M. L. WYMAN.

Hydraulic-Elevator.

No. 203,520. Patented May 7, 1878.

Fig. 1.

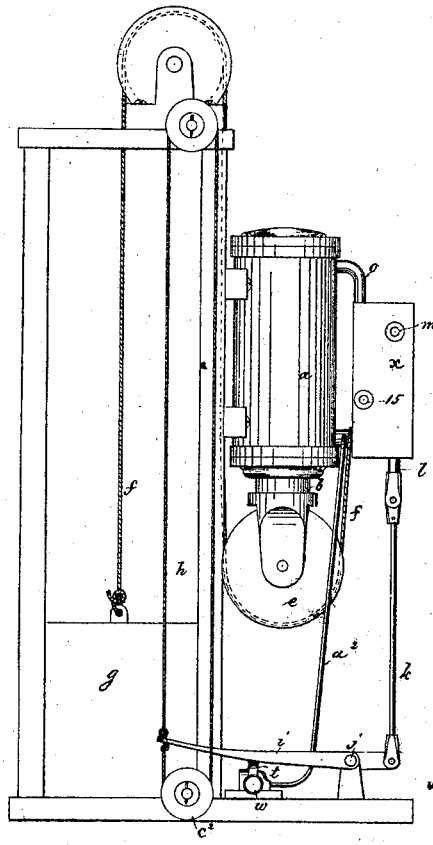


Fig. 3.

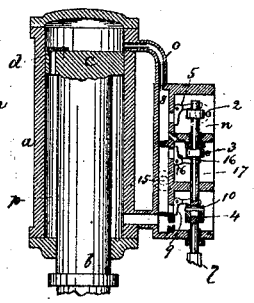


Fig. 2.

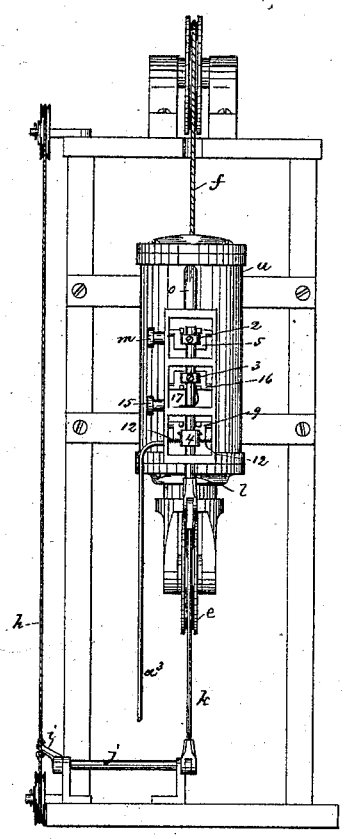


Fig. 4.

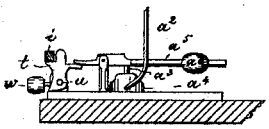


Fig. 5.

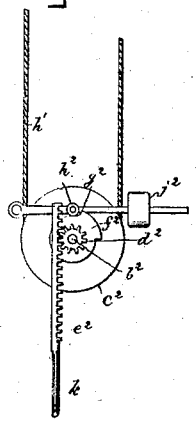


Fig. 6.

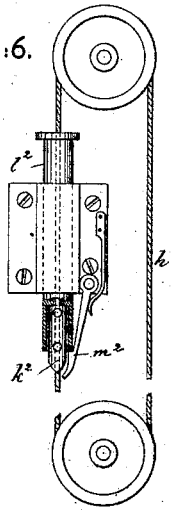
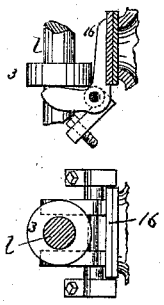


Fig. 7.



Witnesses.

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UNITED STATES PATENT OFFICE.

MARTIN L. WYMAN, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN HYDRAULIC ELEVATORS.

Specification forming part of Letters Patent No. **203,520**, dated May 7, 1878; application filed January 11, 1878.

To all whom it may concern:

Be it known that I, MARTIN L. WYMAN, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Hydraulic Elevators, of which the following is a specification:

This invention relates to hydraulic elevators; and consists in a hydraulic elevator having two or more lifting capacities depending upon the effective area of piston-surface acted upon by the water coming in from the main or supply valve or valves, and mechanism to operate them by a single hand-rope, to control the flow of water to make available the smaller and then the larger capacity, and to operate them simultaneously to completely shut off the flow of water for both capacities, to keep the car at rest; also, in a hydraulic elevator of two or more lifting capacities, substantially as hereinafter described, the combination, with the hand-rope, of a stop to retard its movement just before opening the valve for the second or larger capacity; also, in the combination, in a hydraulic elevator of two or more lifting capacities, as hereinafter described, of a hand-rope and a stop with an automatically-operated releasing device to release said stop, to permit the movement of the rope, to open the valve for the second or larger capacity; also, in the combination, with the releasing-lever, of a piston operated by the pressure of the fluid, so as to actuate the releasing device, substantially as described.

Figure 1 represents, in side elevation, a sufficient portion of an elevator to illustrate an embodiment of my invention; Fig. 2, a front elevation; Fig. 3, a section through the valve mechanism and cylinder; Fig. 4, a detail of the stop mechanism, which, through the hand-rope, regulates the openings of the valves. Figs. 5 and 6 represent modifications of stop mechanism for the hand-rope, and Fig. 7 represents one of the valves.

The main cylinder *a*, plunger *b*, and piston-head *c* and its valve *d* are substantially as in my patent No. 174,171, February 29, 1876, to which reference may be had.

In this instance of my invention I have located the plunger within the cylinder, so that the plunger is moved downward to lift the car.

The plunger carries a proper number of sheaves *e*, which bear upon the ropes or other usual connections *f*, which extend to the elevator-car *g*, in order that such plunger, by its own gravity, may partially or fully counterbalance the weight of the car. This connection also prevents slack in the ropes in case the car meets with obstruction while descending, and obviates the escape of the ropes from the sheaves.

The fluid in the cylinder is the motor for the ascending car, and the car, when descending by its own or additional weight, lifts the plunger.

The hand-rope *h* (a single one, as shown in Figs. 1 and 2) for operating all the valves may be supported and placed within the control of the operator in any usual way. In such figures the rope is shown as connected with a lever, *i*, pivoted at *j*, the opposite end of the lever or an arm at the end of *j* being joined by a link, *k*, with the valve-actuating rod *l*, it, in this instance, being shown as provided with collars 2 3 4, the ones 2 and 3 being fixed thereon, while the one 4 is so connected with such rod as to be moved longitudinally thereon for a short distance.

The collar 2 operates the inlet-valve 5, which permits the fluid to flow from the main or other supply pipe, connected at *m* with the chamber *n*, into the passage 8, through passage *o*, into the cylinder above the piston-head *c*, such fluid, so admitted by this single valve 5, setting in motion the plunger, and consequently the car, for its first or smallest capacity. At this time the fluid in the annular space *p*, between the plunger and the interior of the cylinder *a*, passes through the valve *d* in the piston-head. If it becomes necessary to lift a heavier load than can be lifted by the first or smallest capacity, this valve-rod is moved a little farther, so that the collar 4 will be moved to open the valve 9 for the larger capacity. During this last movement of the valve-rod the collar 2 yet farther opens the inlet-valve 4. This operation of these two valves permits the full pressure of the water in the main to become effective upon the entire face of the piston-head, all pressure of fluid at the under side of the head being removed, for the water at the under side of the

piston-head in the annular space between the plunger and cylinder is permitted to escape through the passage covered by valve 9 into the drain through outlet 15 as the piston descends.

The collar 4, which operates this valve 9 to call into play the second capacity of the elevator, is connected with the valve-rod by means of a pin, 10, which extends through an opening in the rod, (see Fig. 3,) or vice versa, suitable friction devices (shown in this instance as springs 12) holding the collar 4 until the ends of the stop, during the movement of the rod, strike the pin 10. This provision for lost movement between the valve-rod and collar 4 for the valve of the second capacity permits me to operate the valves for the first and second capacities consecutively, and to fully close them simultaneously.

It is found very desirable, and essentially necessary, in hydraulic elevators of two or more capacities that the valves controlling the flow of water for the second capacity be simultaneously closed, for should the larger capacity be closed first, and the car be relieved of weight, leaving the weight thereon within the power of the smaller capacity to lift, then such smaller capacity will at once elevate the car, which is dangerous, and is a source of great annoyance.

By means of but a single hand-rope on a hydraulic elevator of two or more capacities, if the valve for each capacity were cut off consecutively in the order reverse to that at which they were let on, the car, before it reached the upper story, would strike the stop on the hand-rope and close the larger capacity, thereby stopping the car below the level of the floor; and it is therefore obvious (it being understood the car would have to move about three feet between the times of operating such valves) that, at the upper story, it would be impossible, with the larger capacity in operation, to stop the car at the level of such upper floor; but by closing each capacity simultaneously the car can be instantly stopped, and be retained in any position.

When the valve-rod is being moved to close the valves 5 and 9 of the smaller and larger capacities, the collar 2 partially closes the valve 5; but during this movement of the valve-rod to so partially close it the collar 4 is held by the friction devices, and the valve 9 is not moved; but the continuation of the movement of the valve-rod finally picks up the collar 4, and thereafter the collars 2 and 4 move in unison, and each permits its valve to come to its seat at the same instant. The valve 16 in the chest 17 is opened to communicate, through passage 15, with the drain. When the car is descending, the valve 9, being then also opened automatically by the force of the fluid, permits the fluid to pass into the annular space *p*, as described in my former patent.

When using a hydraulic elevator of two or more capacities, the operator, by carelessness, is liable to pull the hand-rope far enough to open the larger capacity when the smaller capacity would have been amply sufficient. To indicate to the operator the point at which the larger capacity is ready to be opened for operation, I have arranged a stop, it being shown in Fig. 4 by the letter *t*. This stop is pivoted at *u*, and is provided with a weight, *w*, to keep it in such position that the lever *i* will strike and be positively stopped when the operator moves the hand-rope far enough to open the valve of the smaller capacity.

If the smaller capacity is insufficient to lift the load, the pressure of the fluid in the cylinder becomes equal to the pressure in the main, and the fluid, passing from the cylinder through the pipe a^2 into a chamber, a^4, operates in any usual way a piston, a^3, which acts to lift a releasing-lever, a^5, weighted at a^6, so as to rise at any desired pressure and release the stop *t*, permitting it to turn from under the lever, after which the operator can move the hand-rope to open the valve for the larger capacity. This, it will be noticed, is a positive stop, and the operator cannot use the larger capacity unless the pressure of the fluid in the cylinder is sufficient to release the stop.

In the drawing, Figs. 5 and 6, I have shown modified forms of stops, which are not positive, but which are sufficient to indicate to the operator the opening-points of the valves of the larger capacity.

In Fig. 5 the shaft b^2, carrying the sleeve c^2, has a pinion, d^2, which engages with a rod, e^2, on the link *k*, which operates a valve-rod, such as *l*. Near the pinion d^2 is a cam, f^2, having a stop, g^2, which, as the shaft b^2 is rotated, meets the stud h^2 on the lever i^2, weighted at j^2, the stop meeting the stud or a roller thereon just before the larger capacity commences to open.

In Fig. 6, I have fixed upon the hand-rope *h* a stop, k^2, which, just as the larger-capacity valve is to be opened, meets a weight, l^2, and before the larger capacity can be opened this weight must be lifted. When lifted sufficiently far it is caught by a catch, m^2.

The form shown in Fig. 5 is quite sufficient for intelligent operators using passenger-elevators; but the other forms are preferred for use in warehouses, where less care is exercised. The cover for the valve-box *x* is omitted in the drawings.

It is obvious that instead of the valves herein shown any other well-known valves may be used, they being operated in the order described.

I claim—

1. The combination, in a hydraulic elevator having two or more lifting capacities depending upon the effective area of piston-surface acted upon by the water coming against it from the main, of valves and mechanism to operate them by a single hand-rope, to control the flow of water to make available the smaller and then the larger lifting capacity of the elevator, and to operate them simultane-

ously to completely shut off the flow of water for both capacities, to keep the car at rest.

2. In a hydraulic elevator of two or more lifting capacities, substantially as described, the combination, with the hand-rope, of a stop to retard the motion of the hand-rope just before opening the valve for the second or larger capacity, substantially as described.

3. The combination, in a hydraulic elevator of two or more lifting capacities, substantially as described, of a hand-rope, a stop to check its movement, and automatically-operated releasing mechanism actuated by the pressure of the fluid to release the stop, that the hand-rope may be moved to open the valve for the larger capacity, substantially as described.

4. A stop and releasing mechanism, in combination with a piston set in motion by the pressure of the fluid in the cylinder, the piston actuating the releasing mechanism to release the stop, substantially as described.

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

MARTIN L. WYMAN.

Witnesses:
G. W. GREGORY,
W. J. PRATT.