Feb. 12, 1946. N. C. WOODIN 2,394,830

TRACTOR LOADER

Filed Sept. 16, 1944 5 Sheets-Sheet 1

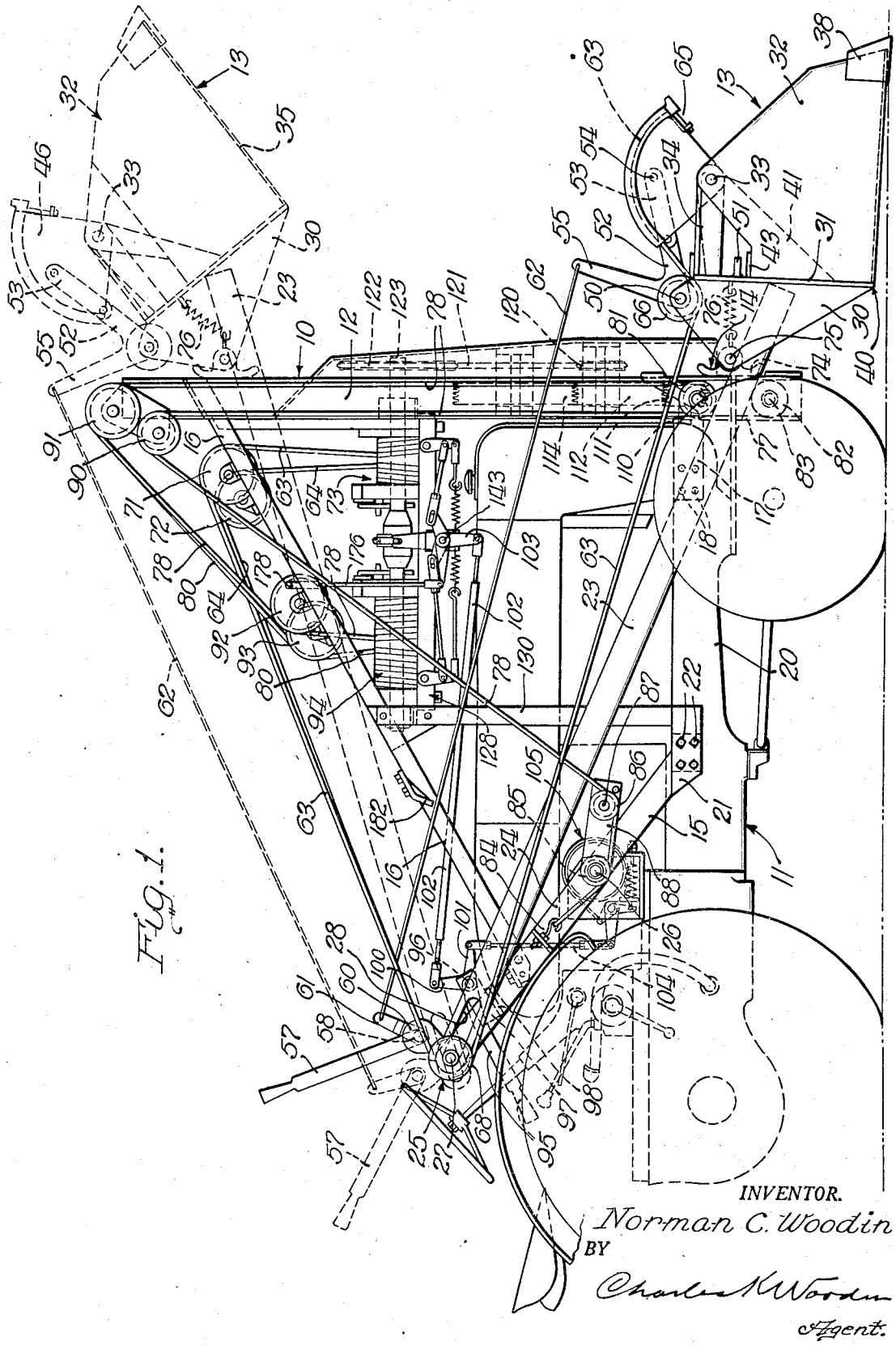


Fig. 1.

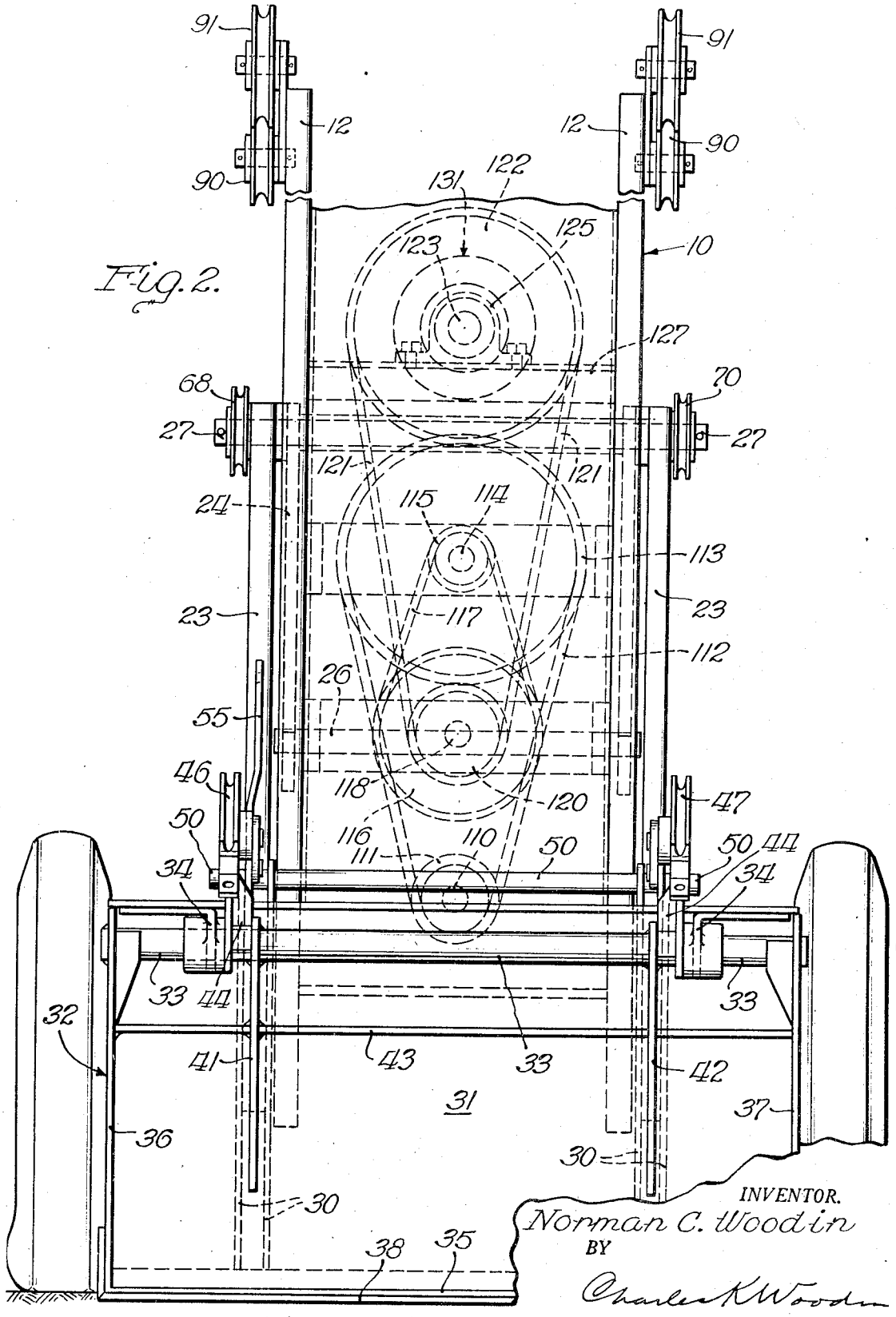
INVENTOR.
Norman C. Woodin
BY
Charles K. Woodin
Agent.

Feb. 12, 1946. N. C. WOODIN 2,394,830

TRACTOR LOADER

Filed Sept. 16, 1944 5 Sheets-Sheet 2

Fig. 2.



INVENTOR.
Norman C. Woodin
BY
Charles K. Woodin
Agent.

Feb. 12, 1946. N. C. WOODIN 2,394,830

TRACTOR LOADER

Filed Sept. 16, 1944 5 Sheets-Sheet 3

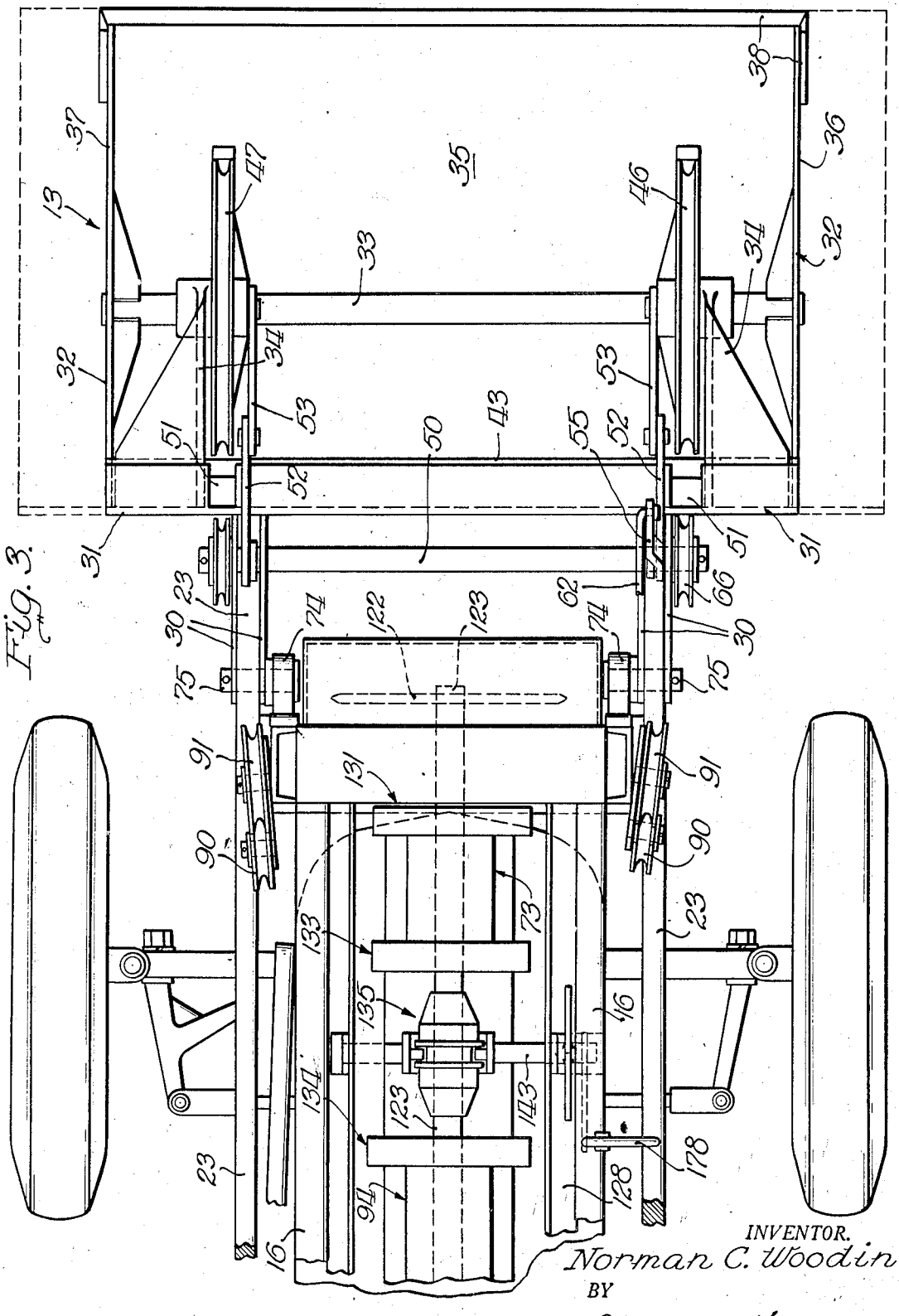


Fig. 3.

INVENTOR.
Norman C. Woodin
BY
Charles K. Woodin
Agent.

Feb. 12, 1946. N. C. WOODIN 2,394,830

TRACTOR LOADER

Filed Sept. 16, 1944 5 Sheets-Sheet 4

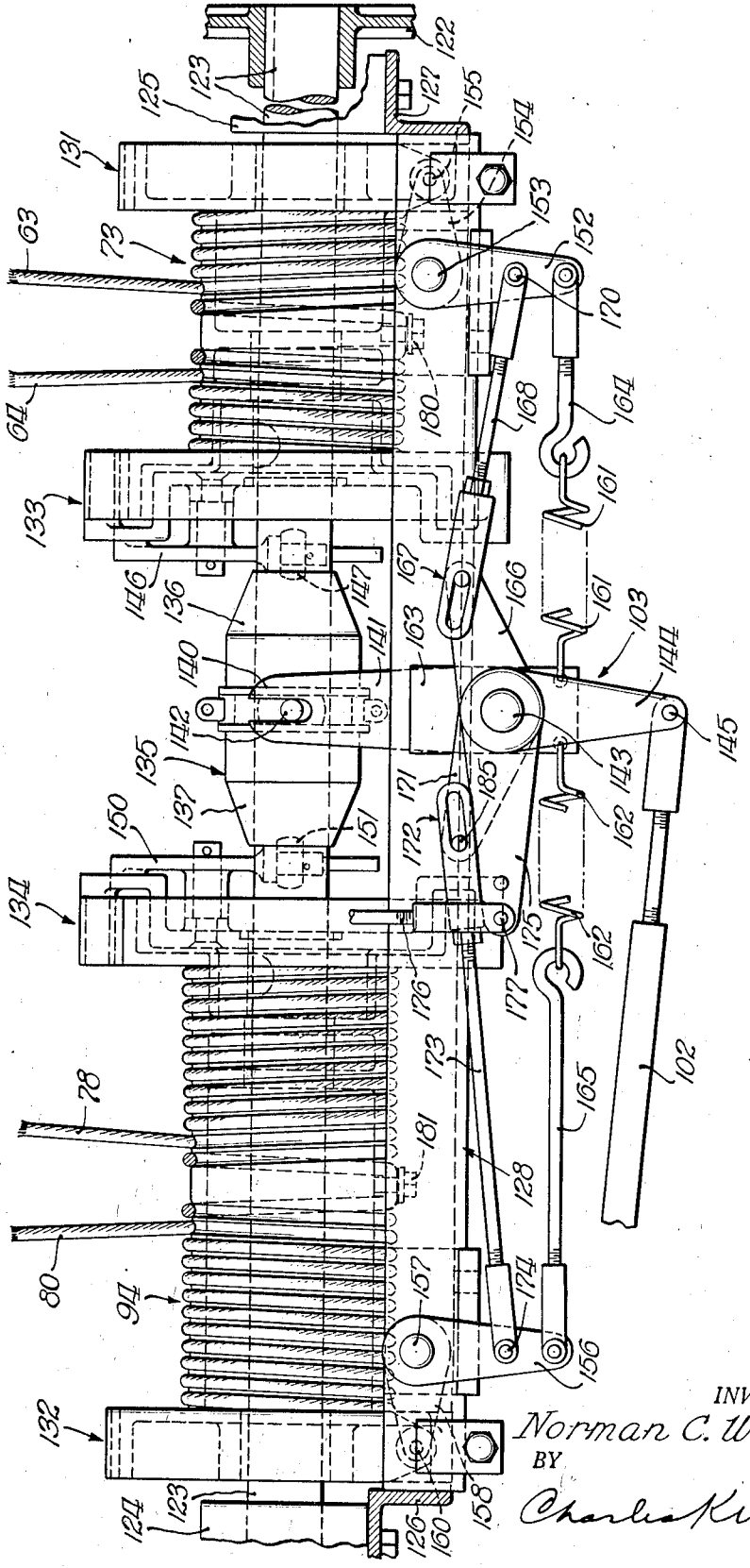


Fig. 4.

INVENTOR.
Norman C. Woodin
BY
Charles K. Woodin
Agent.

Feb. 12, 1946. N. C. WOODIN 2,394,830

TRACTOR LOADER

Filed Sept. 16, 1944 5 Sheets-Sheet 5

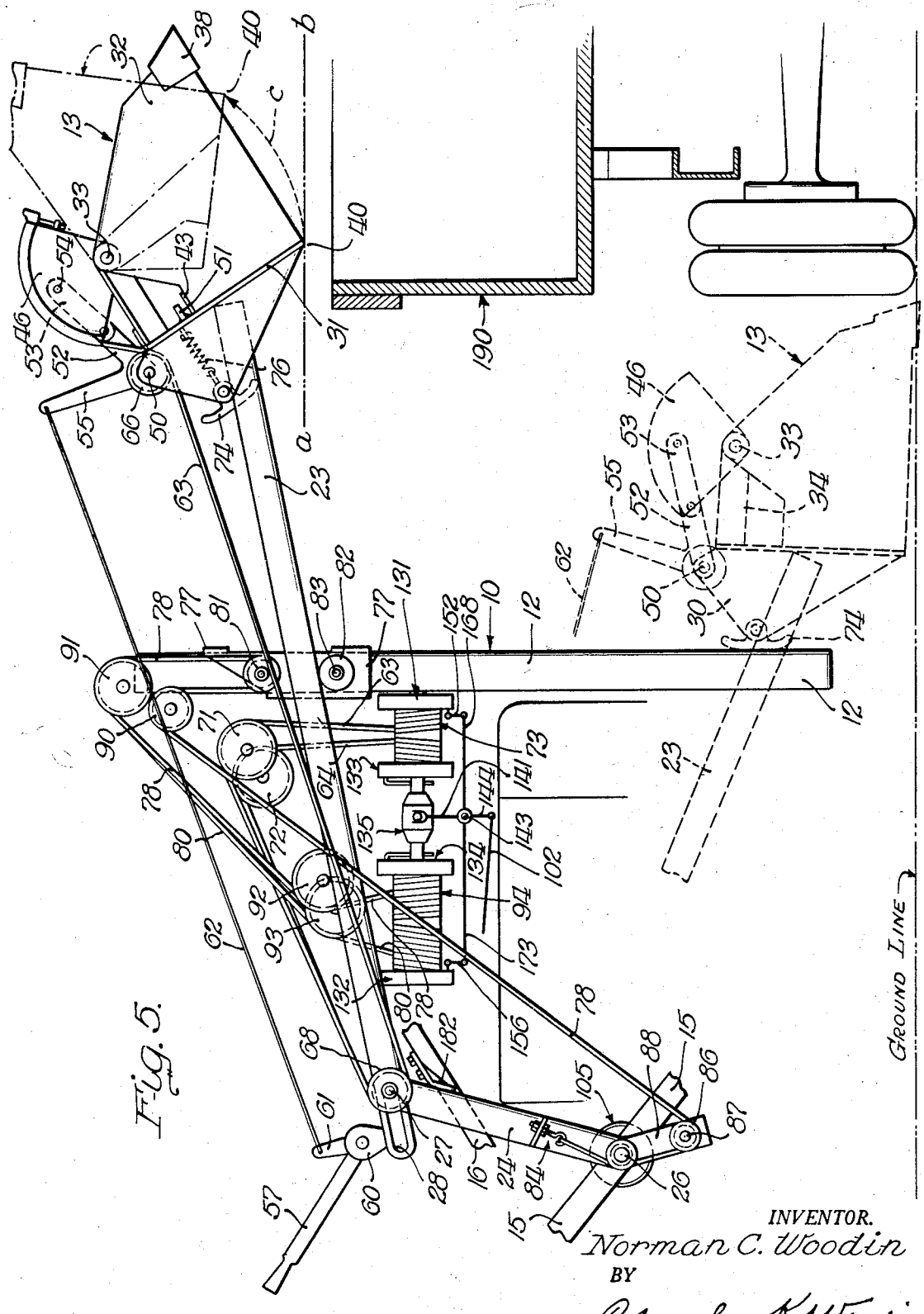


Fig. 5.

INVENTOR.
Norman C. Woodin
BY
Charles K. Woodin
Agent.

Patented Feb. 12, 1946

2,394,830

UNITED STATES PATENT OFFICE

2,394,830

TRACTOR LOADER

Norman C. Woodin, Peoria, Ill.

Application September 16, 1944, Serial No. 554,485

20 Claims. (Cl. 214—139)

The present invention is directed to improvements in a loader of the type adapted for mobile use and operation. The loader of the present design is more specifically of a construction wherein the operable mechanisms are all mounted and supported for their individual function upon a unitary frame, and wherein such frame is adapted to be mounted upon a tractor, power being furnished by the latter for operating the respective mechanisms and the loading units.

One of the main objects of the present invention is to provide a loading bucket which is supported and operated from the framework of the loader by means of articulated arms and wherein suitable means have been provided between the bucket and the framework for counteracting and resisting all load shock during the loading operations. This particular feature has the advantage of relieving the articulated arms supporting the loading bucket from the stresses and reactionary forces creating those stresses at the time when the mobile unit directs the loading bucket into a pile of material. Neither of the arms, their pivotal connections, nor their pivotal mountings upon the framework are therefore subjected to the forces created during the loading of the bucket inasmuch as the reactionary means interposed between the bucket and the framework functions to transmit such loading forces directly to the framework supporting the loader and obviously to the tractor upon which the frame is mounted.

Another object of the present invention is to provide a lift means for the loading bucket which is so connected with the pivotal means mounted upon the framework and forming a portion of the articulated bucket supporting arms as to transmit a reactive force for continually urging the articulated arms in a direction to hold the bucket against the frame when the bucket is disposed in digging position. Thus the lift means carries out its own function of lifting the arms and bucket and acts in the dual capacity of urging the bucket against the frame face to relieve the bucket arms from the reaction of the digging thrust as pointed out above.

A further advantage of the present invention is embodied in the particular feature of providing a lost motion connection between the articulated arms to permit the bucket and its associated parts to travel through a path having no definite geometric relation to the roving pivotal points established between such arms. In other words, as illustrated in the preferred embodiment of the present invention, the bucket and its reactionary means can contact the vertical members on the frame and move substantially vertically adjacent the frame face, whereas the arms connected with the bucket are adapted to swing about their respective pivotal connections.

Another object of the present invention is to embody into a loader of the type referred to the faculty, by means of the articulated arms and their particular connections and supports, whereby the loader is adapted to raise a loaded bucket adjacent the frame and tractor, and to subsequently project the bucket outwardly away from the frame and tractor into a position overhanging a load receiving unit such as a truck, bin or the like.

Another feature extremely advantageous in a loader of this type is the particular arrangement comprising the power driven means for moving the bucket through its necessary operations to perform the loading task together with the introduction of mechanism easily operated for causing a bucket jar when the bucket is disposed in dumping position for completely discharging the entire loaded material therefrom.

The above noted feature as to the emptying of the bucket while in dumping position is augmented by the bucket construction per se. The bucket is made in two principal sections comprising a rigid back stop secured to the lifting arms, and a pivotally supported scoop section having a bottom and two sides for coacting with the back stop to form the completed shovel or bucket scoop. The parting line of these two sections is substantially at the flat forward face of the bucket back stop and by rocking the scoop section on its pivotal support carried by the back stop it is possible to jar the entire bucket by means of the scoop section being dropped against the back stop. The bucket is also jarred when the scoop is rocked into its full open position.

The two sections of the bucket are designed to permit a smaller lifting distance between digging position and load discharging position than in prior comparable loaders. The loader construction of this design only necessitates elevating the bucket to a position where the lowermost edge of the bucket back stop section can clear the sides of a vehicle being loaded or of a bin or the like, and the dumping action is such that the movable bucket section forming the scoop of the bucket operates only in the space above a horizontal plane coincident with the lowermost edge of the bucket back stop. In other words, the scoop of the present design is such that it does not discharge the load from the forward edge thereof providing the digging edge, but the scoop dis-

charges the load through the rear open side thereof when the scoop is moved or rocked away from the adjacent surface of the back stop. With the foregoing design of bucket it is obvious that the vertical height of the basic framework of the loader may be reduced proportionately in respect to loaders wherein a dump type of bucket is employed that discharges its load forwardly off of the same edge with which the bucket is used for digging.

All other features and advantages incorporated into the loader of the present design and construction shall hereinafter be described and explained in the following detailed description having reference to the accompanying drawings which disclose a preferred embodiment of the loader.

In the drawings:

Fig. 1 is a general side elevational view of the tractor loader embodying the principles and operations of the combined mechanisms of the present invention;

Fig. 2 is a front elevational view of the tractor loader illustrated in Fig. 1 with the lifting and dumping cables omitted therefrom for the sake of clarity;

Fig. 3 is a fragmentary plan view of the forward portion of the tractor loader illustrating certain details of construction thereof;

Fig. 4 is an enlarged side elevational view of the tractor driven control mechanism employed for manipulating the bucket of the loader to carry out the functions thereof; and

Fig. 5 is a diagrammatic illustration of the essential working parts of the loader to demonstrate the operative actions of the bucket parts in a loader of this construction.

Referring now to Fig. 1, the loader frame indicated generally by the reference numeral 10 is illustrated as conveniently attached to a conventional tractor 11, the frame 10 being a rigid attached portion of the tractor per se so as to follow the directed movements of such vehicle. It is understood that the frame may be constructed in different ways to furnish a supporting medium for the operative loading mechanisms utilized. However, in the present embodiment the frame comprises in general a substantially vertically upright channel structure 12 forming a guide member which functions as an abutment member for the bucket 13 and its associated reactionary mechanisms 14; the rearwardly extending diagonal frame members 15; and overhead diagonal braces 16 connected between members 12 and 15. A bracket 17 is connected with the vertical members 12 of the framework and is bolted as at 18 to the chassis 20 of the tractor 11 while the frame members 15 terminate in a bracket 21 conveniently bolted as at 22 to the tractor chassis 20. Other suitable cross braces and intermediate members are also used to supplement the aforementioned main frame sections and shall only hereinafter be referred to when necessary.

As best illustrated in Figs. 2 and 3, it is to be noted that the bucket supporting arms, the lift mechanisms, and the bucket dumping means are substantially duplicated on opposite sides of the tractor and the loader frame so that the description will in general refer to both sides of the tractor and frame where not otherwise specifically designated.

The bucket 13 is secured to the articulated arms 23 and 24 pivotally joined as at 25; the arm 24 being pivotally mounted on a cross shaft 26 suitably supported by brackets mounted upon the frame members 16. The pivotal connection 25 comprises a cross pin or shaft 27 carried by the arms 24 for movement directly therewith, while the ends of arms 23 adjacent pin 27 are slotted as at 28 to form a lost motion connection between the two pairs of arms 23 and 24. Obviously, arm 24 being pivoted at 26 pivotally connects with arm 23 in the manner just described and comprises a pivotal means to swingably support the bucket 13 from the framework 10 of the loader.

The bucket ends of the arms 23 are suitably fastened to ears 30 comprising integral parts of the bucket back stop 31 which is the stationary section of the bucket 13 with respect to the dumping operation thereof. The movable section 32 of the bucket is pivotally supported and suspended by its shaft 33 from suitable brackets or arms 34 carried by the back stop 31. The bucket section 32 forms a U-shaped scoop best illustrated in Figs. 2 and 3 having a bottom 35 flanked by the sides 36 and 37, the forward edge of section 32 being provided with a hardened replaceable blade 38 for cutting into and digging under the loading material, the rearward edge 40 of the bottom 36 providing the discharge edge of the scoop in the present construction.

A pair of spaced baffles 41 and 42 are secured to the shaft 33 and to a cross strap 43 as shown in Figs. 1, 2 and 3. A pair of sheave or pulley segments 46 and 47 are welded or otherwise secured to shaft 33 and braced by connecting members 44 from the baffles 41 and 42, see Fig. 2. Segments 46 and 47 are adapted to rock directly with the movements of the movable section 32 of the bucket 13. A suitable cross shaft 50 is disposed and supported by ears 30 in aligned relation to the rear of the bucket back stop 31 as best shown in Figs. 2 and 3. A pair of connected links 52 and 53 are employed at each side of the bucket and are pivotally connected between shaft 50 and pins 54 on the segments 46 and 47. These connected links are of such size as to maintain the two relatively movable bucket sections 31 and 32 in closed relation to each other when the links are disposed in aligned relation as shown in Fig. 1.

Links 52 are secured to the shaft 50 and any rocking movement of the shaft 50 will throw thereby the links 52 and 53 out of alignment permitting the segments 46 and 47 together with the movable section 32 of the bucket to swing away from the stationary back stop 31. To rock shaft 50 and to move links 52 and 53 out of their substantial straight line position between their connected segments 46 and 47, one of the links 52 is provided with an actuating lever 55 as shown in Figs. 1, 2 and 3.

A dump control lever 57 is secured to a cross shaft 58 suitably pivoted in housings 60, and the latter are conveniently secured to and carried by the pivotal ends of the bucket arms 23. An arm 61 is secured to the cross shaft 58 and a connecting rod or link such as 62 extends between the arm 61 and the dump control lever 55.

A pair of cables 63 and 64 are each secured to their respective segments 46 and 47 at the forward ends thereof as at 65 in Fig. 1, and such cables follow the peripheries of the segment sheave grooves and pass under sheaves 66 and 67 carried by the cross shaft 50 and extend rearwardly to the pivotal ends of the arms 23. Sheaves 68 and 70, see Figs. 1 and 2, are carried at the rearward ends of the arms 23 and are piv-

otally supported upon the cross shaft 27 hereinbefore described. The cables 63 and 64 which control the dumping operation of the bucket encircle the sheaves 68 and 70 passing forwardly therefrom over spaced and suitably supported sheaves 71 and 72 and then to the power operated dump drum 73.

Referring back to Fig. 1 and more directly to the bucket 13 it is to be noted that the reactionary means 14 hereinbefore mentioned refers to a pair of shoes 74 each pivotally mounted on pins 75 carried by the pairs of spaced ears 30, respectively. These shoes 74 may ride against and abut the outer face of the two channel members 12 of the framework 10, thereby forming means for guiding the bucket generally vertically adjacent the forward edge of the frame and beyond the forward end of the tractor. Springs 76 are interposed between securing eyes carried by the back stop 31 and the shoes 74, respectively, for the purpose of maintaining the shoes in the position shown in Fig. 5 when the bucket is projected outwardly and away from the frame 10. Obviously, upon return of the bucket toward the frame through the instrumentality of the articulated bucket arms and associated mechanism the faces of the shoes will again properly engage and seat against the forward edges of the channels 12 to allow the bucket to descend generally along such framework into the digging position shown in full lines in Fig. 1.

The shoes 74 act as reactionary mechanism providing a means through their connection with the ears 30 on the bucket to thereby transmit directly the load shock or digging thrust from the bucket to the forward vertical portion of the frame entirely relieving any transmission of such force or shock to the arms and their pivotal connections on the frame and tractor while the bucket is made to dig as hereinbefore described.

The lifting of the bucket and its arms, etc., may be accomplished in various ways. In the present construction, slides 77 are conveniently mounted for movement at each transverse edge of the vertical portion 12 of the frame 10 and are adapted to slide upon and to be guided along such frame as the lifting cables 78 and 80 are wound upon their drum. These cables each pass about sheaves 81 carried by the slides 77, respectively, and on either side of the tractor. Suitable rollers 82 are pivotally secured to pivot pins 83 of the slides and extend outwardly from the slide surfaces and frame 12 for the purpose of engaging the under sides of the arms 23 to establish a rolling contact relationship between the arms and the slides.

Each of the lifting cables 78 and 80 are deadended and secured to the fastening means 84 carried by the arms 24. The cables pass about the sheaves 85 mounted upon the pivotal shaft 26 and then pass about sheaves 86 pivotally supported upon stub shafts 87 in aligned but axial offset relation to the pivotal shaft 26 through the use of the tail pieces 88 forming an integral portion of the arms 24. From there the cables pass over idler sheaves 90 pivotally supported at the upper end of the portion 12 of the frame 10 and pass downwardly about the slide sheaves 81 reversing in direction to again pass upwardly over the idler sheaves 91. From this point, cables 78 and 80 each pass respectively over the sheaves 92 and 93 suitably positioned and mounted upon the framework 10 for directing the cables 78 and 80 to the power driven lifting drum 94.

The control and power operation of the loader may best be described in connection with Figs. 1 and 4. A main control lever 95 is secured to a rock shaft 96 pivotally mounted in spaced brackets 97 fastened to a cross brace 98 secured to the frame members 15. A pair of arms 100 and 101 are secured to shaft 96 to be rocked by the control lever 95, and suitable connecting linkage 102 connects the arm 100 with the drum operating control mechanism 103. A connecting link-mechanism 104 connects arm 101 with the brake mechanism 105 adapted to act upon and control the rotation of shaft 26 and consequently controlling the rocking movements of the arm 24 and its connected tail piece 88.

The connecting link mechanism 104 is adjusted to cause the brake 105 acting on pivot shaft 26 to remain effective during the time that the brake on drum 73 is released as will hereinafter be explained. This arrangement functions to hold the arms 24—24 in position while manipulating the bucket 13 and prevents retraction of the bucket 13 and arms 23—23 through the pull exerted upon the tail pieces 88—88 by cables 78 and 80 encircling sheaths 85—86.

The mechanism illustrated in Fig. 4 embodying the bucket thrusting and dumping drum 73, and lift drum 94, is the power means for controlling the various functions of the loader. This unit may be suitably driven in any particular manner desired. In the present design of loader power is supplied by the tractor engine through a conventional power take-off shaft 110 illustrated in Figs. 1 and 2. A multiple sheave 111 is secured to shaft 110 and a plurality of V belts 112 transmit power from the sheave 111 to the large multiple sheave 113 mounted for rotation upon an intermediate shaft 114. A sprocket 115 is secured to shaft 114 and connects with the large sprocket 116 through the use of a chain 117. Sprocket 116 is rotatably carried upon another intermediate shaft 118 which also drives a sprocket 120 that is chain connected by means of a chain 121 with the main drive sprocket 122 keyed or otherwise fastened to the drum driving and supporting shaft 123 illustrated in Figs. 2 and 4.

Referring now to Fig. 4, it is to be noted that shaft 123 is continuous and is journalled in bearings 124 and 125 mounted upon suitable angles 126 and 127 which form a part of the auxiliary frame 128 that supports the power control mechanism. The angles 126 and 127 are conveniently mounted upon portions 130 of the frame member 10 (see Fig. 1) and upon the forward channels 12 of the frame 10 respectively. Drums 73 and 94 are each free to turn upon shaft 123 but are normally held against rotation by means of suitable brakes 131 and 132 respectively when the parts are in the position shown in Fig. 4, which is the neutral relation thereof. Each of the drums 73 and 94 are individually provided with suitable clutching mechanisms comprising outside band clutches 133 and 134 respectively. Each of these clutches when operated transmits the drive from the main drive shaft 123 to the clutch spiders of either of the drums respectively. A control cone 135 is slidably mounted on shaft 123 and has tapered cone ends 136 and 137 for operating the clutches 133 and 134 respectively. The cone 135 is shifted either to the right or the left as viewed in Fig. 4 by means of the fork end 140 of the lever 141 engaging pins 142 which form a portion of the cone assembly. Lever 141 is secured to the cross shaft 143, and depending from the cross shaft 143 is a connected

arm 144 having pivotal connection at 145 with the connecting link 102, that leads to the main control lever 95 as indicated in Fig. 1.

Clutch 133 is provided with a pivotally supported clutch control lever 146 having an actuation roller 147 pivotally carried thereby in a position to be in line for engagement by the cone end 136 of the cone 135. Similarly, the clutch 134 has a clutch control lever 150 supporting roller 151 in a position to be engaged by the other cone end 137 of the cone 135. In either case, the movement of the cone in one direction or the other will cause a shifting of one or the other of the control levers of the clutches 133 and 134 thereby connecting the spider portion of the respective clutches keyed to the shaft 123 with either of the drums 73 or 94 respectively as the case may be. Thus the drive is transmitted directly from the shaft through either one of the clutches directly to the drum adjacent thereto depending upon the direction in which the cone 135 is shifted through the instrumentality of the main control lever 95, connecting link 102, and the link mechanism generally indicated at 103 in Fig. 4.

Still referring to Fig. 4, the brake 131 is operated through a brake arm 152 pivotally supported upon the shaft 153 mounted in the auxiliary frame 128, said shaft 153 having an arm 154 connected with the band of the brake 131 at 155. Similarly, the brake arm 156 is rockable and connected with the shaft 157 of the auxiliary frame. This arm 156 connects with the band of the brake 132 through an arm 158 secured to the band at 160. Springs 161 and 162 are hooked onto a bracket 163 secured to the auxiliary frame 128, while links 164 and 165 connect these springs respectively to the brake arms 152 and 156. Under normal conditions of operation, with the respective mechanisms all in neutral positions as indicated in Fig. 4, the springs 161 and 162 both act to maintain the brakes 131 and 132 applied and effective to prevent rotation of the drums 73 and 94.

The active means for controlling the operation of the brake 131 comprises an arm 166 secured to the shaft 143 having a lost motion connection 167 with a link 168 pivotally connected at 170 with the brake arm 152 of the brake 131. The active operating linkage for the brake 132 comprises a similar arm 171 keyed to the shaft 143, said arm having a lost motion connection 172 with the connecting link 173 and the latter is pivotally connected at 174 with the brake arm 156 for the brake 132. With the use of a single hand control lever, it is possible to control both brakes and clutches to obtain the results desired in operating the bucket movements.

In addition to the particular linkages above described in connection with the operation of the two independent brakes 131 and 132 and the two distinct clutches 133 and 134, an auotmatically operable control means has been introduced for limiting the upward swing of the bucket and the bucket arms. This means comprises an additional arm 175 secured to shaft 143 and having a connecting link 176 pivotally secured to the outer end thereof at 177, the link 176 terminating with a horizontally disposed catch 178 best shown in Figs. 1 and 3. The catch 178 projects into the path of one of the bucket arms 23. This catch 178 and the connecting link 176 may be suitably guided and held in position from one of the diagonal braces 16 of the framework by any appropriate means for the purpose of substantially maintaining this automatic control in proper relation to limit the upward movement of the bucket and its bucket arms.

In Fig. 4 attention is directed to the fact that the cables of each drum are actually continuous but have been separately designated for the purpose of classifying which section of each of the cables goes to which side of the loader and tractor. In other words, the cables 63 and 64 are actually a single continuous cable having the mid-point thereof bolted or otherwise secured at 180 to the mid-point of the drum with the two leads thereof operating to either side of the fastening point and running to the segments 46 and 47 of the bucket terminating at the ends thereof as described. Likewise, the cables 78 and 80 are also continuous and are secured at the center point of the drum 94 substantially as shown at 181 and to wind upon such drum to either side of the fastening point, the ends 78 and 80 thereof leading up to the idler sheaves 91 for connection with the slide members 77 disposed on each side of the loader frame for lifting purposes in a manner hereinbefore described.

The automatic control which limits the upward movement of the bucket arms functions to control the maximum vertical height to which the bucket may be moved. In addition thereto a pair of stops in the form of laterally extending brackets 182 mounted upon the diagonal braces 16 of the frame 10 provide means for limiting the angular movement of the arms 24 at the limit for projecting of the bucket away from the tractor frame as illustrated in Fig. 5.

The operation and control of the loader bucket in the performance of the loading operation is accomplished in the following manner. With the bucket and its connected supporting parts all in a position indicated in full lines in Fig. 1, the operator of the tractor guides the tractor toward the material to be loaded driving the bucket 13 into such material. Thereafter, the bucket may be raised from the position the tractor then occupies or else the tractor may be reversed to draw the loaded bucket away from the material pile depending upon conditions of operation. Assuming the bucket is loaded and in condition to be raised, the operator moves the main control lever 95 upwardly actuating the connecting link 102 toward the front of the tractor and rocking the shaft 143 in a counter-clockwise direction to move the cone 135 toward the clutch 134 of the lifting drum 94. Before the cone 135 is moved sufficiently for the cone end 137 to engage the clutch operating roller 151 the brake link 173 is actuated by means of the pin 185 on link 171 which action releases the brake 132 to permit subsequent free rotation of the drum 94. Therefore, the brake of the drum 94 is first released before the clutch becomes operative and thereafter clutch 134 will drive drum 94 directly from the shaft 123 to wind the cables 78 and 80 upon drum 94 to raise the bucket. Cables 78 and 80 lift sheaves 81 and the slides 77, and consequently, the arms 23 which are resting upon rollers 82 carried by the slides are swung upwardly about their pivotal connections at 25 at the ends of the arms 24.

Inasmuch as the path of the bucket and the reactionary means is generally vertical along the front face of the framework, the slots 28 in the arms permit rearward movement of such arms at the pivotal point 27 thereby accommodating themselves to the line of motion of the bucket, through the lost motion connection of the articulated arms.

Motion of the bucket may be stopped at any

point intermediate the positions illustrated in Fig. 1 by moving the control lever 95 back to its normal neutral position. In the event that the bucket is to be raised to the uppermost position the operator may depend upon the automatic control means 176—178 to rock shaft 143 through arm 175 when the arm 23, which is in the path of such control, strikes the latter and interrupts the lifting motion of the drum 94 by automatically releasing clutch 134 and setting the brake 132.

During the lifting action and the control and operation of the drum 94 it is seen from Fig. 4 that the lost motion connection 167 prevents brake release of the drum 73 and the latter remains dormant and has no function at this time. Now however, with the bucket in raised position, the operator may then move the main control lever 95 downwardly through neutral position to reverse the former action of the brakes and clutches causing the brake 131 to be initially released from the drum 73 and shifting the cone 135 to actuate clutch 133 whereupon shaft 123 will then be connected to directly drive the drum 73. At this time the brake 105 is automatically released to face the pivot shaft 26. Cables 63 and 64 will then swing arms 24 forwardly of the tractor about their pivotal mountings 26 since these cables pass over the arm sheaves 68 and 70, see Fig. 2. This action will cause arms 23 to roll forwardly upon the rollers 82 of the slides 77 thereby projecting the bucket forwardly and away from the frame and tractor substantially into the overhanging position indicated in full lines in Fig. 5. This outward movement of the arms 23 and the outward thrust of the bucket 13 is halted when the arms 24 engage suitable stops 182 that may be carried upon the frame brace 16. By adjustably securing the stops 182 it is possible to provide a somewhat variable field within which to limit the outward thrusted movement of the bucket under various conditions of operation.

When the arms 24 strike the stops 182, clutch 133 will slip until the bucket trip lever 57 is pulled toward the operator. This action will cause a rocking of shaft 50 on the bucket which will throw pairs of the links 52 and 53 out of line to permit drum 73 to again pull cables 63 and 64 an additional amount sufficient to rock the segments 46 and 47 together with the movable section 32 of the bucket. The latter is then rocked into a position substantially as indicated in dotted lines in Fig. 5. Any suitable limit stop 51 may be provided on the stationary bucket section 31 to be struck by some part of the movable bucket section 32 as by the adjacent corners of the segments 46 and 47. This causes a jar and a discharge of the loaded material which slides and drops off of the back stop 31 of the bucket and downwardly out of the rear edge 40 of the movable scoop section of the bucket to permit the latter to quickly and readily empty itself. Should any of the material be of a nature as to stick to sides of the bucket or bucket scoop sections, it is possible to also allow the scoop section 32 to drop against the back stop 31 to jar loose such sticky material. This is done by pulling the main control lever 95 upwardly to release clutch 133 an amount that will free drum 73 without making the brake 131 effective whereupon the weight of the bucket section 31 will reverse the directional movement of the cables 63 and 64 and the connected drum 73. This jarring action may be repeated several times until the bucket is entirely free of material. Moving lever 95 down each time will cause the bucket to open and the movable section will engage stop 51, dropping back as lever 95 is raised toward neutral, etc.

After the bucket is emptied it is returned to its position against the frame after restoring lever 57 to straighten links 52 and 53 by raising the main control lever 95 a sufficient amount to release clutch 133 and into a position to keep brake 131 off and this same action releases the brake 105 on the pivot shaft 26 of the arm 24. The weight of the bucket 13 and bucket arms 23 acting through the slides 77 upon the cables 78 and 80 will then swing the tail piece 88 in a counterclockwise direction moving the arms 24 therewith to retract arms 23 rearwardly of the tractor and frame until the bucket shoes 74 again strike the forward surface of the vertical channels 12. At this point the arms 24 and tail pieces 88 will again substantially occupy the position indicated in Fig. 1 and the bucket may now be returned to the ground.

The lowering of the bucket is accomplished by raising the lever 95 slightly off of neutral position to release brake 132 of the lift drum but not a sufficient amount to cause the clutch cone 135 to operate the lift drum clutch 134. As the arms 23 descend along the forward face of the frame together with the bucket, downward action may be halted at any intermediate point by returning the main control lever 95 to its neutral position rendering brake 132 effective. Otherwise, the action of the bucket will continue until the same has reached its lowermost ground position as indicated in full lines in Fig. 1.

The entire cycle of operation is brought about through the single control lever 95 which governs all the movements of the bucket. The only other control means resides in lever 57 which provides the trip means to permit the bucket thrusting mechanism to function in the dual capacity of initially projecting the bucket and subsequently opening the same to clear the load from the bucket. During the entire cycle of operation the pivot shaft brake 105 has been connected and arranged to prevent swinging of arms 23—24 except at a time when such arms must move to thrust the bucket outwardly and to permit the free return thereof toward the frame 10 after load discharge. Brake 105 therefore remains on at all times excepting when lever 95 is moved downwardly to a point where it has caused a release of brake 131 and just before clutch 133 is rendered operative. This is during the operation of lever 95 below neutral position and while the same is acting to control the operation of drum 73 and its brake and clutch.

Attention is directed to the fact that when the bucket descends along the front face of the frame 10 the weight of the bucket and arms tension the cables 78 and 80 through the connected slide members 77. Such force is transmitted through the cables to act upon the sheaves 86 mounted upon the tail pieces 88 of the arms 24. This produces a retractive force for urging arms 24 in a counter-clockwise direction to exert a rearward pull upon the arms 23 through shaft 27 which pull will automatically cause the shoes 74 of the bucket to be forced against the forward faces of the channel members 12 and in slideable contact therewith when the bucket is brought to the ground for loading as in Fig. 1.

Another feature worthy of attention at this point is that the bucket when raised to a certain

clearance position as indicated for example by the dot-dash line *a—b* in Fig. 5 representing a definite clearance level, that there will be no portion of the bucket which will thereafter drop below this clearance line to cause interference in loading or to necessitate the use of greater clearances than absolutely necessary. When the bucket is raised to the full line position indicated in Fig. 5 with the corner thereof coincident with the clearance line *a—b*, such line may be assumed as representing a maximum clearance position. Thereafter, by performing the dumping action of the bucket it is to be noted that the lowermost corner 40 of the scoop section 32 moves through an arc indicated by the letter *c* which is in a direction upwardly from the clearance line *a—b*. A truck 190 may therefore be loaded with the present loader without requiring additional height of structure and lifting mechanism that would be necessary with dump buckets which pivot and drop into the truck or toward the loaded material heaped within the truck.

With the above clearance action of the bucket there is one additional feature to be noted. When the bucket is raised from the ground into the dotted position in Fig. 1 the same is presumably high enough to clear the truck or bin sides. The bucket is now held in this position by the brake 132 on the lifting drum 94 while the other drum 73 is made to project such bucket outwardly. As the arms 24 rotate or swing about pivot shaft 26, the tail-pieces 38 act to pull cables 78 and 80 an added amount as best evident from Fig. 1. This causes a slight added lift of the bucket providing a safety feature giving the bucket a little more elevation than which was deemed sufficient for clearance necessary. This action results for any given elevation of the bucket.

The loader of the present design and construction is a highly efficient unit embodying the various features pointed out above, comparatively simple in construction, and embodying but one control lever for operating the same through all of its movements of operation aside from the actual dumping of the bucket which is also accomplished by the simple lever link construction described. Furthermore, the bucket of the design illustrated in combination with the working mechanisms of the loader produces a loader requiring a minimum of height of framework in view of the fact that the bucket is not the forward dumping type necessitating additional clearances as hereinbefore explained. Also the present construction of dump bucket is such as to eliminate the use of a push-off and the associated mechanisms needed in obtaining a complete discharge of the load from within that type of a bucket. Such a means runs into considerable additional cost as well as more parts adding not only to the first cost but to the maintenance of such a loader as well.

It is to be understood that the foregoing description and disclosure are all directed more specifically to an exemplary preferred construction of loader. Various changes and modifications are contemplated to produce equivalent mechanisms or mechanical structures that may function or produce the same operative requirements in a like manner as do the mechanisms described. It is obvious, therefore, that the present form, construction, or combination of parts described and illustrated are not to be limited to the exact disclosures excepting insofar as such structures shall be defined and limited by the breadth and scope of the appended claims.

What I claim is:

1. A loading attachment for a mobile vehicle, comprising a frame mounted upon said vehicle, a loading bucket operably disposed adjacent the frame, arms mounted on said frame and connected with said bucket to raise and lower the bucket, reactionary means directly carried by said bucket and contacting said frame to counteract load shock as said bucket is being directed into loading material, and lift means for raising and lowering said bucket, said lift means being connected to normally urge and maintain the reactionary means of said bucket in operative contact with said frame to relieve the bucket arms and their connections with said bucket from all load shock when driving the bucket into the materials being loaded.

2. A loader for a vehicle, comprising a frame unit mounted upon said vehicle, a loading unit disposed adjacent said frame unit, operable means including arms pivotally mounted on said frame unit and connected with said loading unit to move the latter toward and away from said frame unit, reactionary means carried by one of said units and contacting the other of said units to transmit loading shock of the loading unit directly to said frame unit, and lift means to the operable means to move the loading unit, said lift means also being connected with said arms of said operable means to urge and maintain said reactionary means therethrough into operative shock resisting relation between the aforesaid two units while said loading unit is in digging position.

3. A loading attachment for a mobile vehicle, comprising a framework rigidly mounted upon said vehicle and having an abutment member, a loading bucket operably disposed adjacent said abutment member, reactionary means carried by said bucket and contacting said abutment member to resist load shock as said bucket is directed into the material being loaded, arms for said bucket to raise or lower the same, pivotal means to support said arms and bucket upon said framework, and lift means connected with said arms to raise and lower said bucket, said lift means being connected with said pivotal means to maintain the reactionary means of said bucket in contact with said abutment member while said bucket is in digging position.

4. A loader comprising a supporting frame, a loading bucket having arms connected therewith, movable arms mounted upon said frame and connected with said bucket arms, reactionary means carried by said bucket and interposed directly between said bucket and said frame to transmit load shock directly to said frame from the bucket when said bucket is being loaded, and lift means for raising and lowering said bucket, said lift means being connected with said movable arms to urge the latter in a direction to hold said bucket arms and bucket in a direction to render said reactionary means effective when loading thereby preventing load shock transmittal to said arms or to the connections of the arms with said bucket.

5. A loader comprising a supporting frame having guide means, a loading bucket disposed adjacent said guide means and having a contact member, arms connected with said bucket, pivotal means for shiftably supporting the free ends of said bucket arms relative to said frame, and lift means connected to raise and lower said bucket

during the loading operation, said lift means being connected with said pivotal means and adapted to normally maintain said contact member in cooperative engagement with said guide means through the instrumentality of said bucket arms when the bucket is in load receiving position.

6. A loader comprising a supporting frame, a substantially vertically disposed guide member connected with said frame, a loading bucket having shoe means in abutting engagement with said guide member, arms connected with said bucket, pivotal means carried by said frame and adapted to shiftably support the free ends of said bucket arms for movement relative to said frame, and lift means connected with said bucket to raise and lower the same during the loading operation, said lift means having connection with said pivotal means to cause the latter to shift the free ends of said bucket arms relative to said frame to hold said shoe means in contact with said guide member during the loading of said bucket.

7. A loader comprising a supporting frame having guide means, a loading bucket disposed adjacent said guide means, said bucket having a contact member mounted directly thereon to engage the guide means, arms connected with said bucket, pivotal means for shiftably supporting the free ends of said bucket arms relative to said frame, lift means connected to raise and lower said bucket during the loading operation, said lift means being connected with said pivotal means and adapted to normally maintain said contact member in cooperative engagement with said guide means through said instrumentality of said bucket arms when loading to relieve said arms and their connections with the bucket from load shock, and actuating means connected with said pivotal means to project the bucket arms and bucket outwardly and away from said frame guide means into load discharging relation, said lift means functioning to return said bucket toward said guide means upon release of the aforesaid actuating means.

8. A loader comprising a supporting frame having guide means, a loading bucket disposed adjacent said guide means and having a contact member engageable with said guide means, arms connected with said bucket, pivotal means for shiftably supporting the free ends of said bucket arms relative to said frame, lift means connected to raise and lower said bucket during the loading operation, actuating means connected with said loading bucket and connected with said pivotal means to urge said bucket arms and the bucket outwardly and away from said frame guide into load discharging relation, said lift means being connected with said pivotal means to shift the latter to return said bucket and its contact member to the guide means upon release of the aforesaid actuating means, and bucket trip means to discharge the bucket load connected to cause said actuating means to dump said bucket.

9. A loader comprising a supporting frame, a substantially vertically disposed guide member connected with said frame, a loading bucket having shoe means for abutting engagement with said guide member when said bucket is in certain positions, arms connected with said bucket, pivotal means carried by said frame and adapted to shiftably support the free ends of said bucket arms for movement relative to said frame, power lift means connected with said bucket to raise and lower the same during the loading operation, said lift means being connected with said pivotal means to normally urge said bucket arms in a direction to cause said bucket shoe means to move toward said guide member, and power actuated means connected with said pivotal means to move said bucket away from said guide member into a projected dumping position.

10. A loader comprising a supporting frame, a guide member connected with said frame, a loading bucket having shoe means for abutting engagement with said guide member, arms connected with said bucket, pivotal means carried by said frame and adapted to shiftably support the free ends of said bucket arms for movement relative to said frame, power lift means connected with said bucket to raise and lower the same during the loading operation, said lift means being connected with said pivotal means to normally urge said bucket arms in a direction to cause said bucket shoe means to move toward said guide member, power actuated means connected with said pivotal means and connected to said bucket to cause the latter to be moved outwardly away from said guide member when said power actuated means is operated to dispose said bucket into dumping position, and bucket trip means to discharge the bucket load connected to cause said actuating means to dump the bucket.

11. A loader comprising a supporting frame, a guide member connected with said frame, a loading bucket having shoe means to abut said guide member, arms connected with said bucket, pivotal means carried by said frame and adapted to shiftably support the free ends of said bucket arms for movement relative to said frame, lost motion means interposed between said bucket arms and said pivotal means, and lift means connected with said bucket to raise and lower the same during the loading operation, said lift means having connection with said pivotal means to cause the latter to shift the free ends of said bucket arms relative to said frame to urge said shoe means toward said guide member during the loading of said bucket, and said lost motion means permitting said shoe member to substantially follow the path of said guide member during the raising of said bucket by said lift means, and actuating mechanism connected to said pivotal means to move said bucket and its shoe means away from said frame into a projected dumping position, said actuating means being connected with said bucket and having trip means to cause the actuating means to dump said bucket while holding the same in projected position.

12. In a loader, a frame, a bucket, articulate arms pivotally mounted upon said frame and connected with said bucket, power lift means to raise and lower said bucket connected with said articulate arms at two separate points, said lift means acting to raise said bucket at one point of connection with said arms, the weight of said bucket acting on said articulate arms through said lift means at said second point of connection of the lift means to normally urged said bucket into abutting contact with said frame during loading.

13. In a loader, a frame, a bucket, articulate arms pivotally mounted upon said frame and connected with said bucket, power lift means to raise and lower said bucket connected with said articulate arms at two separate points, said lift means acting to raise said bucket at one point of connection with said arms, the weight of said bucket acting on said articulate arms through said lift means at said second point of connection of the lift means to normally urge said bucket

into abutting contact with said frame during loading, and power means connected with the bucket and having connection with said articulate arms at a third point whereby said bucket may be projected outwardly away from said frame.

14. In a loader, a frame, a bucket having separable sections, articulate arms pivotally mounted upon said frame and connected with said bucket, power lift means to raise and lower said bucket connected with said articulate arms at two spaced points, said lift means functioning to raise said bucket through one of the connecting points with said arms, the bucket weight acting on said lift means to cause said lift means to act upon said articulate arms at said other point of connection to normally urge the bucket toward said frame, power means connected with one of the separable bucket sections and connected with said articulate arms at a third point, said latter power means acting to project said bucket outwardly away from said frame when operated, and trip means to normally retain said bucket sections in load carrying relation, said trip means when operated causing said power means to open said separable bucket sections to discharge the load while said power means holds the bucket in projected position.

15. An arm supported bucket for a loader, said bucket comprising two separable sections, one section being fixed with respect to the bucket arms, the other section being swingably supported from said fixed section, both sections together forming a material carrier with the fixed section a backstop for the material and the movable section a scoop therefor, said movable scoop section having a bottom providing a cutting edge to dig into the material to be loaded, said bottom being disposed at right angles with respect to the backstop section to transmit the digging force directly to said backstop without straining the point of support between said sections, and means for causing separation of said sections to permit the material to discharge through the gap formed by the separation of said two sections.

16. An arm supported bucket for a loader, said bucket having two relatively movable sections, one being secured to the bucket arms, the other being pivotally connected with said one section, said pivotally supported section having a bottom for edgewise insertion into the material being loaded, said bottom being disposed at right angles to said fixed section to transmit the digging force directly to said fixed section without straining the pivotal connection between said sections, and means for actuating said movable section away from said fixed section to discharge the loaded material, said pivotal connection between said sections being positioned to cause the movable section to travel above the clearance line position of the fixed section when said bucket is discharging.

17. In a loader, a bucket, articulated arms pivotally supported upon the frame of the loader and connected with said bucket to move the latter, power means for operating said bucket comprising a first power unit to lift said bucket and connected with said arms to normally urge the bucket against said loader frame while in digging position, a second power unit to project said bucket away from said loader, trip means carried by said bucket and connected to cause said second power unit to dump the bucket, brake means connected with said articulated arms and with said power units to hold the arms in a position to permit raising of said bucket by said first power means, and to automatically release said arms for actuation by said second power unit into projected load discharging position.

18. In a loader, a bucket, an arm connected with said bucket, a second arm pivotally supported on the loader and pivotally connected with said first arm, a power lift means connected with said arms to raise said bucket, a power operable means connected with said arms to move the latter to project the bucket into a load discharging position, a brake connected with said arms to hold one arm in position while the bucket is raised by the other arm through the instrumentality of said power lift means, said brake acting when released to permit both arms to project said bucket into discharging position, and a single control mechanism connected with said power means and said brake to automatically control the latter and the sequence of operation of said power means for operating said bucket.

19. In a loader, a bucket, an arm connected with said bucket, a second arm pivotally supported on the loader and pivotally connected with said first arm, a power lift means connected with said arms to raise said bucket, a power operable means connected with said arms to move the latter to project the bucket into a load discharging position, trip means connected with said bucket and adapted for dumping the latter by actuation of said power operable means when said trip means is operated, a brake connected with said arms to hold one arm in position while the bucket is raised by the other arm through the instrumentality of said power lift means, said brake acting when released to permit both arms to project said bucket into discharging position, and a single control mechanism connected with said power means and said brake to automatically control the latter and the sequence of operation of said power means for operating said bucket.

20. In a loader having a bucket, bucket operating mechanism comprising a pair of pivotally connected arms, one arm being connected with the bucket and the other arm being pivotally mounted on the loader, a brake for controlling the movements of the loader connected arm, a power lift means for raising the bucket arm and bucket, power operated means to rotate said loader arm to project said bucket into load discharging position, said power operated means being connected with bucket to dump the latter, trip means for said bucket to cause the latter to discharge its load under the action of said power operated means, and lever controlled link mechanism connecting said brake and the power means, said link mechanism being arranged to set the brake while the bucket is being raised and to release the brake to allow freedom of movement of said arms when said bucket is being thrust into load discharging position.

NORMAN C. WOODIN.