April 27, 1965 E. A. HORTON 3,180,514

CONTROL SYSTEM FOR A LOAD HANDLING ATTACHMENT ON AN INDUSTRIAL TRUCK

Filed March 14, 1963 3 Sheets-Sheet 1

Fig. 1.

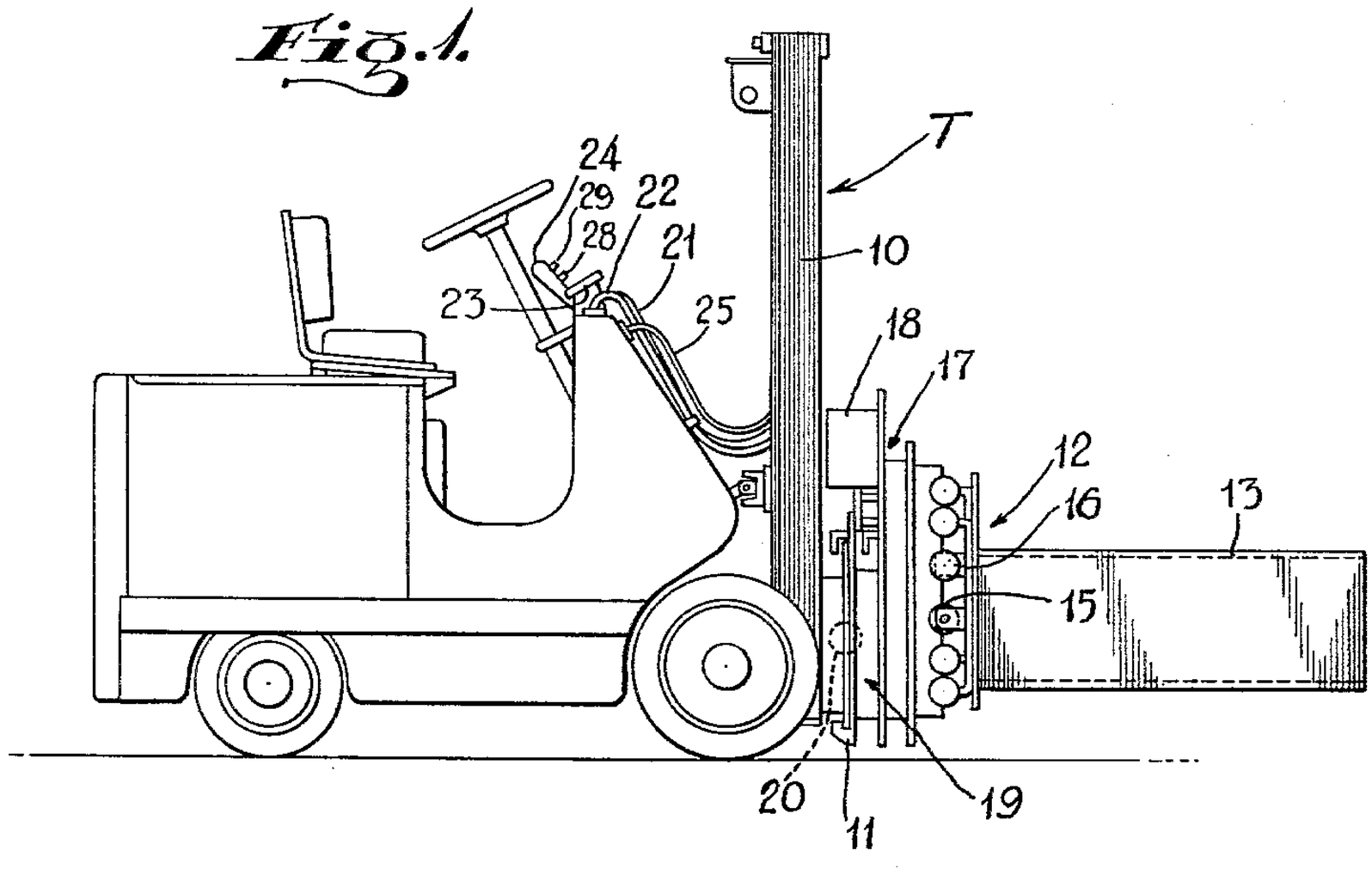
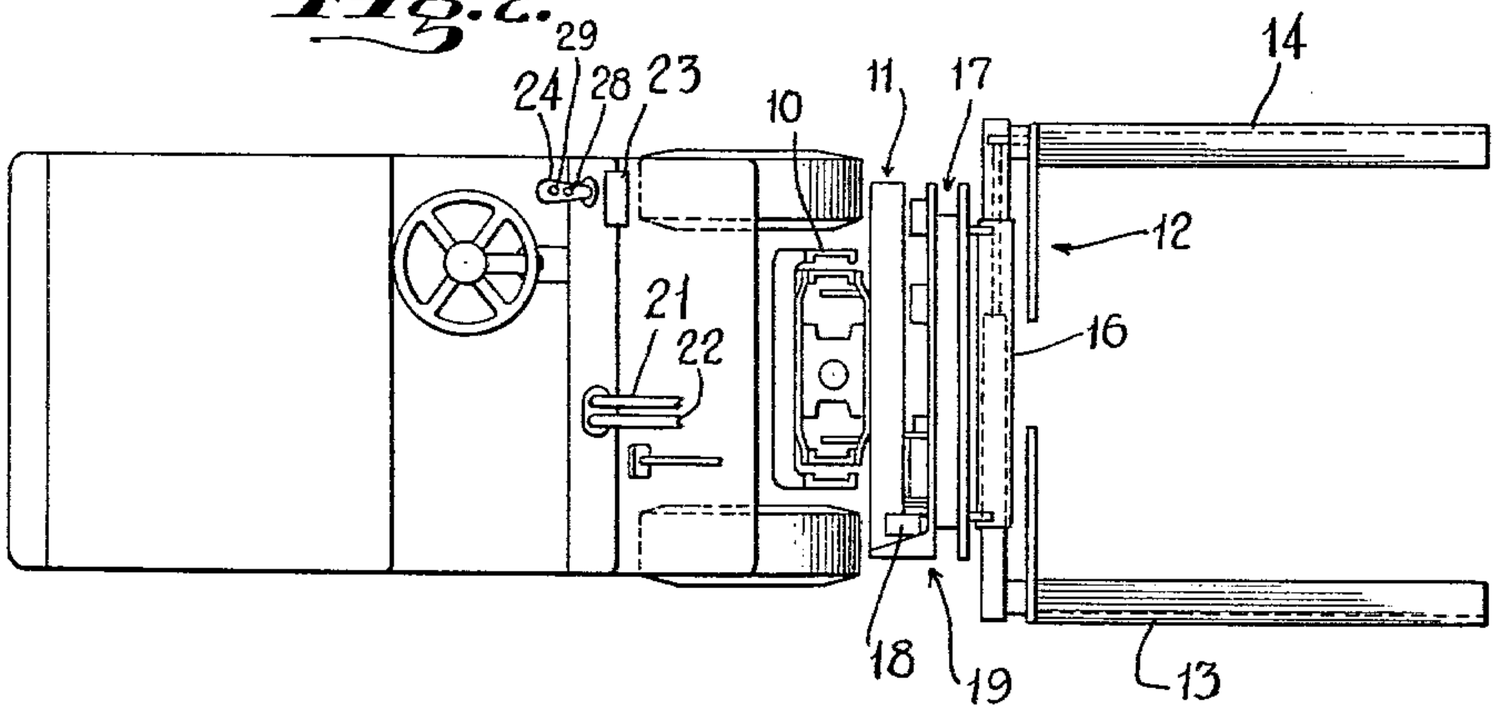


Fig. 2.



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CONTROL SYSTEM FOR A LOAD HANDLING ATTACHMENT ON AN INDUSTRIAL TRUCK

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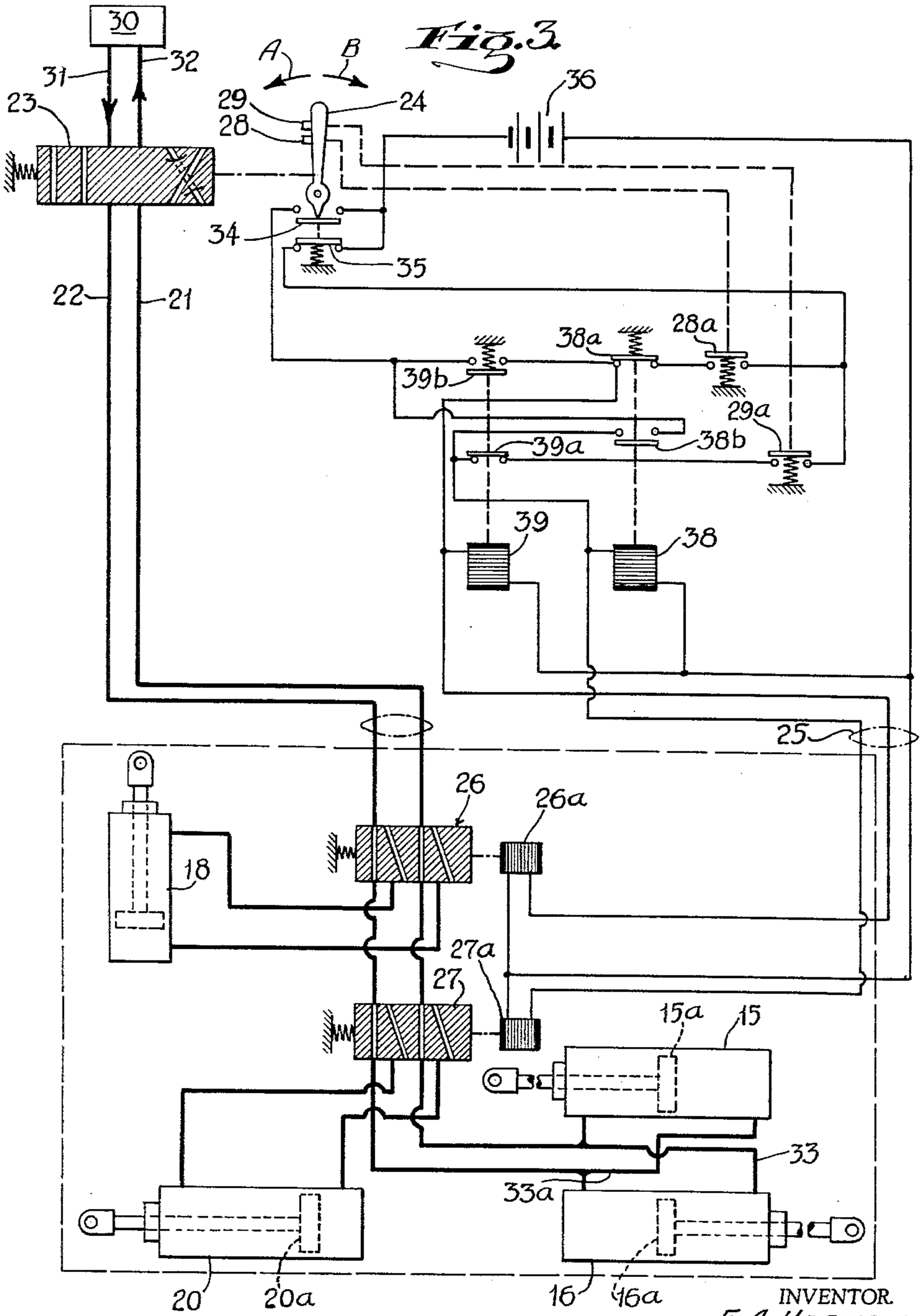
Fig. 3



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CONTROL SYSTEM FOR A LOAD HANDLING ATTACHMENT ON AN INDUSTRIAL TRUCK

Filed March 14, 1963 3 Sheets-Sheet 3

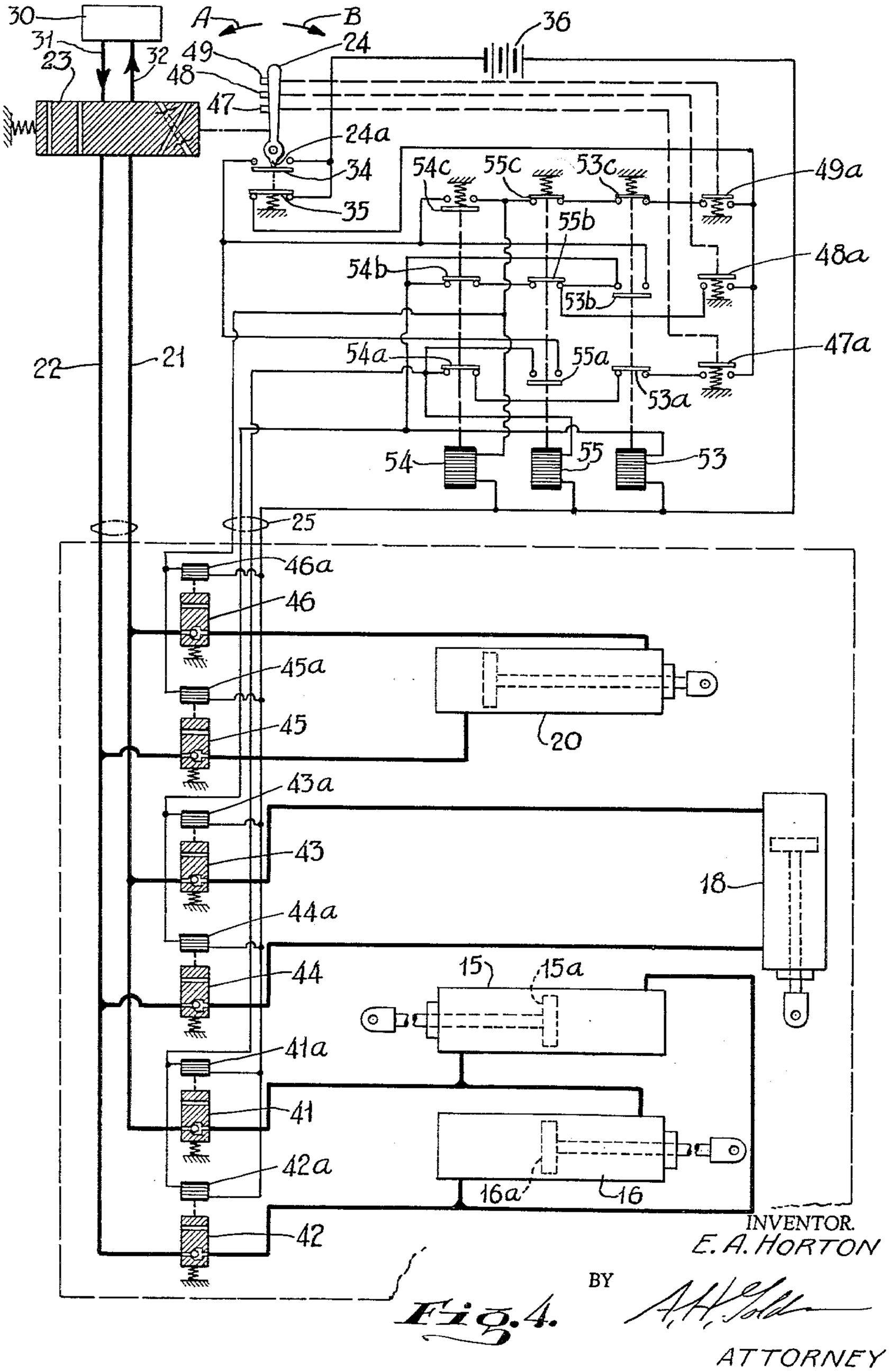

Fig. 4.

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CONTROL SYSTEM FOR A LOAD HANDLING ATTACHMENT ON AN INDUSTRIAL TRUCK

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5 Claims. (Cl. 214—652)

This invention relates to industrial trucks. More particularly, the invention relates to a control system for operating a plurality of hydraulically actuated load manipulating devices mounted on the lifting carriage of such a truck.

It has heretofore been proposed to control such hydraulically actuated devices through a hydraulic directional control valve mounted on the truck, adjacent the operator's seat, and electrically operated valves mounted on the load carriage, with the valves being operated by electric switches mounted on the truck. This arrangement provides individual control of the plurality of hydraulically actuated devices on the load carriage, while utilizing only one pair of hydraulic hoses and a relatively small multiple conductor electric cable leading from the truck to the load carriage.

With an arrangement of this type, however, it is possible, particularly if the switches are mounted on the handle for the directional control valve, for the operator to accidentally release a switch thereby stopping operation of one hydraulic device and immediately start operation of a second hydraulic device. This can be dangerous. Thus, the operator may release a switch to stop operation of a hydraulic device on the load carriage for rotating a load, and by doing so, simultaneously start operation of a load clamping device, with resulting crushing or dropping of a load.

This invention provides an improved arrangement of this type in which either actuating or releasing a switch is ineffective to operate the electric valve on the load carriage, unless the directional control valve is in a neutral position in which no fluid is supplied to the hydraulic devices. Thus, with this arrangement, it is impossible to stop operation of one hydraulic device and simultaneously start operation of a second hydraulic device.

The invention and its advantages having been described, a more detailed description of two forms of the invention is given hereafter by reference to the accompanying drawings wherein:

FIG. 1 is a side elevational view of a lift truck of the type on which the control system of the invention may be advantageously used;

FIG. 2 is a top plan view of the truck shown in FIG. 1;

FIG. 3 is a combined electrical and hydraulic diagram showing one form of control system constructed in accordance with the invention for controlling operation of three hydraulically operated load manipulating devices mounted on the lifting carriage of the truck shown in FIGS. 1 and 2; and

FIG. 4 is a combined electrical and hydraulic diagram showing a second control system constructed in accordance with the invention for controlling operation of three hydraulically operated manipulating devices mounted on the lifting carriage of the truck shown in FIGS. 1 and 2.

Referring to the drawings and in particular to FIGS. 1 and 2, there is shown an industrial truck T of the type on which the control system of the invention may be used advantageously.

The truck T is of conventional construction and includes uprights 10 and a lifting load carriage 11 which is mounted for vertical movement on the uprights 10. Three conventional hydraulically actuated load manipulating devices are shown mounted on the lifting carriage 11.

The first device is a load clamping device, generally indicated at 12, and includes a pair of clamping arms 13 and 14 and a pair of hydraulic rams 15 and 16 for moving the clamping arms toward and away from each other to clamp or release a load.

The second device is a rotating device, generally indicated at 17, and includes a hydraulic ram or motor 18 by which the clamping device 12 may be rotated about a horizontal axis relatively to the load carriage 11.

The third device is a side shifting device, generally indicated at 19, and includes a hydraulic ram 20 by which the clamping device 12 and rotating device 17 may be shifted as a unit in a direction transversely of the load carriage 11. Each of these hydraulic devices are of conventional, well-known constructions, and the details thereof form no part of the invention.

Fluid for operating the rams 15, 16, 18 and 20 is supplied from a single pair of hoses 21 and 22, extending between the load carriage 11 and a fluid pump, or other pressure source, mounted on the truck. The direction of flow of fluid through the hoses is controlled through a reversing valve 23 mounted on the truck body, which is actuated through movement of a handle 24. As will be described in detail, fluid from the hoses 21 and 22 is selectively directed to rams 15 and 16 or to ram 18 or ram 20 through electrically actuated valves mounted on the load carriage and operated by switches which are mounted on the truck body and connected to the valves by a multiple conductor electric cable 25. By this arrangement, individual control of the three hydraulically actuated devices 12, 17 and 19 is obtained, while utilizing only a single pair of hoses and a relatively small multiple conductor electric cable leading from the truck to the load carriage.

Referring now to FIG. 3, there is shown diagrammatically, one form of control system constructed in accordance with the invention for controlling operation of the rams of the three devices 12, 17 and 19. In the system illustrated in FIG. 3, two solenoid operated valves 26 and 27, which are mounted on the carriage 11, are used to selectively control the flow of fluid from the pair of hoses 21 and 22 to the rams 15, 16, 18 and 20. As will be described in detail hereafter, these two valves are actuated by push buttons 28 and 29, which are conveniently mounted on the handle 24 of the reversing valve 23.

In FIG. 3, each of the solenoid operated valves 26 and 27 are shown in the non-actuated position and the various relays are shown in the non-energized condition. Reversing valve 23 is shown in a neutral position in which the hoses 21 and 22 are disconnected from the pump 30, or other source of fluid pressure.

Assuming that the operator wishes to clamp a load, he moves the hande 24 in the direction of the arrow A, without operating push buttons 28 and 29. This moves the reversing valve 23 to a position in which the hose 21 is connected with a pressure line 31 from a fluid pressure source 30, while hose 22 is connected with a return line 32 to the pressure source 30. Fluid under pressure flows from the fluid pressure source through the hose 21, through solenoid operated valve 26, and through solenoid operated valve 27 to the left-hand side of the ram 15, causing the piston 15*a* thereof to move to the right.

The ram 15 is connected in parallel with the ram 16 by a conduit 33, so that fluid from the hose 21 also flows to the right-hand side of the ram 16, causing the piston 16*a* thereof to move to the left. As the piston 15*a* moves to the right and the piston 16*a* moves to the left, fluid on the right-hand side of piston 15*a* and the fluid on the left-hand side of piston 16*a* flows through a conduit 33*a*, which connects the opposite ends of the rams in parallel,

through the solenoid operated valve 27, the solenoid operated valve 26, the hose 22, the reversing valve 23 and the return line 32 back to the pressure source 30.

The clamping arms 13 and 14 are thus moved toward each other by the rams 15 and 16 to clamp the load. When the load is properly gripped by the clamping arms 13 and 14, the operator moves the handle 24 back to the neutral position, thereby disconnecting the hoses 21 and 22 from the pressure source 30 and trapping the fluid in the rams 15 and 16 so that the load is held clamped between the clamping arms 13 and 14.

As the handle 24 is moved in the direction of the arrow A, to actuate the rams 15 and 16, electrical contacts 34, which are held open by a cam 24*a* on the handle 24 when the handle 24 is in the neutral position, close, and contacts 35, which are held closed by the cam 24*a* of the handle 24 in the neutral position of the handle open. The opening of contacts 35 prevents a circuit from being completed to the solenoid 26*a* of the solenoid operated valve 26 and also to the solenoid 27*a* of the solenoid operated valve 27, so that if either push button 28 or push button 29 is accidentally pressed while the valve 23 is shifted to operate the rams 15 and 16, the pressing of the buttons 28 and 29 is ineffective to operate the rams 18 and 20. Thus once the operator has moved the handle 24 from the neutral position to operate the rams 15 and 16, he cannot accidentally start operation of the ram 18 or 20, without first returning the handle 24 to neutral position.

To unclamp the load, the handle 24 is moved in the direction of the arrow B. The system then functions in the same manner as in clamping the load except that the direction of the flow of fluid is reversed so that the clamps are moved apart by the rams 15 and 16.

Assuming that the load has been properly clamped and the handle 24 returned to neutral position, the operator may operate ram 18 to rotate the clamped load by pressing push button 28 and then again moving the handle 24 in the direction of the arrow A.

Pressing of push button 28 closes electrical contacts 28*a* completing a circuit from the battery 36 through closed contacts 38*a* of a relay 38 and closed contacts 35 to both energize the solenoid 26*a* of the solenoid operated valve 26 to shift the valve 26 and to energize a relay 39 causing normally closed contacts 39*a* thereof to open and causing normally open contacts 39*b* thereof to close.

The shifting of valve 26 by energizing the solenoid 26*a* connects hose 21 to the lower end of ram 18 and connects hose 22 to the upper end of ram 18, so that when the reversing valve 23 is shifted to the left by movement of the handle 24 in the direction of the arrow A, fluid under pressure is applied to the ram 18 to extend the piston and rotate the load. At the same time, fluid is held trapped in the rams 15 and 16 so that the load remains clamped. As the handle 24 is moved from the neutral position, contacts 34 close and contacts 35 open.

Closing of contacts 34 forms a holding circuit through closed contacts 39*b* around the contacts 28*a*, so that once the button 28 is pressed and the handle 24 is moved from the neutral position, accidental releasing of the push button 28 to open contacts 28*a* is ineffective to de-energize the solenoid 26*a* of the solenoid operated valve 26. Thus, once the push button 28 has been pushed and the handle 24 moved from the neutral position, solenoid 26*a* cannot be de-energized with resulting simultaneous operation of the clamping rams 15 and 16, except by first moving the handle 24 back to the neutral position.

The opening of contacts 39*a* of the relay 39 opens the circuit through contacts 39*a* of push button 29 so that accidental closing of push button 29 is ineffective at this time to energize the solenoid 27*a* of the solenoid operated valve 27 to operate the ram 20.

Assuming that the load has been rotated to the desired position by operation of the ram 18, the operator moves the handle 24 back to the neutral position thereby disconnecting the hoses 21 and 22 from the fluid pressure source 30. As the handle 24 is moved back to the neutral position, contacts 34 are again opened and contacts 35 are closed. As the contacts 34 are again opened, the holding circuit through the closed contacts 39*b* is broken so that the relay 39 and the solenoid 26*a* of the solenoid operated valve 26 are de-energized and valve 26 moves back to the initial position, as shown in the drawing, trapping the fluid in the ram 18 to hold the load in the rotated position.

To rotate the load in the opposite direction, push button 28 is pressed and the handle 24 moved in the direction of the arrow B. The system then functions in the same manner as just described with the flow of fluid to the ram 18 being reversed to reverse the direction of rotation of the load.

Assuming now that the operator wishes to side shift the load, he presses push button 29 and moves the handle 24 in the direction of the arrow A to shift the valve 23 to the right.

Pressing push button 29 closes contacts 29*a* to complete a circuit through closed contacts 35, closed contacts 39*a* of the relay 39 and the battery 36 to energize the solenoid 27*a* of the solenoid operated valve 27 to shift the valve 27 and to energize relay 38 to open contacts 38*a* thereof and close contacts 38*b*.

The shifting of the valve 27 connects the hoses 21 and 22 to the ram 20, so that when the handle 24 is moved in the direction of the arrow A, fluid is applied to the ram 20 to shift the load. As the handle 24 is moved from the neutral position, contacts 34 again close and contacts 35 open. Closing of contacts 34 completes a holding circuit through the closed contacts 38*b*, around contacts 29*a*, to hold the relay 38 and the solenoid 27*a* of the solenoid operated valve 27 energized should the push button 29 accidentally be released. Thus, the solenoid 27*a* cannot be de-energized to shift the valve 27 except by movement of the handle 24 back to the neutral position.

At the same time, the opening of contacts 38*a* by energizing relay 38 opens the circuit through contacts 28*a* so that the accidental pressing of push button 28 is ineffective to energize the solenoid 26*a* of the solenoid operated valve 26, once the push button 29 has been pushed and the handle 24 moved from the neutral position.

Side shifting of the load is stopped by again returning the handle 24 to neutral position to disconnect the hoses 21 and 22 from the pressure source 30 and to close contacts 35 and open contacts 34. Opening of contacts 34 breaks the holding circuit through closed contacts 38*b* so that the relay 38 and the solenoid 27*a* are de-energized and valve 27 moves back to the original position, trapping the fluid in the ram 20.

To side shift the load in the opposite direction, the push button 29 is pressed and the handle 24 moved in the direction of the arrow B to reverse the flow of fluid to the ram 20.

Thus, it can be seen that by this arrangement shown in FIG. 3, either actuating or releasing one of the push buttons 28 or 29 is ineffective to operate the solenoid operated valves 26 and 27, unless the handle 24 and therefore the reversing valve 23 are in the neutral position, in which no fluid is supplied to the hydraulic rams 15, 16, 18 and 20. Thus, with this arrangement, it is impossible to stop operation of one hydraulic device and simultaneously start operation of a second hydraulic device.

Referring now to FIG. 4, there is shown a slightly different control arrangement which may be used when solenoid operated valves of the type shown in FIG. 3 are not available for the particular volumetric requirements of the system.

In this arrangement, two solenoid operated valves are used for controlling the fluid to each hydraulic device. Thus, two valves 41 and 42 are used for controlling the flow of fluid to the rams 15 and 16 of the clamping device, two valves 43 and 44 are used for controlling the flow of fluid to the ram 18 of the rotating device and two

valves 45 and 46 are used for controlling the flow of fluid to the ram 20 of the side shifting device. Each of these solenoid operated valves is identical, and, when non-energized, as shown in FIG. 4, prevent return flow of fluid from each side of the rams while allowing fluid to be applied to each side of the rams. When energized, the valves allow fluid to flow in both directions from the ram.

Three push buttons 47, 48 and 49, conveniently mounted on the handle 24, are used to control the operation of the solenoid operated valves of the hydraulic devices.

Assuming that the operator wishes to clamp a load, he first presses push button 47 and moves the handle 24 in the direction of the arrow A. Pressing push button 47 closes contacts 47*a* completing a circuit from the battery 36 through closed contacts 35, closed contacts 53*a* of a relay 53 and closed contacts 54*a* of a relay 54 to energize solenoids 41*a* and 42*a* of the valves 41 and 42, and also to energize a relay 55.

Energizing solenoids 41*a* and 42*a* shifts the valves to a position in which fluid may flow to the rams 15 and 16, so that shifting the reversing valve 23 to the left by movement of the handle 24 in the direction of the arrow A, applies fluid pressure through hose 21 to the left-hand side of the ram 15 and also to the right-hand side of ram 16 to move the piston 15*a* to the right and piston 16*a* to the left. As the piston 15*a* moves to the right and the piston 16*a* moves to the left, the fluid on the opposite sides of the pistons flows through the valve 42 to the return hose 22. The clamping arms 13 and 14 are thereby moved together to clamp the load.

Energizing relay 55 causes normally open contacts 55*a* to close and normally closed contacts 55*b* and 55*c* to open. Closing contacts 55*a* forms a holding circuit through contacts 34, which close as the handle 24 is moved in the direction of the arrow A, around the contacts 47*a*, so that once the button 47 is pressed and the handle 24 moved from the neutral position, accidental releasing of the button 47 to open the contacts 47*a* is ineffective to de-energize the solenoids 41*a* and 42*a* of the solenoid operated valves 41 and 42. The opening of contacts 55*b* and 55*c* breaks the circuits through contacts 48*a* and 49*a* so that accidental pressing of push buttons 48 and 49 is ineffective at this time to energize the solenoids of the valves 43, 44, 45 and 46 to operate the rams 18 and 20.

When the load has been properly clamped, the operator moves the handle 24 back to neutral position thereby disconnecting the hoses 21 and 22 from the fluid pressure source 30. As the handle 24 is moved back to neutral position, contacts 34 are again opened and contacts 35 are closed. As the contacts 34 are again opened, the holding circuit through the closed contacts 55*a* is broken so that relay 55 and the solenoids 41*a* and 42*a* of the valves 41 and 42 are de-energized and the valves 41 and 42 moved back to the initial position shown in the drawing, trapping the fluid in the rams 15 and 16 to hold the load clamped.

To unclamp the load, the operator again presses push button 47 and moves handle 24 in the direction of the arrow B. The system then functions in the same manner as just described with the flow of fluid to the rams 15 and 16 being reversed to move the clamping arms away from each other.

Assuming that the load has been properly clamped and the handle 24 returned to neutral position, the operator may operate ram 18 to rotate the clamped load by pressing button 48 and then again moving the handle 24 in the direction of the arrow A.

Pressing push button 48 closes contacts 48*a* completing a circuit from the battery 36 through closed contacts 35 and closed contacts 55*b* and 54*b* of relays 55 and 54 to energize solenoids 43*a* and 44*a* of the solenoid operated valves 43 and 44 to shift the valves 43 and 44. The closing of the contacts 48*a* also completes a circuit to energize the relay 53 to open contacts 53*a* thereof and to close contacts 53*b* and 53*c*.

The shifting of the valves 43 and 44 connects hose 21 to the upper end of the ram 18 and connects hose 22 to the lower end of ram 18, so that when the reversing valve 23 is shifted to the left by movement of the handle 24 in the direction of the arrow A, fluid under pressure is applied to the ram 18 to extend the piston 18*a* thereof to rotate the load.

The closing of contacts 53*b* forms a holding circuit through closed contacts 34 around the contacts 48*a*, so that once the button 48 is pressed and the handle 24 is moved from the neutral position, accidental releasing of the push button 48 to open contacts 48*a* is ineffective to de-energize the solenoids 43*a* and 44*a* of the solenoid operated valves 43 and 44.

The opening of contacts 53*a* and 53*c* breaks the circuit through contacts 47*a* and 49*a* so that accidental pressing of buttons 47 and 49 is ineffective to energize the solenoids of the solenoid operated valves 41, 42, 45 and 46.

When the load has been rotated to the desired position by operation of the ram 18, the operator moves the handle 24 back to the neutral position, thereby disconnecting the hoses 21 and 22 from the fluid pressure source 30. As the handle 24 is moved back to neutral position, contacts 34 are again opened and contacts 35 are closed. As the contacts 34 are again opened, the holding circuit through the closed contacts 53*b* is broken so that the relay 53 and the solenoids 43*a* and 44*a* are de-energized and valves 43 and 44 moved back to the initial position, shown in the drawing, trapping the fluid in the ram 18 to hold the load in the rotated position.

To rotate the load in the opposite direction, push button 48 is again pressed and the handle 24 moved in the direction of the arrow B. The system then functions in the same manner as just described with the flow of fluid to the ram 18 being reversed to reverse the direction of rotation of the load.

Assuming now that the operator wishes to side shift the load, he presses push button 49 and moves the handle 24 in the direction of the arrow A to shift the valve 23 to the left.

Pressing push button 49 closes contacts 49*a* to complete a circuit from the battery 36 through the closed contacts 35 and closed contacts 53*c* and 55*c* to energize the relay 54 and to energize the solenoids 45*a* and 46*a* of the solenoid operated valves 45 and 46 to shift these valves.

The shifting of the valves 45 and 46 connects the hose 21 to the left-hand end of the ram 20 and connects the hose 22 to the right-hand end of the ram 20, so that when the handle 24 is moved in the direction of the arrow A, fluid is applied to the ram 20 to shift the load. The closing of contacts 54*c* when the relay 54 is energized completes a holding circuit through contacts 34, around the contacts 49*a*, so that once the button 49 is pressed and the handle 24 moved from the neutral position, accidental releasing of the button 49 is ineffective to de-energize the solenoids 45*a* and 46*a* of the valves 45 and 46.

The opening of contacts 54*a* and 54*b* breaks the circuits through contacts 48*a* and 47*a* so that accidental pressing of push button 47 or 49 is ineffective at this time to energize the solenoids of the valves 41, 42, 43 and 44 to operate the rams 15, 16 and 18. The side shifting of the load is stopped by again returning the handle 24 to neutral position to disconnect the hoses 21 and 22 from the pressure source 30 and to close contacts 35 and open contacts 34. The opening of contacts 34 breaks the holding circuit through contacts 54*c* so that the relay 54 and the solenoids 45*a* and 46*a* are de-energized and the valves 45 and 46 moved back to the original position, trapping the fluid in the ram 20.

To side shift the load in the opposite direction, the push button 49 is pressed and the handle 24 is moved in the direction of the arrow B to reverse the flow of fluid to the ram 20.

Thus, it can be seen by the arrangement shown in FIG. 4, that either actuating or releasing the push buttons 47, 48 and 49 is ineffective to operate the solenoid operated valves 41, 42, 43, 45 and 46, unless the handle 24 and therefore the reversing valve 23 are in the neutral position in which no fluid is supplied to the hydraulic rams. Thus with this arrangement, it is impossible to start operation of one hydraulic device and simultaneously start operation of a second hydraulic device.

From the preceding description, it can be seen that there is provided a novel arrangement in which either actuating or releasing a switch is ineffective to operate the electric valve on the load carriage, unless the directional control valve is in a neutral position in which no fluid is supplied to the hydraulic device. Thus accidental stopping of one operation and simultaneous starting of a second operation resulting in the creation of a dangerous situation is effectively prevented.

While two embodiments of the invention have been shown and described, it will be appreciated that this is for the purpose of illustration and that changes and modifications may be made therein without departing from the spirit and scope of the invention.

I now claim:

1. In an industrial truck having a main frame, a lifting carriage mounted for movement on said main frame, a plurality of hydraulically actuated load manipulating devices on said carriage, a source of fluid pressure on said main frame, flexible conduit means extending between said main frame and said lifting carriage, a hydraulic control valve on said main frame movable between a neutral position in which said flexible conduit means is disconnected from said source of fluid pressure and a power position in which said flexible conduit means is connected to said source of fluid pressure, power operated hydraulic valve means on said carriage operable to selectively direct fluid from said conduit means to one of said hydraulically actuated load manipulating devices, control means on said truck for selectively operating said power operated valve means, and means interconnecting said hydraulic control valve and said power operated valve means for preventing operation of said power operated valve means when said hydraulic control valve is in said power position while permitting operation of said power operated valve means when said hydraulic control valve is in neutral position whereby simultaneous stopping of the operation of one hydraulic device and starting operation of a second hydraulic device is prevented.

2. In an industrial truck having a main frame, a lifting carriage mounted for movement on said main frame, a plurality of hydraulically actuated load manipulating devices on said carriage, a source of fluid pressure on said main frame, flexible conduit means extending between said main frame and said lifting carriage, a hydraulic control valve on said main frame movable between a neutral position in which said flexible conduit means are disconnected from said source of fluid pressure and a power position in which said flexible conduit means are connected to said source of fluid pressure, electrically operated hydraulic valve means on said carriage operable to selectively direct fluid from said conduit means to one of said hydraulically actuated load manipulating devices, switch means on said truck for selectively operating said electrically operated valve means, and means interconnecting said hydraulic control valve and said electrically operated valve means for preventing operation of said electrically operated valve means when said hydraulic control valve is in said power position while permitting operation of said electrically operated valve means when said hydraulic control valve is in neutral position whereby simultaneous stopping of the operation of one hydraulic device and starting operation of a second hydraulic device is prevented.

3. In an industrial truck having a main frame, a lifting carriage mounted for movement on said main frame, a plurality of hydraulically actuated load manipulating devices on said carriage, a source of fluid pressure on said main frame, flexible conduit means extending between said main frame and said lifting carriage, a hydraulic control valve on said main frame movable between a neutral position in which said flexible conduit means is disconnected from said source of fluid pressure and a power position in which said flexible conduit means is connected to said source of fluid pressure, electrically operated hydraulic valve means on said carriage operable to selectively direct fluid from said conduit means to one of said hydraulically actuated load manipulating devices, switch means on said handle means for selectively operating said electrically operated valve means, and means interconnecting said hydraulic control valve and said power operated valve means for rendering said switch means ineffective to operate said electrically operated valve means when said hydraulic control valve is in said power position while permitting operation of said electrically operated valve means by said switch means when said hydraulic control valve is in neutral position whereby stopping operation of one hydraulic device and simultaneous starting operation of a second hydraulic device is prevented.

4. In an industrial truck having a main frame, a lifting carriage mounted for movement on said main frame, a plurality of hydraulically actuated load manipulating devices on said carriage, a source of fluid pressure on said main frame, flexible conduit means extending between said main frame and said lifting carriage, a hydraulic control valve on said main frame movable between a neutral position in which said flexible conduit means are disconnected from said source of fluid pressure and a power position in which said flexible conduit means are connected to said source of fluid pressure, electrically operated hydraulic valve means on said carriage for each hydraulically operated device for connecting the hydraulic devices with said conduit means, switch means on said truck for selectively operating the electrically operated hydraulic valve means of each hydraulically operated device, and means interconnecting said hydraulic control valve and said electrically operated valve means for rendering said switch means ineffective to operate said electrically operated valve means when said hydraulic control valve is in said power position while permitting operation of said electrically operated valve means by said switch means when said hydraulic control valve is in neutral position whereby stopping operation of one hydraulic device and simultaneous starting operation of a second hydraulic device is prevented.

5. In an industrial truck having a main frame, a lifting carriage mounted for movement on said main frame, at least two hydraulically actuated load manipulating devices on said carriage, a source of fluid pressure on said main frame, flexible conduit means extending between said main frame and said lifting carriage, a hydraulic control valve on said main frame movable between a neutral position in which said flexible conduit means is disconnected from said source of fluid pressure and a power position in which said flexible conduit means is connected to said source of fluid pressure, electrically operated hydraulic selector valve means on said carriage operable to selectively direct fluid from the said conduit means to either one of said hydraulically actuated load manipulating devices, switch means on said truck for operating said electrically operated selector valve means, and means interconnecting said hydraulic control valve and said electrically operated selector valve means for rendering said switch means ineffective to change the position of said selector valve means when said hydraulic control valve is in power position while permitting changing of the position of said selector valve means by said switch means when said hydraulic control valve is in neutral position whereby stopping operation of one hydraulic device and

simultaneous starting operation of a second hydraulic device is prevented.

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