United States Patent [19]

Pasideris et al.

[11] **3,872,991**

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[54] **VEHICLE LOADER LINKAGE MEANS**

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[52] **U.S. Cl.** **214/770**, 214/771, 214/778

[51] **Int. Cl.** **E02f 3/28**

[58] **Field of Search** ..... 214/770, 778, 130 R, 140, 214/769, 771, 778

[56] **References Cited**

UNITED STATES PATENTS

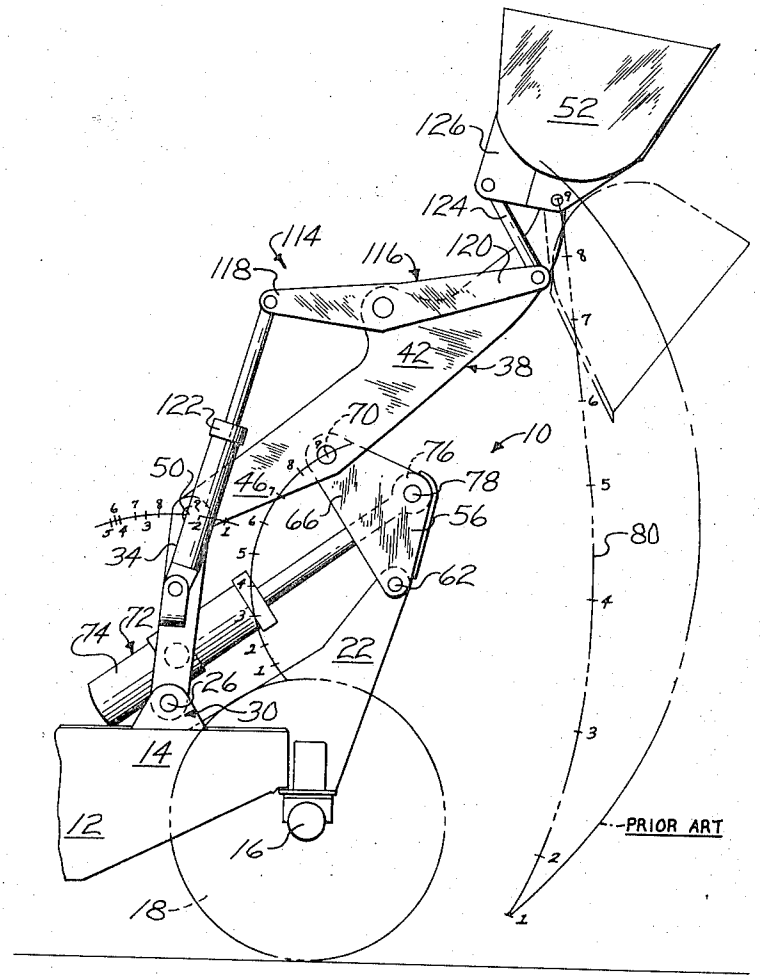
3,024,933	3/1962	Albert	214/770
3,411,647	11/1968	Zimmerman	214/770
3,731,827	5/1973	Eaves	214/770

Primary Examiner—Albert J. Makay
Assistant Examiner—Ross Weaver
Attorney, Agent, or Firm—Phillips, Moore, Weissenberger, Lempio & Strabala

[57] **ABSTRACT**

A vehicle has a frame which has mounted adjacent the front thereof a pair of generally upwardly extending lever arms. A pair of lift arms have their rear ends pivotally attached to the lever arms, and extend forwardly therefrom. A carrying bucket is pivotally attached to the forward portions of the lift arms. The lift arms may be raised and lowered by means of a cylinder during which, through the operation of a pair of link members associated with the frame and lift arms, the rear portions of the arms move (i) from a forward position when the lift arms are fully lowered, to (ii) a rearward position when the lift arms are in a position intermediate fully raised and fully lowered, and (iii) a forward position when the lift arms are fully raised, so that the carrying bucket describes a more vertical path during such raising and lowering of the arms than would be the case with normal linkages. Included is another linkage system for properly cooperating with the movement of the lifting arms, meanwhile allowing for proper, smooth movement of the carrying bucket between its carrying and its dumping positions.

15 Claims, 8 Drawing Figures



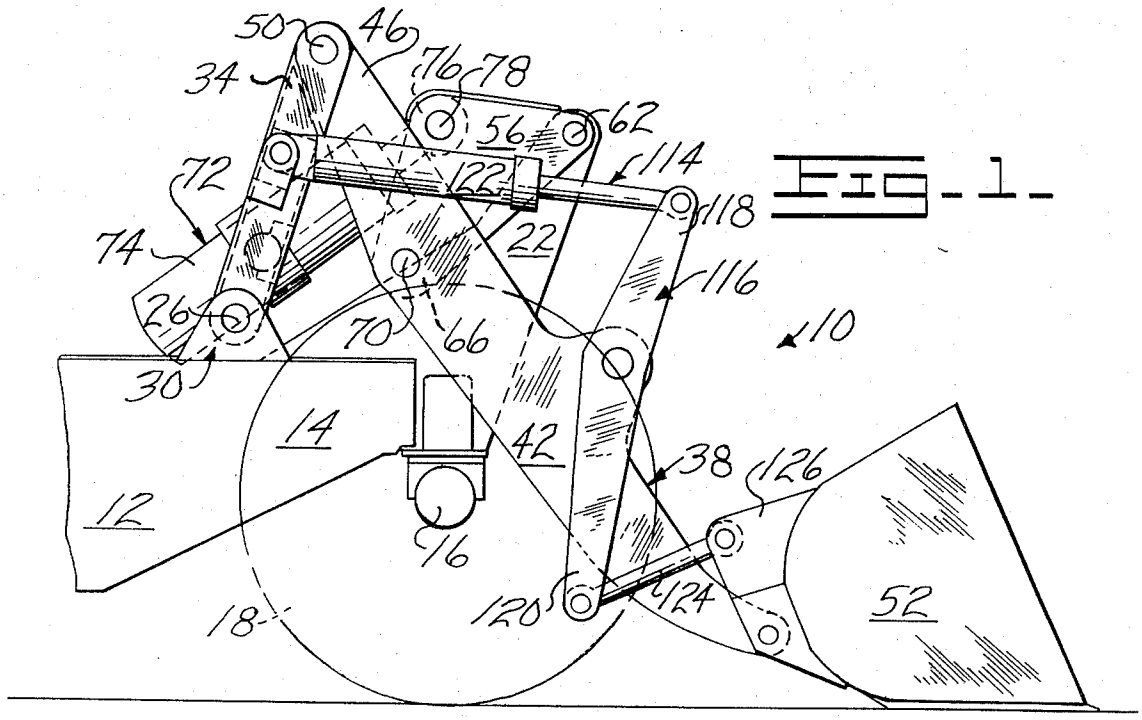

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Fig. 1

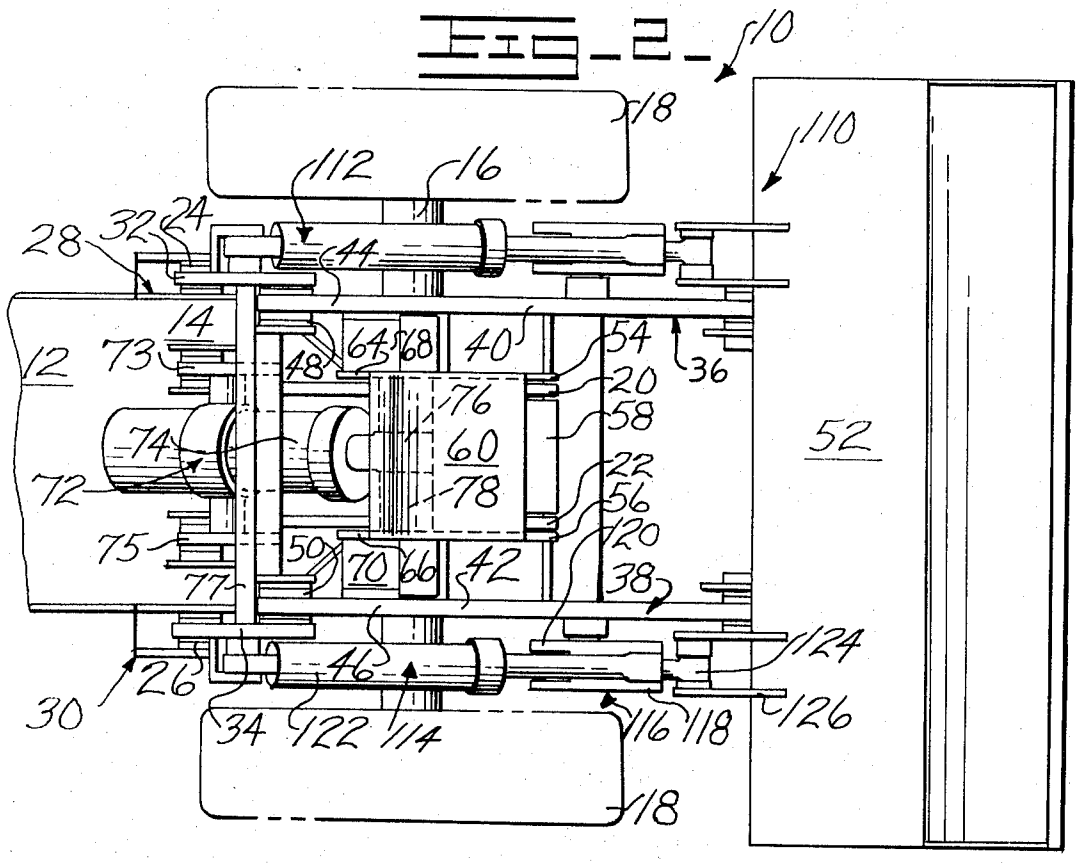
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Fig. 2

Fig. 3

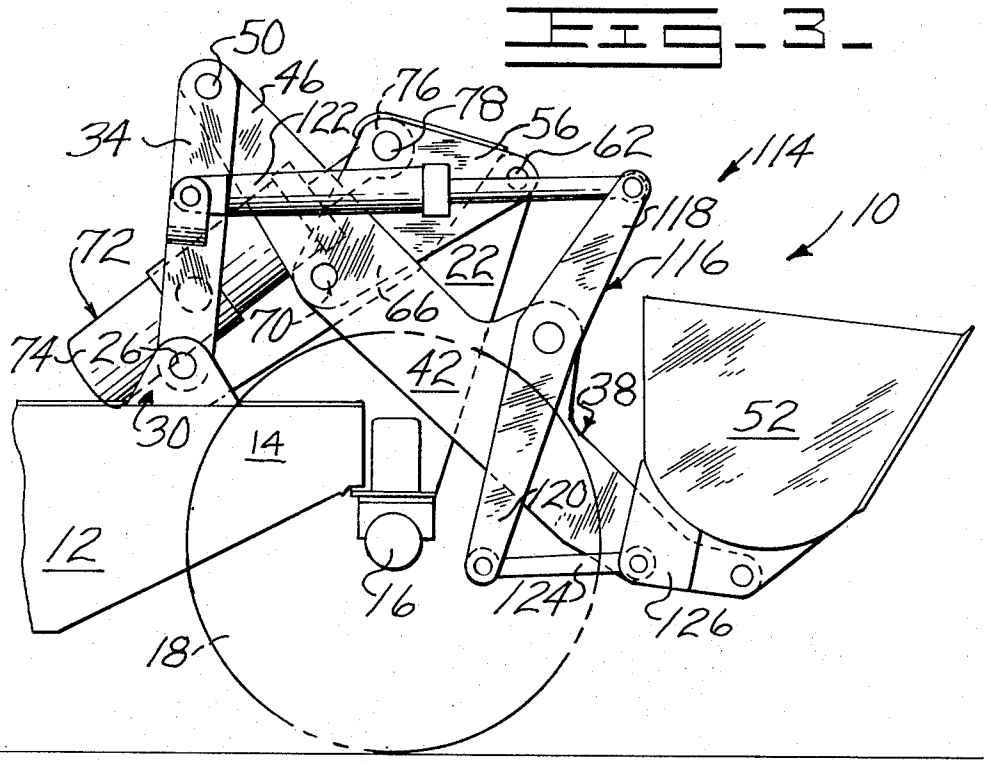
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Fig. 7

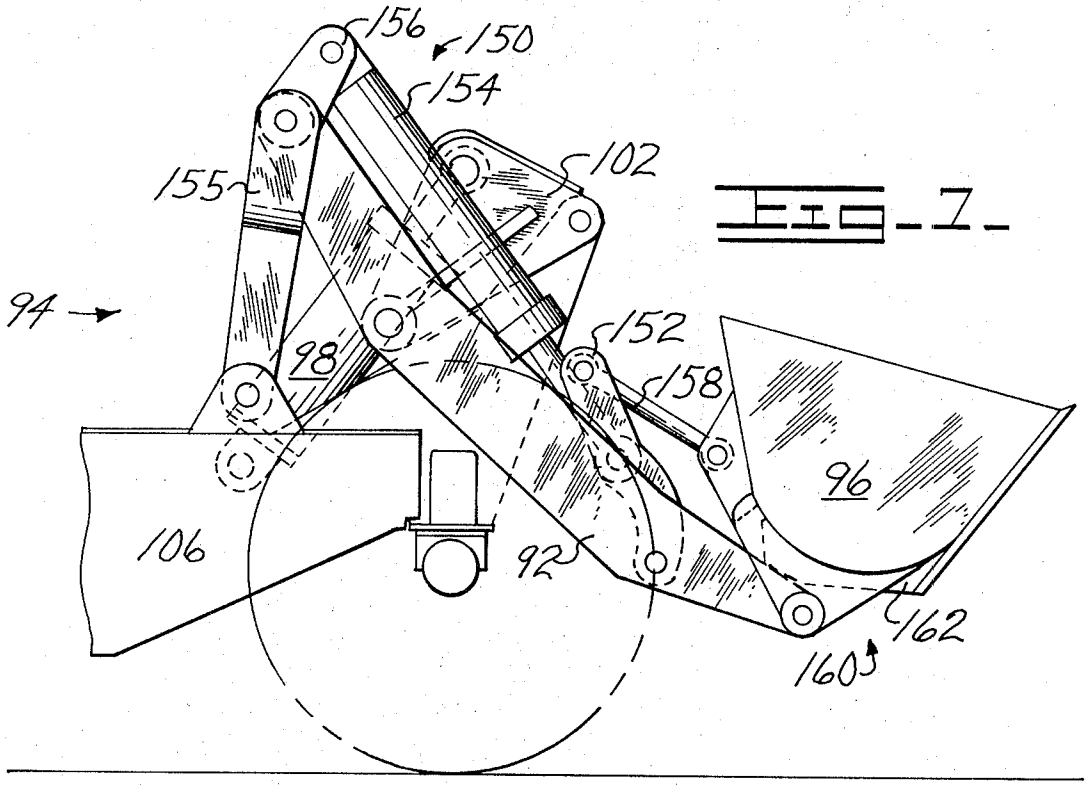
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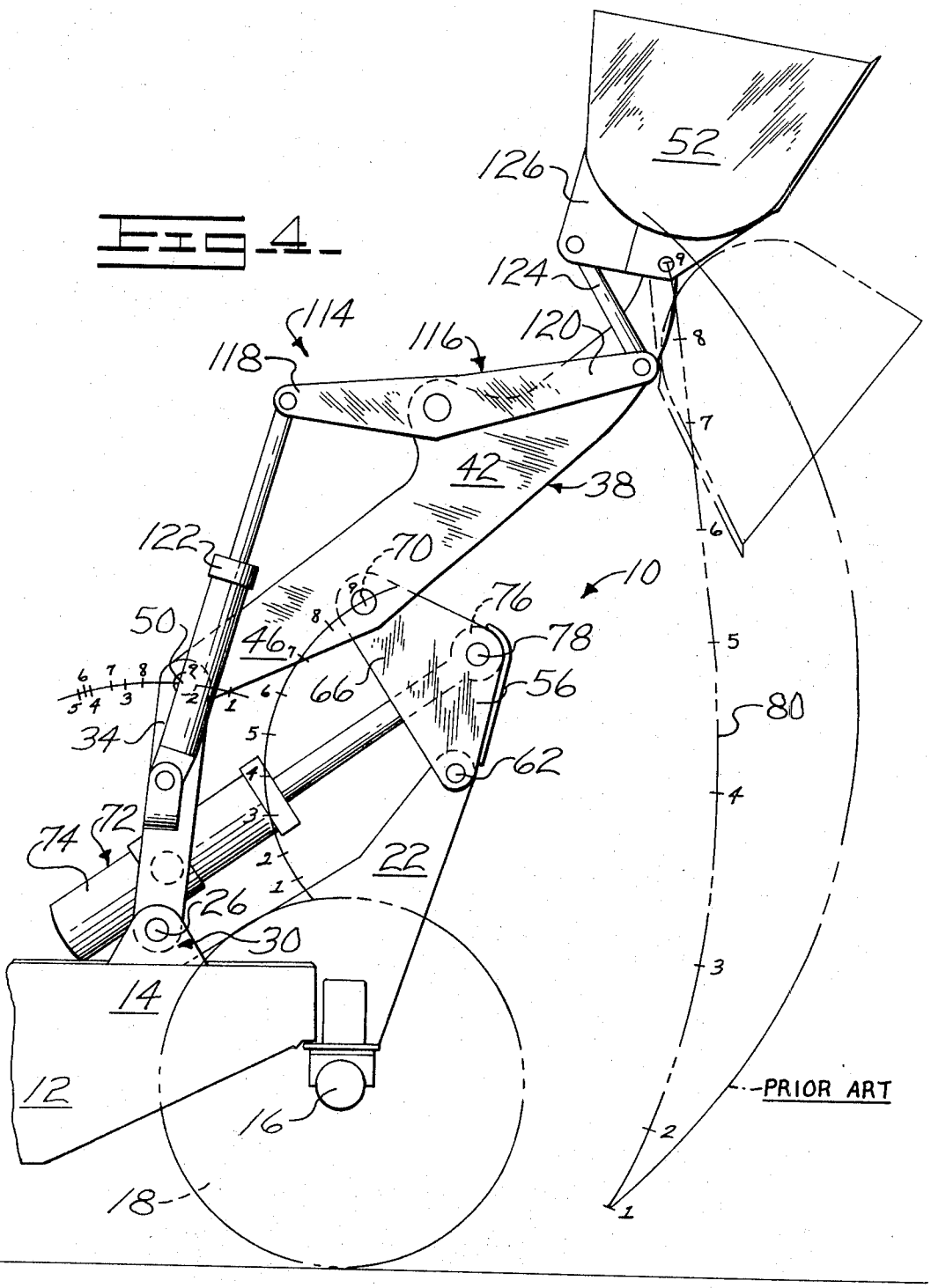
Fig. 4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PRIOR ART

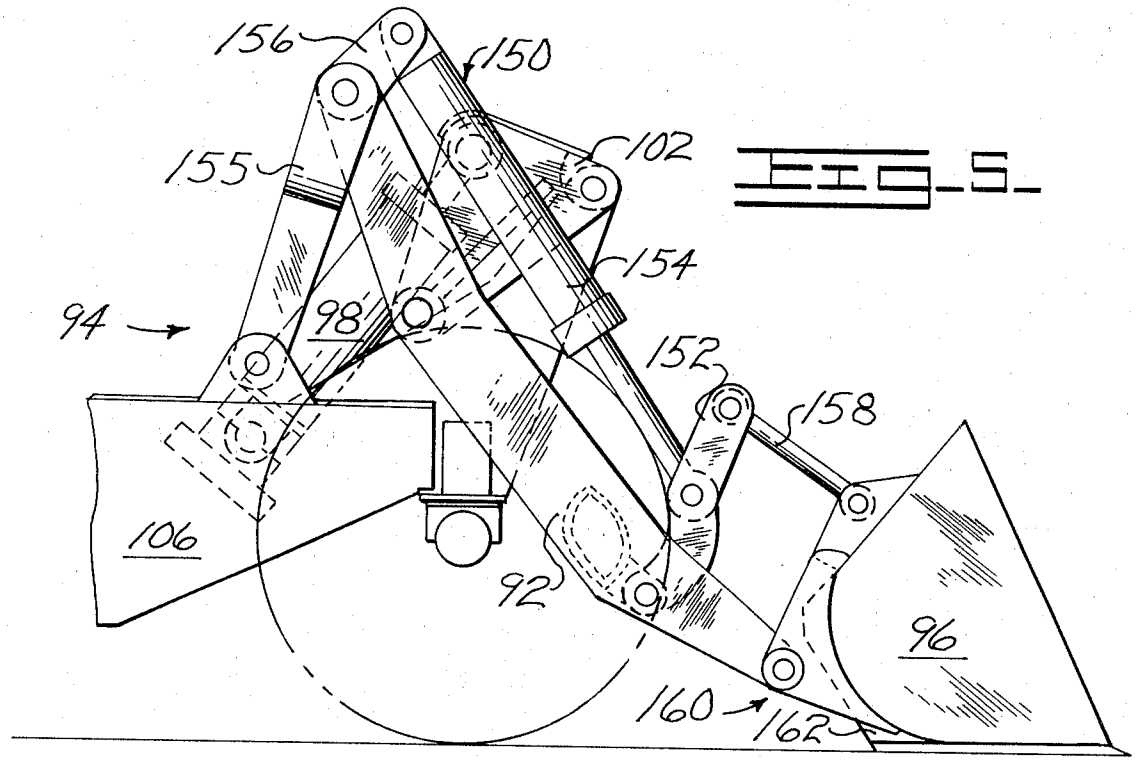
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Fig. 5

Fig. 6

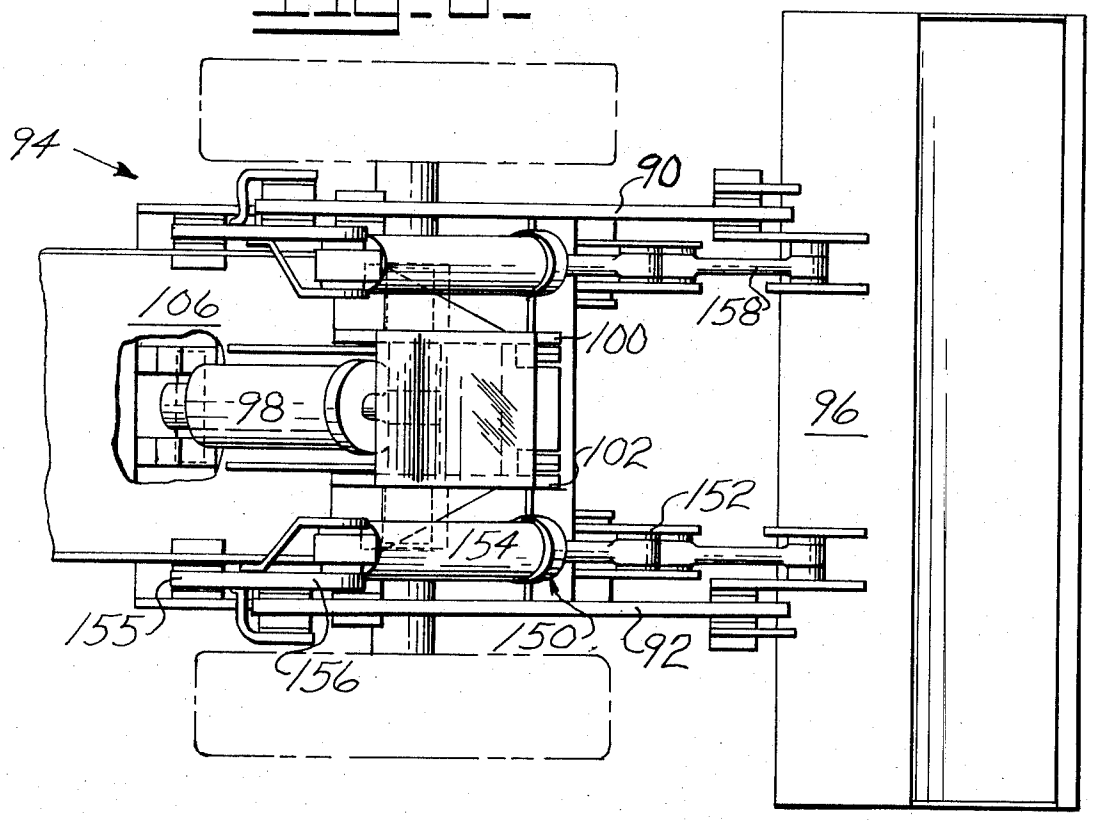
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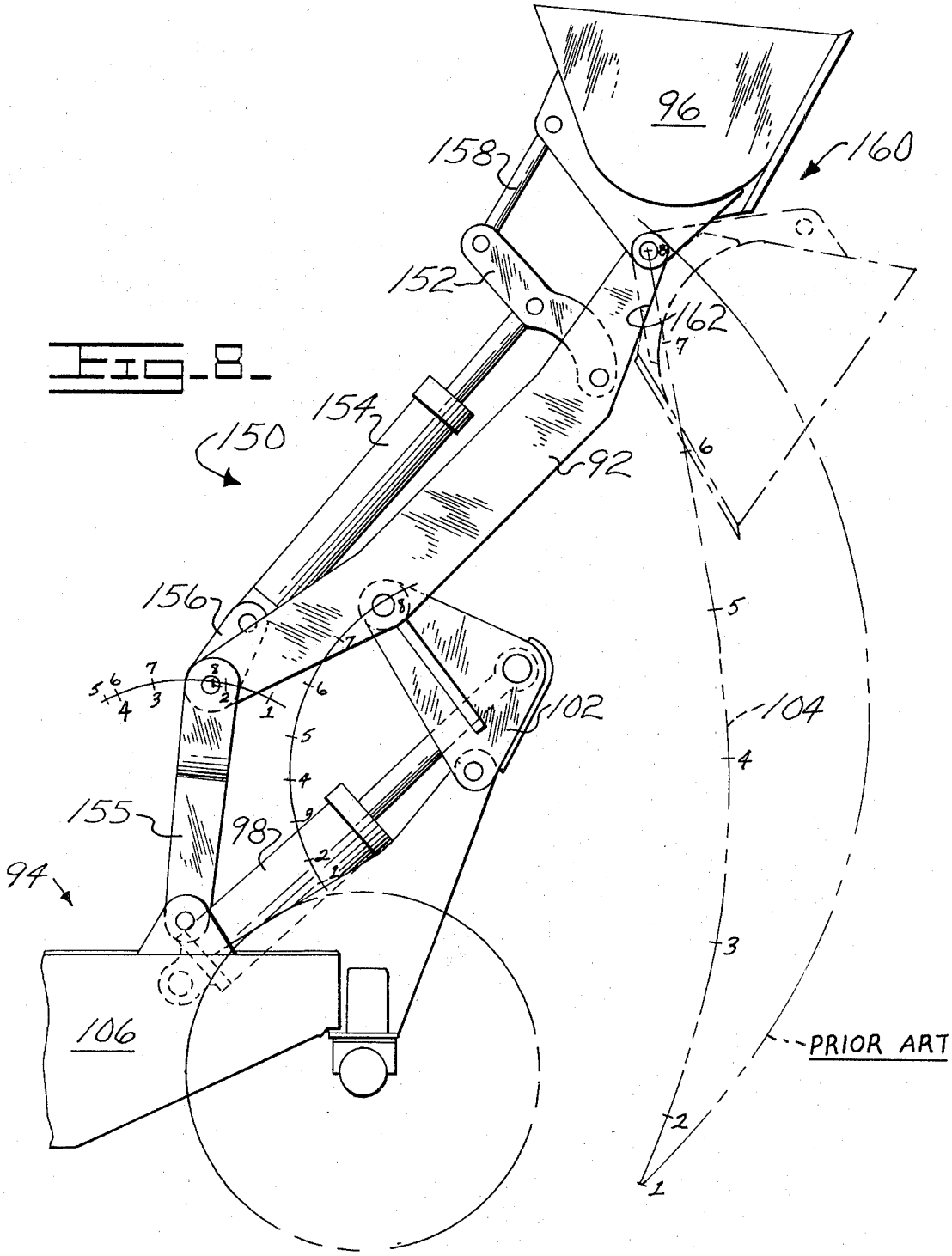
Fig-8



VEHICLE LOADER LINKAGE MEANS

BACKGROUND OF THE INVENTION

This invention relates to a linkage system for a loader-type vehicle which effects generally vertical lifting of an implement carried at the forward end of a lift arm assembly associated with the vehicle.

The large majority of commercially available loading vehicles, on either wheels or track undercarriages, employ pairs of lift arms which transversely straddle the vehicle frame, and are pivotally supported thereby at their rearward extremities. An implement, such as an earthmoving bucket, is disposed on the forward extremity of the lift arms, and one or more extendible hydraulic cylinders are disposed between the frame and the arms to raise the arms for positioning the bucket with respect to a truck body for loading purposes. Because the lift arms are pivotally anchored relative to the frame, the forward extremities of the arms describe an arcuate path as the arms are positioned from approximately 40° of 50° below to 40° or 50° above the horizontal. The arms reach a maximum forwardly disposed condition when they are substantially horizontally placed. At such a horizontal position, the load carried by the bucket has the maximum tendency to tip the vehicle forward about a forward ground engaging fulcrum point, such as the front wheels on a wheel loader, and it often becomes necessary to attach heavy counterweights to the rear of the machine for safety purposes. (The load in the bucket required to tip the vehicle so that the rear would tend to raise off the ground is referred to as the minimum tipping load.) Most typically, the minimum tipping load is experienced when the lower bucket hinge point at the front of the lift arms is raised to substantially the same height as the pivotal connection of the lift arms to the vehicle frame. This condition generally corresponds to the vehicle load carrying or transporting mode of operation.

Another problem with such arcuate movement at the forward extremities of the lift arms exists during loading of the bucket from a substantially vertical bank. As the lift arms are raised and the bucket is moved back to help collection of material into the bucket, such arcuate movement crowds the bucket into the bank in an excessive manner, tending to force the vehicle rearwardly. This places the hydraulic implement horsepower in opposition to the ground engaging power train horsepower, which tends to stall the vehicle engine. In turn, the resulting lower engine speed decreases the response rate of the implement system.

By increasing the minimum tipping load, the lifting capacity of the vehicle would be increased in the carrying mode of operation. At the same time, maximum height and reach, corresponding to dumping a bucket of material over the side of a truck body, which corresponds to the typical unloading portion of the operation, must not be sacrificed so that a larger machine would be needed.

Various vehicles which include means for altering the normal arcuate travel of the implement means are known. See, for example, U.S. Pat. No. 2,538,000 to Hoar, et al., U.S. Pat. No. 2,774,496 to Dorkins, U.S. Pat. No. 2,820,555 to Lessmann, U.S. Pat. No. 2,980,271 to Ulinski, U.S. Pat. No. 3,001,654 to Albert, U.S. Pat. No. 3,175,711 to Granryd, U.S. Pat. No. 3,411,647 to Zimmerman, U.S. Pat. No. 3,572,531 to Ulinski, and U.S. Pat. No. 3,658,202 to Peterson. However, each of these systems includes inherent problems. The systems of U.S. Pat. No. 2,820,555 (Lessman), U.S. Pat. No. 3,001,654 (Albert), U.S. Pat. No. 3,175,711 (Granryd), U.S. Pat. No. 3,572,531 (Ulinski) and U.S. Pat. No. 3,658,202 (Peterson), for example, each utilizes a pair of independent cylinder systems, one system for raising and lowering the lift arms, and another system for providing an extent of rearward and forward movement of the lift arms. The operator of such a system, obviously, must be extremely careful to coordinate such operation of the two cylinder systems, so that he can achieve the desired arcuate movement of the implement as the arms are raised and lowered. Such coordination requires a degree of skill and care which would not be necessary if the system were designed to automatically provide rearward and forward movement of the arms in coordination with their raising and lowering.

The systems disclosed in U.S. Pat. No. 2,538,000 (Hoar, et al), U.S. Pat. No. 2,774,496 (Dorkins), U.S. Pat. No. 2,980,271 (Ulinski), and U.S. Pat. No. 3,411,647 (Zimmerman), do provide means for automatically regulating the forward-rearward position of the arms in relation to their raising and lowering. However, in the case of U.S. Pat. No. 2,774,496 (Dorkins) and U.S. Pat. No. 3,411,647 (Zimmerman), the lift arms are provided with extensions which are instrumental in providing such fore and aft movement, and in the case of U.S. Pat. No. 2,538,000 (Hoar, et al) and U.S. Pat. No. 2,980,271 (Ulinski), linkages necessary for such fore and aft movement are at the rear portion of the vehicle, meaning that the lift arms extend from the rear of the vehicle to the front. Such designs adversely influence the disposition of major machine components, and pose a safety hazard as the linkage may straddle the operator's station.

Another problem arising with such loader-type vehicles is that it is necessary to retain a given angular disposition of the implement as the lift arms are raised, without the necessity for operator manipulation of the tilt control system or for complex compensating hydraulic circuitry. For example, when a bucket is loaded with material to a relatively heaped condition at the ground line, it would obviously be impractical to allow tipping of the bucket as the arms are being lifted through the normal carrying mode and to the maximum elevational disposition. Material would be spilled from the bucket if it were permitted to tip, posing a potentially hazardous condition to the operator, as well as providing a rougher surface condition over which the vehicle would travel.

In addition, means for moving the bucket to carrying and dumping positions when desired must, of course, be provided. While all the above designs, and in addition U.S. Pat. No. 3,606,061 to Molby provide such means, it is always desirable to provide means which minimize tipping of the bucket as the lift arms are raised and lowered. Furthermore, it would be desirable to design the system to provide a slowing down of implement movement as it approaches its dumping position, when being moved from its carrying position, to increase efficiency and smoothness of the dumping operation.

SUMMARY OF THE INVENTION

It is an object of this invention to provide an implement carrying vehicle loader which provides a more

vertical path of travel for the implement than is normally provided upon raising and lowering thereof.

It is a further object of this invention to provide an implement carrying vehicle loader which, while fulfilling the above object, provides such more vertical path automatically through linkage means upon the raising and lowering of the implement.

It is a still further object of this invention to provide an implement carrying vehicle loader which, while fulfilling the above objects, is designed to provide such above objects in an efficient manner.

It is a still further object of this invention to provide an implement carrying vehicle loader which, while fulfilling the above objects, provides means for moving the implement to carrying and dumping positions, meanwhile insuring that once a position is chosen and set, such position is substantially kept upon the raising and lowering of the implement.

It is a still further object of this invention to provide implement carrying vehicle loader which, while fulfilling the above objects, operates in a smooth and efficient manner, with safety and convenience to the operator of the vehicle.

Broadly stated, the invention is in combination with a vehicle having a vehicle frame. The invention comprises first and second generally parallel lever arms pivotally fixed to the frame of the vehicle adjacent the forward end thereof and extending from the frame. First and second generally parallel lift arms having elongated body portions extend forwardly relative to the vehicle, and have rear portions thereof pivotally fixed to the extended portions of the first and second lever arms respectively. Implement means are associated with the forwardly extending portions of the lift arms. First and second link members are pivotally fixed to and extend from the frame, the extended portions thereof being pivotally fixed to the elongated body portions of the first and second lift arms respectively, forwardly of said rear portions thereof. Further included are means for moving the lift arms and the implement means therewith to fully raised and fully lowered positions relative to the vehicle, the link members being located to position the rear portions of the lift arms, with the lift arms intermediate the fully raised and fully lowered positions, (i) rearwardly of the positions of the rear portions with the lift arms in their fully raised positions, and (ii) rearwardly of the positions of the rear portions with the lift arms in the fully lowered positions, the lever arms pivoting to allow such forwardrearward movement of the rear portions of the lift arms.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the invention will become apparent from a study of the following specification and drawing, in which:

FIG. 1 is a side elevation of the forward end of a vehicle incorporating a first embodiment of loader linkage means, with the implement in a lowered, intermediate position;

FIG. 2 is a plan view of the forward end of the vehicle shown in FIG. 1;

FIG. 3 is a view similar to that of FIG. 1, but with the implement in its carrying position;

FIG. 4 is a view similar to those of FIGS. 1 and 3, but with the implement in its upper, carrying position;

FIG. 5 is a side elevation of the forward end of a vehicle incorporating a second embodiment of loader linkage means, with the implement in a lowered, intermediate position;

FIG. 6 is a plan view of the forward end of the vehicle shown in FIG. 5;

FIG. 7 is a view similar to that of FIG. 6, but with the implement in its carrying position; and,

FIG. 8 is a view similar to those of FIGS. 5 and 7, but with the implement in its upper, carrying position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 and 2, a loading linkage 10 is shown disposed on the forward portion of a vehicle main frame 12. The forward end 14 of the main frame 12 includes an axle portion 16 and a pair of wheels 18. Making up part of the frame 12 are forwardly leaning support arms 20, 22, which are secured to axle portion 16. Pivotally fixed to the forward end 14 of frame 12 by means of pins 24, 26 in mounting ears 28, 30, are generally parallel lever arms 32, 34. Such lever arms 32, 34 extend generally upwardly from the respective lever arm-frame pivot points thereof.

Included are generally parallel lift arms 36, 38 having elongated body portions 40, 42. The rear portions 44, 46 of the lift arms 36, 38 are pivotally fixed to the extended portions of the lever arms 32, 34 by means of pins 48, 50, and the body portions 40, 42 extend forwardly relatively to the vehicle 10.

Implement means (i.e., a bucket), are associated with the forwardly extending portions of the lift arms 36, 38 by means which will be described in detail. Such bucket 52 acts as carrying means in the operation of the vehicle 10.

Link members 54, 56 have fixed thereto and extending therebetween a tube 58, and a cover plate 60. A pivot pin 62 pivotally fixes link members 54, 56 to the support arms 20, 22, passing through tube 58. The extending portions 64, 66 of link members 54, 56 are pivotally fixed to body portions 40, 42 of the lift arms 36, 38 by means of pins 68, 70, forwardly of the rear portions 44, 46 thereof. A cylinder 72 has the body 74 thereof pivotally fixed to the lever arms 32, 34 between the lever arm-frame pivot points and extended portions thereof respectively, through pivotal arms 73, 75, the lever arms 32, 34 and arms 73, 75 being interconnected by a bar 77 so that they pivot together. The extended, rod end 76 of the cylinder 72 is pivotally fixed to link members 54, 56 by pivot pin connection 78. Each rod end-link member pivot point is between and not aligned with the associated link member-frame pivot point, and the extended portion of that link member, as shown.

Well-known means are provided for extending and retracting the cylinder 72, and extension of the cylinder 72 pivots link members 54, 56 together about pin 62, moving the link members 54, 56 from lowered positions (FIGS. 1, 2, and 3) to raised positions (FIG. 4). Likewise, the retraction of cylinder 72 moves the link members 54, 56 from raised to lowered positions.

As shown in FIGS. 1 and 3, with the lift arms 36, 38 in their relatively lowered positions, the link members 54, 56 are in their lowered positions with the extended portions 64, 66 thereof lower than the link member-frame pivot points determined by the pin 62. Also, with the lift arms 36, 38 in their fully raised positions as shown in FIG. 4, the link members 54, 56 are in their raised positions with the extended portions 64, 66 of

the link members 54, 56 higher than the link member-frame pivot point determined by the pin 62. As such lift arms 36, 38 are raised and lowered, the path of the link members 54, 56 and the corresponding path of the extended portions of the lever arms 32, 34 are shown in FIG. 4. It will be seen that, because of the location of the link members 54, 56, the extended portions of the lever arms 32, 34 are moved initially rearwardly as the lift arms 36, 38 are moved from their fully lowered positions to positions between fully raised and fully lowered, at which point the extended portions of link members 54, 56 are most rearward. Upon further raising of the lift arms 36, 38 through the pivoting of the link members 54, 56, the extended portions of the lever arms 32, 34 are moved forwardly as the lift arms 36, 38 are raised from the positions between fully raised and fully lowered to the fully raised positions. In such operation, the rear portions 44, 46 of the lift arms 36, 38 are positioned, with the lift arms 36, 38 in such position between fully raised and fully lowered, (i) rearwardly of the positions thereof with the lift arms 36, 38 in their fully raised positions, and (ii) rearwardly of the positions thereof with the lift arms 36, 38 in their fully lowered positions. Thus, the bucket 52 describes a path 80 inward or rearward of the path generally indicated in FIG. 4 as that of the ordinary non-retracting prior art bucket path. Obviously, the same path 80 is achieved when the lift arms 36, 38 are moved from the fully raised to the fully lowered positions thereof.

In FIGS. 5-8 is shown a similar system for raising and lowering lift arms 90, 92 of a vehicle 94, said lift arms 90, 92 having a bucket 96 fixed thereto. Such system also includes a cylinder 98 the extension of which pivots link members 100, 102 upwardly, raising the lift arms 90, 92, and the retraction of which pivots link members 100, 102 downwardly, lowering the lift arms 90, 92. In such system, bucket 96 describes a path 104 (FIG. 8) upon the raising and lowering thereof, as compared to the general prior art path shown. However, in the embodiment shown in FIGS. 1–4, it will be remembered that the cylinder body 74 thereof is pivotally connected relative to the lever arms 32, 34, as described above. During the raising of the lift arms 36, 38, the lever arms 32, 34 pivot initially rearwardly. The extension of the cylinder 72 aids in such rearward pivoting, since the cylinder 72 acts directly on the lever arms 32, 34 until lift arms 36, 38 are in the positions between fully raised and fully lowered.

In the embodiment of FIGS. 5–8, the cylinder 98 is pivotally fixed to the frame 106 of the vehicle 94, and does not directly aid in such rearward pivoting of the lever arms thereof. It will be understood that either embodiment may use either cylinder mounting desired.

As shown in FIGS. 1–4, bucket 52 is pivotally mounted to the forwardly extending portions of the lift arms 36, 38, and movable relative to the lift arms 36, 38 to the carrying position and to the dumping position. Control means 110 are provided for controlling this movement of the bucket 52.

Such control means 110 comprise a control system 112 associated with lift arm 36, and a control system 114 associated with lift arm 38. As the systems 112, 114 are identical and work together, only one will be described in detail.

Control system 114 includes a control lever 116 mounted between its ends 118, 120 to lift arm 38 between the rear portion 46 and the forwardly extending portion of the lift arm 38. A cylinder 122 has one end pivotally mounted to end 118 of control lever 116, and the other end pivotally mounted to lever arm 34 adjacent the extended portion thereof. A control link 124 has one end pivotally mounted to the end 120 of control lever 116, and the other end pivotally mounted to a flange 126 fixed to bucket 52, and thus pivotally mounted relative to bucket 52. It will be seen that extension of the cylinder 122 moves the bucket 52 to the carrying position (FIG. 3), and retraction of the cylinder 122 moves the bucket 52 to the dumping position (FIG. 4). Because of this particular control linkage, it will be seen that, once the bucket 52 is selectively positioned in the carrying position (FIG. 3), it remains in this carrying position as the lift arms 36, 38 are raised and lowered (FIGS. 3 and 4).

Also, because of this particular linkage means, as the cylinder 122 is retracted at a relatively constant rate to move the bucket 52 from the carrying position to the dumping position, the rate of pivoting of the bucket 52 relative to the lift arms 36, 38 lessens as the dumping position is approached.

Another embodiment of control means 150 is shown in FIGS. 5–8. Such control means 150 include a link 152 pivotally mounted at one end to the lift arm 92 between the rearward portion and the forwardly extending portion of the lift arm 92. A cylider 154 has one end pivotally fixed to an extension 156 of lever arm 155, and the other end pivotally fixed to link 152 between the ends of link 152. A control link 158 is pivotally fixed relative to bucket 96 and the extending end of link 152, so that it will be seen that extension and retraction of cylinder 154 moves the bucket 96 to its dumping and its carrying positions. (It will be understood that lift arm 90 has similar linkage means associated therewith to act with such described linkage means associated with lift arm 92.)

Further included are stop means 160 associated with the bucket 96 and lift arms 90, 92 for limiting movement of the bucket 96 as the bucket 96 is moved to the dumping position to, in fact, define such dumping position. Such stop means 160 are made up of a flange 162 extending from the bucket 96 and adapted to contact a lift arm 92 to define such dumping position.

In either embodiment, the bucket thereof, when being raised and lowered, describes a path inwardly of the general prior art bucket path (see FIGS. 4 and 8), with the advantages attendant thereto. Each entire linkage system has the advantage that it is mounted at the front portion of the vehicle, and that through this feature, there are no members which extend rearwardly thereof to adversely influence the disposition of vehicle components, or to pose a safety hazard.

Both embodiments include means for retaining a chosen angular disposition of the bucket as the lift arms thereof are raised and lowered. In FIGS. 1–4, the means have the added advantage that movement of the bucket 52 lessens (i.e., it slows down) as it approaches its dumping position, increasing efficiency of the dumping operation.

What is claimed is:

1. In combination with a vehicle having a vehicle frame; first and second generally parallel lever arms pivotally fixed to the frame of the vehicle adjacent the forward end thereof, and extending from the frame; first and second generally parallel lift arms having elongated body portions and extending forwardly relative to

the vehicle and having rear portions pivotally fixed to the extended portions of the first and second lever arms respectively; implement means associated with the forwardly extending portions of the lift arms; first and second link members pivotally fixed to and extending from the frame, the extended portions thereof being pivotally fixed to the elongated body portions of the first and second lift arms respectively, forwardly of said rear portions thereof; and, means for moving the lift arms and the implement means therewith to fully raised and fully lowered positions relative to the vehicle, the link members being located to position the rear portions of the lift arms, with the lift arms between the fully raised and fully lowered positions, (i) rearwardly of the positions of the rear portions with the lift arms in their fully raised positions, and (ii) rearwardly of the positions of the rear portions with the lift arms in the fully lowered positions, the lever arms pivoting to allow such forward-rearward movement of the rear portions of the lift arms, wherein (i) with the lift arms in the fully lowered positions, each link member is in a lowered position with the extended portion of each link member lower than the link member-frame pivot point, and (ii) with the lift arms in the fully raised positions, each link member is in a raised position with the extended portion of each link member higher than the link member-frame pivot point, wherein means for moving the lift arms to the fully raised and fully lowered positions relative to the vehicle comprise cylinder means extendible and retractable to move the link members to provide such raising and lowering, wherein one end of the cylinder means is pivotally associated with each link member at a point between and not aligned with (i) that associated link memberframe pivot point and (ii) the extended portion of that link member, the extension of the cylinder means moving the link members from lowered to raised positions, the retraction of the cylinder means moving the link members from raised to lowered positions.

2. The combination according to claim **1** wherein each lever arm extends generally upwardly from that lever arm-frame pivot point, with the extended portion of each lever arm moving initially rearwardly as the lift arms are raised from their fully lowered to their positions between fully raised and fully lowered, and then forwardly as the lift arms are raised from between fully raised and fully lowered to their fully raised positions.

3. The combination of claim **2** wherein the other end of the cylinder means is pivotably associated with each lever arm between the lever arm-frame pivot point and extended portion thereof so that, with the lift arms in their fully lowered positions, and the link members in their lowered positions, the extension of the cylinder means aids in pivoting the lever arms to move the extended portions of the lever arms and the rear portions of the lift arms rearwardly while moving the link members from their lowered positions, until the lift arms are in their positions between fully raised and fully lowered.

4. The combination according to claim **3** wherein said implement means comprise carrying means pivotably mounted to the forwardly extending portions of the lift arms and movable relative to the lift arms to a carrying and to a dumping position.

5. The combination according to claim **4** wherein are further included control means for selectively moving the carrying means to the carrying position and dumping position, meanwhile providing that the carrying means, once selectively positioned in the carrying position, remain substantially in such carrying position as the lift arms are raised and lowered.

6. The combination according to claim **5** wherein such control means comprise a control lever pivotally mounted between its ends to a lift arm between the rear portion and forwardly extending portion of the lift arm, second cylinder means one end of which is pivotally mounted to one end of the control lever and the other end of which is pivotally mounted to a lever arm adjacent the extended portion thereof, and a control link one end of which is pivotally mounted to the other end of the control lever and the other end of which is pivotally mounted relative to the carrying means, so that the extension of the second cylinder means moves the carrying means to the carrying position, and the retraction of the second cylinder means moves the carrying means to the dumping position.

7. The combination according to claim **6** wherein the second cylinder means, control lever and control link are positioned so that as the second cylinder means are retracted at a relatively constant rate to move the carrying means from the carrying position to the dumping position, the rate of pivoting of the carrying means relative to the lift arms lessens as the dumping position thereof is approached.

8. The combination of claim **7** and further including stop means associated with the carrying means and lift arms for limiting movement of the carrying means as said carrying means are moved to said dumping position to so define said dumping position.

9. The combination according to claim **8** wherein said stop means comprise a flange extending from said carrying means and adapted to contact a lift arm to define the dumping position.

10. In combination with a vehicle having a vehicle frame:

a. first and second generally parallel lever arms pivotally fixed to the frame of the vehicle and extending from the frame;

b. first and second generally parallel lift arms having elongated body portions extending forwardly relative to the vehicle and having rear portions pivotally fixed to the extended portions of the first and second lever arms respectively;

c. carrying means pivotally mounted to the forwardly extending portions of the lift arms and movable relative to the lift arms to a carrying position and to a dumping position;

d. means for moving the lift arms and the carrying means therewith to fully raised anf fully lowered positions;

e. control means for selectively moving the carrying means to the carrying position and dumping position, meanwhile providing that the carrying means, once selectively positioned in the carrying position, remain substantially in such carrying position as the lift arms are raised and lowered, such control means comprising a control lever pivotally mounted between its ends to a lift arm between the rear portion and forwardly extending portion of the lift arm, control cylinder means one end of which is pivotally mounted to one end of the control lever and the other end of which is pivotally mounted to the lever arm adjacent the extended portion thereof, and a control link one end of which is piv-

otally mounted to the other end of the control lever and the other end of which is pivotally mounted relative to the carrying means, so that extension of the control cylinder means moves the carrying means to the carrying position, and retraction of the control cylinder means moves the carrying means to the dumping position.

11. The combination according to claim **10** wherein the control cylinder means, control lever, and control link are positioned so that as the control cylinder means are extended at a relatively constant rate to move the carrying means form the carrying position to the dumping position, the rate of pivoting of the carrying means relative to the lift arm lessens as the dumping position thereof is approached.

12. The combination according to claim **11** and further including stop means associated with the carrying means and lift arm for limiting movement of the carrying means as said carrying means are moved to said dumping position, to so define said dumping position.

13. The combination according to claim **12** wherein said stop means comprise a flange extending from the carrying means and adapted to contact a lift arm to define the dumping position.

14. The combination according to claim **5** wherein such control means comprise a link pivotally mounted at one end to a lift arm between the rear portion and the forwardly extending portion of the lift arm, second cylinder means one end of which is pivotally fixed to the link between the ends of said link, and the other end of which is pivotally fixed relative to a lever arm adjacent the extended portion thereof, and a control link one end of which is pivotally mounted to the extending end of the link and the other end of which is pivotally mounted relative to the carrying means, so that the retraction of the second cylinder means moves the carrying means to the carrying position, and the extension of the second cylinder means moves the carrying means to the dumping position.

15. The combination according to claim **14** and further including stop means associated with the carrying means and lift arm for limiting movement of the carrying means as the carrying means are moved to said dumping position, to so define said dumping position, said stop means comprising a flange extending from the carrying means and adapted to contact the lift arm to define the dumping position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. 3,872,991
DATED March 25, 1975
INVENTOR(S) Stamos I. Pasideris, et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the Title Page, Item [73], change the spelling of the assignee's corporate name from "Caterpillar Tractor Company" to --- Caterpillar Tractor Co. ---.

Signed and Sealed this

twenty-second Day of *July 1975*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks