

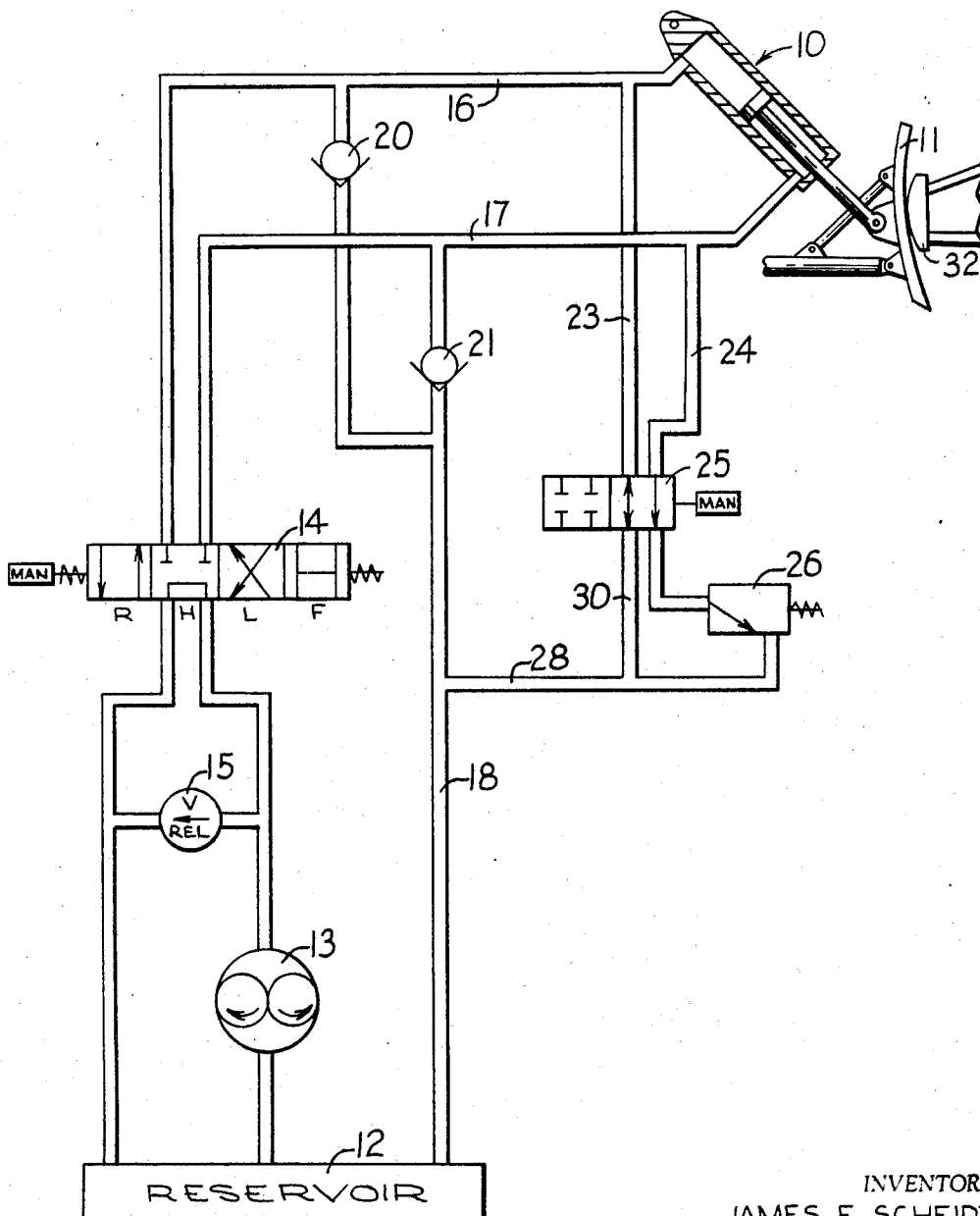
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J. E. SCHEIDT

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CONTROL CIRCUIT FOR BULLDOZERS USED IN PUSHING

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INVENTOR
JAMES E. SCHEIDT
BY

Fryer, Gimzewald, Feip, Phillips & Lemus
ATTORNEYS

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CONTROL CIRCUIT FOR BULLDOZERS USED IN PUSHING

James E. Scheidt, Joliet, Ill., assignor to Caterpillar Tractor Co., Peoria, Ill., a corporation of California

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5 Claims

ABSTRACT OF THE DISCLOSURE

A control circuit for bulldozers which are used as pushers of other vehicles and particularly to a circuit which provides a modification of the conventional float arrangement by preventing the bulldozer blade from dropping to the ground when it loses contact momentarily with a push block with which it is engaged.

Hydraulically actuated bulldozers usually have conventional controls including a manually actuated valve with raise and lower positions, a neutral or hold position in which the blade is hydraulically locked in any selected attitude and a float position which interconnects the pump reservoir and operative ends of the bulldozer jack so that the blade is free to float or move upwardly or downwardly in response to gravity or other external forces.

When a bulldozer is used in pushing operations such for example as when it is pushing a scraper to provide extra power required during its loading cycle, the bulldozer blade is brought into engagement with a push block on the rear of the scraper and the valve is adjusted to its hold position. This has disadvantages because as the scraper and tractor move over uneven terrain, the height of the blade varies relative to the push block causing a scrubbing action against the mold board of the blade which results in excessive wear. Another disadvantage is that with the blade locked in its hold position, action between the blade and push block sometimes raises the forward end of the tractor sufficiently to reduce its tractive effort. To overcome these disadvantages, some operators place the blade in its hold position while contacting the push block and then move the control to the float position so that the blade is free to follow the movement of the push block. However, loss of contact with the push block with the blade in float position permits the blade to drop to the ground so that this practice is not satisfactory.

It is an object of the present invention to provide an improved hydraulic circuit for the control of a bulldozer blade with means to effect more efficient and safe operation during pushing with the blade.

A further object is to provide a circuit including auxiliary valve means to establish a semi-float position of a bulldozer blade in which the blade is free to move upwardly and can be moved downwardly by external forces which exceed the force of gravity normally causing the blade to drop.

Further and more specific objects and advantages of the invention are made apparent in the following specification by reference to the accompanying drawing.

The drawing is a schematic view of a bulldozer blade control circuit embodying the present invention and illustrating the blade in contact with a push block.

A conventional circuit includes a hydraulic jack, generally indicated at 10, for raising and lowering a bulldozer blade 11. Fluid from a reservoir 12 is directed selectively to opposite ends of this jack by a pump 13 and a manually actuated control valve 14 having raise, hold, lower and float positions as above described. A conven-

tional relief valve 15 prevents overloading of the circuit and lines 16 and 17 communicate with opposite ends of the jack and also communicate with the reservoir through a common line 18. Check valves 20 and 21 are provided to prevent flow from lines 16 and 17 to the reservoir but to permit flow from the reservoir to either end of the jack for makeup fluid which prevents cavitation during operation of the jack.

The valve 14 is illustrated in its H or hold position and it can be seen that in its F or float position, both ends of the jack would be in open communication with each other so that the blade would move freely either upwardly or downwardly in response to external forces.

In accordance with the present application, with the valve 14 in its hold position, opposite ends of the jack are placed in communication with each other through lines 23 and 24, a manually actuated auxiliary control valve 25 and a pressure relief valve 26. With the valve 25 in its closed position, there is no effect upon the conventional circuit previously described. However, with the valve 25 in its open position as shown, upward movement of the blade by external force is permitted with fluid being expelled from the head end of the jack through the line 23, the valve 25 and the line 28 communicating with line 18 while makeup fluid is supplied to the rod end of the jack through the check valve 21 and line 17. Downward movement of the blade is permitted only by the application of force sufficient to open the spring loaded relief valve 26. Upon downward movement, fluid from the rod end of the jack will flow through line 24, valve 25, relief valve 26 and thence through a line 30 back through the valve 25 toward the head end of the jack with the makeup valve 20 functioning in its usual manner. A setting of relief valve 26 is established which prevents opening of the valve by the force exerted by the weight of the blade and its supporting mechanism.

Consequently with the main control valve 14 in its hold position and the auxiliary valve 25 in its open position, the blade is in a semi-float position where it is free to move upwardly with upward movement of the push block which is shown at 32 and to move downwardly with the push block. However, upon loss of contact between the blade and block, the blade will not drop to the ground because its gravitational force is insufficient to effect opening of the relief valve 26.

I claim:

1. In a hydraulic control circuit for raising and lowering a bulldozer blade including a double acting hydraulic jack controllably connected to the bulldozer blade, a source of supply of fluid under pressure, and valve means to direct flow of said fluid selectively to opposite ends of the jack, auxiliary conduits forming communication between opposite ends of the jack, an auxiliary valve controlling flow of fluid between the head and rod ends of the jack whereby with the auxiliary valve open the bulldozer blade will tend to float, and a relief valve in said conduits preventing downward floating of the bulldozer blade until a predetermined pressure is realized to open the relief valve.

2. The combination of claim 1 in which the pressure required to open the relief valve is greater than that produced by the force of gravity of the bulldozer blade.

3. The combination of claim 1 in which the hydraulic control circuit includes conduits between opposite ends of the jack and the source of supply, an anti-cavitation check valve in said conduits for each end of the jack, and means communicating between said auxiliary conduits through said check valves to the source of supply.

4. In a hydraulic control circuit for raising and lowering a bulldozer blade including a double acting hydraulic jack controllably connected to the bulldozer blade, a

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source of supply of fluid under pressure, valve means to direct fluid selectively to opposite ends of the jack, said valve means including a hold position preventing flow to or from either end of the jack, and means operable with the valve means in said hold position to permit limited flow from one end of the jack toward the other to establish a semi-float condition of the bulldozer blade.

5. The combination of claim 4 with auxiliary valve means to prevent such limited flow.

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EDGAR W. GEOGHEGAN, Primary Examiner

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