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(54) VEHICLE HAVING PORTABLE POWER MEANS FOR BRAKE CONTROL

(71) We, CATERPILLAR TRACTOR CO., a corporation organized and existing under the laws of the State of California, United States of America, of 100 N.E. Adams Street, Peoria, Illinois, 61629, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Work vehicles having track or wheel type locomotion are generally of large size and great weight and often operate on steep gradients and are therefore equipped with a braking system that is spring locked, and released in response to fluid pressure. Therefore, in the absence of fluid power to controlling assemblies of the brakes, the brakes are locked.

Owing to the rough, abusive use of these vehicles, the fluid power system of the vehicle sometimes malfunctions. In order to move the vehicle for servicing, it then becomes necessary to provide a method by which to release the brakes for transportation of the vehicle to a servicing site.

Some vehicles have redundant power supplies for automatic or manual actuation upon failure of the main fluid power means. However, since malfunction is generally most infrequent, it is desirable to eliminate the redundant system from the vehicle and provide other means for releasing the brakes and thereby to avoid a wastage of material and labour.

According to the present invention, a vehicle has first and second spring actuated, normally locked, brakes that are fluid pressure releasable; a fluid control system connected to the brakes for controllably, selectively passing fluid to the brakes; a fluid power means supplying fluid to the

control system through a check valve; a fluid reservoir connected to the fluid means; first and second fluid couplings; a first conduit connected at one end to the first fluid coupling with the other end being in fluid communication with the control system at a location downstream of the check valve; a second conduit connected at one end to the second fluid coupling with the other end being in fluid communication with the reservoir; and a second fluid power means, movable to and from the vehicle and releasably connectable to the first and second fluid couplings for receiving fluid from the fluid reservoir and delivering pressurized fluid to the brakes via the control system in the absence of pressurized fluid being delivered from the first fluid power means.

One example of a vehicle according to the invention will now be described with reference to the accompanying drawing which is a diagrammatic view of a portion of the vehicle.

A vehicle 10 has first and second endless tracks 12, 14. First and second brakes 16, 18 are associated with a respective track 12, 14, the brakes being spring actuated, normally locked brakes, that are fluid releasable, as is hereinafter more fully described.

A control system 20 includes first and second control means 22, 24, connected to the brakes 16, 18 for controllably, selectively passing fluid to the brakes 16, 18. The control means 20 can be one or more valve assemblies as is known in the art. A fluid power means 26, preferably a variable displacement pump, is connected to the control means 22 and 24 through a check valve 28 for supplying fluid in one direction from the power means 26 to the control system 20. A fluid reservoir 30 is connected to the fluid power means 26 for supplying fluid thereto.

A first conduit 36 is connected at one end to the first, quick-release, fluid coupling 38, with the other end in fluid communication with one control system 20 of each brake 16, 18 at a location downstream of the check valve 28 and associated fluid power means 26. A second conduit 40 is connected at one end to a second fluid coupling 42, with the other end connected between the reservoir 30 and power means 26. The control means 22, 24 are also associated with first and second steering clutches 32, 34 for controllably delivering pressurized fluid from the control means 22, 24, to the clutches 32, 34 for the operation thereof.

It should be understood that the control means 22, 24 and check valve 28 can be separate or contained within the same housing.

Alternatively, a separate check valve 28 can be provided for each control means 22, 24.

The conduits 36, 40 are connected by brackets 56, 58 to the vehicle 10 adjacent to the outer periphery 54 of the vehicle 10 for positioning the coupling 38, 42 at an easily accessible location relative to the ground.

In operation, on the absence of pressurized fluid deliverable from the fluid power means 26 and when the brakes 16, 18 are desired to be released for moving the vehicle 10, an operator can move a second, battery powered fluid power means 44 to the vehicle, connect the fluid couplings 38, 42, and actuate the second fluid power means 44. A pump 50 driven by a battery 52, draws fluid from the reservoir 30 via conduit 40 and delivers it via conduit 36 to the control system 20. Actuation of the control system 20, as is known in the art, delivers the pressurized fluid to the brakes 16, 18 for selectively releasing one or both brakes and allowing the vehicle to be moved or towed to a remote location for repair. Fluid from fluid power means 44 is deliverable only to the brakes 16, 18, or to the brakes 16, 18 and the steering clutches 32, 34. The check valve 28 and conduit system prevent this fluid from being delivered into other hydraulic systems (not shown) which are served by the first fluid power means 26. The second fluid power means 44 can therefore be of relatively small size and easily portable and connectable into the fluid system. The invention eliminates a wastage of materials, labour and equipment in providing a vehicle-contained redundant power system and/or mechanical brake release apparatus.

WHAT WE CLAIM IS:—

1. A vehicle having first and second spring actuated, normally locked, brakes that are fluid pressure releasable; a fluid control system connected to the brakes for controllably, selectively passing fluid to the brakes; a fluid power means supplying fluid to the control system through a check valve; a fluid reservoir connected to the fluid power means; first and second fluid couplings; a first conduit connected at one end to the first fluid coupling with the other end being in fluid communication with the control system at a location downstream of the check valve; a second conduit connected at one end to the second fluid coupling with the other end being in fluid communication with the reservoir; and a second fluid power means, movable to and from the vehicle and releasably connectable to the first and second fluid couplings for receiving fluid from the fluid reservoir and delivering pressurized fluid to the brakes via the control system in the absence of pressurized fluid being delivered from the fluid power means.
2. A vehicle according to claim 1, wherein the first and second couplings are of a quick-release type.
3. A vehicle according to claim 1, or claim 2 wherein the second fluid power means has a battery-powered pump.
4. A vehicle according to any of claims 1 to 3, wherein the control system has a pair of control means each associated with a respective one of the brakes, the first conduit being in fluid communication with both control means.
5. A vehicle according to claim 4, including first and second steering clutches each associated with a respective one of the control means.
6. A vehicle according to any of claims 1 to 5, wherein the first and second conduits are connected to the vehicle adjacent its outer periphery.
7. A vehicle according to claim 1, substantially as described with reference to the accompanying drawings.

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10 It should be understood that the control means 22, 24 and check valve 28 can be separate or contained within the same housing.

20 Alternatively, a separate check valve 28 can be provided for each control means 22, 24.

25 The conduits 36, 40 are connected by brackets 56, 58 to the vehicle 10 adjacent to the outer periphery 54 of the vehicle 10 for positioning the coupling 38, 42 at an easily accessible location relative to the ground.

30 In operation, on the absence of pressurized fluid deliverable from the fluid power means 26 and when the brakes 16, 18 are desired to be released for moving the vehicle 10, an operator can move a second, battery powered fluid power means 44 to the vehicle, connect the fluid couplings 38, 42, and actuate the second fluid power means 44. A pump 50 driven by a battery 52, draws fluid from the reservoir 30 via conduit 40 and delivers it via conduit 36 to the control system 20. Actuation of the control system 20, as is known in the art, delivers the pressurized fluid to the brakes 16, 18 for selectively releasing one or both brakes and allowing the vehicle to be moved or towed to a remote location for repair. Fluid from fluid power means 44 is deliverable only to the brakes 16, 18, or to the brakes 16, 18 and the steering clutches 32, 34. The check valve 28 and conduit system prevent this fluid from being delivered into other hydraulic systems (not shown) which are served by the first fluid power means 26. The second fluid power means 44 can therefore be of relatively small size and easily portable and connectable into the fluid system. The invention eliminates a wastage of materials, labour and equipment in providing a vehicle-contained redundant power system and/or mechanical brake release apparatus.

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2. A vehicle according to claim 1, wherein the first and second couplings are of a quick-release type.
3. A vehicle according to claim 1, or claim 2 wherein the second fluid power means has a battery-powered pump.
4. A vehicle according to any of claims 1 to 3, wherein the control system has a pair of control means each associated with a respective one of the brakes, the first conduit being in fluid communication with both control means.
5. A vehicle according to claim 4, including first and second steering clutches each associated with a respective one of the control means.
6. A vehicle according to any of claims 1 to 5, wherein the first and second conduits are connected to the vehicle adjacent its outer periphery.
7. A vehicle according to claim 1, substantially as described with reference to the accompanying drawings.

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