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BUCKET SUPPORTING AND OPERATING MECHANISM

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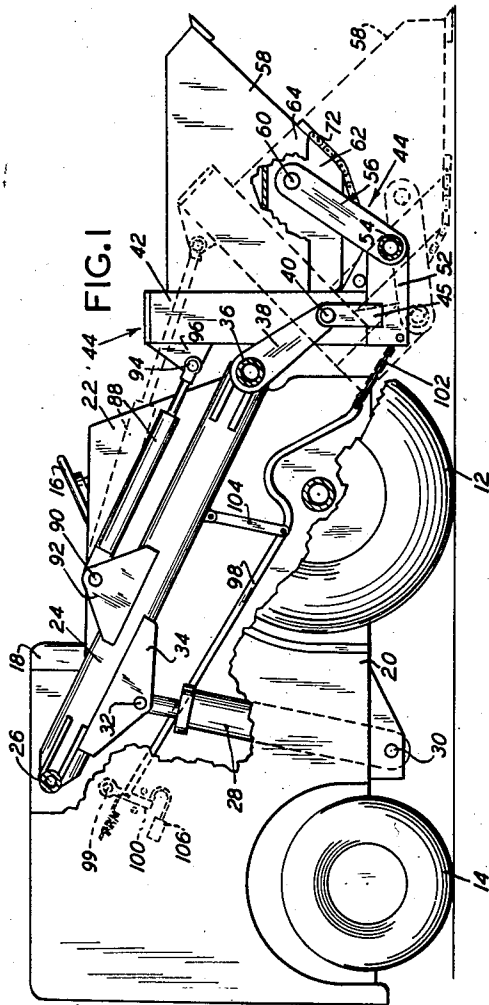


FIG. 1

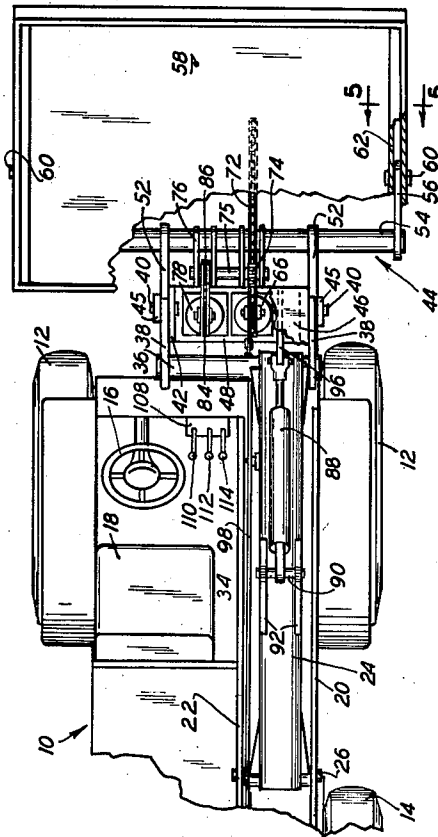


FIG. 2

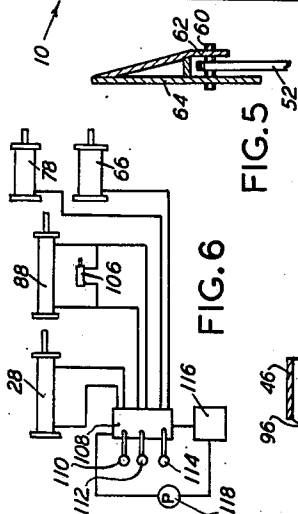


FIG. 3

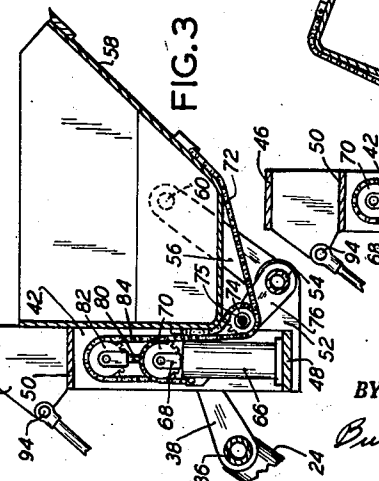
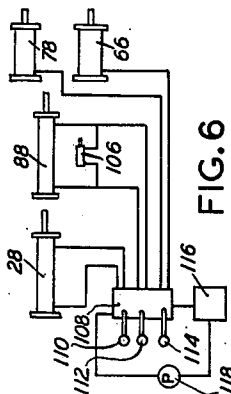


FIG. 4



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BUCKET SUPPORTING AND OPERATING MECHANISM

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6 Claims. (Cl. 214-140)

This invention relates to a bucket supporting and operating mechanism for a loader and more particularly to a mechanism of the type which pivotally supports a bucket or scoop on the end of a boom about an axis extending laterally of the boom and employs a hydraulic power actuator for pivotally moving the bucket about such axis.

Hydraulic actuators have to a considerable extent replaced other power means, such as cables connected to power operated drums, for raising and lowering the booms of loaders, pivotally moving bucket supporting structure relative to the boom, and pivotally moving the bucket relative to the boom or its bucket supporting structure. Such hydraulic actuators have been employed to tip the bucket forwardly relative to a bucket supporting structure about a laterally extending axis. It is desirable to have such pivotal axis a considerable distance above the bottom of the scoop or bucket and as high as practicable relative to the end of the boom when the boom is in elevated position, since this enables the bucket to be dumped at a greater elevation for a given position of the boom. Difficulties have, however, been encountered in positioning the bucket tipping hydraulic actuator so as to provide sufficient range of movement of the bucket about its pivotal axis in order to enable the bucket to be moved to an upright position while being raised from loading to dumping position and also substantially inverted for dumping the bucket. One manner of mounting the bucket and actuator therefor is shown in the co-pending application of Elmer A. Wagner, Serial No. 277,764, filed March 21, 1952, and now Patent No. 2,741,378, such mounting placing the pivotal axis for the bucket at its lower rear corner. Another mounting for a bucket or scoop and its actuator is shown in my co-pending application, Serial No. 517,998, filed June 27, 1955, in which the pivotal axis of the bucket is positioned adjacent the front of the bucket but substantially above the bottom thereof. The structure shown in the latter application, however, involves a housing which extends upwardly from the bottom of the bucket into the interior thereof. For some purposes such a housing is not desirable and the range of movement of the bucket about its pivotal axis is usually such that the bucket supporting structure must also be forwardly tipped in order to dump the bucket, thus lowering the pivotal axis of the bucket and obviating the advantages of the relatively high pivotal axis of the bucket.

The present invention is directed to an improved bucket supporting and operating mechanism employing hydraulic actuating means for tipping the bucket relative to a bucket supporting structure. Such bucket operating mechanism can be advantageously substituted for that shown in the co-pending applications above referred to. That is to say, the bucket operating mechanism of the present invention can be employed with a boom structure of the type shown in said co-pending application, Serial No. 277,764, in which there is a parallelogram linkage for maintaining the bucket supporting structure in a fixed

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angular position relative to the vehicle, or it can be employed with a boom structure of the type shown in said co-pending application, Serial No. 517,998, in which hydraulic actuator means form part of the parallelogram linkage of the boom structure so that the bucket supporting structure can be tipped relative to the boom while being maintained in a given angular position relative to the vehicle for a given position of the actuator means. The bucket operating structure of the present invention is, however, most advantageously employed with the boom structure shown in the present application in which a hydraulic actuator is connected between the bucket supporting structure and the boom to tip such structure forwardly relative to the loader vehicle but such actuator is prevented from tripping the bucket rearwardly toward the vehicle from an upright position of the bucket. The latter type of boom structure is described and claimed in my co-pending application, Serial No. 563,981, filed February 7, 1956.

In the bucket operating structure of the present invention, the pivotal axis about which the bucket is tipped relative to the bucket supporting structure or boom, can be placed at substantially any desired position along the width or height of the bucket, a preferred position being close to a point midway between the top and bottom of the bucket and midway between the front and rear portions of the bucket. In the preferred embodiment, such pivotal axis is just below such point and somewhat closer to the inclined front wall of the bucket than to the rear wall thereof and a pair of hydraulic power actuators carried by the bucket supporting structure and connected to the bucket by short flexible tension members are employed to tip the bucket about such axis. This structure provides for effective dumping of the bucket while also providing effective support of the bucket during loading. The hydraulic actuators are positioned completely within the confines of the bucket supporting structure and the bucket supporting structure provides a backing for the bucket during loading operations. The connection of the actuators to the bucket through the flexible tension members enables projection of the plunger of one actuator to cause retraction of the plunger of the other actuator and also enables such actuators to be of relatively small size and short stroke as compared to previous bucket tipping hydraulic actuator means.

It is therefore an object of the present invention to provide an improved bucket supporting and operating mechanism for loaders in which hydraulic actuators carried by a bucket supporting structure can be positioned in a restricted space and employed to tip a bucket or scoop about a laterally extending axis through a range of movements sufficient to provide for moving the bucket between an upright loading position and a substantially inverted dumping position.

Another object of the invention is to provide a bucket supporting and operating mechanism for loaders in which the bucket is movable through a relatively large angle about a laterally extended axis positioned substantially above the bottom of the bucket by hydraulic actuators carried by a bucket supporting structure and positioned within a restricted space.

Another object of the invention is to provide a bucket supporting and operating mechanism providing for moving a bucket or scoop of a loader between an upright load carrying position and a substantially inverted dumping position which mechanism may be advantageously applied to various types of boom structures.

A further object of the invention is to provide a bucket supporting and operating mechanism for loaders in which a bucket supporting mechanism carried by the boom and providing a backing for said bucket can be tipped relative to the boom so as to move the bucket between

an upright position and a loading position and in which the bucket may be dumped by hydraulic actuator means producing pivotal movement of the bucket about an axis spaced upwardly from the bottom of the bucket without tipping of the bucket supporting structure relative to the boom.

A still further object of the invention is to provide a bucket supporting and operating mechanism for loaders in which a pair of short stroke hydraulic actuators are employed and positioned entirely within the confines of a vertically extending body portion of a bucket supporting structure and are connected to tip the bucket from an upright load carrying position to a dumping position through short flexible tension members.

Other objects and advantages of the invention will appear in the following description of a preferred embodiment thereof which is shown in the attached drawings, of which:

Fig. 1 is a side elevation of a loader with parts broken away and illustrating a bucket operating mechanism in accordance with the present invention with the bucket shown in full lines in upright or load carrying position and shown in dotted lines in loading position;

Fig. 2 is a partial plan view of the loader of Fig. 1 with the bucket in upright position and parts of the bucket broken away to show the bucket supporting and operating mechanism;

Fig. 3 is a partial vertical section on a somewhat enlarged scale showing the bucket in upright position and the boom in elevated position;

Fig. 4 is a view similar to Fig. 3 showing the bucket in dumping position;

Fig. 5 is a fragmentary vertical section on an enlarged scale on the line 5—5 of Fig. 2; and

Fig. 6 is a schematic diagram of the hydraulic system of the loader of the present invention.

Referring more particularly to the drawings, a loader in accordance with the present invention may include a vehicle having a body 10, front wheels 12, which are driven from a motor (not shown) through any known or suitable power transmission, and a pair of rear wheels 14 which can be steered from a steering wheel 16 by any known or suitable steering mechanism. That is to say, the vehicle may be of any known or suitable type which is self-propelled both forwardly and backwardly under control of an operator occupying the seat 18 in a suitable cab near the front of the vehicle and at one side thereof. The vehicle at the other side thereof has a pair of spaced upstanding support members 20 and 22, which may be heavy metal plates, between which is positioned a boom 24. The boom 24 is pivotally mounted at one end on a pivot shaft 26 extending between the plates 20 and 22 and can be raised and lowered by a hydraulic actuator 28 extending upwardly from a pivot pin 30 positioned below the pivot shaft 26 for the vehicle end of the boom 24 and a pivot pin 32 extending between supporting plates 34 secured to the lower side of boom and extending downwardly therefrom at a point spaced from the pivot shaft 26. It will be apparent that the boom 24 may be raised and lowered by the actuator 28 between a position somewhat lower than that shown in Fig. 1 and an elevated position.

At the other end of the boom, a tubular cross member 36 is rigidly secured in the end of the boom so as to extend laterally of the boom. The cross member 36 has secured to each end thereof a forwardly and downwardly extending arm 38. The lower ends of the arms 38 are pivotally connected by pivot pins 40 to the side plates 42 of a bucket supporting structure 44, the pivot pins also extending through upwardly extending pin supporting arms 45 also secured to the bucket supporting structure. The bucket supporting structure 44 also includes top and bottom cross plates 46 and 48, respectively, and an intermediate cross plate 50, all of the cross plates extending between the side plates 42. The

side plates 42 have forwardly extending side arms 52 secured thereto adjacent their lower portions, the arms 52 having the pin supporting arms 45 secured thereto and carrying at their forward ends a laterally extending tubular member 54 extending through the arms 52 and rigidly secured thereto. The tubular member 54 has rigidly secured to each end a forwardly and upwardly extending bucket supporting arm 56. The arms 56 receive a bucket or scoop 58 therebetween and each arm is connected to the side of the bucket by a pivot pin 60. The pivot pins each extend through a side wall 62 of the bucket, then through one of the arms 56 and then through a depending cover portion 64 secured to a side wall of the bucket, as most clearly shown in Fig. 5. It will be apparent that the bucket 58 can pivot about the axis of the pivot pins 60 from the upright or loaded position, shown in Fig. 3, to the dumping position shown in Fig. 4.

In order to tip the bucket from the position shown in Fig. 3 to that shown in Fig. 4, a hydraulic actuator 66 is positioned within the space provided in the bucket supporting structure 44 between the side plates 42 and the bottom and intermediate plates 48 and 50, respectively. The actuator 66 has its base secured to the bottom plate 48 and has an upwardly extending plunger 68 which can be moved from the position shown in Fig. 3 to that shown in Fig. 4 by admission of hydraulic fluid under pressure into the power portion of the actuators 66. The plunger 68 has a sprocket 70 journaled in its upper end about an axis extending transversely of the plunger 68. A sprocket chain 72 has one end connected to a fixed point in the bucket supporting structure, for example, to the cylinder of the actuator 66 and is trained over the sprocket 70 then downwardly under a sprocket 74 positioned below the rear portion of the bucket 58 and journaled on a shaft 75 carried in the upper end of a plurality of spaced arms 76 secured to the tubular member 45 and extending upward and rearwardly therefrom. The other end of the sprocket chain 72 is connected to the front wall of the bucket and it will be apparent that that upward movement of the plunger 68 of the hydraulic actuators 66 will cause pivotal movement of the bucket 58 about its pivot pins 60 from the position shown in Fig. 3 to that shown in Fig. 4.

The bucket supporting structure 44 also has positioned therein a second hydraulic actuator 78 having its base portion secured to the bottom plate 48 of the bucket supporting structure and extending upwardly therefrom beside the actuator 66. The actuator 78 also has a plunger 80 which is moved upwardly when hydraulic fluid under pressure is introduced into the lower portion of the actuator 78. A sprocket 82, similar to the sprocket 70, is journaled in the upper end of the plunger 80. A sprocket chain 84 has one end secured to its actuator 78 and is trained upwardly and over the sprocket 82 and then downwardly and under another sprocket 86 journaled on the shaft 75. The chain 84 has its other end secured to the rear wall of the bucket 58 and it will be apparent that upward movement of the plunger 80 will cause the bucket 58 to be pivoted about its pivot pin 60 from the position shown in Fig. 4 to the position shown in Fig. 3. It will be further apparent that upward movement of either of the plunger 68 or 80 will cause downward movement of the other plunger by reason of their interconnection through the chains 72 and 84 and the bucket 58.

The bucket supporting structure 44 may be pivoted relative to the boom 24 about its pivot pins 40 from its upright position shown in full lines in Fig. 1 and a position somewhat below that shown in dotted lines in Fig. 1. The pivotal movement of the bucket supporting structure 44 is produced by a hydraulic actuator 88 which is connected between the bucket supporting structure 44 and the boom 24. That is to say, one end of the actuator 88 is connected to a pivot pin 90 extending between a

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pair of plates 92 secured to and extending upwardly from an intermediate portion of the boom 24 and a pivot pin 94 pivotally connecting the other end of the actuator 88 to a plate 96 secured to and extending vertically between the upper cross member 46 of the bucket supporting structure 44 and the intermediate cross member 50. It will be apparent that the actuator 88 may be employed to pivot the bucket supporting structure 44 about its pivot pins 40 relative to the boom 24.

It will be apparent that if the boom 24 is raised to an elevated position by the actuator 28 with the bucket 58 and bucket supporting structure 44 in the position shown in full lines in Fig. 1, the bucket 58 will be tipped rearwardly toward the body of the vehicle. The present device preferably contains a mechanism of the same general type as that disclosed and claimed in my co-pending application, Serial No. 563,981, referred to above which prevents such rearward tipping of the bucket 58. That is to say, a parallelogram linkage mechanism may be provided, including a valve actuating rod 98, which extends between a control valve actuating lever 100 having one end pivoted at 99 to the vehicle, and a chain 102 forming a lost motion connection between the other end of the valve actuating rod 98 and the lower end of the bucket supporting structure 44. The valve actuating rod 98 may be supported from the boom 24, for example, by means of a link 104 positioned intermediate the ends of the valve actuating member 98 and the boom 24. The link 104 has its opposite ends pivotally connected to the boom 24 and to the valve actuating rod 98 and such pivotal connections provide a parallelogram linkage arrangement including the boom 24. That is to say, the pivotal connection of the valve actuating rod 98 with the valve actuating lever 100 has substantially the same relative position with respect to the pivot shaft 76 between the boom and the vehicle body 10 as the pivotal connection of the link 104 with the valve actuating rod 98 has with respect to the pivotal connection between the link 104 and the boom 24. Similarly, the point of attachment of the chain 102 to the bucket supporting structure 44 has substantially the same relative position with respect to the pivot pins 40 for the bucket supporting structure 44 as the point of connection of the valve actuating rod 98 with the valve actuating lever 100 has with respect to the pivotal shaft 26 between the boom 24 and the body 10 of the vehicle.

The valve actuating lever 100 has its other end connected to a valve 106 secured to the body 10 of the vehicle. It will be apparent that when the boom is elevated by the actuator 28, the chain 102 will be tensioned to tend to move the valve actuating rod 98 to the right in Fig. 1. Such movement opens the valve 106 and such valve is connected to the actuator 88 so as to cause the bucket supporting structure 44 to be pivoted in a clockwise direction in Fig. 1 relative to the boom as the boom is elevated until the valve again closes. The result is to maintain the bucket 58 in an upright position as the boom is raised. The actuator 88 may be employed at any time to pivot the bucket supporting structure 44 in a clockwise direction in Fig. 1 from the upright position shown in full lines but the valve 106 and its actuating mechanism, including the parallelogram linkage above described, prevents rearward tipping of the bucket supporting structure 44 past the position shown in Fig. 1, thus preventing tipping of the bucket toward the loader vehicle.

The various hydraulic actuators may be controlled by hydraulic valves in a valve assembly 108 provided with a series of valve actuating levers 110, 112 and 114, the valve assembly 108 being positioned adjacent the steering wheel 16 so as to be accessible to the operator of the loader. As shown in Fig. 6, the hydraulic system may include a storage tank 116 and a power driven pump 118 for supplying fluid under pressure to the valve assembly 108, the hydraulic fluid being exhausted from the valve assembly back to the tank 116. The lever 110

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controls operation of the actuator 28 for the boom 24. The lever 112 controls operation of the actuator 88 for pivoting the bucket supporting structure 44 about its pivot pins 40 relative to the boom 24 and the lever 114 controls operation of the actuators 66 and 78 for tipping the bucket about its pivot pins 60 relative to the bucket supporting structure 44. It will be apparent that the control levers 110, 112 and 114 may actuate any known or suitable type of hydraulic valves which will admit hydraulic fluid under pressure into one end of an actuator, such as actuator 28, while exhausting fluid from the other end, the valve associated with the lever 114 admitting fluid under pressure into one of the actuators 78 or 66 while exhausting it from the other. The valve 106 may be connected between the conduits leading to the opposite ends of the actuator 88 so that opening of the valve 106 will enable the plunger of the actuator 88 to be withdrawn therefrom until the valve 106 is again closed. It will be apparent from Fig. 1 that the weight of the bucket supporting structure 44 and of the bucket 58 and its contents is largely forwardly of the pivot pins 40 between the bucket supporting structure and the boom 24, such that establishing communication through the valve 106 between the opposite ends of the actuator 88 will cause the bucket supporting structure to rotate clockwise in Fig. 1 until the valve 106 is closed, thus causing the bucket supporting structure to be maintained in its upright position shown in Fig. 1.

The operation of the loader shown in the drawings is believed to be apparent from the above description. The boom 24 may be raised and lowered by the hydraulic actuator 28 under control of the lever 110. Similarly, the bucket supporting structure 44 can be pivoted about its pivot pins 40 by the hydraulic actuator 88 under control of the control lever 112. That is to say, the bucket supporting structure 44 can always be pivoted between the upright position shown in full lines in Fig. 1 and a position such as that shown by dotted lines in the same figure. However, the parallelogram linkage afforded by the valve actuating member 98, link 104 and chain 102, and the valve operating lever 100, and pivotal connection of the boom 24 at 26 to the body of the vehicle will cause operation of the valve 106 to open the valve whenever the bucket supporting structure 44 tends to pivot in a counterclockwise direction in Fig. 1 about the pivot pins 40 from the upright position shown in full line therein. Upon opening of the valve 106, communication is established between the opposite ends of the hydraulic actuator 88 so that the weight of the bucket supporting structure 44, as well as the weight of the bucket 58 supported thereby, and any load contained in the bucket tends to pivot the bucket supporting structure 44 in a clockwise direction in Fig. 1 so as to prevent such bucket supporting structure from being tipped rearwardly toward the vehicle from an upright position.

The bucket 58 may be tipped relative to the bucket supporting structure 44 about the pivot pins 60 by the two hydraulic actuators 66 and 78, the actuator 66 operating through the chain 72 trained over the sprocket 70 journaled on the plunger 68 of the actuator to pivot the bucket from the upright position shown in Fig. 3 to dumping position shown in Fig. 4, and the actuator 78 operating through the chain 84 to pivot the bucket 58 from the position shown in Fig. 4 to the position shown in Fig. 3. It will, of course, be apparent that the bucket may be made to assume any position intermediate between the positions shown in Figs. 3 and 4, and that upward movement of the plunger of either actuator 66 or 78 will cause downward movement of the plunger of the other actuator by reason of the interconnection of the two plungers through the chains 72 and 84 and the bucket 58.

The loading position of the bucket 58 is shown in dotted lines in Fig. 1 and it will be apparent that during a loading operation with the bucket in the position shown in such figure, that the bucket 58 is backed up by the bucket supporting structure 44. The boom can be low-

ered somewhat lower than the position shown in Fig. 1 and also for certain types of operations, the bucket supporting structure 44 can be further tipped relative to the boom and the bucket 58 can also be tipped relative to the bucket supporting structure. Loading of the bucket can be accomplished by forward movement of the vehicle, by raising of the boom, or rearward tipping of the bucket, or it supporting structure, or by a combination of such movements. The loaded bucket can be returned to load carrying or upright position, such as that shown in full line in Fig. 1, and the boom then elevated. The actuator 66 can then be employed to dump the bucket by pivoting the bucket about its pivot pins 60, such pivot pins occupying a higher elevation than the end of the boom.

I claim:

1. Bucket operating mechanism for a loader having a boom providing a bucket carrying end which can be raised and lowered, said mechanism comprising a bucket supporting structure mounted on said end of said boom, a bucket pivotally connected to said structure for pivotal movement about an axis extending laterally of said structure, a pair of hydraulic power actuators positioned within said structure, each of said actuators having a hydraulically actuated power plunger, a flexible tension member connected between one of said plungers and a portion of said buckets spaced from said axle so that movement of said one plunger in a direction producing tension in said flexible member causes pivotal movement of said bucket about said axis in one direction, a second flexible tension member connected between the other of said plungers and another portion of said bucket spaced from said axis so that movement of said other plunger in a direction producing tension in said second flexible member causes pivotal movement of said bucket about said axis in the other direction, and hydraulic control means for selectively producing said movement of either of said plungers while releasing the other of said plungers so that movement of one of said plungers in said direction causes reverse movement of the other plunger.

2. Bucket supporting and operating mechanism for a loader having a boom providing a bucket carrying end which can be raised and lowered, said mechanism comprising a bucket supporting structure mounted on said end of said boom and having a pair of laterally spaced arms extending from the side of said structure opposite said boom, a bucket positioned between said arms and pivotally connected thereto for movement about an axis extending laterally of said structure, a pair of hydraulic power actuators positioned within said structure, each of said actuators having a hydraulically actuated power plunger, a flexible tension member connected between one of said plungers and a portion of said buckets spaced from said axis so that movement of said one plunger in a direction producing tension in said flexible member causes pivotal movement of said bucket about said axis in one direction, a second flexible tension member connected between the other of said plungers and another portion of said bucket spaced from said axis so that actuation of said other plunger in a direction producing tension in said second flexible member causes pivotal movement of said bucket about said axis in the other direction, and hydraulic control means for selectively producing actuation of said plungers in said direction while releasing the other of said plungers so that movement of one of said plungers in said direction causes reverse movement of the other plunger.

3. Bucket supporting and operating mechanism for a loader comprising a boom providing a bucket carrying end which can be raised and lowered and having a pair of laterally spaced arms extending from the end of said boom, a bucket supporting structure mounted on said end of said boom between said arms and having a pair of laterally spaced arms extending from the side of said structure opposite said boom, a bucket positioned between the last mentioned arms and connected thereto for pivotal movement about an axis extending laterally of said struc-

ture, said supporting structure providing a space therein between said boom and said bucket, a pair of hydraulic power actuators positioned within said space in said structure, each of said actuators having a hydraulically actuated power plunger, a flexible tension member connected between one of said plungers and a portion of said buckets spaced from said axis so that movement of said one plunger in a direction producing tension in said flexible member causes pivotal movement of said bucket about said axis in one direction, a second flexible tension member connected between the other of said plungers and another portion of said bucket spaced from said axis so that movement of said other plunger in a direction producing tension in said second flexible member causes pivotal movement of said bucket about said axis in the other direction, and hydraulic control means for selectively producing said movement of either of said plungers while releasing the other of said plungers so that movement of one of said plungers in said direction causes reverse movement of the other plunger.

4. Bucket operating mechanism for a loader comprising a boom providing a bucket carrying end which can be raised and lowered, a bucket supporting structure having a pair of side plate members and connecting top and bottom plate members forming a generally vertically extending body portion carried by the end of said boom, a pair of upwardly inclined laterally spaced arms extending from the lower portion of said body portion on the side thereof opposite the said boom, a bucket positioned between said arms and pivotally connected thereto for movement about an axis extending laterally of said structure between a loaded position in which the rear portion of said bucket rests against said body portion and a position in which said bucket is tipped away from said body portion, said axis being positioned above the bottom wall of said bucket and between the front and rear wall thereof, a pair of generally vertically extending hydraulic power actuators positioned within said body portion, each of said actuators having a plunger movable upwardly from a retracted position, a first sprocket journaled in the upper end of each of said plungers, a second sprocket aligned with each of said first sprockets and journaled in said structure below said bucket, a pair of sprocket chains each having one end connected to a fixed point on said structure and being trained over one of said first sprockets and below the second sprocket aligned therewith, the other ends of said chains being connected to the front and rear walls of said bucket, and means for supplying hydraulic fluid under pressure to said actuators to selectively move either of said plungers upwardly while exhausting fluid from the other of said actuator so that upward movement of either of said plungers causes downward movement of the other plunger.

5. Bucket supporting and operating mechanism for a loader having a boom providing a bucket carrying end which can be raised and lowered, said mechanism comprising a bucket supporting structure pivotally mounted on said end of said boom for movement about an axis extending laterally of said boom and having a pair of side plate members and connecting upper and lower plate members forming a generally vertically extending body portion, a pair of upwardly inclined laterally spaced arms extending from the lower portion of said body portion on the side thereof opposite the said boom, a bucket positioned between said arms and pivotally connected thereto for pivotal movement about an axis extending laterally of said structure between a loaded position in which the rear portion of said bucket rests against said body portion and a position in which said bucket is tipped away from said body portion, said axis being positioned above the bottom wall of said bucket and between the front and rear wall thereof, a pair of generally vertically extending hydraulic power actuators positioned within said body portion, each of said actuators having a plunger movable upwardly from a retracted position,

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a first sprocket journaled in the upper end of each of said plungers, a second sprocket aligned with each of said plunger sprockets and journaled in said structure below said bucket, a pair of sprocket chains each having one end connected to a fixed point on said structure below said first sprockets and being trained over one of said first sprockets and below the second sprocket aligned therewith, the other ends of said chains being connected to the front and rear walls of said bucket and means for supplying hydraulic fluid under pressure to said actuators to selectively move either of said plungers upwardly while exhausting fluid from the other of said actuators so that upward movement of either of said plungers causes downward movement of the other plunger.

6. Bucket operating mechanism for a loader comprising a boom providing a bucket carrying end which can be raised and lowered, said boom having a pair of laterally spaced arms extending from its end, a bucket supporting structure having a pair of side plate members and connecting top and bottom plate members forming a generally vertically extending body portion, said structure being positioned between said arms and having its side plate members pivotally connected to said arms for movement about an axis extending laterally of said boom, a pair of upwardly inclined laterally spaced arms extending from the lower portion of said body portion on the side thereof opposite the said boom, a bucket positioned between said upwardly inclined arms and pivotally connected thereto for pivotal movement about an axis extending laterally of said structure between a loaded position in which the rear portion of said bucket rests against said body portion and a position in which said bucket is tipped away from said body portion, the last mentioned axis being positioned above the bottom wall

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of said bucket and between the front and rear wall thereof, a pair of generally vertically extending hydraulic power actuators positioned within said body portion, each of said actuators having a plunger movable upwardly from a retracted position, a first sprocket journaled in the upper end of each of said plungers, a second sprocket aligned with each of said first sprockets and journaled in said structure below said bucket, a pair of sprocket chains each having one end connected to a fixed point on said structure and being trained over one of said first sprockets and below the second sprocket aligned therewith, the other ends of said chains being connected to the front and rear walls of said bucket, means for supplying hydraulic fluid under pressure to said actuators to selectively move either of said plungers upwardly while exhausting fluid from the other of said actuator so that upward movement of either of said plungers causes downward movement of the other plunger toward retracted position, hydraulic actuator means connected between said structure and said boom for pivoting said structure relative to said boom about the first mentioned axis, means for raising and lowering said boom, and hydraulic control means preventing tipping of said structure toward said boom past a position in which said bucket is upright when the rear portion of said bucket rests against said structure.

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