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PLUNGER-ELEVATOR.

955,959.

Specification of Letters Patent.

Patented Apr. 26, 1910.

Application filed June 30, 1906. Serial No. 324,205.

To all whom it may concern:

Be it known that I, FLOYD C. FURLOW, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Plunger-Elevators, of which the following is a specification.

My invention relates to hydraulic elevators of the plunger type and one of its objects is the provision of simple and efficient means for operating elevators.

More particularly it is the object of the present invention to connect one or more rams to a piston and provide means permitting pressure to be applied to the piston without necessitating the immersion of said rams.

Other objects of the invention will appear hereinafter, the novel combinations of elements being pointed out in the claims.

Referring to the drawing, which is an elevation view partly in section of an elevator embodying the principles of this invention, 1 designates an elevator car, connected to a counter-weight 2 by means of a cable 3 passing over the sheave 4 which is supported by the beam 5 in the upper part of the elevator well.

6 designates the guides and 7 the guide shoes of the car.

Inside the car is shown the operating lever 8 connected by means of the pulleys 9 to the operating ropes 32 and 33 which are secured to the beam 5 at 10 and 11 and to the lever 12 at 13 and 14. This lever 12 is at the bottom of the hatchway and is pivoted to a standard 15 supported in any suitable manner. At the pivotal point of the lever 12 is a lever 16 rigid with said lever 12 and pivotally connected by the link 17 to the links and levers 18 of the controlling valve mechanism 19.

The parts thus far described are of usual construction and *per se* form no part of my invention.

20 and 21 designate, respectively, the supply and exhaust ports of the main valve and 22 the pipe leading from the main valve to the hydraulic cylinder 23. It should be noted that the cylinder 23 is open at the top 24 and that the pipe 22 enters the side of the cylinder near the top at 27 and passes vertically downward through the longitudinal axis of said cylinder. The lower end 29

of this cylinder pipe 22 is secured to the support 28 which rests on the bottom of the cylinder and which is provided with a plurality of circularly arranged holes 34 through which the motor fluid may pass from the pipe 22 to the space beneath the piston 31. The pipe may be supported wholly from its connection with the cylinder at 27, if desired, in which case the support 28 may be omitted. It is preferable, however, to use the support 28 as the pipe 22 may be secured to it in such manner that the end 29 can not touch the bottom of the cylinder and thus unduly restrict the flow of fluid to and from the pipe 22. The piston 31 is provided with a leather 35 and also with a central stuffing box 36 which is adapted to slide over the smooth exterior surface of the pipe 22. Rigidly secured to the piston and also to the bottom of the car are the supporting rods 30 and 37. It will also be noticed that the top of the cylinder 23 is wide open, the car being guided properly by the guide rails 6 which are engaged by the shoes 7 carried by the car, and also by the piston 31 in the cylinder 23.

The parts rigidly connected with the bottom of the car in reality constitute moving means, while the moving means in combination with the cylinder 23 and pipe 22 may be termed a motor. However, I do not wish to be restricted to the precise arrangement shown by using these terms in the claims, as the arrangement may be varied without departing from the spirit and scope of my invention. For instance, instead of having the pipe 22 pass longitudinally through the axis it may be arranged to one side or two small side pipes be used instead so that only one larger rod need be employed, this rod then being rigidly secured to the center of the piston 31 and to the car 1. In such case a plunger elevator of the ordinary direct-acting type could have its plunger fitted with a suitable piston at its lower end, the top of the cylinder being left open; the supply pipes being arranged either inside or outside of the cylinder 23 just so the pressure acts on the under side of the piston.

The operation of the arrangement described is as follows: The car being at the lower limit of its travel let the controlling lever 8 in the car be moved in such a direction as to open communication between the

supply port 20 and the cylinder pipe 22. The motor fluid will now flow through the pipe 22 and holes 34 in the support 28 to the space beneath the piston 31 and exert an upward pressure on the same. Of course, this will effect a lifting of the piston 31, rods 30 and 37, and car 1. It is evident that the head of water below the piston 31 in the cylinder 23 gradually increases and therefore the pressure on the bottom of the piston 31 gradually diminishes but this is compensated for by the increasing counterweight due to the hoisting rope passing to the opposite side of the overhead sheave 4. Assuming that the car has been stopped by bringing the lever 8 to central position, let the lever now be moved so as to establish communication between the cylinder 23 and the exhaust port 21 of the main valve. The car will now begin to descend. The gradually increasing head due to the difference between the head in the pipe 22 and the head in the cylinder 23 below the piston 31 and acting on the bottom of said piston will tend to retard the downward motion of the car, but this tendency is overcome by the cable 3 passing from the counterweight side to the car side of the overhead sheave 4.

Although I have herein shown one form of my invention I desire it to be understood that modifications in the details and arrangement of parts such as would occur to those skilled in the art may be made without departing from the spirit and scope of the invention herein disclosed and claimed.

What I claim and desire to have protected by Letters Patent of the United States is:

1. The combination with a car, of moving means therefor, an open cylinder for said moving means, means passing through said cylinder to the lower portion thereof for directing the flow of motor fluid downward through the cylinder, and means for controlling the flow of motor fluid to and from said cylinder.

2. The combination with a car, of a piston having a fixed connection therewith, a cylinder for said piston, controlling valve mechanism, and a pipe leading from said valve mechanism to the lower portion of said cylinder and passing through said piston.

3. The combination with a car, of a piston connected to move with the car, an open hydraulic cylinder for said piston, controlling valve mechanism, and a pipe leading from said valve mechanism longitudinally through said cylinder and through said piston to a point adjacent the lower end of said cylinder.

4. The combination with a car and a piston connected to move together; of an open hydraulic cylinder for said piston; controlling valve mechanism; a pipe leading from said valve mechanism longitudinally and

substantially through the axis of said cylinder, and also through said piston, to a point adjacent the center of the bottom of said cylinder; and a stuffing box for said pipe and carried by said piston.

5. The combination with an elevator car, of a direct acting moving means therefor, a cylinder for receiving said moving means, apparatus for controlling the application of hydraulic pressure to said moving means at or near the lower end of the cylinder without immersing the said moving means, said apparatus passing through said moving means, and mechanism for compensating for variations of pressure on said moving means.

6. The combination with an elevator car, of a piston connected to move therewith, a hydraulic cylinder for said piston, apparatus for controlling the application of hydraulic pressure to said piston beneath the same without immersing it, said apparatus passing through the cylinder and piston, and mechanism for compensating for the variation in pressure due to variation in head in said cylinder.

7. The combination with a car, of a piston connected to move with the car, a hydraulic cylinder for said piston and open at the top, guides and guide shoes for the car, controlling valve mechanism, a pipe within said cylinder and leading from the upper to the lower portion thereof, means for operating said valve mechanism from the car to control the flow of fluid to and from the cylinder beneath said piston, a counterweight for the car, an overhead sheave, and a counterweight cable passing over said sheave and connecting said counterweight to the car, said cable being of such weight as to compensate for the varying head of fluid in said cylinder.

8. The combination with an elevator car, of a piston connected to move therewith, a vertical open cylinder for said piston, controlling valve mechanism located adjacent the upper end of the cylinder, and a pipe leading from the valve mechanism into the cylinder and extending vertically downwardly and passing through the piston.

9. The combination with a car, of a piston connected to move therewith, an open cylinder for said piston, controlling valve mechanism, and a pipe leading from the valve mechanism through the side wall of the cylinder and extending downwardly through the cylinder and piston.

10. In an elevator system, the combination with a car, of means for guiding it in its travel, a piston, means rigidly connecting the piston and car, a cylinder for the piston closed at its lower end and open at its upper end, valve mechanism, and a pipe leading from the valve mechanism into the cylinder, passing through the piston, and opening into the cylinder below the piston.

11. In an elevator system, the combination
with a car, of means for guiding it in its
travel, a plurality of rods rigidly connected
to the bottom of the car, a piston secured to
5 the lower ends of the rods, a cylinder for
the piston closed at its lower end and open
at its upper end, valve mechanism, a pipe
leading from the valve into the upper end
of the cylinder and extending downwardly

through the cylinder and piston, and open- 10
ing into the cylinder below the piston.

In testimony whereof, I have signed my
name to this specification in the presence of
two subscribing witnesses.

FLOYD C. FURLOW.

Witnesses:

CHAS. M. NISSEN,
W. H. BRADY.