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Geier

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[54] **BUCKET POSITIONER FOR LOADERS**

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[52] **U.S. Cl.** **214/764**

[51] **Int. Cl.** **E02f 3/87**

[58] **Field of Search** 214/764, 140, 762

[56] **References Cited**

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[57] **ABSTRACT**

A loader comprises a pair of lift arms pivotally mounted on a tractor and bucket pivotally mounted on the forward ends of the lift arms. A tilt linkage is operatively connected between the lift arms and the bucket to selectively position the bucket for various earth working operations. The tilt linkage comprises a hydraulic cylinder adapted to be selectively actuated manually by a three-position, four-way directional control valve. An extensible rod of the cylinder is mechanically connected by a cable to an air valve which opens to extend a pilot piston which in turn actuates the directional control valve upon extension of the rod.

6 Claims, 2 Drawing Figures

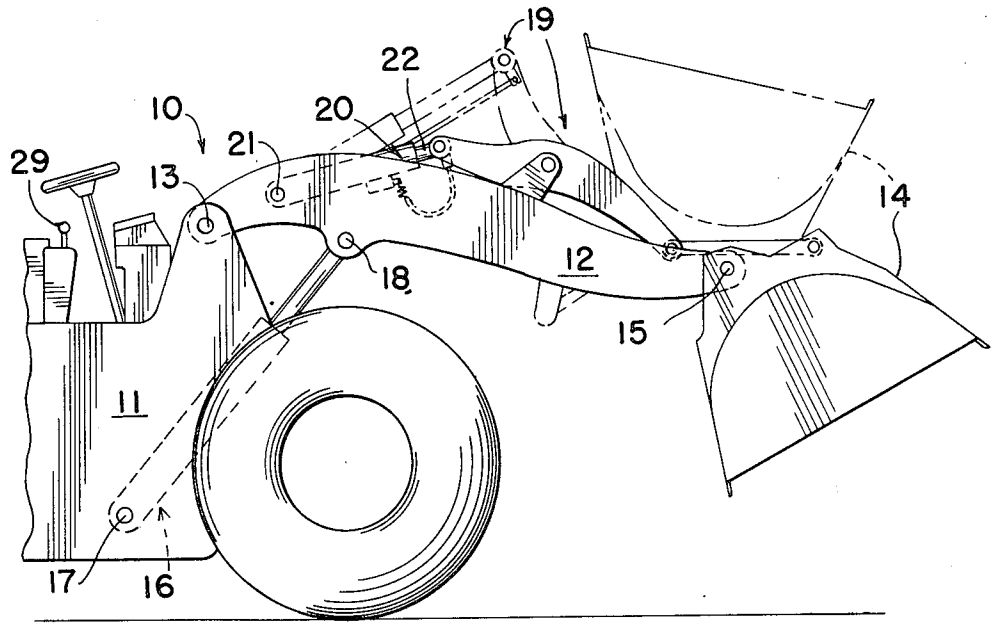


Fig. 1

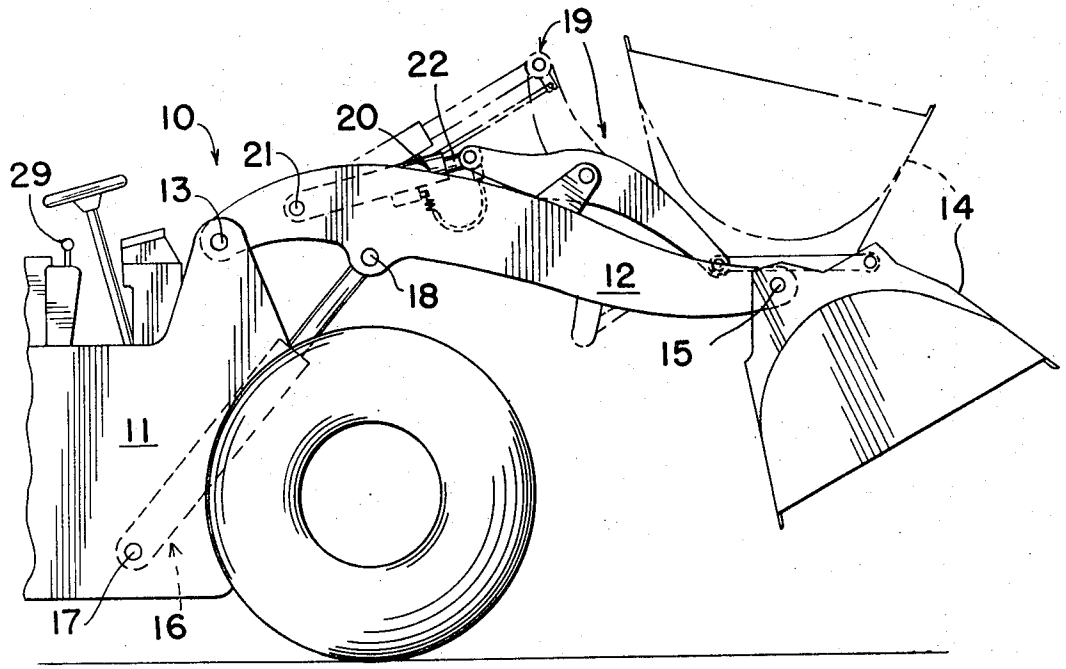
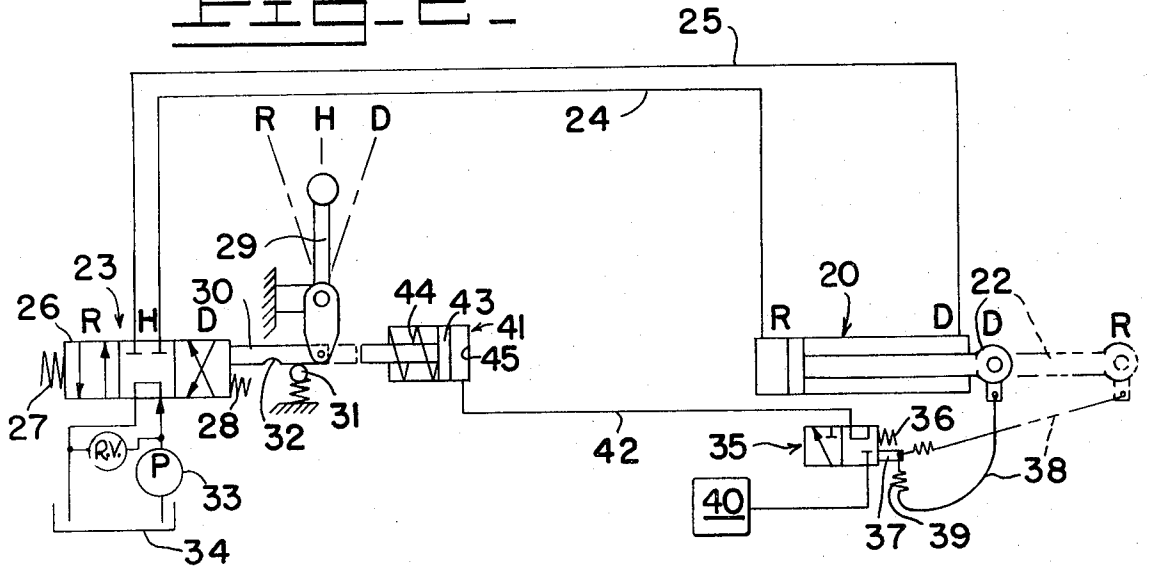

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Fig. 2


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R H D
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R H D
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BUCKET POSITIONER FOR LOADERS

BACKGROUND OF THE INVENTION

Conventional wheel-type loaders are adapted to perform various digging, loading and carrying functions during a cycle of loader operation. During the digging phase of loader operation, it is oftentimes desirable to provide means for automatically holding the loader bucket in a digging position. Such means are normally operatively associated with the bucket's tilt linkage to automatically move a bucket control valve to a "hold" position upon movement of a tilt linkage component or the rod of an actuating cylinder therefor. Various prior art means of this type are disclosed in U.S. Pat. Nos. 3,088,489; 3,141,562; 3,122,247; 3,155,252; 3,187,913; 3,211,310; 3,234,855; 3,265,229; 3,289,546; 3,429,471; and 3,508,675; and British Patent No. 1,236,326.

SUMMARY OF THE INVENTION

An object of this invention is to overcome the above, briefly described problems, by providing a non-complex and compact positioner for a work implement which exhibits a high degree of structural integrity and ability to be adjusted and repaired expeditiously. The work implement, such as a loader bucket, is adapted to be moved into various working dispositions by positioning means, including a fluid-actuated cylinder having a rod reciprocally mounted therein. A directional control valve, having releasable holding means operatively associated therewith for maintaining the valve in one condition of operation, is adapted to selectively communicate pressurized fluid to the cylinder to extend or retract same. Release means comprise first pilot means operatively connected to the rod to be actuated thereby upon extension thereof and second pilot means operatively connected between the first pilot means and the directional control valve to actuate the directional control valve to release the holding means thereof in response to actuation of the first pilot valve means.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects of this invention will become apparent from the following description and accompanying drawings wherein:

FIG. **1** is a partial, side elevational view of a wheel loader, including a bucket positioner embodiment of this invention therein; and

FIG. **2** schematically illustrates a bucket tilt control circuit, including such bucket positioner.

DETAILED DESCRIPTION

FIG. **1** illustrates the front end of a wheel loader **10** comprising a frame **11** having lift arm means preferably comprising a pair of lift arms **12** (one shown) each pivotally mounted thereon by a pivot pin **13.** The lift arms have a bucket **14** pivotally mounted on the forward ends thereof by laterally spaced pivot pins **15** (one shown). Although the herinafter described positioner finds particular application to such a loader bucket, it should be understood that this invention may be adapted for use to selectively position other types of work implements movably mounted on a vehicle.

Each lift arm is adapted to be selectively raised or lowered by a double-acting hydraulic cylinder **16** pivotally mounted on frame **11** and the lift arm by pivot pins **17** and **18,** respectively. A standard tilt linkage or bucket positioning means **19** is pivotally interconnected between the lift arms and the bucket to move it between its full and dotted-line positions, shown in FIG. **1.** The tilt linkage includes a hydraulically actuated double-acting cylinder **20,** pivotally mounted on lift arm **12** by a pivot pin **21.**

As schematically illustrated in FIG. **2,** cylinder **20** has a rod **22** reciprocally mounted therein to be selectively extended or retracted between its full and dotted-line positions. The hydraulic control circuit for actuating such cylinder comprises a three-position, four-way directional control valve **23** adapted to alternately pressurize and exhaust the head and rod ends of the cylinder by working lines **24** and **25,** respectively. The directional control valve comprises a reciprocal spool member **26** normally biased to its self-centered, hold position H by spring means. comprising opposed coil springs **27** and **28,** to block the working lines.

The spool member is adapted to be selectively moved by a handle **29,** pivotally connected to a rod-like extension **30** of the spool. Releasable holding means, such as the schematically illustrated detent means comprising a spring loaded detent **31** and mating socket **32** formed on extension **30,** are operatively associated with the control valve to releasably hold handle **29** in rack-back position R. In such position, a pump **33** and resevoir **34** of a pressurized fluid source will function to communicate pressurized hydraulic fluid to working line **24** and to simultaneously exhaust line **25.** Clockwise movement of the handle to its digging position D will function to communicate pressurized hydraulic fluid to working line **25** and to simultaneously exhaust line **24.**

Release means for automatically releasing the detent means upon extension of rod **22** comprises first pilot means, such as the illustrated two-position, two-way directional air control valve **35,** normally biased to its closed position by a coil spring **36.** A spool **37** of the air valve is operatively connected to rod **22** by extensible cable means comprising an inextensible cable **38** and an extensible coil spring **39.** Upon extension of the rod to its dotted-line position shown in FIG. **2,** the air control valve will open to communicate pressurized air from a source **40** to a second pilot means **41,** via a working line **42.**

The second pilot means preferably comprises a pilot cylinder having a piston **43** reciprocally mounted therein and normally biased rightwardly to its full-line, retracted position by a coil spring **44.** Upon pressurization of an actuating chamber **45** of the pilot cylinder, piston **43** will move leftwardly to engage an end of extension **30** to move it from its dotted-line to its full-line position, shown in FIG. **2.** Such movement will function to automatically release the detent means during operating conditions hereinafter described.

FIG. **1** illustrates loader **10** in its dumping phase of operation wherein handle **29** has been moved to its D position to fully retract cylinder **20.** Cable **38** is thus slackened to allow spring **36** to bias spool member **37** of air control valve **35** to a closed position, preventing the communication of pressurized air from source **40** to second pilot means **41.** Upon movement of handle **29** to its R or rack-back position, detent **31** will engage notch **32** to automatically hold spool **26** of the directional control valve in a condition of operation wherein

pressurized hydraulic fluid is communicated from pump **33** to the head end of cylinder **20** to extend same. Simultaneously therewith, the rod end of the cylinder will be exhausted.

When rod **22** reaches its predetermined extended digging position illustrated by dotted lines in FIG. **2** whereby bucket **14** is pivotally positioned between its full and dotted-line positions in FIG. **1**, cable **38** will become taut to actuate air control valve **35** to an open position. Pressurized air will thus be communicated to chamber **45** of second pilot means **41.** The resulting leftward movement of piston **43** will function to release detent **31** from notch **32** whereby springs **27** and **28** will cooperate to automatically self-center spool **26** to its H or holding position, also illustrated in FIG. **2.** Extensible spring **39** of the cable means will permit further rightward movement of rod **22** from its FIG. **2** to its FIG. **1** dotted-line position when handle **29** is again moved to its R or rack-back position to move bucket **14** to its FIG. **1** dotted-line position.

I claim:

1. A vehicle comprising a work implement movably mounted on said vehicle, positioning means, including a fluid-actuated cylinder having a rod reciprocally mounted therein, for selectively moving said work implement upon extension or retraction of said cylinder, control means, including a multi-directional control valve having releasable mechanical holding means operatively associated therewith for maintaining said control valve in a first condition of operation for selectively communicating pressurized hydraulic fluid from a pressurized fluid source to said cylinder, and release means for releasing said holding means upon extension of said rod comprising first pilot means operatively directly connected to said rod to be actuated thereby upon extension thereof and second pilot means oepratively connected between said first pilot means and said directional control valve to actuate said directional control valve to release said holding means in response to actuation of said first pilot means, said work implement being a loader bucket pivotally mounted on the forward end of lift arm means, said lift arm means pivotally mounted on a frame of said vehicle, said positioning means including tilt linkage means operatively connected between said lift arm means and said loader bucket for selectively pivoting said loader bucket on said lift arm means, said cylinder constituting a double-acting cylinder, said control means further including a manually manipulatable handle directly pivotally attached to a spool member of said directional control valve for directly mechanically moving said spool member to actuate said control means, said releasable holding means comprising spring-loaded detent means operatively disposed for directly engaging said spool member, said first pilot means including an extensible cable means having a first end directly attached to said rod and a second end directly attached to a spool member of a pilot valve thereof, said pilot valve including a two-position, two-way directional control valve and a pressurized source of pneumatic fluid operatively communicable through said control valve upon actuation thereof by said cable means, said second pilot means including a pilot cylinder operatively connected to said pneumatic valve and having a piston reciprocally mounted therein to directly mechanically engage and move said spool member of said directional control valve upon extension of said rod.

2. The vehicle of claim **1** wherein said multi-directional control valve constitutes a three-position, four-way directional control valve having a spool member movably mounted therein to be shifted between said first condition of operation to communicate pressurized fluid to a first end of said cylinder and to simultaneously exhaust fluid from a second end thereof, a second condition of operation to communicate pressurized fluid to the second end of said cylinder and to simultaneously exhaust fluid from the first end thereof and a third condition of operation to block communication of fluid to both the first and second ends of said cylinder.

3. The vehicle of claim **2** further comprising spring means operatively engaging said spool member to move said spool member to said third condition of operation automatically upon release of said releasable holding means.

4. The vehicle of claim **1** wherein said cable means comprises an inextensible cable and an extensible spring connected to said cable to extend upon maximum extension of said rod.

5. The vehicle of claim **1** further comprising spring means operatively engaging a spool member of said air control valve to normally bias said spool member to a closed position.

6. The vehicle of claim **1** further comprising spring means normally biasing said piston axially away from said spool member.

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