated with said scoop holding means, a pivoted control lever on said horizontal frame portion for operating said trip member to release said holding means, a pulley rotatably supported on said control lever, a second pulley carried upwardly on said frame member, and a flexible means connecting said control lever and trip member having one end attached adjacent the rear end of said lifting arm, and extended about said second pulley and then about said first pulley and having its opposite end attached to said trip member.

11. A loading machine comprising an upright frame, a pivoted lifting arm, pivot means at the rear end of said arm movably supported on said frame for movement in a forwardly and upwardly inclined plane, load-carrying means carried at the front end of said arm, means providing initially for only a pivotal upward movement of said arm to elevate said load-carrying means adjacent said frame to a pre-determined elevation, and a pivoted member pivotally supported on said frame for up and down movement, said pivoted member being engageable with said arm at said pre-determined elevation for movement with said arm, with said pivoted member, on a continued upward movement of said arm, acting to move said pivot means forwardly and upwardly on said frame, whereby to extend said arm forwardly of said frame.

12. A loading attachment for a tractor comprising a main frame having a longitudinal frame member with a front portion laterally offset inwardly from a rear portion thereof, a pivoted lifting arm, and means pivotally supporting said arm on the front portion at said offset for pivotal movement in the plane of the rear portion of said frame member, and coacting portions on the rear end of said lifting arm and on the front end of said rear portion adapted to be in contact engagement, when the arm is in a lowered position, to provide for said supporting means being free of any bucking force applied in a rearward direction on said arm.

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