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3,155,253

CONTROL SYSTEM FOR TRACTOR MOUNTED APPARATUS

Original Filed March 9, 1956

3 Sheets-Sheet 1

Fig. 1.

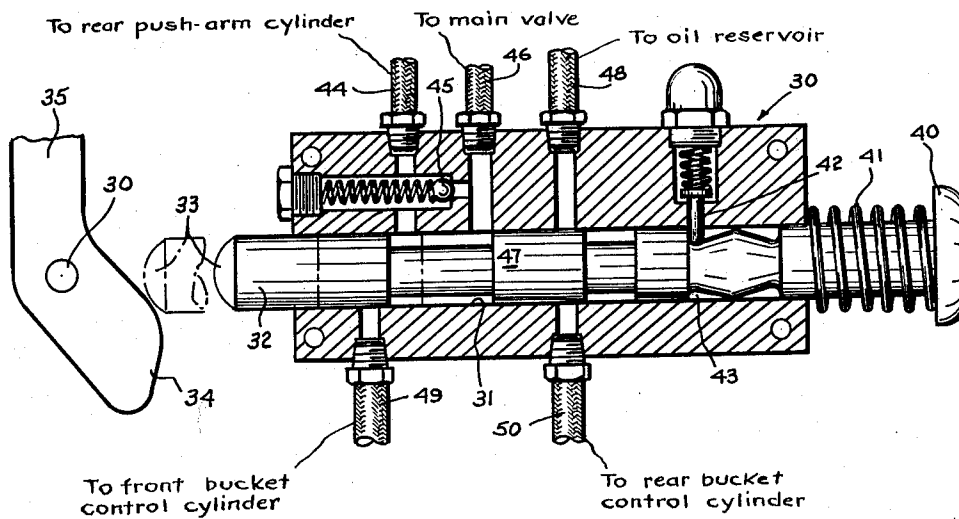
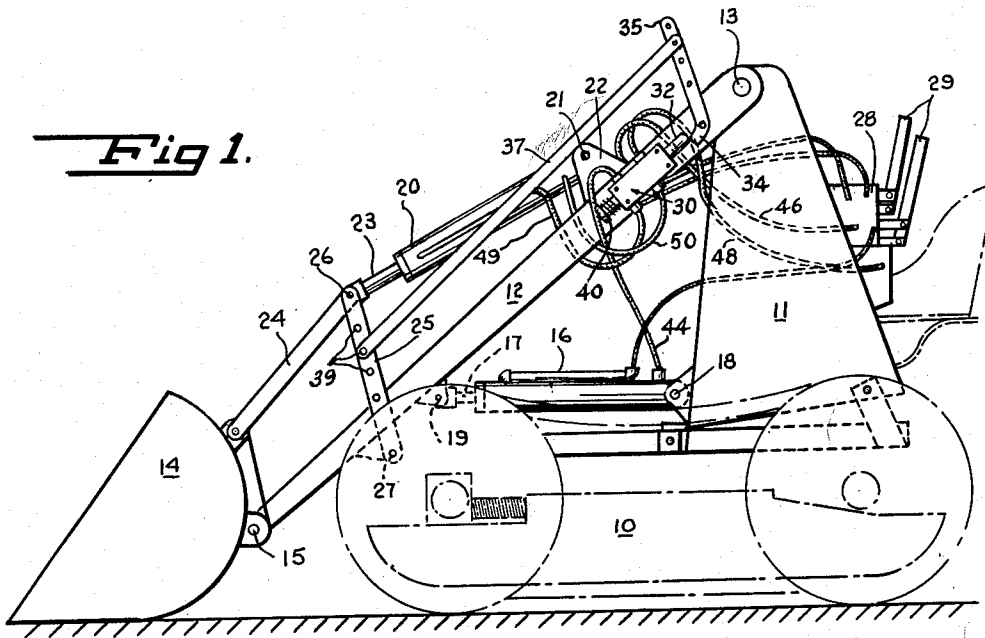


Fig. 2.

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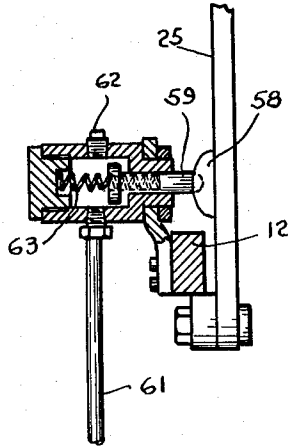


Fig. 3.

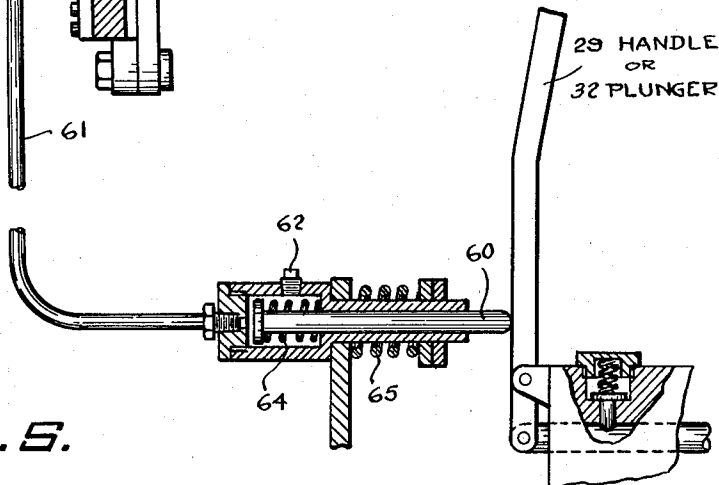


Fig. 5.

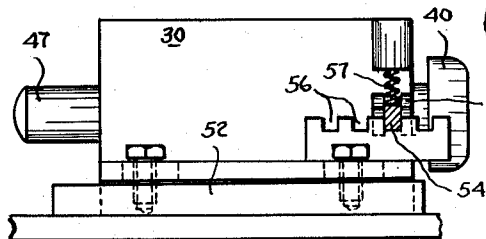
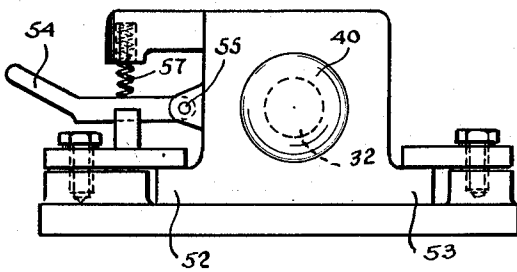


Fig. 6.

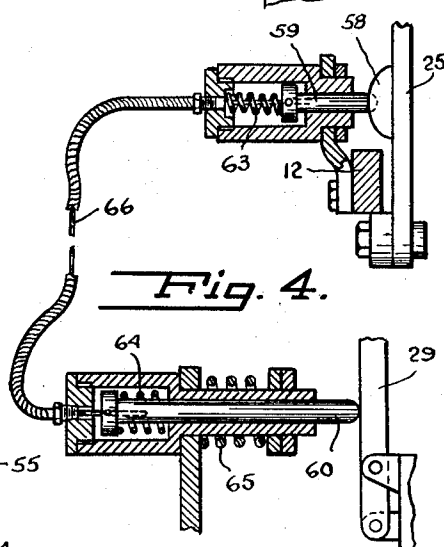


Fig. 4.

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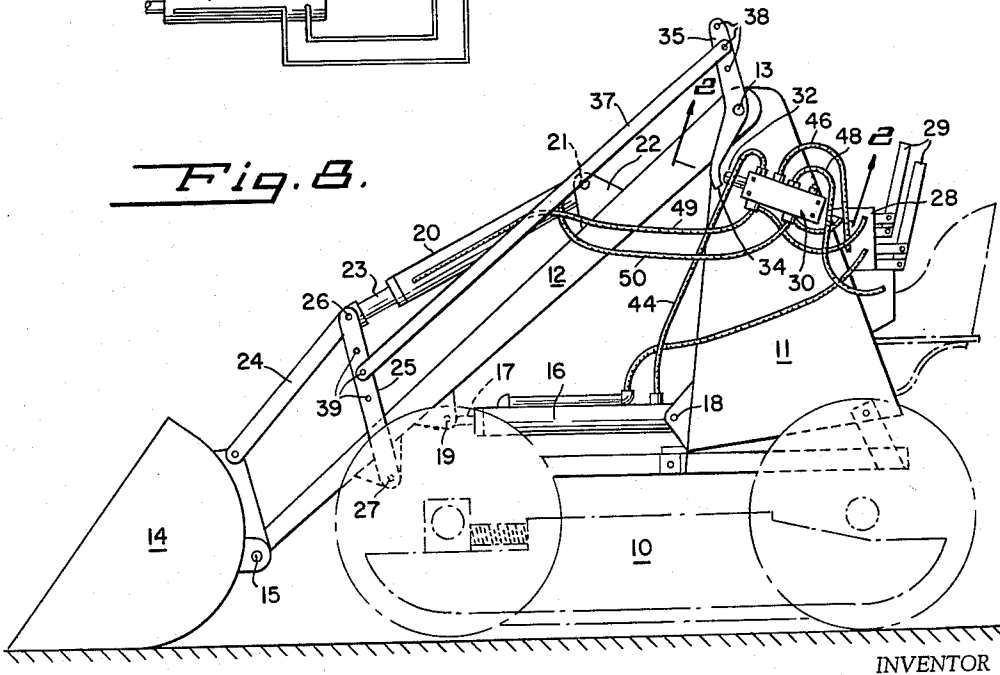
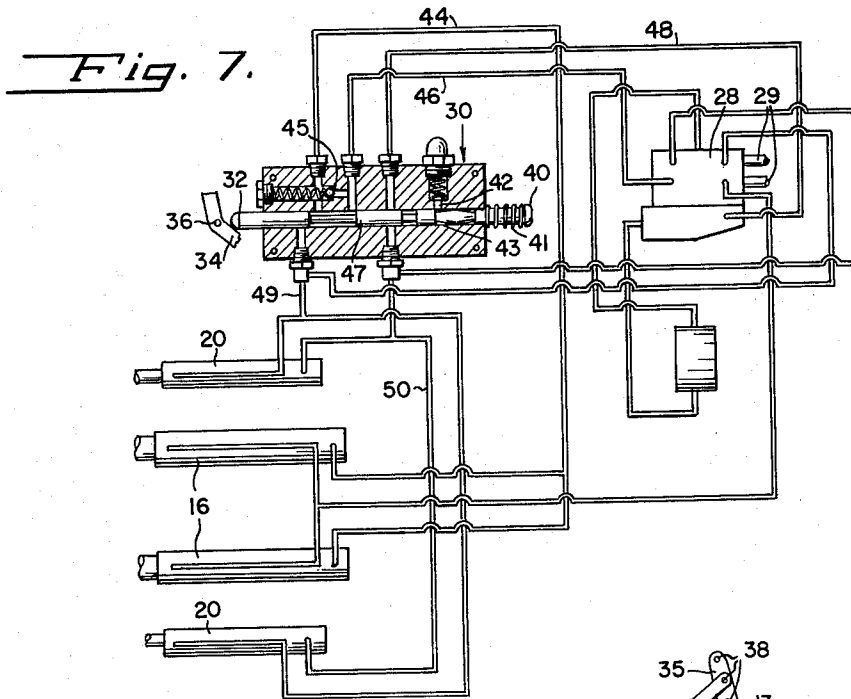
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CONTROL SYSTEM FOR TRACTOR MOUNTED APPARATUS

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3 Sheets-Sheet 3



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3,155,253

CONTROL SYSTEM FOR TRACTOR MOUNTED APPARATUS

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Continuation of application Ser. No. 30,402, May 16, 1960, which is a continuation of application Ser. No. 570,605, Mar. 9, 1956. This application June 21, 1963, Ser. No. 289,678

6 Claims. (Cl. 214-140)

This invention relates to tractor mounted apparatus or the like and has particular reference to new and improved means for providing control of such equipment.

This is a continuation of my application Serial Number 30,402, filed May 16, 1960, now abandoned which is a continuation of my application Serial Number 570,605, filed March 9, 1956.

An object of the invention is to provide new and improved means for automatically effecting the movement of the bucket or lift-arms or any other part of the apparatus to a predetermined position.

Another object is to provide new and improved means for speeding up the operation of the apparatus.

Another object is to provide new and improved means for assuring exact or precise positioning of the apparatus which is difficult or impossible to accomplish manually.

Another object is to provide new and improved means whereby a bucket or other part of a tractor mounted loader or trencher or the like will be returned to a predetermined position at will, which position may be varied.

Another object is to provide a device of the type set forth which precisely positions such part of the apparatus without error.

Another object is to provide new and improved means of the type set forth which is operable selectively and optionally and wherein the unit can be repositioned manually at will.

Another object is to provide an apparatus of the type set forth which can be actuated by hydraulic fluid from the operating cylinder or which can employ scavenger fluid without requiring additional hydraulic capacity, or fluid from any other source.

Another object of the invention is to provide new and improved means for automatically controlling a loader bucket whereby during lowering of the loader arms the bucket is automatically pivoted from dumping position to loading position.

Another object is to provide a new and improved device of the type set forth which is simpler and easier for the operator who does not have to concentrate on the correct positioning of the bucket or other part of the apparatus which part is precisely positioned without diverting the attention of the operator from control of other parts of the apparatus.

Another object is to provide new and improved means for actuating the control valves or other controls of apparatus, which means is relatively simple and inexpensive and which is capable of use regardless of the relative positions of the member to be controlled.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings. It will be understood that changes may be made in the details of construction and arrangement of parts without departing from the scope of the invention as set forth in the accompanying claims as the preferred forms have been given by way of illustration only.

Referring to the drawings:

FIG. 1 is a side view of a tractor mounted loader embodying the invention,

FIG. 2 is a vertical sectional view of the valve shown in FIG. 1;

FIG. 3 is a side view, partially in section, of a modified form of apparatus;

FIG. 4 is a view generally similar to FIG. 3, but showing another form of the apparatus of the invention;

FIG. 5 is a side view of a device which may be used with the form of apparatus of FIGS. 1 and 2;

FIG. 6 is an end view of the device shown in FIG. 5;

FIG. 7 is a fluid circuit diagram showing the hydraulic system of the apparatus; and

FIG. 8 is a side view of a tractor mounted loader embodying a modified form of the invention.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout, the apparatus is shown mounted on a tractor 10 which has the upright supports 11 secured to the frame on the opposite sides of the tractor.

Adjacent the opposite ends of each of the supports 11 is pivotally mounted a loader or lift-arm 12 by the pivots 13 and adjacent the opposite end of loader or lift-arms 12 is positioned the bucket 14 which is pivotally connected to the arms 12 by the pivots 15.

The arms 12 are adapted to be raised and lowered by the hydraulic cylinder and ram 16 and 17 respectively.

The ram is pivotally connected at 18 to support 11 adjacent the lower end thereof or to the tractor frame and the ram 17 is pivotally connected at 19 to a lug on the arm 12.

The bucket 14 is adapted to be pivoted about arms 12 from loading position shown in FIG. 1 to load carrying position when the arms are raised and when the bucket has been raised to desired height and moved to desired location, the bucket is then rotated to dump the load. Afterwards, the bucket is pivoted again to the loading position of FIG. 1 and the cycle repeated. To effect such rotation or pivotal movement of the bucket 14, there is provided the cylinder 20 which is pivotally connected at 21 to lug 22 on arm 12, and ram 23 is connected to bucket 14 through link 24. Ram 23 is also connected to a link 25 by a pivot 26 and said link 25 is pivotally connected at 27 to a lug secured to arm 12.

The tractor is provided with the usual hydraulic pump adapted to be operated by the tractor and which is connected to a hydraulic tank at the operating or control valve 28 in the usual manner, whereby upon actuation of controls 29, the arm lift cylinders and/or the bucket rotating cylinders will be actuated as desired.

During the lowering of the arms 12 to loading position as shown in FIG. 1, it is essential that the bucket be rotated from load dumping position to loading position and at the same time the operator is engaged in actuating the control 29 to actuated cylinders 16 for effecting such lowering of the arms 12 and bucket 14. At the same time, the operator is engaged in operating the tractor to move the bucket from dumping position to loading position, and during this same time, unless the bucket is rotated to loading position, the operation of the apparatus will be slowed up or delayed until the bucket is so rotated. For this purpose the valve member designated generally at 30 is provided which has the bore 31 in which is mounted the valve member 32 which has an end 33 engaging a cam surface 34 on lever 35 which is pivotally mounted at 36 on arm 12 and which is connected through a link 37 to link 25. It will be noted that a plurality of pivot connections 38 are provided on lever 35 and a plurality of pivot connections 39 are provided on lever 25 and, thus by connection of the ends of link 37 to the proper pivots 38 and 39, the extent of pivotal adjustment of the bucket automatically can be varied.

The valve member 32 is provided with the manual push button 40 adapted to be pushed by the operator

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against the force of spring 41 which tends to retain the valve 32 in inoperative position and the locking member 42 which engages a recess or socket 43 in valve member 32 to lock valve member 32 in adjusted position so that it will continue to operate until the valve member 32 is returned to neutral position. Valve member 30 is adapted to be actuated through actuation of the valve 32 by cam 34 upon movement of said cam upon lowering of the lift-arms 12 which effects pivotal movement of link 25 through which movement of link 37 and lever 35 is effected and such movement of valve member 32 effects actuation of bucket rotating cylinder and ram 20 and 23 respectively to return bucket 14 to loading position as previously described.

The valve 30 can also be positioned other than on the arm 12 as shown such as on the frame 11 by suitable positioning of the cam such as on the pivot of arm 12 to support 11, as will be seen from FIG. 8 of the drawings.

The valve 30 is interposed in the hydraulic lines as shown in FIGS. 1 and 2 and 7 and operates as follows:

The valve member 32 is shown in FIG. 2 in inoperative position. In order to place the valve in operative position, the operator need only push the valve forwardly by pushing button 40, and the valve will be placed in operative position where it will be retained until, during the lowering of the lift-arms 12, cam lobe 34 engages the end 33 of valve member 32 and the bucket is rotated to predetermined position, such as loading position, relative to lift-arms 12. This engagement kicks valve member 32 out of operative position and into inoperative position where it remains until the valve member is again preset by the operator and, in the meantime, the apparatus can be operated without use of the automatic feature, and in the normal or conventional manner, if desired.

When the valve member has been preset in operative position by the pushing in of button 40, while the bucket is in dumped position, oil escapes, as the lift arms are dropped, from the rear of the lift arm cylinders through line 44 to bore 31. Check valve 45 prevents the return of said oil to the main valve through line 46 and land 47 blocks off line 48 to the oil reservoir. The oil therefore passes to line 49 and then to the front of the bucket control cylinders 20 to pivot the bucket from dumping position to loading position automatically. When cam 34 engages the end 33 of valve member 32, it kicks it from such preset or operative position into inoperative position as shown in FIG. 2. While bucket control cylinder is being actuated as described above, oil from the rear of that cylinder escapes through line 50 to line 48 to the oil reservoir.

In the event that the operator should push in valve member 32 when the arms 12 are only partly raised and thereafter desires to raise said arms further, oil would pass from line 46 from the main valve through check valve 45 to the line 44 to rear of the push or lift arm cylinders and would, thus, allow the raising of the arms.

The check valve 45 is a safeguard should the operator make a mistake or wish to raise the lift arms higher after the dumping of the bucket, and valve 30 has been pushed in. In such a situation, land 47 would block off passage from line 46 to line 44, and oil would then pass through the passage controlled by check valve 45 from line 46 to line 44, and in such event the oil would pass either past check valve 45, as stated, to line 44 to raise the arms as described, or pass through line 49 to the front of the bucket control cylinder which would pivot the bucket and through cam 34 move valve member 32 out of operative position.

In FIGS. 5 and 6 is shown an arrangement for adjusting valve 30 towards or away from cam 34 by which adjustment the position to which the bucket is returned may be predetermined and varied.

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In these FIGS. 5 and 6, the valve 30 has the flanges 52 and 53 in a slide whereby the valve may be slid to desired adjusted position and valve 30 has the handle 54 pivotally connected thereto at 55. The handle is adapted to be retained in any of the indents or slots 56 by spring 57. By raising handle 54 and sliding valve 30 to adjusted position and allowing the handle 54 to be forced into one of the slots 56, the valve can be adjusted and retained in adjusted position.

In FIGS. 3 and 4 are shown means for automatically or manually actuating or controlling the main control valve or special control of apparatus, which means is relatively simple and inexpensive and which may be positioned practically anywhere on the apparatus and which will not be materially affected by movement of the loader or lift arms.

In these forms the actuating means is a cam 53 on link 25 which cam engages plunger 59 and actuation of link 25 will effect actuating of plunger 59 and there-through effect actuation of plunger 60 which engages control handle 29 or could engage end 33 of valve member 32 for actuating such valve.

In the form of the apparatus of FIG. 3, a hydraulic link 61 is employed for connecting plungers 59 and 60. Fill plugs 62 are provided whereby the line forming the hydraulic link may have fluid added thereto. Spring 63 is connected to plunger 59 for urging plunger 59 against the cam 53 and plunger 60 is provided with return spring 64 and override spring 65 to prevent damage and allow the whole unit to slide back.

The apparatus of FIG. 4 is generally similar to FIG. 3 but employs a flexible cable 66 connected directly to both plungers 59 and 60 at its opposite ends, whereby motion of plunger 59 is directly transmitted to plunger 60.

Because of the flexible cable or flexible hose forming line 61, the plungers 59 and 60 may be remote from each other and movement of the arms 12 will not materially affect operation of the device.

In these forms, movement of the links 25 upon pivoting of the bucket 14 or raising or lowering of said bucket could be caused to actuate the control valve 29, with the extent of such movement depending upon the movement of link 25 and the movement of arms 12 will not materially affect such actuation of the control valve.

From the foregoing it will be seen that I have provided new and improved means for obtaining all of the objects and advantages of the invention.

I claim:

1. In a device of the character described, a pair of arms adapted to be pivotally connected adjacent one end to a vehicle, a bucket pivotally connected to said arms adjacent the free ends thereof, hydraulic means for raising and lowering said arms and bucket relative to said vehicle, bucket pivoting means including hydraulic means operatively connected to the bucket for pivoting said bucket relative to said arms, means for controlling both of said hydraulic means, a valve member adapted to be automatically actuated whereby said bucket will be automatically pivoted to position its cutting edge in loading position during lowering of said arms at substantially any loading position between dumping position and ground, said valve member being operatively connected to said bucket pivoting means and means operatively connected to said bucket for actuating said valve member such as to cause said bucket to be automatically positioned in proper loading position during the lowering of said arms.

2. In a device of the character described, a pair of arms adapted to be pivotally connected adjacent one end to a vehicle, a bucket pivotally connected to said arms adjacent the free ends thereof, hydraulic means for raising and lowering said arms and bucket relative to said vehicle, bucket pivoting means including hydraulic means operatively connected to the bucket for pivoting said bucket relative to said arms, means for controlling both of

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said hydraulic means, a valve member adapted to be automatically actuated whereby said bucket will be automatically pivoted to position its cutting edge in loading position during lowering of said arms at substantially any loading position between dumping position and ground, said valve member being actuated upon lowering of said arms and bucket to automatically effect actuation of said bucket pivoting means, and means operatively connected to said bucket for actuating said valve member to cause said bucket to be automatically positioned in proper loading position during the lowering of said arms, said means being positioned between said valve member and said bucket pivoting means.

3. In a device of the character described, a pair of arms adapted to be pivotally connected adjacent one end to a vehicle, a bucket pivotally connected to said arms adjacent the free ends thereof, hydraulic means for raising and lowering said arms and bucket relative to the vehicle, bucket pivoting means including hydraulic means operatively connected to the bucket for pivoting said bucket relative to said arms, manually operable control valve means for controlling both of said hydraulic means, a set of hydraulic lines connecting said control valve means with said hydraulic means for pivoting said bucket, a set of hydraulic lines connecting said control valve means with said hydraulic means for raising and lowering said arms, a valve member interposed in and connecting said sets of hydraulic lines to effect direct communication between said sets of hydraulic lines whereby said bucket will be automatically pivoted with its cutting edge in loading position during lowering of said arms, said valve member being operatively connected to the bucket pivoting means, and means operatively connected to said bucket pivoting means for actuating said valve member such as to cause said bucket to be automatically positioned in loading position during the lowering of said arms, said means being positioned between said valve member and said bucket pivoting means.

4. In a device of the character described, a pair of arms adapted to be pivotally connected adjacent one end to a vehicle, a bucket pivotally connected to said arms adjacent the free ends thereof, hydraulic means for raising and lowering said arms and bucket relative to the vehicle, bucket pivoting means including hydraulic means operatively connected to the bucket for pivoting said bucket relative to said arms, manually operable control valve means for controlling both of said hydraulic means, a set of hydraulic lines connecting said control valve means with said hydraulic means for pivoting said bucket, a valve member adapted to be automatically actuated whereby said bucket will be automatically pivoted to position its cutting edge in loading position during lowering of said arms, said valve member being operatively connected to said bucket pivoting means, and means operatively connected to said bucket pivoting means for actuating said valve member such as to cause said bucket to be automatically positioned in loading position during the lowering of said arms and bucket.

5. In a device of the character described, a pair of arms

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adapted to be pivotally connected adjacent one end to a vehicle, a bucket pivotally connected to said arms adjacent the free ends thereof, hydraulic means for raising and lowering said arms and bucket relative to the vehicle, bucket pivoting means including hydraulic means operatively connected to the bucket for pivoting said bucket relative to said arms, manually operable control valve means for controlling both of said hydraulic means, a set of hydraulic lines connecting said control valve means with said hydraulic means for pivoting said bucket, a set of hydraulic lines connecting said control valve means with said hydraulic means for raising and lowering said arms, a valve member interposed in and connecting said sets of hydraulic lines to effect direct communicating between said sets of hydraulic lines whereby said bucket will be automatically pivoted with its cutting edge in loading position during lowering of said arms, said valve member being operatively connected to the bucket pivoting means, and means whereby said valve member may be preset to effect direct communication between said sets of hydraulic lines whereby said bucket will be automatically pivoted to loading position during lowering of said arms, and adjustable means operatively connected to said bucket pivoting means for actuating said valve member such as to cause said bucket to be automatically positioned in its loading position during the lowering of said arms, said adjustable means being positioned between said valve member and said bucket pivoting means.

6. In a device of the character described, a pair of arms adapted to be pivotally connected adjacent one end to a vehicle, a bucket pivotally connected to said arms adjacent the free ends thereof, hydraulic means for raising and lowering said arms and bucket relative to said vehicle, bucket pivoting means including hydraulic means operatively connected to the bucket for pivoting said bucket relative to said arms, means for controlling both of said hydraulic means, a valve member adapted to be automatically actuated whereby said bucket will be automatically pivoted to position its cutting edge in loading position during lowering of said arms at substantially any loading position between dumping position and ground, said valve member being operatively connected to said bucket pivoting means and adjustable means operatively connected to said bucket for actuating said valve member to cause said bucket to be automatically pivoted to loading position during the lowering of said arms, said means being positioned between said valve member and said bucket pivoting means, and means whereby said valve member may be preset whereby said bucket will be automatically pivoted to loading position during lowering of said arms.

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