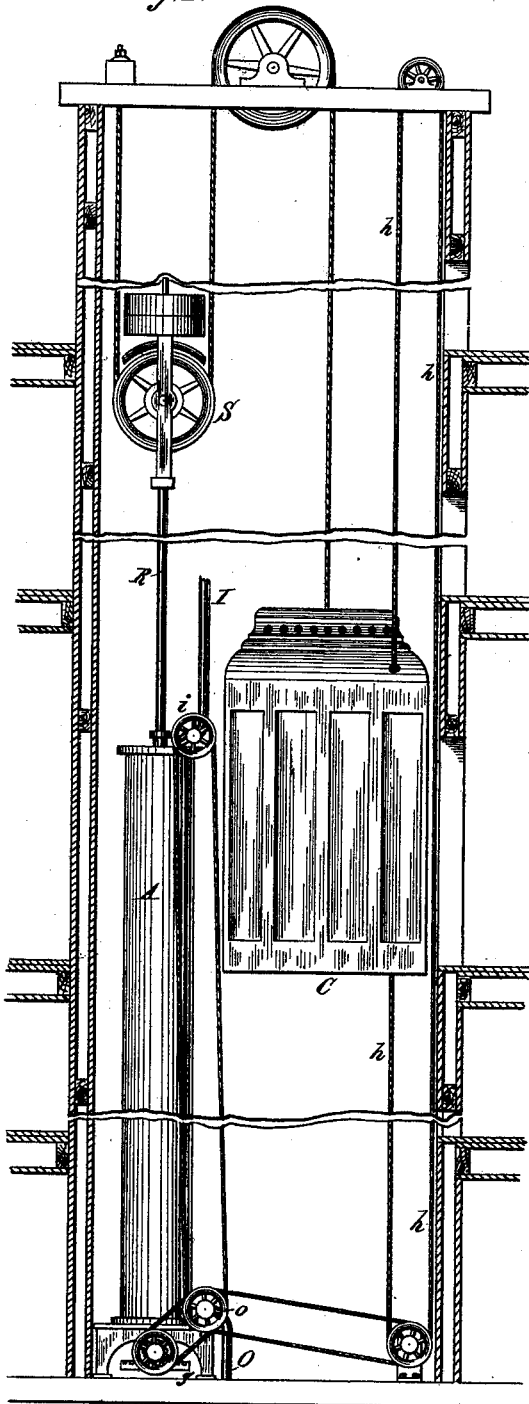


S. SWARTZ.
Hydraulic-Elevator.

No. 220,040.

Patented Sept. 30, 1879.

Fig. 1.



Attest:
Charles H. Seale.
C. J. Morgan

Fig. 2.

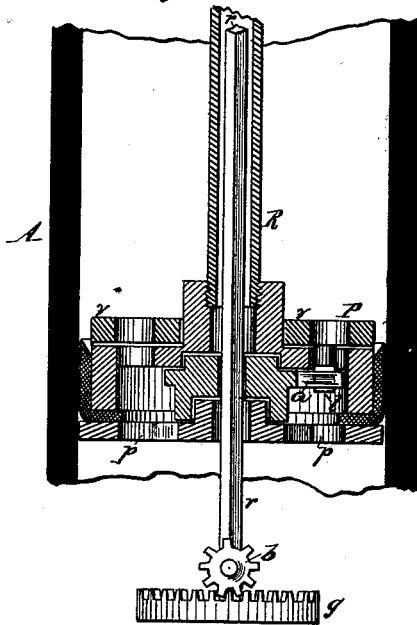
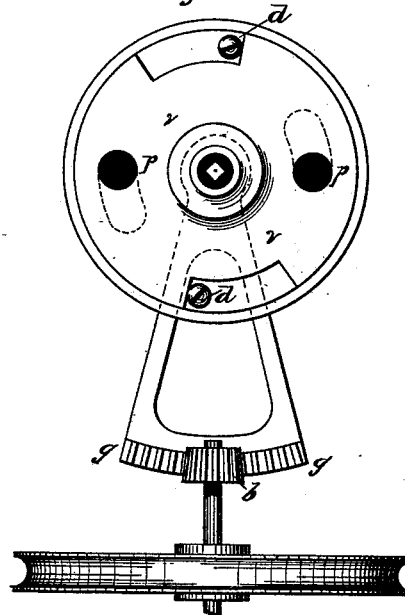


Fig. 3.



Samuel Swartz,
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UNITED STATES PATENT OFFICE.

SAMUEL SWARTZ, OF BUFFALO, NEW YORK.

IMPROVEMENT IN HYDRAULIC ELEVATORS.

Specification forming part of Letters Patent No. 220,040, dated September 30, 1879; application filed August 1, 1879.

To all whom it may concern:

Be it known that I, SAMUEL SWARTZ, of Buffalo, county of Erie, and State of New York, 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, and to the letters of reference marked thereon.

Figure 1 is a sectional elevation of an elevator-shaft, showing my improved machine in position for work, and illustrating one manner of connecting it with a suitable car or carriage. Fig. 2 is a sectional view upon a plane through the axis of a cylinder, such as shown in Fig. 1, illustrating in detail the construction of the piston, the arrangement of the valve therein, and the hollow piston-rod which accommodates the valve-rod. Fig. 3 is a plan view of the top of the piston, showing also the location and arrangement of one form of attachment for operating the valve-rod from a point outside of the cylinder.

Like letters in all the figures indicate corresponding parts.

My invention has special relation to that class of hydraulic elevators wherein the effective pressure due to the height of water in the tank, or due to the pressure on the pipes from which the supply is drawn, is supplemented by the atmospheric pressure produced in consequence of the employment of a second column of water in a pipe extending below the cylinder and leading into any suitable drain, wherein its mouth is sealed; and the object of my invention is to provide a simple and effective means of returning the piston to any point within its cylinder without displacing the water therein.

To accomplish this the invention consists, essentially, in providing the main piston, which, through the medium of the attached piston-rod, moves the car or load, with a valve, which may be opened or closed at any point of the stroke from the outside of the cylinder, thus (the valve being opened) permitting the piston to move through the fluid in the cylinder without displacing it; and in certain new and useful combinations of parts or arrangements thereof, all of which

will be hereinafter first fully described, and then pointed out in the claims.

A is the cylinder, which may be made of any length, preferably up to half the height of the shaft in which the car or carriage moves. If of half this height, a single sheave attached to the piston-rod, as at S, and a rope or cable wound in the usual way, as indicated in the drawings, will afford the desired travel of the car C.

By increasing the number of sheaves and varying the arrangement of the cables after well-known principles, the cylinder may be shortened and the same travel of car still afforded.

The piston-rod R is made hollow, in order to accommodate the valve-rod *r*, which controls a valve in the piston, and to prevent communication of fluid from one side of the piston to the other, except through the passage or port in the piston.

The valve-rod *r* extends the entire length of the stroke of the piston and projects through the lower cylinder-head, and is provided with a gear, as at *g*, on its extremity, by which it may be turned, through the medium of a corresponding pinion, *b*, which is operated by the hand-rope *h* in the car C.

The valve-rod is shown as made square in horizontal section, the better to turn the valve; but any angular form of rod, or a suitable feather thereon, may be employed, and its connection with the hand-rope *h* may be of any desirable kind suitable for the purpose.

The drawings show two water-passages, *p p*, through the piston P, though one or more passages may be employed.

Upon the top of the piston is located a plate, *v*, perforated to correspond with the water-passages *p p*, and this has a limited movement on its seat, being arrested at the proper points by suitable detents *d d*, and forming the valve which serves to open or close the water-communication between the parts of the cylinder above and below the piston.

At *a* is an arm which engages with a lug, *l*, on the under side of the valve-plate, and has a central perforation through which the valve-rod *r* passes.

By turning the valve-rod *r*, the arm *a*, and

through it the valve-plate *r*, is turned, as may be desired, either to open or close the water-passages; and this turning may obviously be accomplished at any position of the piston, since the latter, with all its appendages, is free to move up and down upon the valve-rod.

The inlet-pipe *I* enters at the upper part of the cylinder, and is supposed to proceed from a tank above, or to communicate with the water-mains or other source from which the supply proceeds. This pipe is provided with a suitable valve, as at *i*, under the control of the operator, having a belt or other connection suitable for the purpose. The valve in the piston being closed and the water-supply being opened, the weight of the column of water in pipe *I* will tend to force the piston *P* downwardly, and thus to elevate the carriage *C*. In descending, the weight of the carriage will elevate the piston, and to permit this without the necessity of discharging any water from the cylinder the passage *p* in the piston is opened, when the water above it will be allowed to pass through, and thus the piston brought to the required position for again elevating the car.

Of course, as the piston descends, the water below it must be discharged from the cylinder. To provide for this the outlet-pipe *O* leads from the lower part of the cylinder. It is shown as provided with a suitable valve, as at *o*, and this, like the one at *i*, is also under the control of the operator. This last-named valve *o* might be omitted, since under the construction indicated no water could flow from pipe *O* except as the piston is descending, provided the lower end of said pipe be sealed against the admission of air. This sealing is accomplished by submerging the end of the pipe in water, allowing a free outlet for the water in the pipe, but excluding all air therefrom.

It is apparent that the column of fluid sustained in this outlet-pipe *O* by the atmospheric pressure will tend to create a vacuum in the lower end of the cylinder, and thus its weight will continually draw down upon the piston and supplement the action of the column of fluid in pipe *I* by a pressure equal to that which would be produced by a similar column if located above the piston—that is, up to a length of thirty-two feet, or thereabout. The longer the pipe *O* is made, (up to thirty-two feet,) the more effective will be the action of the fluid therein.

These principles of operation are well understood by elevator-builders, and need not be herein more particularly explained.

The simplicity of construction by which I am enabled to return the piston without wasting any water from the upper compartment of the cylinder will recommend it for adoption in preference to the application of side pipes running from top to bottom of the cylinder, or other contrivances by use of which the water in the upper compartment has to be led away.

The connection of the several means employed for operating the valves throughout the system should be such as that when the inlet-valve *i* is opened, *v* should be closed and *o* opened, thus allowing the water to flow in at top, exert its pressure on the piston, and the water below it to flow out of the way, so that the carriage will move upwardly. To arrest the motion of the carriage and hold it stationary, it is only necessary to close valve *i*. To allow it to descend, valve *i* should be closed and *v* opened. All these motions of the valves are under control of the operator, and through them the motions of the carriage are controlled, as may be desired.

The valve-plate is shown as being located upon the top of the piston. It might be otherwise arranged therein or thereon; but in this position it is continually pressed down upon its seat, and a water-tight joint thereby insured.

The invention is to be distinguished from such constructions as exhibit a valve or secondary piston having a port or opening through it capable of being opened or closed at pleasure, and from such pistons as are moved by the application of power independent of the fluid-pressure, all of which are well known to be old.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hydraulic elevator, a valve controlling a port in the piston operated by a rod within the cylinder, passing through the piston and within the hollow piston-rod, substantially as and for the purposes set forth.

2. In a hydraulic elevator, the combination of the valve-rod, operated from the exterior of the cylinder, and the hollow piston-rod, within which said valve-rod is located, substantially as and for the purposes set forth.

3. In a hydraulic elevator, the main piston carrying the rod which moves the car, said piston having a port or water-passage through it, the same being controlled by a valve capable of being opened or closed from the exterior of the cylinder at any point of the stroke, and thus permitting the movement of the piston within the cylinder and through the water contained therein, substantially as and for the purposes set forth.

4. The combination, as before set forth, of the cylinder, the piston with its water-passage, the hollow piston-rod, the valve, the valve-rod, the gear connected with the valve-rod, and the inlet and outlet pipes, the several parts being combined and arranged to operate substantially in the manner and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of two witnesses.

SAMUEL SWARTZ.

Witnesses:

WORTH OSGOOD,
S. W. HOLCOMB.