S. J. GARDNER.

ELEVATOR ACTUATING MECHANISM.

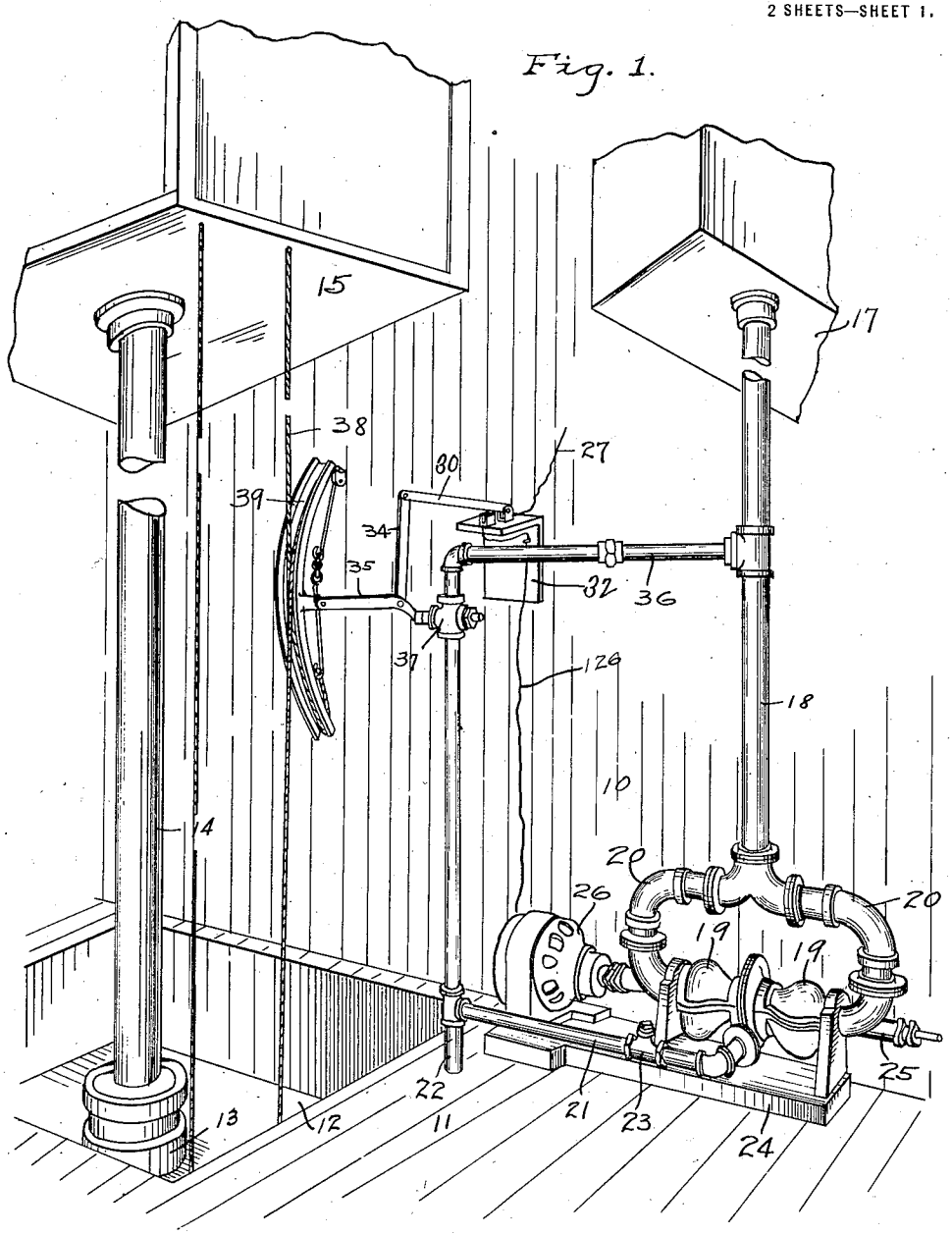
APPLICATION FILED JULY 26, 1915.

**1,203,323.**

Patented Oct. 31, 1916.

2 SHEETS—SHEET 1.

Fig. 1.




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2 SHEETS—SHEET 2.

Fig. 2.

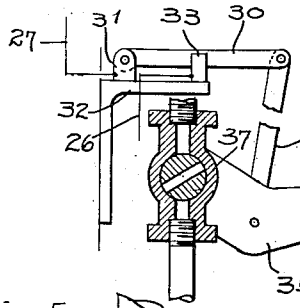



Fig. 3.

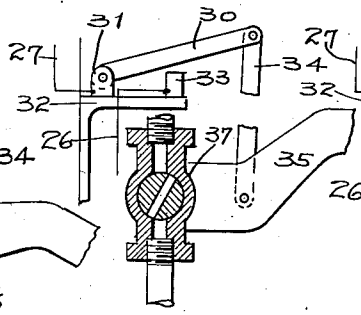



Fig. 4.

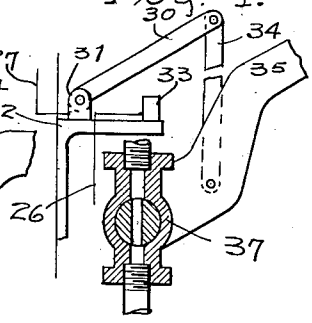



Fig. 5

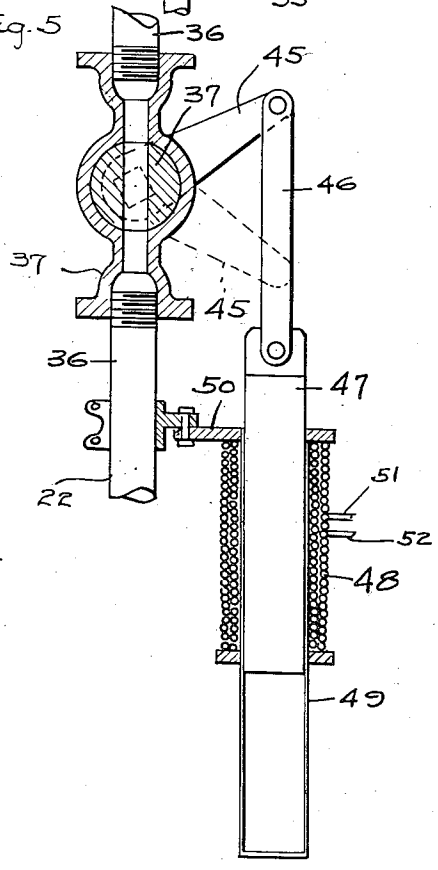
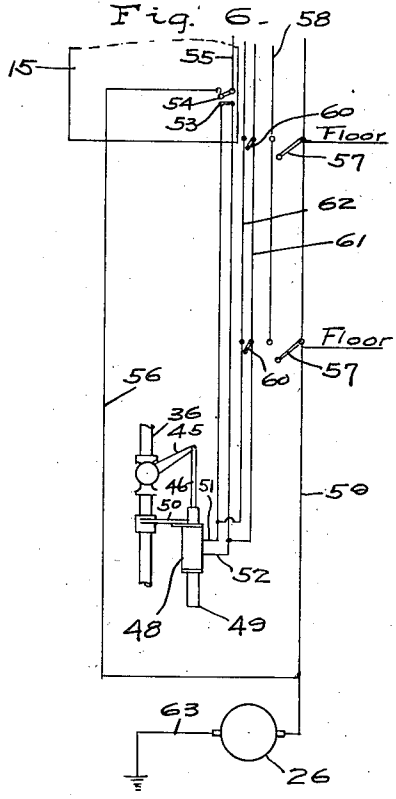



Fig. 6.




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# UNITED STATES PATENT OFFICE.

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## ELEVATOR-ACTUATING MECHANISM.

1,203,323. Specification of Letters Patent. Patented Oct. 31, 1916.

Application filed July 26, 1915. Serial No. 42,006.

*To all whom it may concern:*

Be it known that I, STONEWALL J. GARDNER, a citizen of the United States, and a resident of New Albany, county of Floyd, and State of Indiana, have invented a certain new and useful Elevator-Actuating Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters refer to like parts.

The object of this invention is to provide simple and efficient means for controlling the operation of hydraulic elevators.

One feature of the invention consists in the combination with a hydraulic elevator, of a pump for forcing the liquid, water or oil, from a reservoir or tank into the plunger ground pipe for elevating the elevator, and a by-pass avoiding the pump for the return of the liquid under the pressure of the plunger while the elevator is descending and through which the liquid is returned to the reservoir without passing through the pump.

Another feature of the invention consists in associating with the foregoing a valve in said by-pass and means operable from the elevator for controlling said valve arranged so that when the elevator is to ascend the valve will be moved to close the by-pass and will remain closed while the elevator is rising and also standing still and can be opened when the elevator is ready to descend, whereby the liquid can pass through the by-pass to the reservoir; and associating with the foregoing means for starting the electric motor when said valve is closed and stopping said motor without closing the valve, when the elevator is stopped. Thus the pump motor is started when the by-pass is closed and the elevator then rises and it is stopped by shutting off the pump motor, but without opening the by-pass, and then the column of liquid in the ground pipe will maintain the elevator in its elevated position and without the motor operating. When it is desired to descend, the by-pass is opened and the elevator descends by gravity and returns the fluid to the reservoir. In no case does the fluid pass back through the pump. This enables the device to operate with a small tax on the pump motor as it does not work excepting when the elevator is ascending. It is not at work while the elevator stands still or is descending. This minimizes the work of the pump and pump motor.

The full nature of the invention will be understood from the accompanying drawing and the following description and claims:

In the drawings, Figure 1 is a perspective view of the apparatus, parts being partially broken away. Fig. 2 is a section through the valve and associated parts when the by-pass is closed and the motor circuit also closed and the parts in working position for lifting the elevator. Fig. 3 is the same with the motor circuit open, but the by-pass still closed for holding the elevator in position without the operation of the pump motor. Fig. 4 is the same with the parts in position while the elevator is descending or idle. Fig. 5 shows a modified form of valve and valve actuating means in central vertical section, parts being broken away. Fig. 6 is a diagram of the wiring when said modified form is used.

In Fig. 1 there is shown a building with a side wall 10, floor 11, elevator shaft 12, ground pipe 13, plunger 14, and a portion of an elevator 15. There is also shown a liquid reservoir 17, and a pipe 18 leads from the reservoir down to the centrifugal pumps 19, there being a pair of said pumps connected with said pipe 18 by connections 20. A pipe 21 leads from a point between the two pumps 19 to a pipe 22 which connects with the ground pipe 13. There is a check valve 23 in pipe 21 to prevent back flow of liquid through the pumps. A double centrifugal pump apparatus 25 is shown in perfect hydraulic balance and mounted on a platform 24, and the pump 25 is driven by a motor 26 which is supplied with current through electrical connections 126 and 27, the circuit through which is adapted to be closed by means of a switch construction of any suitable type. The line 27 leads from the source of electricity.

The electric switch here shown is of a common type of knife switch consisting of a bar 30 pivoted at one end of a post 31 mounted on a bracket 32 fastened to the wall. The line 27 is connected with said post 31 and a spring contact 33 is secured on the bracket 32 in position to be engaged by the connect-

ing bar 30 and the line 126 extends from said contact 33. The switch is operated by a link 34 pivoted thereto and also to a valve actuating lever 35 so that the operation of the valve controls the switch.

There is a by-pass 36 leading from the pipe 22 to pipe 18 so as to avoid the pump and said by-pass is opened and closed by a valve 37 which is actuated by said lever 35. In the form shown in Fig. 1, said lever is operated by an elevator cable 38 which is connected with a segmental bar 39 centrally secured to said lever 35.

In operation when the elevator is down and in idle position, the valve 37 is in open position, as shown in Fig. 4, and the electric switch is also opened. When one wishes to ascend, he pulls down on the cable 38 in the elevator, which forces the valve lever 35 from its highest position, as seen in Fig. 4, to its lowest position, as seen in Fig. 2. That closes the by-pass and also closes the electric circuit and the motor 26 starts and operates the pump 19 which pumps the fluid from the reservoir 17 down into the ground pipe 13 and that causes the plunger 14 and elevator to ascend. When the elevator has reached the desired floor or elevation, the cable 13 is lifted enough to move the valve lever 35 to a midway position, as shown in Fig. 3. That still leaves the by-pass closed so that the liquid will hold the elevator in its elevated position. But it has broken the electric circuit so that the motor stops. If it is desired to ascend again, the lever 35 is thrown down to the position shown in Fig. 2, and the motor starts and runs until the lever is moved up again to disconnect the circuit. When it is desired to descend, the cable is lifted and the lever 35 will be elevated to its highest position, as shown in Fig. 4, which opens the by-pass and the weight of the elevator and plunger forces the fluid out of the ground pipe 13 up through tubes 22, 36 and 18 to the reservoir. Therefore, in this machine, the motor and pump operate when the elevator is ascending. While the elevator is stationary or in its upper position, the motor and pump are not in use. This minimizes the extent of their use and to that extent economizes.

A modified form is shown in Figs. 5 and 6, wherein the valve is electrically instead of mechanically actuated. There the valve has a lever 45 connected by a bar 46 with the core 47 of a solenoid. Said solenoid has wiring 48 around a central tube 49 within which the core 47 operates, and the tube 49 extends below the coil in order to hold the core in its downward position. The coil 48 is mounted in connection with an arm 50 secured to pipe 36 below the valve. When the coil is energized, the core is elevated and that opens the valve. When the coil is de-energized, the weight of the core 47 operates the valve to the dotted line position and closes it.

In the diagram shown in Fig. 6, the wires 51 and 52 and coil 48 run to a switch or button 53 on the elevator. Another switch or button 54 on the elevator closes the circuit through wires 55 and 56 that go to the motor 26. Therefore, assuming the elevator to be down and the current to be off so that the valve 37 will be closed, the elevator is elevated by a person in the car by operating the switch 54 which starts the motor. This circuit is maintained closed until it is desired to stop the elevator, when the switch is opened and the motor stops. Since, however, the valve is still closed, it will maintain the elevator in its upper position. When it is desired to descend, the switch 53 is closed so as to energize the coil 48 and cause the opening of the valve whereby the elevator can descend, as explained heretofore.

When one wishes to operate the elevator from a floor of the building in which the elevator is located, the motor 26 can be started by closing a switch 57 which closes the circuit through wires 58 and 59 which leads to the motor 26. The coil 48 and valve are also controlled from the floors by switches 60 and wires 61 and 62. The wires 55 and 58 lead from some source of current. The motor is grounded through wire 63 or otherwise. To avoid confusion the battery for the circuit through the coil 48 has been omitted.

The invention claimed is:

1. In a hydraulic elevator, the combination with a car, a plunger, and a ground pipe, of a liquid reservoir, a conduit connecting the reservoir and the ground pipe, a pump adapted to force fluid from the reservoir into the ground pipe for elevating car, a valve for controlling the passage of fluid from the ground pipe to the reservoir, and means for simultaneously closing said valve and starting said pump and subsequently stopping said pump and opening said valve.

2. In a hydraulic elevator, the combination with a car, a plunger, and a ground pipe, of a liquid reservoir, a conduit connecting the reservoir and ground pipe, a pump in said conduit arranged to force the liquid from the reservoir directly into the ground pipe for elevating car, a by-pass avoiding the pump, a valve in said by-pass, and means for simultaneously closing said valve and starting said pump and subsequently stopping said pump and opening said valve.

3. In a hydraulic elevator, the combination with a car, a plunger, and a ground pipe, of a liquid reservoir above the ground pipe, a conduit connecting the reservoir and ground pipe, a pump in said conduit, a check valve between the pump and the

ground pipe, an electric motor for driving the pump, a by-pass between the ground pipe and reservoir avoiding the pump and check valve, a valve for controlling said by-pass, a circuit for supplying current to the motor, a switch for controlling said circuit, and a single means for operating said valve and switch.

4. In a hydraulic elevator, the combination with a car, a plunger, and a ground pipe, of a liquid reservoir above the ground pipe, a conduit connecting the reservoir and ground pipe, a pump in said conduit, a check valve between the pump and the ground pipe, an electric motor for driving the pump, a by-pass between the ground pipe and reservoir avoiding the pump and check valve, a valve for controlling said by-pass, a circuit for supplying current to the motor, a switch for controlling said circuit, a valve lever, and a connection between said valve lever and switch arranged so that when the switch is closed the valve will close and the switch may be opened without opening the valve and when the valve is opened the switch is opened.

5. In a hydraulic elevator, the combination with a car, a plunger, and a ground pipe, of a liquid reservoir above the ground pipe, a conduit connecting the reservoir and ground pipe, a pump in said conduit, a check valve between the pump and the ground pipe, an electric motor for driving the pump, a by-pass between the ground pipe and reservoir avoiding the pump and check valve, a valve for controlling the by-pass, a circuit for supplying current to the motor, a switch for controlling said circuit, a valve lever, a connection between said valve lever and switch arranged so that when the switch is closed the valve will close and the switch may be opened without opening the valve and when the valve is opened the switch is open, and means operable from the elevator for actuating said valve lever.

In witness whereof, I have hereunto affixed my signature.

STONEWALL J. GARDNER.