(No Model.)

W. H. MARSH.

HYDRAULIC ELEVATOR.

No. 383,232. Patented May 22, 1888.

Fig. 1.

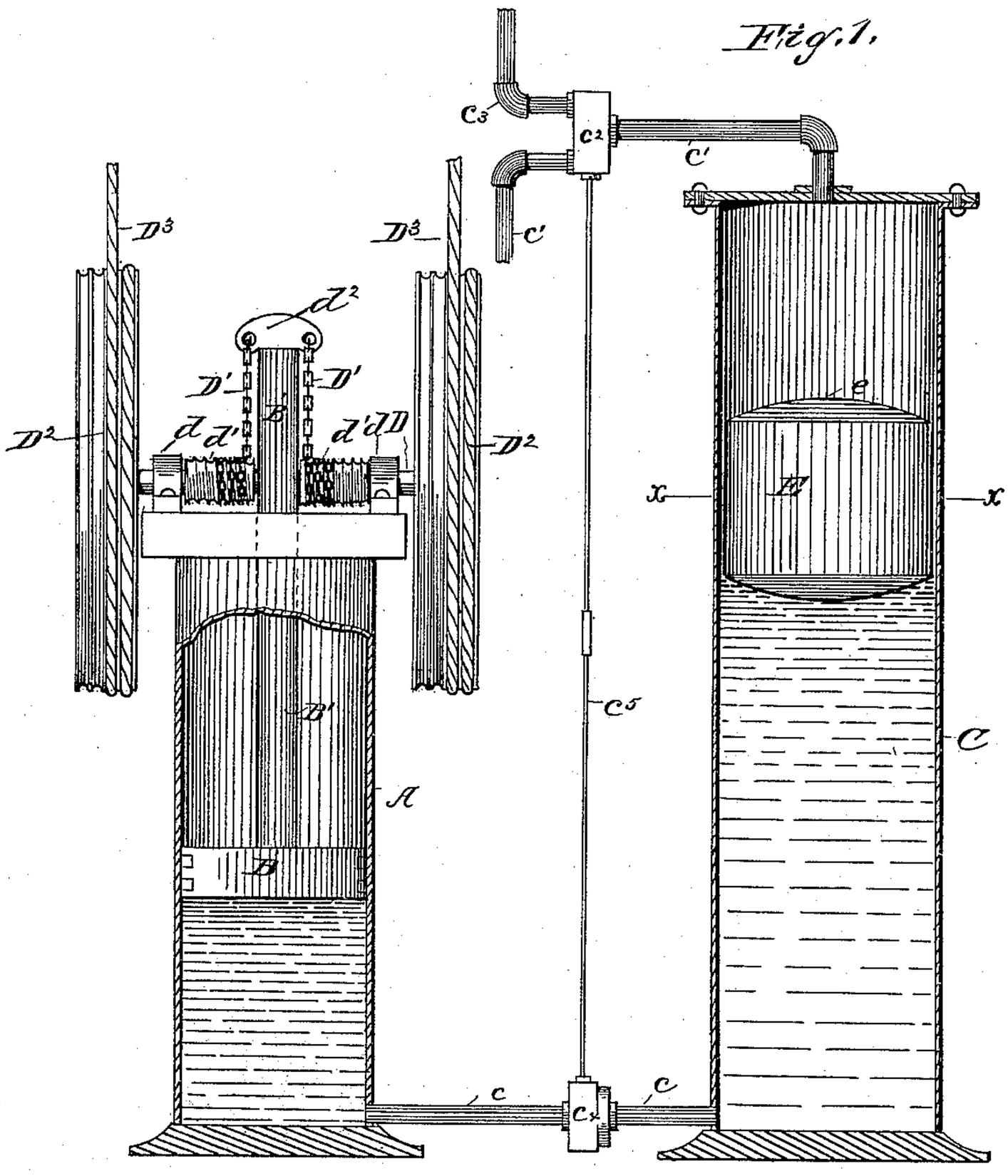


Fig. 2.

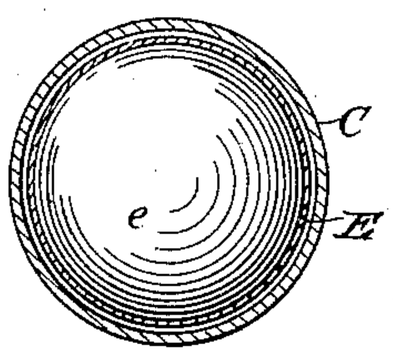
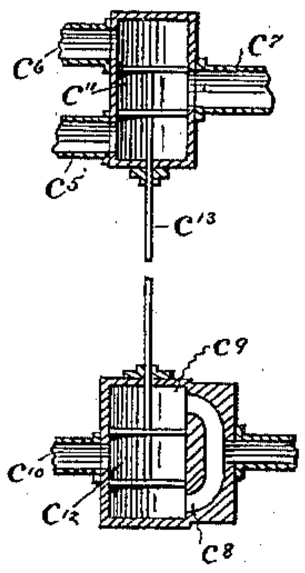


Fig. 3.



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HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 383,232, dated May 22, 1888.

Application filed July 2, 1887. Serial No. 243,213. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. MARSH, of the city, county, and State of New York, a citizen of the United States, have invented certain new and useful Improvements in Hydraulic Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to hydraulic elevators, and more particularly to those in which the water-pressure is established by means of steam admitted to the water-reservoir above the water therein; and my invention consists in the devices hereinafter particularly described, and as more at length recited in the claims.

Figure 1 is a side elevation, partly in section, of a hydraulic-elevator motor containing the principal features of my invention. Fig. 2 is a plan section on the line $x\,x$, Fig. 1, and showing the water-reservoir wall and the float device. Fig. 3 is a detached view in vertical section of the valves I employ in connection with the water-cylinder, the reservoir, and the steam-supply.

A is the water-cylinder, B the piston, and B′ the piston-rod.

C is the water-reservoir.

The cylinder and reservoir are preferably arranged vertically, as shown. At c' is shown a pipe by which steam is admitted to the reservoir C, the pipe being provided with a valve, c^2, (hereinafter more particularly described,) and with this valve is connected an exhaust-pipe, c^3, for the steam. At c is a pipe leading from the lower end of the water-cylinder to the lower end of the reservoir, and this pipe is provided with a valve, c^4. The steam-supply pipe c' leads into the upper end of the reservoir.

The valves c^2 and c^4 are constructed as three-way valves, and I find it preferable to so arrange the corresponding ports in the respective valves that the steam will be admitted to or allowed to exhaust through the valve c^2 from the reservoir C a little before the flow of the water from the reservoir to the cylinder A, or the reverse, respectively, is established through the valve c^4. To accomplish this, the ports in the valve c^2, which communicate with the exhaust and the steam-supply, respectively, as shown at c^5 and c^6, Fig. 3, are formed or placed nearer to the line of the port c^7 in said valve communicating with the pipe to the reservoir than the ports in the valve c^4, which lead thereout to the reservoir, as shown at c^8 c^9, are to the line of the port c^{10}, communicating from said valve to the water-cylinder, and the valve-plunger in the steam-valve c^2 is made somewhat longer than the valve-plunger in the valve c^4.

The two plungers c^{11} and c^{12} are connected together by a rod, c^{13}, so that the plungers have concurrent motion in their respective valve-chambers. Now when the plungers are moved upward together to establish communication between the steam-supply and the upper end of the reservoir C, through the ports c^5 and c^7 in valve c^2, and to establish communication between the reservoir and the water-cylinder A, through the ports c^8 and c^{10} of valve c^4, the ports c^5 and c^7 will be uncovered, either partially or entirely, as may be desired, before the ports c^8 and c^{10} are uncovered. By this means the pressure of the steam in the reservoir C on the water therein will be established more or less completely before the water begins to pass from the reservoir to the cylinder, and in like manner when the plungers are concurrently moved downward the ports c^6 and c^7 in valve c^2 are opened and the exhaust established before the ports c^9 and c^{10} are opened in valve c^4, and the return of the water to the reservoir from the cylinder begins. By means of these valve devices so operating, the entrance and exhaust of the steam in the reservoir are prevented from causing any sudden and violent flow of the water from the cylinder to the reservoir, or vice versa, and consequent irregular or sudden movement of the piston. This described feature of my invention is, it is evident, applicable to all hydraulic motors comprising a water-reservoir in which steam is used to cause a pressure, a cylinder connected to said reservoir, and a piston and piston-rod in said cylinder.

D is a shaft mounted to revolve in suitable bearings, d, on the upper cylinder-head and at right angles to the axial line of the piston-rod B′. This shaft is provided with drums d', or is so formed as to adapt it to have a chain or cable wound upon it.

At D′ D′ are shown chains or cables, which

are of a length substantially equal to the length of the stroke of the piston B, and these chains or cables are attached at one end to the top of the piston-rod by a yoke, d^2, carried thereby, and their opposite ends are secured to the shaft D, one on each side of the piston-rod. Upon the shaft D are keyed the pulleys D^2, adapted to have wound upon them the hoist-ropes D^3, one on each, the ends of said ropes being secured to said pulleys respectively. The hoist-ropes D^3 have their other ends attached to the car or other weight to be elevated. (Not shown.)

It is evident that when the piston is carried upward in the cylinder A the upward thrust of the piston-rod will unwind the cables D′ from the shaft, thus rotating the shaft, and that the hoist-ropes D^3, which are wound in the reverse direction on the pulleys D^2, will by the rotation of the shaft be wound upon the pulleys, and that such movement of the hoist-ropes may be made to serve to elevate a car or weight, and when the piston is free to descend in the cylinder, by the return of the water to the reservoir, it is evident that the descending car or weight will operate to uncoil the hoist-ropes from the pulleys D^2 and so cause the shaft to be reversely rotated, and that the chains D′ will be coiled upon the shaft D as the piston-rod descends. The described movements of the parts will be alternate as the elevator is operated to raise or lower the car or weight on the hoist-ropes.

By means of the construction and arrangement described the cylinder A may be placed upright or vertical, as shown, and carry all the operative parts of the hoist apparatus on its upper head, thus giving an economy of floor-space in setting up the apparatus for use; and, furthermore, by the described construction the strain upon all the parts is equalized, the chains or cables D′ operating on both sides of the piston-rod, as shown, and the two pulleys D^2 on the shaft D dividing the strain of the hoist-ropes on said shaft. The piston-rod is also, by means of the yoke d^2 upon its upper free end, best adapted in its upward thrust to give the best application of its power to the hoisting-gear and with the least liability of displacement or fracture of any of the parts.

E is a float cylindrical in form and fitting loosely within the reservoir, and has the cylindrical body shown and the exteriorly-convex heads *e*. The float will rest on the surface of the water in the reservoir. When steam is admitted to the reservoir in the space above the float, the pressure will submerge the float to no greater extent at any time than to bring the rim of its upper head to the water-level, the convexity of the head projecting above the water-level and precluding the overflow of the water above said head, as would be liable to occur if said head were flat. In this position it will move in the reservoir with the water, and will be constantly interposed between the water and the steam, thus preventing the steam from heating and causing evaporation of the water.

The valves c^2 and c^4 shown are slide-valves; but it is evident that the relative arrangement of parts and the operation described may be effected in rotary valves constructed according to this described feature of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

In a hydraulic motor, the combination, with the water-cylinder and its piston and the water-reservoir, of a steam supply pipe leading to said reservoir and a water-pipe leading from said reservoir to said cylinder, a three-way valve in the steam-pipe, and a three-way valve in the water-pipe, the entrance and exhaust ports of the steam-valve being nearer the line of the port leading to the reservoir and the length of the plunger thereof being less than the inlet and outlet ports of the water-valve are to the port leading to the cylinder, and than the length of the plunger thereof, respectively, together with a rod or stem common to and giving concurrent motion to both valves, as and for the purpose set forth.

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