

[54] **BUCKET LOADER**

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[51] Int. Cl. **E02f 3/00**

[58] Field of Search **214/145, DIG. 10, 214/775, 776**

[56] **References Cited**

UNITED STATES PATENTS

3,275,163 9/1966 Schaeff 214/138 R

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[57]

ABSTRACT

A mobile loader having a vertically positionable bucket which can be used in earth working operations and the like and which can lift, transport, and dump a load as well as scrap the earth for levelling thereof.

The loader has a hydraulically operated, parallel linkage arrangement for maintaining the bucket level regardless of its vertical position. The mounting linkage for the bucket is also such that the bucket can be moved to a completely dumping position for good clean-out of the bucket, it can be maintained in a level position regardless of its vertical position while at the same time the linkage and its associated hydraulic system permit the bucket to be moved to a lower, scraping position in which it is generally curled inwardly to provide good scraping action.

The above described loader also has a quick attachment means for attaching the bucket to the linkage mechanism and by means of which the operator can simply drive the vehicle up to the rear side of the bucket and then manipulate the linkage to attach the bucket.

2 Claims, 9 Drawing Figures

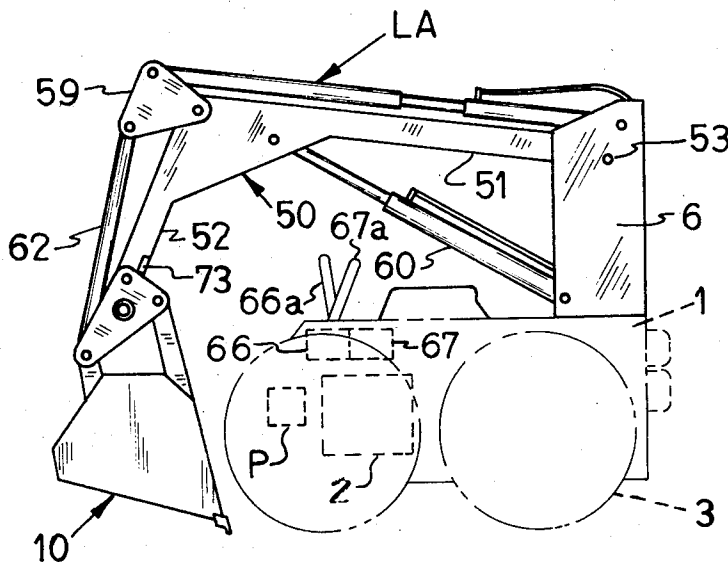


FIG. 1

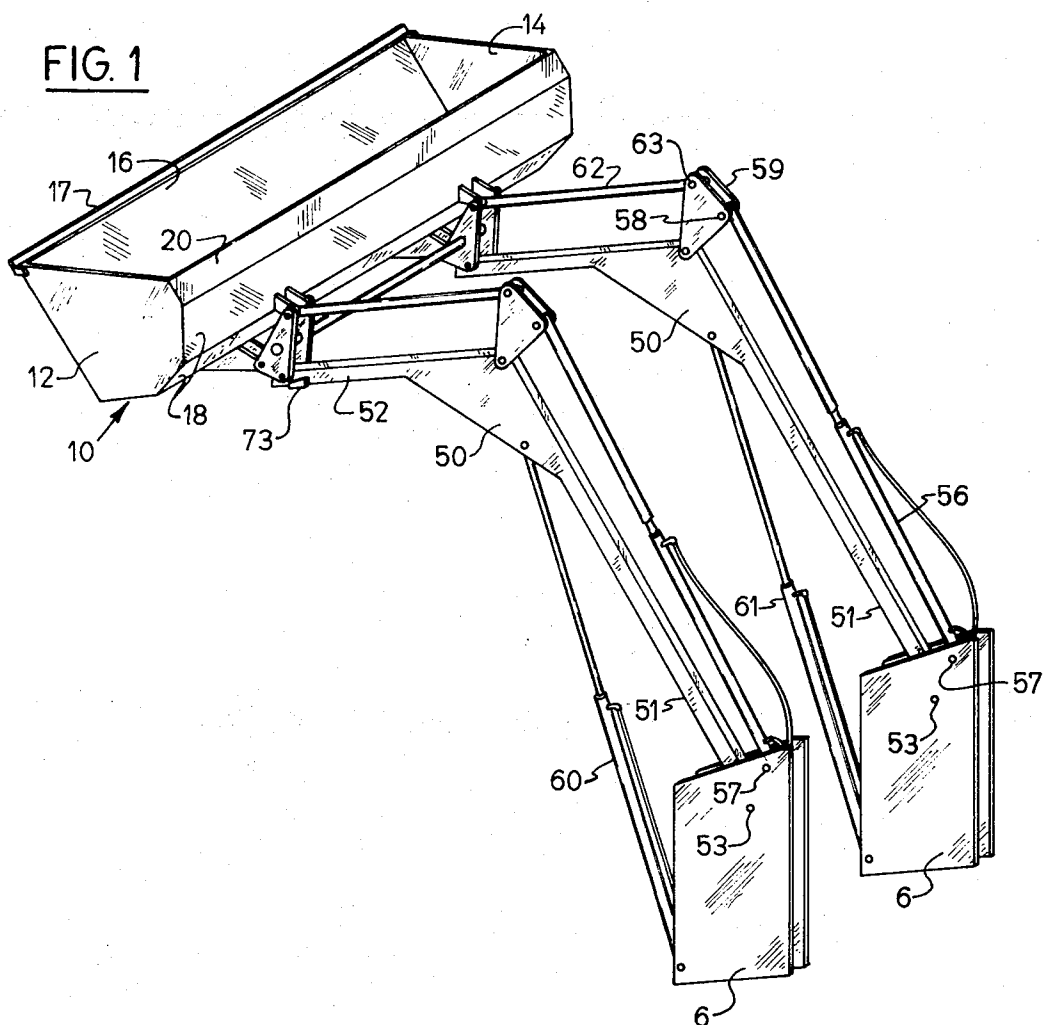


FIG. 2

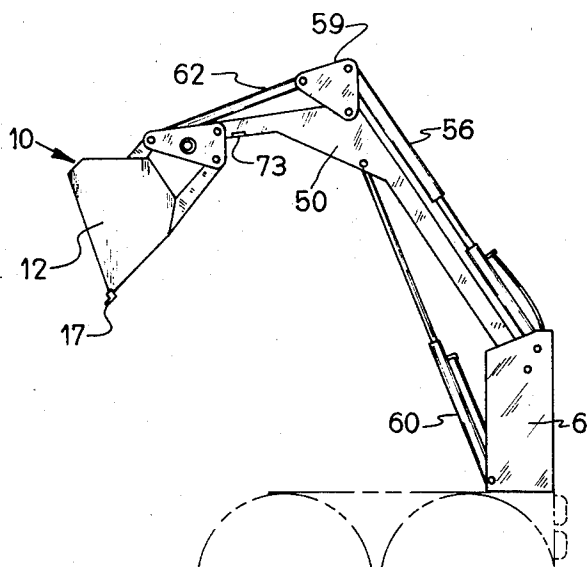


FIG. 3

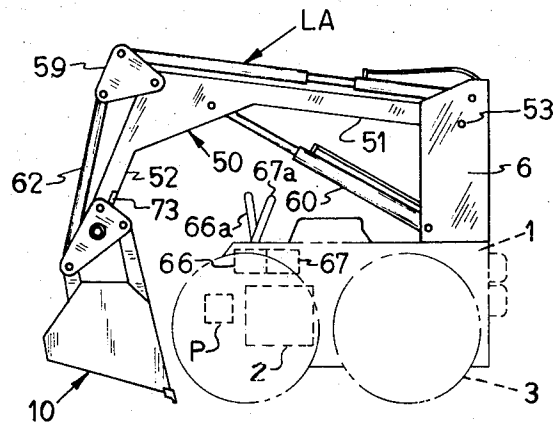


FIG. 4

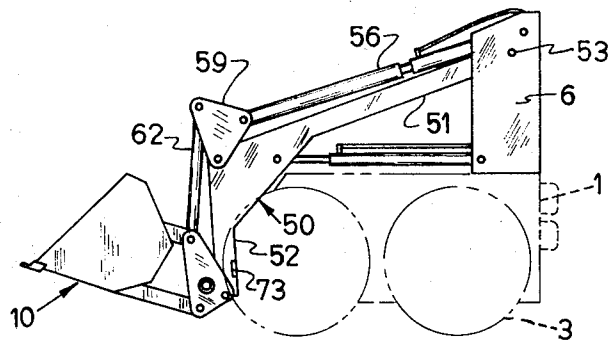


FIG. 9

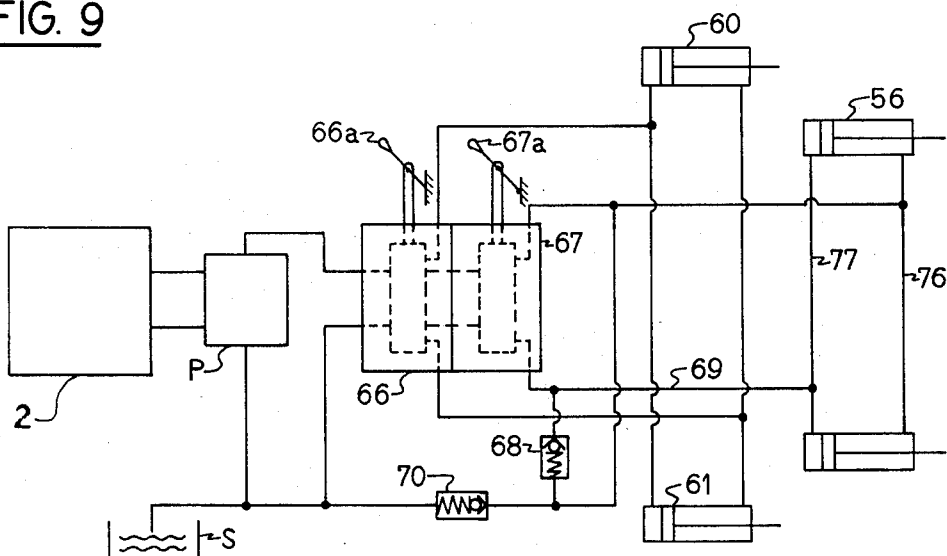


FIG. 5

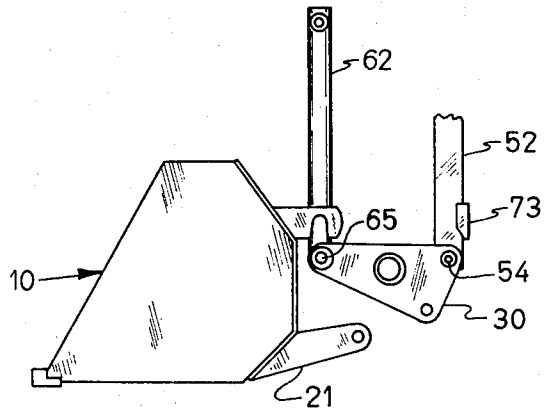


FIG. 6

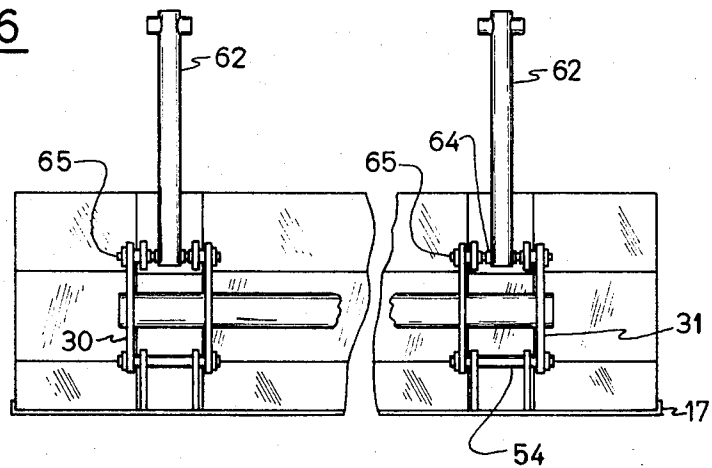


FIG. 7

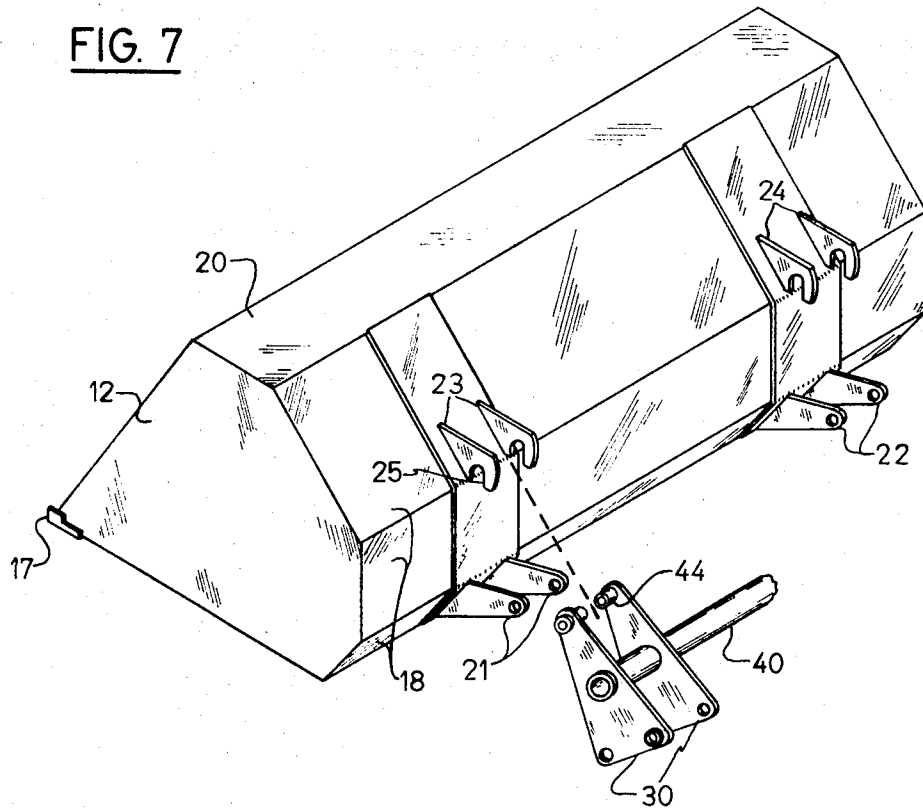
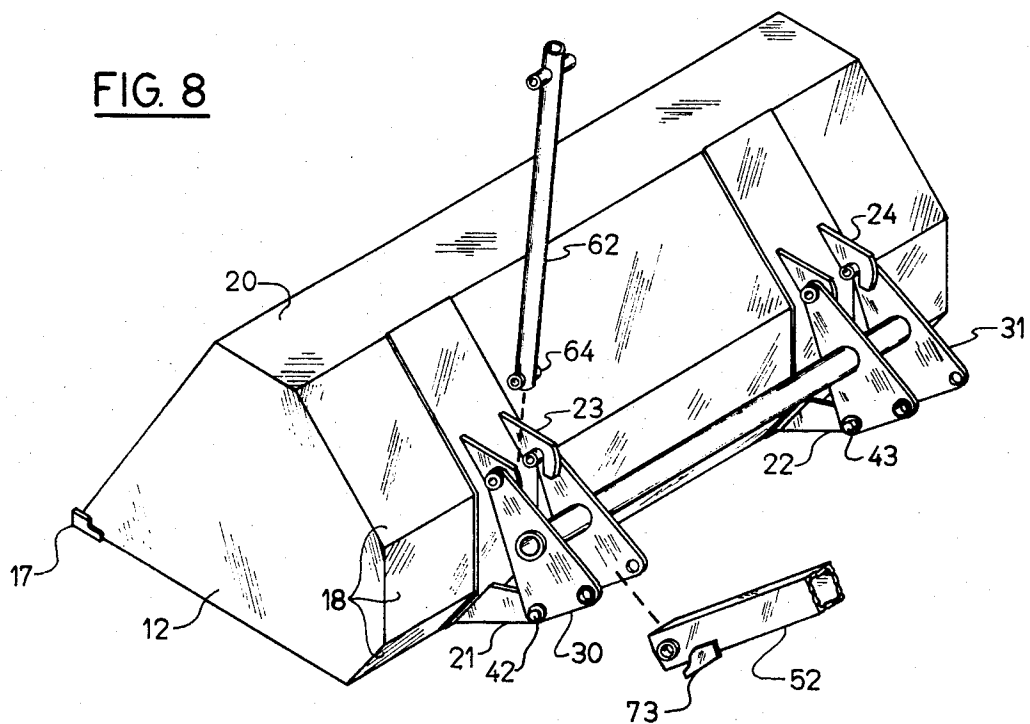


FIG. 8



BUCKET LOADER

The loader has a hydraulically operated, parallel linkage arrangement for maintaining the bucket level regardless of its vertical position. The mounting linkage for the bucket is also such that the bucket can be moved to a completely dumping position for good clean-out of the bucket, it can be maintained in a level position regardless of its vertical position while at the same time the linkage and its associated hydraulic system permit the bucket to be moved to a lower, scraping position in which it is generally curled inwardly to provide good scraping action.

The above described loader also has a quick attachment means for attaching the bucket to the linkage mechanism and by means of which the operator can simply drive the vehicle up to the rear side of the bucket and then manipulate the linkage to attach the bucket.

BACKGROUND OF THE INVENTION

The invention pertains to end loading, mobile vehicles having vertically positionable arms at the end of which the tiltable bucket is mounted. Various hydraulic systems and linkages have been proposed for maintaining the bucket level regardless of its vertical position, assuring good loading carrying capacity of the bucket as well as complete dumping thereof. Heretofore however, it has been difficult to provide a self-leveling bucket and at the same time insure that the bucket could be used in a lower, scraping position and still furthermore insure that a good dumping angle of the bucket was provided at an elevated position.

One example of a prior art device is shown in the U.S. Pat. No. 3,237,795 issued to Kromer on Mar. 1, 1966, and entitled "Means for Detachably Securing Work Heads to Boom Equipped Power Trucks and the Like."

SUMMARY OF THE INVENTION

The present invention provides a mobile loader having a linkage for mounting the vertically positionable bucket, which linkage includes a pair of parallel links, the upper link of which is formed by a hydraulic cylinder. Furthermore, the linkage is used in combination with a hydraulic control system that has a by-pass relief valve and the arrangement is such that the bucket can be maintained level regardless of its vertical position, and in addition, the bucket can be curled under when it is in the lowermost position, to provide a good ground levelling or scraping position for the bucket. Furthermore, the linkage and hydraulic system provided in the present mobile loader is such that good load carrying capacity of the bucket is assured, the bucket is self-leveling in the raised position, the bucket has a good dump angle which assures that the load can be completely cleaned out of the bucket, and furthermore the bucket can be positioned in a lowered scraping position without the need for any additional adjusting levers to be manipulated by the operator.

Another aspect of the invention provides a loader of the above type which has a quick attachment means between the bucket and the linkage and whereby the operator of the vehicle can simply drive up to the back side of the bucket and manipulate the linkage to make the attachment to the bucket.

These and other objects and advantages of the present invention will appear hereinafter as this disclosure

progresses, reference being had to the accompanying drawings.

THE DRAWINGS

FIG. 1 is a perspective view of a loader made in accordance with the present invention and showing the bucket in the fully raised and levelled position;

FIG. 2 is a side elevational view of the loader shown in FIG. 1, but showing the bucket moved to a raised dumping position in which the load can be completely cleaned out of the bucket;

FIG. 3 is a side elevational view of the loader showing the bucket moved to a lower position and in which the bucket has also been moved relative to the linkage to a scraping position in which the bucket is slightly curled in under the linkage;

FIG. 4 is a view of the loader showing the linkage in the lowermost position and the bucket in the load carrying position;

FIG. 5 is a side elevational view of the bucket and showing a portion of the linkage in its initial stage of being maneuvered for attachment to the bucket;

FIG. 6 is a rear view of the bucket with the quick attachment means of the linkage attached thereto, certain parts being shown as broken away or removed for the sake of clarity;

FIG. 7 is a perspective view of the bucket taken generally from the rear left side thereof and showing a fragment of the attaching means in exploded view;

FIG. 8 is a view similar to FIG. 7 and also showing the quick attachment means for connecting the linkage to the bucket, and showing a fragment of the linkage;

FIG. 9 is a hydraulic circuit diagram utilized with the loader and showing the tilt cylinders, the lift cylinders, and the relief valves.

DESCRIPTION OF A PREFERRED EMBODIMENT

The loader provided by the present invention includes a main frame 1 having a power source such as an internal combustion engine 2, four ground engaging wheels 3 which are independently driven to effect a steering action for the vehicle. The main frame includes a pair of rear, generally upwardly extending portions 6. A suitable hydraulic pump P is carried on the vehicle and is driven by the internal combustion engine (not shown) in the known manner so as to be able to supply pressurized fluid to the hydraulic system, to be described, and as shown in FIG. 9.

A load carrying bucket 10 is bodily shiftable in a vertical direction by a parallel arm linkage arrangement LA, and the bucket includes the end walls 12, 14, bottom 16, having a scraping edge 17, an angular rear wall 18 and a top wall 20. Two pairs of fixed, transversely spaced, lower brackets 21, 22 (FIG. 7) are welded to the rear portion of the bucket and have aligned holes through their free ends. Two pairs of upper brackets 23, 24 are also welded to the rear end of the bucket at transversely spaced locations, and have open ended, downwardly facing slots 25.

The bracket is quickly attached to the parallel arm linkage LA to be described, by means of a quick attachment means now to be described. This means includes two pairs of parallel plates 30 and 31 which are welded to a connecting tubular shaft 40. The pair of triangular plates 30 are connected to one of the pairs of brackets 21 and the pair of brackets 23. The pair of plates 31 are connected to the other pair of arms 22 and the other

pair of brackets 24. A pin 42 extends through the plates 30 to hold them captive on the brackets 21 while a similar pin 43 extends through plates 31 to hold them in pivotal connection with the brackets 22, when the unit is assembled.

The pairs of plates have tubular bushings 44 welded in their upper ends and which are engaged in the slots 25 of upper brackets 23, as will appear.

The parallel arm linkage is as follows. A pair of large, generally L-shaped lift arms 50 have an arm portion 51 pivotally attached at 53 to the upright portion 6 of the main frame. The lift arms 50 each also have a forward and generally downwardly extending portion 52 which are pivotally connected at their free ends, respectively, between their plates 30 and 31 by means of pins 54 (FIG. 5). The linkage of the present invention also includes a pair of top links formed by a pair of double acting cylinder assemblies 56, each pivotally connected at 57 to the portion 6 of the frame and then pivotally connected at their other end at 58 to a double plate, motion transmitting strut 59. The strut 59 is also pivotally connected as at 60 to the arm 50 and thus each of the double acting cylinder assemblies 56 and its corresponding arm portion 51 are in general parallelism with one another.

The parallel linkage of the present invention also has a pair of links 62 which are pivoted at 63 to their struts 59, and the other end of the links 62 are pivotally connected by means of a long pin 65 to the tubular plates 30 and 31, as follows. Arms 62 at their ends have shafts or bushings 64 (FIG. 8) extending therethrough and welded therewith to form a good bearing surface for the pairs of brackets 23 and 24, as will appear.

When it is desired to hook the parallel linkage arrangement to the bucket, the cylinder assemblies 56 are extended to move the plates 30 and 31 to the position shown in FIG. 5 whereby the bushings 64 of links 62 are located just below the open slots 25 of the brackets 23, 24. The linkage is then shifted to raise the bushings 64 into the slots 25, and the plates 30 and 31 are then rotated so the pins 42 and 43 can be inserted through the aligned apertures in the arms 21 and 22 and the corresponding plates 30 and 31. This provides a very convenient and easy attachment for the bucket.

A pair of single acting, large hydraulically actuated lift cylinders 60 and 61 are provided between their corresponding frame portions 6 and arms 50, intermediate the length of the latter. These hydraulic cylinders 60 and 61 are actuated to vertically position the bucket.

The fluid pump P is driven from the vehicle engine and provides pressure fluid, through the two conventional four-way valves 66 and 67, to the lift cylinders and also to the tilt cylinders as shown by the circuit diagram of FIG. 9. The valves 66 and 67 are under the influence of the vehicle operator through their spool shifting levers 66a and 67a, respectively.

A relief valve 68 is located in fluid line 69 and is set to crack at a pressure of, for example 700 p.s.i., as determined by the load requirements of the vehicle. Another relief valve 70 is located in series with valve 68 and is set to open at a higher pressure than valve 68.

When the linkage mechanism is in the position shown in FIG. 3, the plates 30 and 31 abut against a stop 73 welded to the load arms. This keeps the bucket in that particular relationship to the load arms so that when the arms are raised as shown in FIG. 2, the bucket maintains a good dump angle. Ordinarily, due to the

self-leveling feature of the linkage arrangement, the bucket would tend to keep curling under the arms when the load arm was raised. However, with the relief valve 68 as disclosed in FIG. 9, the mechanical stop 73 becomes the limit of movement of the bucket relative to the load arm. This causes the relief valve 68 to permit the pressure fluid to bypass from one end of the tilt cylinder 56 to the other end of those cylinders via line 69, as hydraulic line 76 connects the rod ends of the cylinders 56 together while fluid line 77 connects the head ends of the tilt cylinders 56 together. Thus, the bypass valve 68 prevents cavitation, and the balance of the fluid pressure (due to the difference in area between opposite ends of the tilt cylinders 56) then passes through the high value relief valve 70 to the sump S.

The present invention thus gives an improved dumped position shown in FIG. 2. The curled back bucket position at ground level (FIG. 3) allows for the use of the hydraulic system and bucket for additional traction, either forward or reverse, where unit wheels could not provide sufficient traction, for example when the unit is buried in mud and resting on the belly pan of the vehicle.

In addition, when the bucket is then lowered from the FIG. 2 position, the bucket assumes a lowered, scraping position as shown in FIG. 3 without any additional adjustment being required on the part of the operator. It is only necessary for the operator to provide a small adjustment of the actuating tilt lever 67a to finally position the bucket. As a result, the bucket assumes a scraping position in a rapid manner.

The relief valve provided in the hydraulic circuit of FIG. 9 for the tilt cylinders 56 permit the cylinders 56 to contract while the bucket is curled back under the arms and is being raised. The present hydraulic system automatically protects itself while affording the above mentioned advantages.

I claim:

1. A self-propelled end loader vehicle having a frame, and also having a power source, a fluid pump driven by said power source, and ground engaging means for supporting and propelling said frame, an earth engaging bucket having upper and lower attaching brackets, a parallel linkage assembly for connecting said bucket to said frame for vertically positioning and tilting said bucket, said linkage assembly comprising, lift arms having an arm portion pivotally connected at one end to said frame and having a generally downwardly extending portion at the other end, an actuating member pivotally connected to said lift arms intermediate the length thereof, double acting fluid tilt cylinder means arranged in general parallelism with said arm portion and pivotally connected at one end to said frame and at the other end to said actuating member for swinging the latter, link means pivotally connected at one end to said actuating means; said double acting fluid tilt cylinder means being longer than said link means, quick attachment means pivotally connected to said link means and to said lift arm downwardly extending portions, said quick attachment means also pivotally attached to said bucket brackets, said upper attaching bucket brackets having an open slot connection with said quick attachment means, and lift cylinder means connected between said vehicle frame and said parallel link assembly for vertically positioning the latter; a fluid control circuit including said tilt cylinder means and said lift cylinder means, said tilt cylinder means in-

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cluding a pair of cylinder and piston units, first conduit means connecting the rod end of said cylinders in fluid communication with one another, second conduit means connecting the head end of said cylinders in fluid communication with one another, a control valve 5 between said first conduit means and said second conduit means for causing selective pressurization of said rod ends and head ends of said cylinders to cause actuation of said tilt cylinder means to thereby tilt said bucket through said actuating member and said link 10 means, and a fluid pressure relief valve in said control circuit and in communication with said second circuit

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means for dumping fluid pressure from the head end of said tilt cylinder means over a predetermined maximum when said bucket is tilted to a predetermined position by said tilt cylinder means and said bucket is being raised.

2. The loader vehicle set forth in claim 1 further characterized in that said open slot connection comprises generally downwardly facing open ended slots in said upper bucket brackets, and said quick attachment means has bushings for insertion in said slots for pivotal mounting of said attachment means in said slots.

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