

[54] **HIGH DUMP BUCKET LINKAGE**  
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 214/140; 298/22 J

[57] **ABSTRACT**

A bucket linkage for an end loader type vehicle which effects upward and forward dumping movement of the bucket about an axis adjacent the cutting edge utilizing link members so arranged as to obtain a high ratio of bucket travel to cylinder displacement for greater lift height and bucket reach characteristics.

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**5 Claims, 3 Drawing Figures**

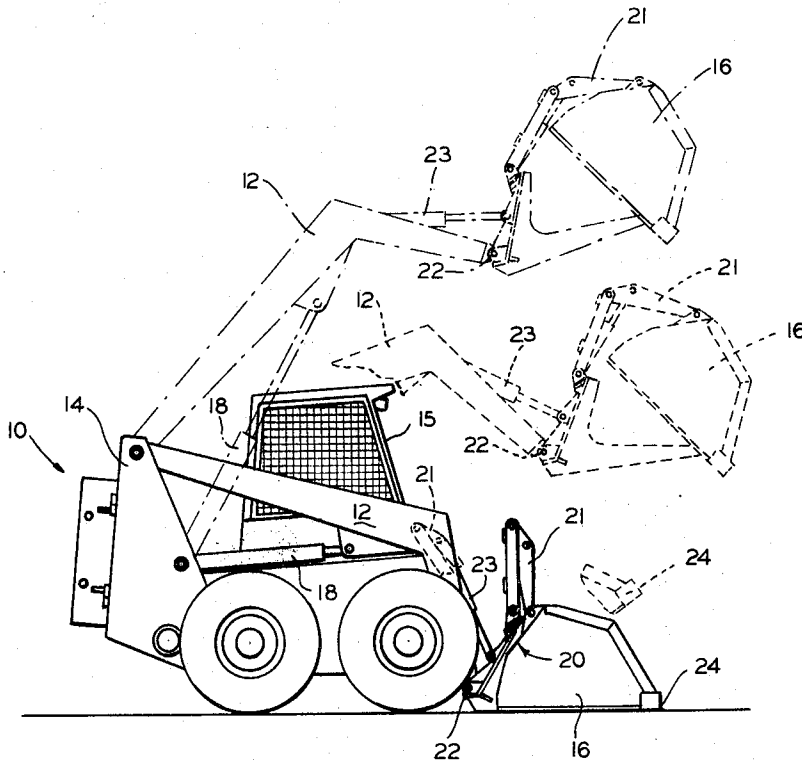
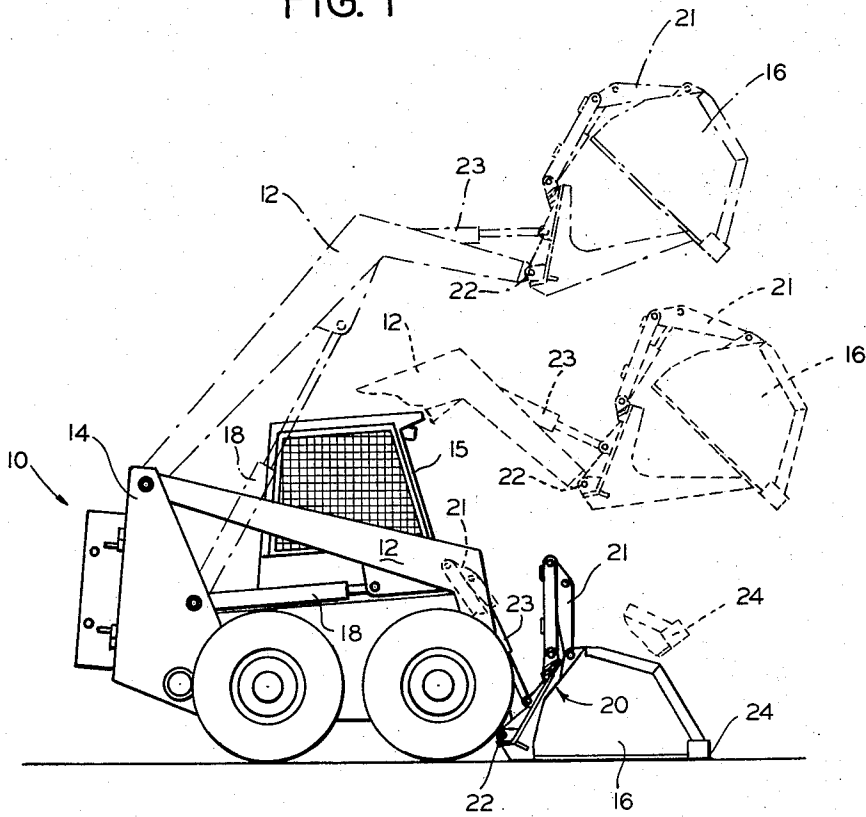
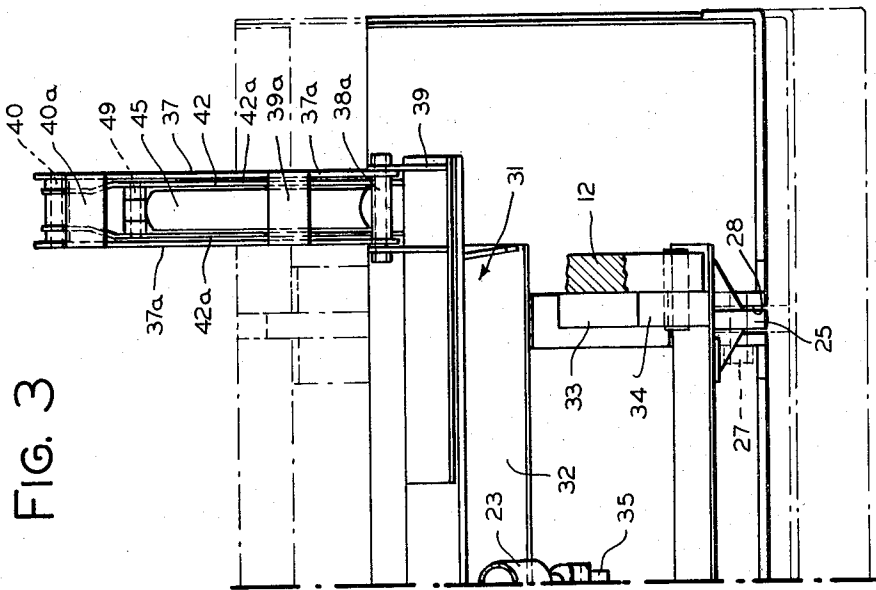
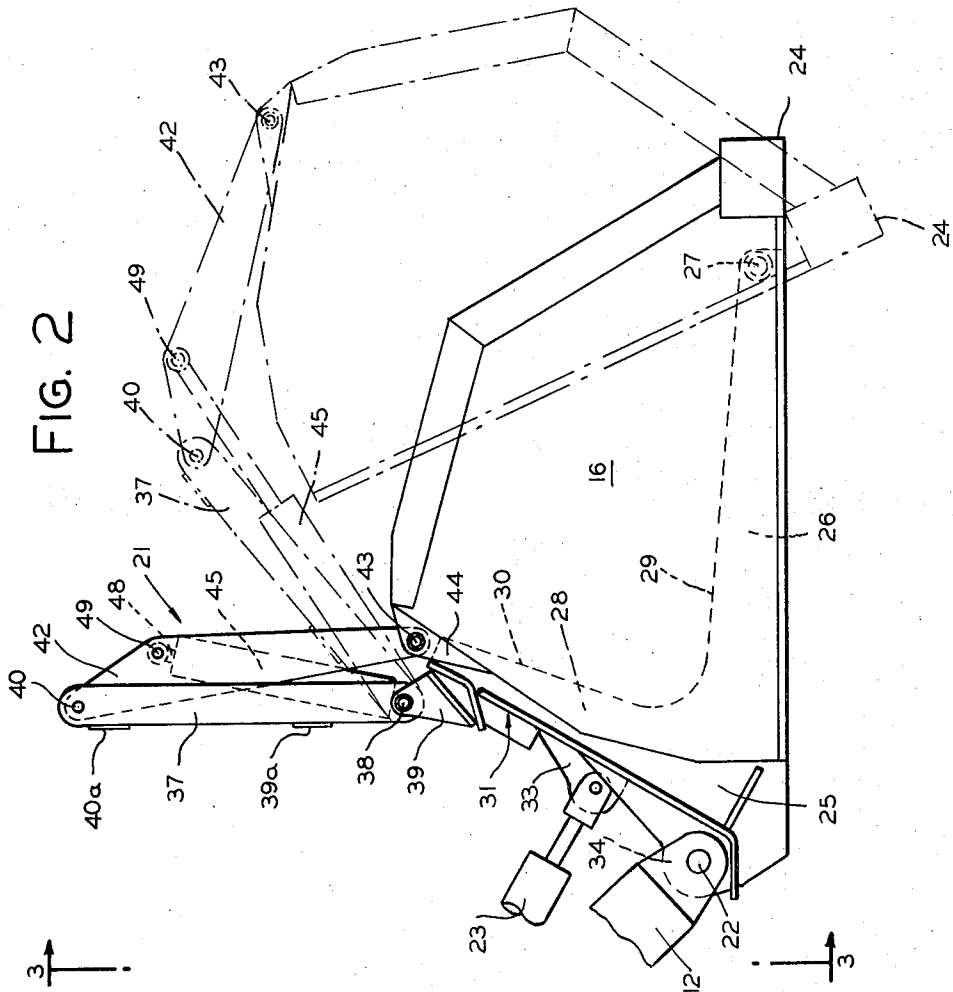


FIG. 1





## HIGH DUMP BUCKET LINKAGE

### BACKGROUND OF THE INVENTION

The invention pertains to the art of end loaders or tractor shovels having lift arms for manipulating a material handling bucket.

### FIELD OF THE INVENTION

Often where the load to be dumped must be raised over the side of a truck, wall or other high object, the reach of the lift arms of the loader is not great enough considering the distance that the cutting edge of the bucket drops in dumping the load. In such cases the bucket drop characteristics of the linkage become a critical factor in being able to obtain the required lift and reach. An example of a bucket linkage dealing with this problem is disclosed in U.S. letters Pat. No. 3,104,771 issued Sept. 24, 1963 entitled "Lift Bucket Assembly" and assigned to the assignee of the present invention.

### DESCRIPTION OF PRIOR ART

In linkage arrangements such as disclosed in the aforementioned patent, the bucket is supported on a pair of short, lower links adjacent the bottom and by a pair of longer, upper links adjacent the top. An actuating cylinder is pivotally connected to swing the lower ends of the longer pair of links outwardly while the shorter links pivot upwardly for a combined pivotal motion resulting in the bucket being raised and moved forwardly or outwardly while it is tilted downwardly. The downward tilt or turning movement imparted at the cutting edge is offset somewhat by the upward movement with the result that the amount of bucket drop is reduced.

### SUMMARY OF THE INVENTION

The present invention contemplates a bucket linkage having improved lift and reach capability with a minimum of bucket drop.

In accordance with the invention a bucket mounting linkage is provided having a lower link pivotally connected to the bucket adjacent the cutting edge. A pair of upper links, one pivoted to the other and the latter to the bucket near the upper edge, are actuated by a cylinder connected between the upper links to form a triangle, two sides of which are formed by the one upper link and cylinder and the third side by a short portion of the other upper link such that the upper pair of links are fully extended from a collapsed, folded position effecting maximum forward or outward travel of the bucket with a minimum of cylinder displacement.

In particular loader applications where the lift arms are pivotally mounted to uprights at the rear of the machine and extend forwardly alongside of the operator and then downwardly closely adjacent the front of the machine in the lowered position of the arms, maximum bucket reach or outward movement in the raised position of the lift arms is still close to the front of the machine and in such cases the present invention is particularly advantageous in providing that the dumping movement is effected at the outermost part of the linkage.

Most preferably the links of the upper pair of links are of substantially the same length such that in the col-

lapsed position, the links are jackknifed or partially overlapped and extend upwardly and rearwardly when the bucket is tilted to the rear or rolled-back position. At maximum forward extension, the links are spread apart in a substantially horizontal or flat arc reaching forwardly over the top of the bucket.

Most applications will find it advantageous to provide channels in the rear and bottom walls of the bucket to accommodate the lower link members. More specifically, the link members will be generally L-shaped with the long leg portion extending forwardly below the bucket and the shorter leg portions extending upwardly behind the bucket, each being received, at least partially, in a channel where the bucket is in the rolled-back position.

### DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of an end loader having lift arms pivoted at the rear to uprights and extending alongside the operator mounting a material handling bucket on the front showing the lift arms in a lowered, intermediate and fully raised position with the bucket in a digging, intermediate dumping and full dump position respectively;

FIG. 2 is a side view of the bucket mounting linkage shown in the digging position by full lines and in the dump position by dot-dash lines corresponding to the lowered and raised position of the lift arms in FIG. 1; and

FIG. 3 is a half rear view of the bucket and mounting linkage symmetrical about the bucket center line.

### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

In FIG. 1 is shown an end loader vehicle 10 having a pair of lift arms 12 pivoted at the rear to uprights 14 on the vehicle and extending forwardly alongside the operator's compartment 15 mounting a material handling bucket 16 on the front. A pair of lift cylinders 18, one on each side of the loader 10, are operated to raise and lower the lift arms 12 shown in lowered, intermediate and fully raised positions as depicted by dashed lines in FIG. 1.

A bucket mounting linkage 20 holds the bucket 16 on to the lift arms 12. The bucket mounting 20 is manipulated by the lift arms 12 about pivot axis 22 by a tilt and roll-back cylinder 23 which is connected to the hydraulic system of the loader 10 and is controlled from the operator's compartment 15. With cylinder 23 extended, the bucket linkage portion 21 of mounting 20 is pivoted outwardly as shown by full lines in FIG. 1 and the cutting edge 24 of the bucket 16 is engageable with the ground. When the cylinder 23 is retracted, the bucket linkage portion 21 is tilted rearwardly about pivot 22 and the bucket is rolled back with the cutting edge 24 and linkage portion 21 of mounting 20 in the dashed line position shown.

Referring now in more detail to the mounting 20 as shown in FIG. 2, there is a lower main pair of link members 25 having a generally L-shaped outline with a long, forwardly extending leg portion 26 pivotally mounted at 27 adjacent the cutting edge 24 of the bucket and a shorter, upwardly directed leg portion 28 extending behind the bucket. The leg portions 26, 28 are recessed in channels 29, 30 in the bottom and back of the bucket and provide rigid support for a bucket. A mounting frame 31 has upper and lower transverse members 32

bridging between the lower link members 25 at the rear (FIG. 3). A heavy rib 33 supported on the transverse members 32 adjacent each side of the mounting frame 31 has an ear 34 at the lower end providing a pivotal connection at 22 for lift arms 12 on opposite sides of the loader. A center rib 35 provides a pivotal mounting on the center line of the bucket for the lower end of the tilt and roll-back cylinder 23.

The bucket mounting 20 includes an upper linkage portion 21 comprising a pair of links 37,42 on each side of the bucket, pivotally connected at 38 on a bracket 39 supported on the upper transverse frame member 32 and at 43 on a bracket 44 fixed to the rear of the bucket. It will be appreciated by reference to FIG. 3, which is a half rear view of the bucket and mounting symmetrical about the center line, that the links 37,42 are fabrications of parallel side pieces 37a,42a joined at each end by sleeve bushings, such as 38a and braced intermediate the ends by cross members 39a,40a and that link 42 is similarly constructed. Within each pair of links 37,42 is an actuating cylinder 45 pivotally mounted with its lower end on bushing 38a and its rod end 48 at 49 on a sleeve bushing near the upper end of the link 42. Thus the links substantially house or enclose on at least two sides, the cylinders 45 tending to protect them from damaging blows.

Thus, in accordance with the invention, the bucket mounting linkage 20 provides a lower pair of links pivotally connected to the bucket adjacent the cutting edge and a pair of upper links pivoted to each of the lower links and to the bucket near its upper edge. Each of the upper pair of links is actuated by a cylinder, the lower end of which is pivotally connected on a first transverse axis at 38 and the rod end of which is pivotally connected on a second transverse axis at 49 forming with a third transverse pivot axis at 40, at the upper pivotal connection between the links 37,42, a triangle having two sides substantially longer than the third side, such that the linkage is fully extended from a collapsed or folded position (full lines in FIG. 2) to an extended maximum forward or outward position (dot-dash lines in FIG. 2) causing the lower ends of the links 42 to have a substantially greater horizontal than vertical component of motion producing a high ratio of bucket travel to cylinder displacement.

It will of course be understood that various changes may be made in form, details, arrangement and proportions of the parts without departing from the scope of the invention herein which, generally stated, consists in an apparatus capable of carrying out the objects above set forth, in the parts and combinations of parts disclosed and defined in the appended claims.

I claim:

1. In an end loader having a body, lift arms pivotally mounted on the body and a material handling bucket supported on the lift arms, the improvement comprising a mounting for the bucket having a lower means pivotally supporting the bucket adjacent its cutting edge and upper link means comprising a first link pivoted at its lower end to a portion of said lower means extending upwardly near the top of the bucket and pro-

jecting upwardly therefrom, a second link pivoted one end to the first link at its upper end and to the bucket near the upper rear edge thereof on its lower end, the lower ends of the links being closely adjacent when the bucket is tilted rearwardly on said pivot adjacent the cutting edge, and an actuating cylinder mounted between said links forming a triangle with two sides formed by said first link and cylinder and the third by a portion of the second link not greater than half its length, said bucket being tilted outwardly about said pivot adjacent the cutting edge by actuation of the cylinder causing said first and second links to spread out their lower ends above the bucket such that the lower end of said second link has a forward reach substantially above the pivot of the bucket adjacent its cutting edge.

2. The improvement according to claim 1 wherein the lower means is a pair of links having leg portions extending below the bucket pivoted at their outer ends adjacent the cutting edge and at their rear ends to the lift arms and a cylinder connected between the lift arms and said pair of links providing tilt and roll-back bucket movement about the rear ends of said pair of links.

3. The improvement according to claim 2 wherein the upper link means comprise a pair of first and second links on each side of the bucket, the first being pivoted on its upper end to the second and being of substantially the same length as the second and the cylinder being pivotally connected on the second link closely adjacent the first.

4. The improvement according to claim 3 wherein said lower pair of links each has an upwardly extending leg portion behind the bucket and the first of each said upper pair of links being pivoted at its lower end adjacent the said leg portion.

5. An end loader having a body, a pair of lift arms pivoted to uprights at the rear of the body and extending forwardly alongside the operator's compartment and downwardly at the front of the loader in the lowered position of the arms, a bucket mounting linkage, a bucket manipulated on the ends of the lift arms mounted on said linkage, said linkage including a lower link with a long, forwardly extended leg portion extending below the bucket and pivoted at the outer end adjacent the cutting edge of the bucket, an upwardly extending shorter leg portion behind the bucket joined to the long leg portion, channels formed in the bottom and back walls of the bucket for receiving said leg portions, a first upper link pivoted at its lower end to an upper portion of said shorter leg, a second upper link pivoted at the upper end of the first upper link and to the upper edge of the bucket adjacent the lower end of the first upper link and a cylinder extending between the first and second upper links forming a triangle with two sides being the first upper link and cylinder and the third side being a short portion of the second upper link whereby the upper links are effectively extended to the end of the long forwardly extending leg portion of said lower link.

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