Feb. 22, 1944. E. B. THOMPSON 2,342,311

VEHICLE HOIST

Filed Aug. 29, 1941

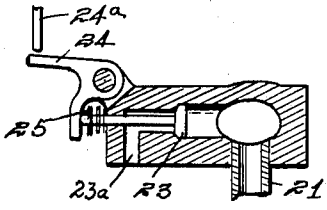


Fig. 3.

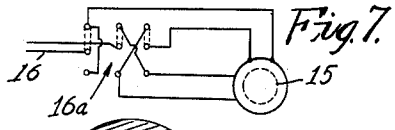


Fig. 7.

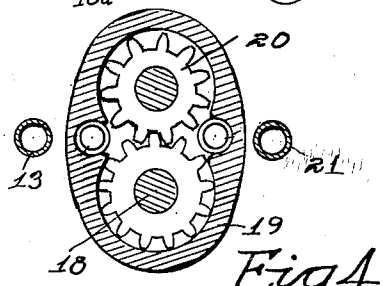


Fig. 4.

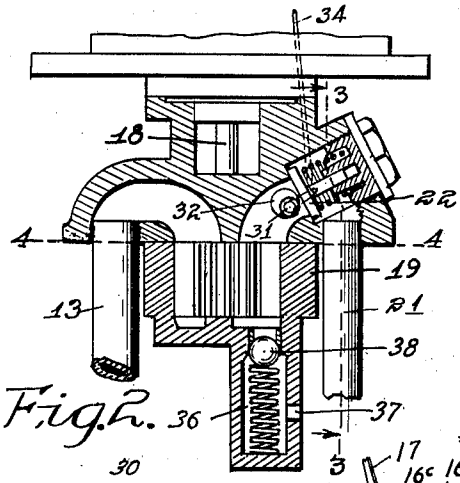


Fig. 2.

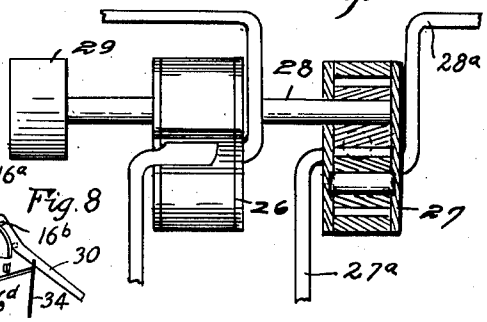


Fig. 5.

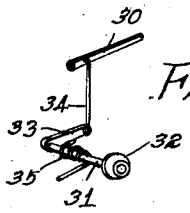


Fig. 6.

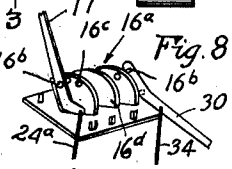


Fig. 8

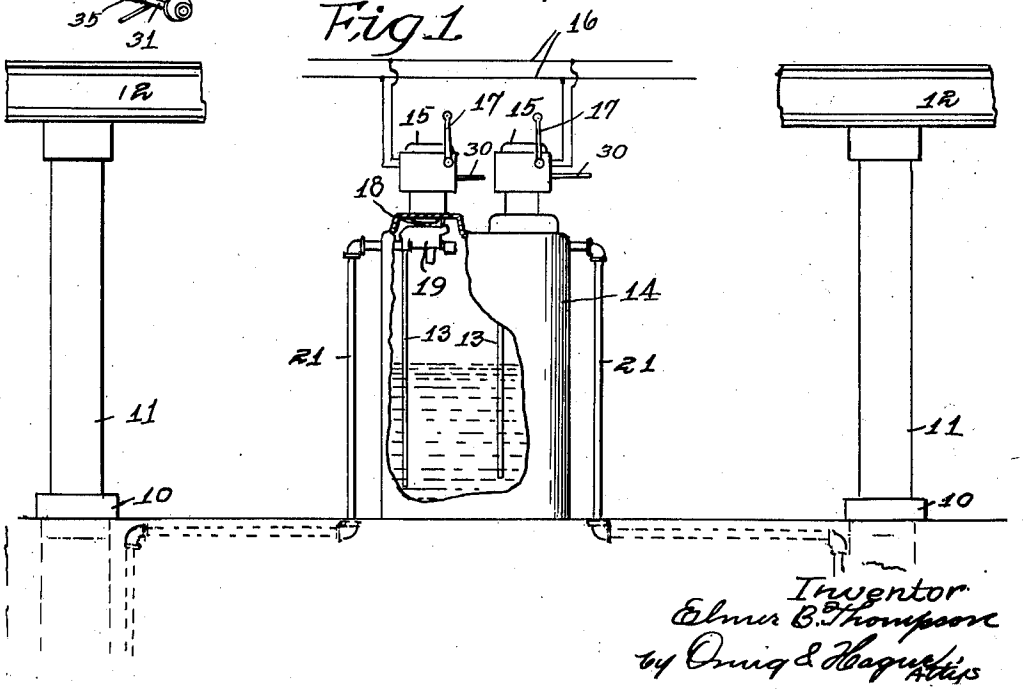


Fig. 1.

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VEHICLE HOIST

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Application August 29, 1941, Serial No. 408,712

1 Claim. (Cl. 60—97)

My invention is especially adapted for use with the so-called "two post hoists" consisting of two hydraulic cylinders and pistons, one for each end of the hoist. These two post hoists are generally used for busses and heavy trucks.

With two post hoists it is highly desirable that both pistons and cylinders be raised and lowered at the same speed to avoid the possibility of sliding the bus or truck off of the hoist. It is also desirable in some instances that the operator may cause one end of the hoist to be raised or lowered slightly relative to the other end.

The object of my invention is to provide a duplex electrically operated pumping and control unit for a two post hoist, comprising a simple, durable and compact unitary structure which may be shipped and installed as a single unit.

More specifically it is my object to provide a unitary structure of this class in which the necessary two electric motors and the associated two oil pumps are mounted upon single oil reservoir tank and the switch levers of the motors are so closely associated that they may readily and easily be moved simultaneously by an operator, to insure the maintenance of both pistons at the same level throughout their entire movement.

In the accompanying drawing—

Figure 1 shows a side elevation, with parts broken away, of my improved electrically operated duplex pumping and control unit, and two hydraulic hoist pistons at opposite sides thereof;

Figure 2 shows an enlarged detail control sectional view of one of the pumping units;

Figure 3 shows a detail sectional view on the line 3—3 of Figure 2;

Figure 4 shows a sectional view on the line 4—4 of Figure 2;

Figure 5 shows a side view, partly in section, of a modified form of pumping unit;

Figure 6 shows a detail perspective view of the means for manually opening the check valve when lowering the hoist by operating the motor in reverse.

Figure 7 illustrates diagrammatically an electrical circuit for the electric motors; and

Fig. 8 is a diagrammatical perspective view of a switch and its control levers.

The hoist proper consists of two hydraulic hoists widely spaced apart and having upright cylinders 10, with a piston 11 in each cylinder and rails 12 at the tops of the pistons for receiving a bus or truck. Communicating with the lower portion of each cylinder is an oil conducting pipe 21, both of the same length.

My improved duplex electric pumping unit and controls comprises an oil reservoir tank 14. Mounted upon and fixed to the top of the tank 14 are two electric pumping units each of which comprises an electric motor 15. These motors are electrically included in the same electric supply wires 16 so that the same amount and quality of electric current is supplied to both motors, and the motors are both of the same capacity so that both will be started, driven and stopped at the same time and at substantially the same speed. Connected in the supply line 16 for each motor is a switch 16*a*, illustrated diagrammatically, including operating levers 17 and 30, each lever having a pin 16*b* adapted to enter an opening 16*c* in corresponding switch sectors 16*d* by lateral movement of the lever before moving the switch elements to closed positions when it is desired to operate a switch, the lever 17 being adapted to move anti-clockwise to start the motor for elevating the hoist, while the lever 30 is adapted to move in a clockwise direction for reversing the motor to lower the hoist. Switch levers 17 and 30 for controlling the current supply to each motor are mounted in closely adjacent positions so that an operator may easily grasp both of them at the same time and move them simultaneously.

Projected downwardly from each motor through the top of its tank 14 is the motor shaft 18. At the lower end of the shaft 18 is a pump housing 19 containing a gear pump mechanism 20 connected to the shaft 18. The oil conducting pipe 21 is connected to one side of the pump and a pipe 13 to the other side thereof which leads to the bottom portion of the tank. Within the passageway leading from the pipe 21 to the pump is a check valve 22 to permit passage of oil only in one direction from the tank 14 through the pump, so that neither piston can be lowered by the oil pressure from the cylinders 10. When it is desired to lower the piston the manually operated valve 23 in the passageway to the tank is opened by the lever 24, but is normally closed by the spring 25. This lever is operatively connected with the control lever 17 by a slide rod 24*a*.

When it is desired to lower the hoist by a reverse movement of the motor I have provided a switch lever 30 operatively connected with each motor 15. In the housing 19 is mounted a rotatable shaft 31 having an eccentric 32 adjacent the check valve 22. On the same shaft is an arm 33 connected by a rod 34 with the lever 30. In operation the levers 30 are both moved at the same time to position for reversing the motors to lower the hoist. At the same time both the check

valves 22 are opened and the fluid passing through the gear pumps is thereby metered so that both ends of the hoist are lowered at substantially the same speed. A spring 35 on the shaft 31 releases the cam when the lever 30 is released.

In practical use, and assuming that through accident or mistake there was no oil in the reservoir tank, then neither piston could be elevated and no damage could result, such as might result from the use of separate oil reservoir tanks one for each pump and in the event that one reservoir tank was filled and the other not.

When a bus is driven upon the hoist the operator grasps both of the motor control levers and turns on the electric current for both motors at the same time. A reverse movement of the control levers opens the valves 23. Since the motors are of the same capacity and are operated from the same electric current, the motors will rotate substantially at the same speed, hence, both pistons will be elevated the same distance and the hoist rails will be horizontal. In the event that it is desired to slightly elevate one of the pistons above the other, this may be done after both motors have been stopped, by starting one of the motors only. When the hoists are in elevated position the check valves 22 prevent the flow of oil from the cylinders to the tank and, hence, the hoist cannot be accidentally lowered by oil leakage or the like. When it is desired to lower the hoist the operator grasps both of the levers 17 and moves them to position for operating the rods 24a to open the valves 23, without operating the pumps.

Ordinarily the operator need only operate the levers 17 to perform an elevating and a lowering movement of the hoist. When the levers 17 are moved in one direction, the electric motors are started and oil is pumped from the tank to the cylinders and the hoist is elevated. When it is desired to lower the hoist by gravity and there is sufficient weight upon it, the levers 17 are moved in the opposite direction, thus opening the valve 23 and permitting oil to flow from the cylinders through the by-pass passage 23a to the tank. When, however, there is an excessive load on one of the hoists and it is desired to lower the load uniformly, the operator may move the levers 30 to thereby reverse the electric motors, and open the check valves 22, thereby causing the pumps to rotate and meter the oil from the cylinders to the tank, and this flow of oil is regulated and controlled or metered both by the substantially uniform speed of the electric motors, hence, the lowering of the hoists is substantially uniform. However, under such condition, and if a levelling movement is desired, the motors may be stopped and one of them again started to raise or lower its associated hoist.

Communicating with the pump casing is a valve chamber 36 having a discharge opening 37 into the tank 14. A spring-actuated ball valve 38 normally closes this chamber but is opened by an excessive pressure within the pump casing, as would occur if the operator should forget to open the control switch before the lift reached either of its limits of movement.

In Figure 5 I have illustrated a modified form of my device in which the pumps 26 and 27, similar to the pump 19, are mounted on a single shaft 28 and operated therefrom by means of a belt wheel 29, said belt wheel being driven by any suitable power, each of the pumps being provided with an inlet pipe 27a and an outlet pipe 28a, the pipes 28a leading to the lifts, while the pipes 27a communicate with the supply tank 14. Inasmuch as both pumps are fixed to a common drive shaft and are of the same size and capacity, it will be seen that both pistons of the lift will be operated substantially at the same speed, thus providing means for metering the lift fluid or oil. This modified form is particularly adapted to be used in connection with lifts wherein the load is considerably heavier on one end than the other.

I claim as my invention:

A hydraulic hoist comprising two spaced apart cylinders and pistons, a single oil tank, a reversible pump for each cylinder, first conduit means connecting each cylinder with an associated pump, second conduit means connecting each pump with the tank, a reversible electric motor for each pump, a reversible switch means for each motor, a switch control lever for each switch means, a by-pass means associated with each of said first conduit means including a normally closed check valve for controlling the flow of oil from a corresponding cylinder to said tank for lowering an associated piston, means connecting a by-pass check valve with a corresponding one of said switch levers, said levers being movable in opposite directions from a neutral position, movement of each lever in one direction from a neutral position providing for the operation of the corresponding motor in a forward direction to elevate the associated piston, and movement of each lever in an opposite direction from a neutral position opening a corresponding by-pass check valve to provide for the lowering of the associated piston by gravity, means for lowering each piston independently of its associated by-pass means including a normally closed check valve in said first conduit means, a second switch control lever for each of said switch means for controlling the operation of a corresponding motor in a reversed direction, and means actuated by each of said second control levers for opening the check valve in the corresponding first conduit means, whereby each pump serves to pump oil from its associated cylinder to the oil tank through said first conduit means and second conduit means.

ELMER B. THOMPSON.