United States Patent

[11] 3,556,330

[72] Inventors **Howard O. Keskitalo**
Batavia;
Lee H. Stowasser, Aurora, Ill.

[21] Appl. No. **794,304**
[22] Filed **Jan. 27, 1969**
[45] Patented **Jan. 19, 1971**

[73] Assignee **Caterpillar Tractor Co.**
Peoria, Ill.
a corporation of California

[54] SIDE DUMPING LOADER BUCKET CONTROL

3 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **214/768**
[51] **Int. Cl.** **E02f 3/76**
[50] **Field of Search** ..... 214/768, 140, 140S.D.

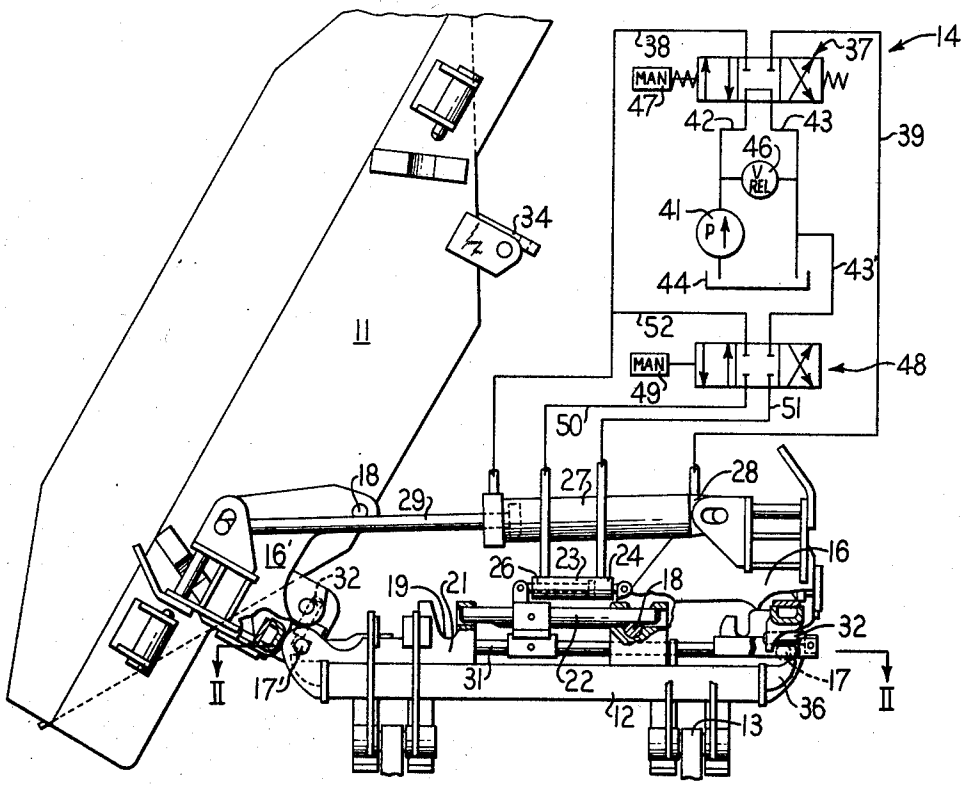
[56] **References Cited**

UNITED STATES PATENTS

3,402,841 9/1968 Salna et al. 214/768

Primary Examiner—Albert J. Makay
Attorney—Fryer, Tjensvold, Feix, Phillips & Lempio

ABSTRACT: A system for side dumping a loader bucket has a first hydraulic jack which is controlled by a manually operated latch valve for shifting locking pins whereby either side of the bucket may be selectively unlatched from its cradle. Actuation of a second jack, by means of a manually controlled dump valve, then lifts the unlatched side of the bucket in order to dump to the opposite side. The control valves are hydraulically interlocked whereby the first jack cannot be operated to shift the locking pins unless the second jack is simultaneously forcing the bucket to seat properly in its cradle thereby assuring that the locking pin mechanisms are properly aligned for engagement and disengagement.



PATENTED JAN 19 1971

3,556,330

SHEET 1 OF 2

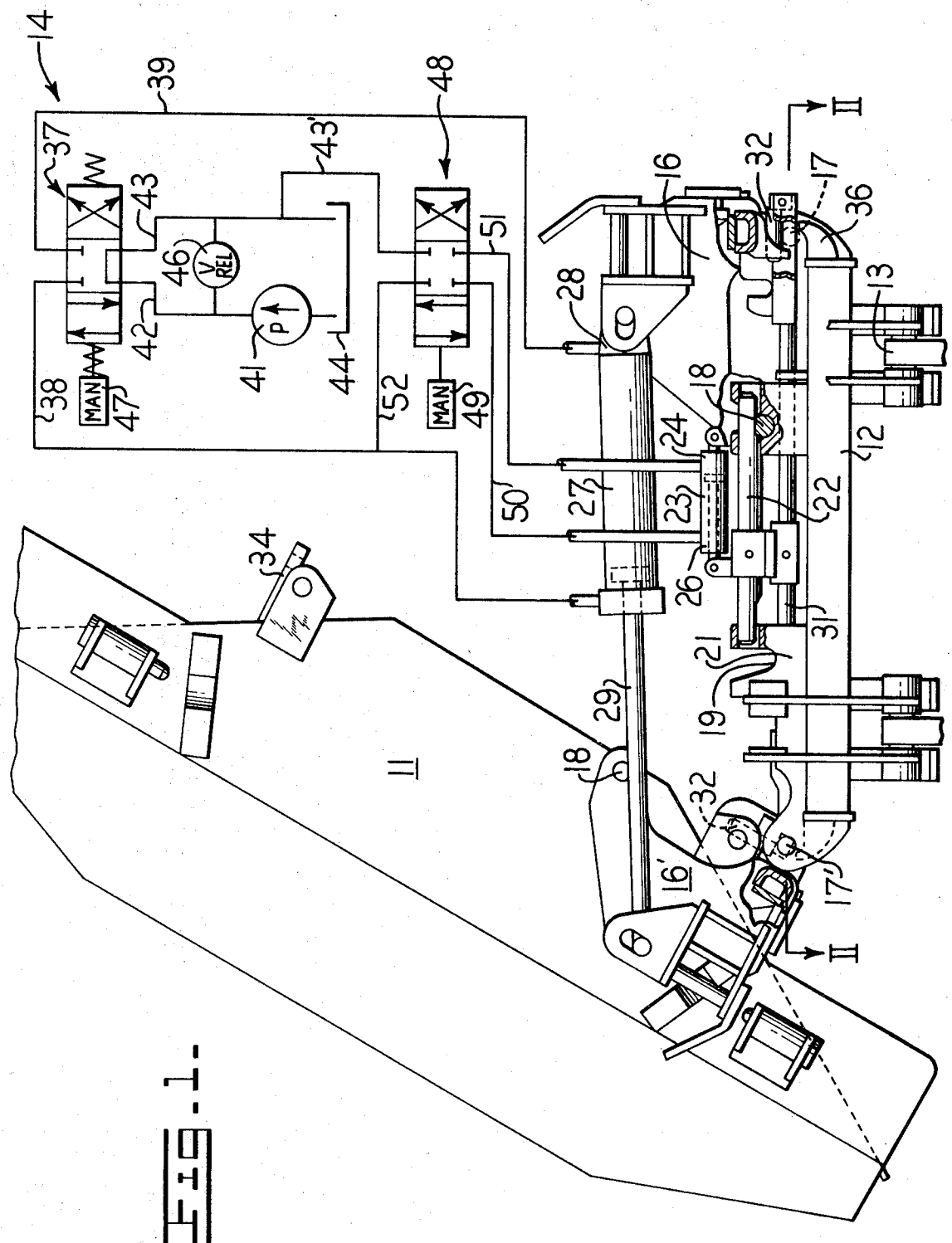


Fig. 1.

INVENTORS
HOWARD O. KESKITALO
LEE H. STOWASSER

BY

Fryer, Tjensvold, Feix, Phillips & Lempio

ATTORNEYS

PATENTED JAN 19 1971

3,556,330

SHEET 2 OF 2

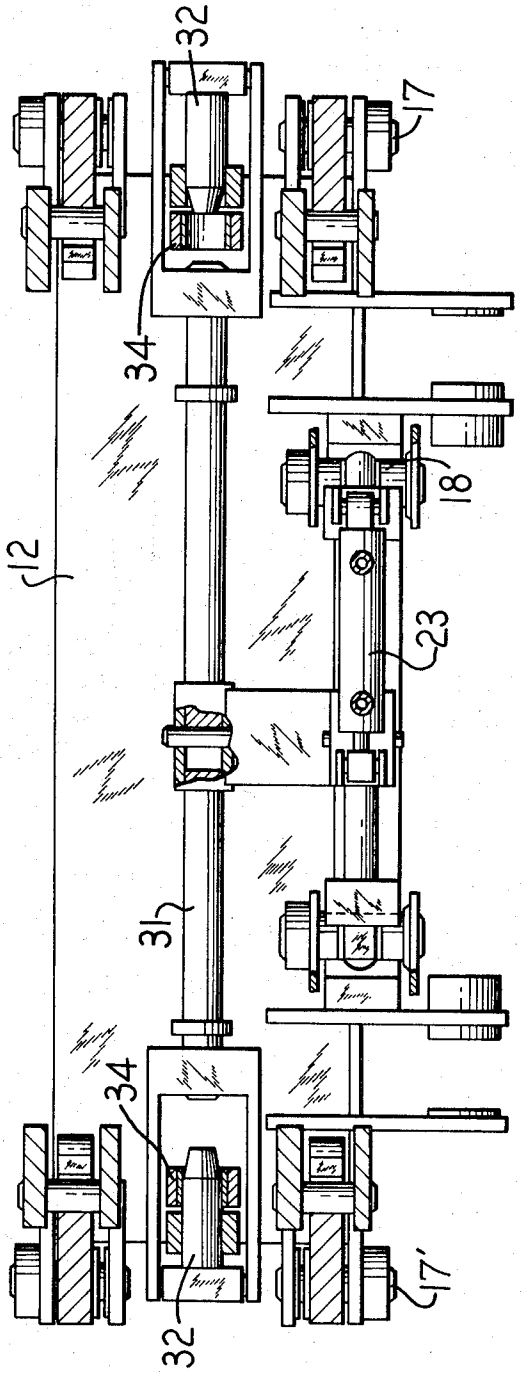


Fig. 2.

INVENTORS
HOWARD O. KESKITALO
LEE H. STOWASSER

BY
Fryer, Tjensvold, Feix, Phillips & Lempio
ATTORNEYS

SIDE DUMPING LOADER BUCKET CONTROL

BACKGROUND OF THE INVENTION

This invention relates to loader vehicles and more particularly to bucket controls for selectively dumping material at the side of a loader.

Buckets of the kind carried on pivotable lift arms at the front of a loader vehicle generally have a dumping mechanism which provides for tilting the bucket forwardly. In many working situations, it may be difficult or impossible to maneuver the loader vehicle into a position at which it faces the side of a truck or other receptacle as is required for forward dumping. To avoid this problem, side dumping loader buckets have been developed with which material may be unloaded at one or both sides of the loader vehicle. Re. No. 26,268 for Vehicle Mounted Loader to H. O. Keskitalo discloses a two-way side dumping loader bucket of this general kind.

As is evident from the above-identified patent, a side dumping bucket requires a latch mechanism of some kind for pivotably coupling one side of the bucket to cradle structure carried by the vehicle while uncoupling the other side of the bucket in order that it may be swung upwardly to effect the side dumping action. In the case of two-way side dumping loaders, latch mechanisms at both sides of the bucket must be alternately engageable and releasable. While the latching mechanisms may take a variety of forms, it is generally necessary that a moveable member on either the bucket or the cradle be shiftable to engage or release a lug, pin or other element of the other component. Difficulties have been encountered with these mechanisms as heretofore constructed. If the pin or the like and the element which it engages are not in precise alignment when the latch is shifted, jamming or excessive wearing of the latch mechanism may occur.

Prior control systems for side dumping buckets have relied on gravity to hold the bucket down against the cradle as the latch is shifted. This has not been found to be entirely reliable. Owing to the presence of mud or other extraneous material at certain points, or as a result of other causes, slight misalignments are common and, in the absence of more serious complications, wearing is pronounced.

SUMMARY OF THE INVENTION

The present invention relieves the problem discussed above by forcing the bucket of the side dumping loader into its proper position at the cradle as a precondition to operation of the latch mechanism. In particular, the bucket is equipped with the usual fluid operated dump jack for lifting and lowering the side of the bucket which is uncoupled from the cradle and which is operated through a first control valve. The invention provides for controlling the latching mechanism by means of a second jack and second control valve arranged in a fluid circuit wherein the second jack derives its driving fluid through the first control valve as well as the second control valve but only when the first control valve is at the particular position where it is causing the dump jack to forcibly pull the bucket downward at its seat at the cradle. Thus, the jack which couples and decouples the latches at the two sides of the bucket cannot be operated unless the dump jack is forcibly holding the bucket in its proper position against the cradle at the same time.

Accordingly it is an object of this invention to provide for greater precision in the operation of the dumping mechanism of side dumping loader buckets. It is a further object of the invention to reduce wear, jamming, and other malfunctions in mechanism of this class.

The invention, together with other objects and advantages thereof, will best be understood by reference to the following description of an illustrative embodiment and to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a rear elevation view of a two-way side dumping loader bucket and operating mechanism therefor with certain components of the hydraulic control circuit being shown schematically, and

FIG. 2 a is a plan view taken along line II–II of FIG. 1 further clarifying the structure shown therein.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to FIG. 1 of the drawing, there is shown a loader bucket **11** supported on a cradle **12** which is carried at the ends of the lift arms **13** of a loader vehicle, the vehicle and lift arms being of any suitable conventional design. Aside from the hydraulic control circuit **14** to be hereinafter described, the mechanical construction of the bucket **11**, cradle **12** and associated dumping and latching mechanisms may be identical to that described in the above-identified U.S. Pat. Re. No. 26,268. Accordingly, this mechanism will be herein described only briefly to the extent necessary to understand the coaction of the control circuit **14** therewith, and reference should be made to the above-identified patent for details of the mechanical construction.

Mechanism for selectively engaging either side of the bucket **11** with the corresponding end of the cradle **12** includes right and left bracket assemblies **16** and **16'** respectively which are coupled to opposite ends of the cradle by pivot pins **17**. Referring now to FIG. 2 in conjunction with FIG. 1, each such bracket assembly **16** and **16'** carries a bar **18** spaced from the associated pivot **17** and situated to be received in a notch **19** of a seat member **21** secured to cradle **12**. A first locking bar **22** extends between the two seat member members **19** and is slideable relative thereto whereby the locking bar may be shifted along the cradle **12** to overlap either of the bars **18**, alternately, and thereby prevent the corresponding one of the bracket assemblies **16** and **16'** from pivoting with respect to the cradle. To shift the locking bar **22** for this purpose, a latch jack **23** of the double-acting hydraulic variety has one end **24** coupled to the cradle structure **12** and the other end **26** coupled to the locking bar. Accordingly, at any given time, only one of the bracket assemblies **16** and **16'** may be pivoted with respect to the cradle **12**, the other being held in fixed relation to the cradle by the locking bar **22** and bracket assembly bar **18**.

An additional double-acting hydraulic motor, specifically a dump jack **27**, has a head end **28** pivotably coupled to bracket assembly **16** and has an extensible and retractable rod **29** pivotably coupled to the other bracket assembly **16'**. Accordingly, extension of the dump jack **27** pivots the unlatched bracket assembly **16** or **16'** upwardly from the cradle **12** and contraction of the jack, lowers the unlatched bracket assembly towards the cradle.

Referring still to FIG. 2 in conjunction with FIG. 1, the latch jack **23** acts to engage one side of the bucket **11** to the corresponding bracket assembly **16** or **16'** in addition to releasing that bracket assembly for pivoting movement relative to the cradle **12** as described above. In particular, the latch jack **23** also moves a second locking rod **31** which has a locking pin **32** at each end. Movement of the locking rods **22** and **31** to release one of the bracket assemblies **16** for pivoting with respect to cradle **12** also causes the locking pin **32** at that end of the bucket **11** to enter an apertured lug **34** secured to the underside of the bucket. This locks the bucket **11** to that particular bracket assembly **16** or **16'** while releasing the opposite side of the bucket from its bracket assembly. Since the particular bracket assembly **16** or **16'** to which the bucket is now locked is the one which will pivot upwardly upon extension of dump jack **27**, operation of the jack effects the desired side dumping of the bucket. If it is desired to dump to the opposite side, the latch jack **23** is shifted after bucket **11** has been lowered. The opposite side of the bucket is thereby engaged with its bracket assembly **16** or **16'** while the first side is released from the other bracket assembly. Thus, a subsequent extension of the dump jack **27** under these changed conditions will side dump to the opposite side.

The locking pins 32 which selectively engage and disengage the ends of the bucket 11 from the bracket assemblies 16 and 16' are necessarily pivoted to locking rod 31 as the locking pins must pivot with the bucket and bracket assemblies during dumping. As shown in FIG. 1, in particular, the cradle structure includes an arcuate cam plate 36 secured to the cradle 12 and disposed to prevent longitudinal motion of the associated locking pin 32 whenever it has been pivoted out of parallelism with locking rod 31 as occurs when the bucket 11 is in the process of dumping. Thus, shifting of the locking pins 32 is blocked except when the bucket 11 is down against its cradle 12 and inadvertent disconnection of both sides of the bucket is thereby forestalled. However, this mechanism does not prevent shifting of the locking pins 32 when the bucket is essentially down but when there is still a small misalignment of the apertured lug 34 and locking pin 32 due to failure of the bucket to seat completely in the proper position on the cradle 12. This condition can readily occur, for example, from looseness in the mechanism or the packing of mud or other material at certain points. If the latch jack 22 is operated under these conditions to shift the locking pins 32, the shift can generally be accomplished but wearing of the pins and the lugs 34 and associated parts is pronounced. Similar wearing may occur in connection with the ends of the first locking rod 22 and the bracket assembly bars 18. The present invention provides control means for the two jacks 23 and 27 which relieve this problem by providing for operation of the latch jack 23 to shift locking pins only when the dump jack 27 is actuated to exert a downward pull on the bucket 11 thereby forcing precise alignment of the mating parts.

In particular, with reference to FIG. 1, the control circuit 14 includes a three-position dump control valve 37 for selectively activating the dump jack 27. Valve 37 connects with first and second fluid conduits 38 and 39 to the rod end and the head end respectively of dump jack 27 and also connects with a pump 41, or other source of fluid under pressure, through an additional line 42. A drain line 43 is connected between valve 37 and a fluid reservoir 44. A relief valve 46 is conventionally coupled between lines 42 and 43. The relief valve 46 bypasses the output of pump 41 back to the reservoir 44 when jack 27 reaches the limit of its travel.

Valve 37 is spring biased towards a centered closed position at which lines 38 and 39 are each blocked. This locks dump jack 27 and holds the bucket 11 in fixed relationship to the cradle 12 insofar as side dumping motion is concerned. Valve 37 has a second position at which pressurized fluid from pump 41 is transmitted to line 39 while line 38 is communicated with drain line 43, thereby actuating dump jack 27 to lift one side of bucket 11 from the cradle 12 as previously described. Valve 37 has still a third position at which line 38 is communicated with pump 41 while line 39 is coupled to the drain line 43 and thus at the third position of the valve, dump jack 27 is actuated to force the bucket 11 towards cradle 12.

Dump control valve 37 is provided with any suitable manual control element 47 such as a lever or the like, whereby the operator may forcibly shift the valve to any of its positions. As discussed above, valve 37 is spring biased to the first or closed position and thus will automatically inactivate the dump jack 27 whenever the manual control 47 is released.

Latch jack 23, which determines the side to which the bucket 11 dumps, is controlled by a latch control valve 48 which also has a suitable manual control means 49. Latch valve 48 has a pair of lines 50 and 51 connecting with the rod end and the head end respectively of latch jack 23 and has a fluid input line 52 which does not connect directly with the fluid source 41 but connects instead with the line 38 between dump valve 37 and dump jack 27. Thus, latch valve 48 receives fluid under pressure from pump 41 only when dump valve 37 is held in the third position thereof at which the dump jack is actuated to pull the bucket 11 down against cradle 12.

Latch valve 48 has a first position at which lines 50, 51 and 52 are each blocked, thereby immobilizing the latch jack 23. At a second position of latch valve 48, the fluid supply line 52 is communicated with line 50 while line 51 is communicated with a drain line 43' thereby operating latch jack 23 to shift the locking mechanism to provide for dumping motion of the bucket 11 about pivot 17'. Valve 48 has a third position at which these connections are reversed. In particular, line 51 is communicated with the fluid supply line 52 while line 50 is coupled to the drain 43', thereby shifting the latch jack 23 to provide for dumping motion of the bucket about the other pivot 17.

As is evident from the foregoing, the operator cannot actuate the latch jack 23 to reverse the side at which the bucket dumps unless he simultaneously holds the dump control valve 37 in the position at which the dump jack is forcibly seating the bucket 11 at its cradle. This assures precise alignment of the locking pins 32 and lugs 34 as well as proper seating of bars 18 as such a shift is executed. While the invention has been described with respect to a two-way side dumping bucket, it will be apparent that it is also applicable to the latching and unlatching of a one-way side dump bucket. Many modifications are possible and it is not intended to limit the invention except as defined in the following claims.

We claim:

1. In a loader having a bucket and a cradle therefor with fluid operated latch means for selectively engaging and disengaging at least one side of the bucket from the cradle and having fluid operated dump men means for lifting the disengaged side of said bucket away from said cradle and for drawing said disengaged side of said bucket towards said cradle, a dump control system comprising:

a course source of fluid under pressure;

a multiposition manually operated dump control valve connected between said source of fluid and said fluid operated dump means and having one position at which fluid from said source is supplied to said dump means through a first flow passage to draw said bucket towards said cradle; and

a manually operated latch control valve connected between said first flow passage and said latch means for supplying actuating fluid thereto through said dump valve and said passage whereby said latch means may be activated only when said dump valve is at said one position thereof and said dump means is forcibly urging said bucket against said cradle.

2. The combination defined in claim 1 wherein said dump control valve has a second position blocking fluid flow through said passage and has biasing means forcing said valve to said second position in the absence of manual actuation of said valve.

3. In a two-way side dumping loader, the combination comprising:

a bucket;

a cradle for supporting said bucket having pivoting bracket means at each side;

a double acting hydraulic dump jack connected between said bracket means;

latch means shiftable between two positions at each of which a separate side of said bucket is coupled to the bracket means thereat while the other bracket means is locked against pivoting movement with respect to said cradle;

a double acting hydraulic latch jack for shifting said latch means between said two positions thereof;

a source of operating fluid under pressure;

a manually operated dump jack control valve connected between said source of fluid and said dump jack and having a first position at which said fluid is supplied to a first end of said dump jack through a first flow passage to draw said bracket means towards said cradle and having a second position at which said source is isolated from said dump jack and having a third position at which said fluid is supplied to the other end of said dump jack to urge said bracket means away from said cradle; and

a manually operated latch jack control valve coupled between said dump control valve and said latch jack and

having a first position at which said flow passage is communicated with a first end of said latch jack and a second position at which said flow passage is isolated from both

ends of said latch jack and a third position at which said flow passage is communicated with the opposite end of said latch jack.