G. H. BAILEY.

Hydraulic-Elevator.

No. 208,282. Patented Sept. 24, 1878.

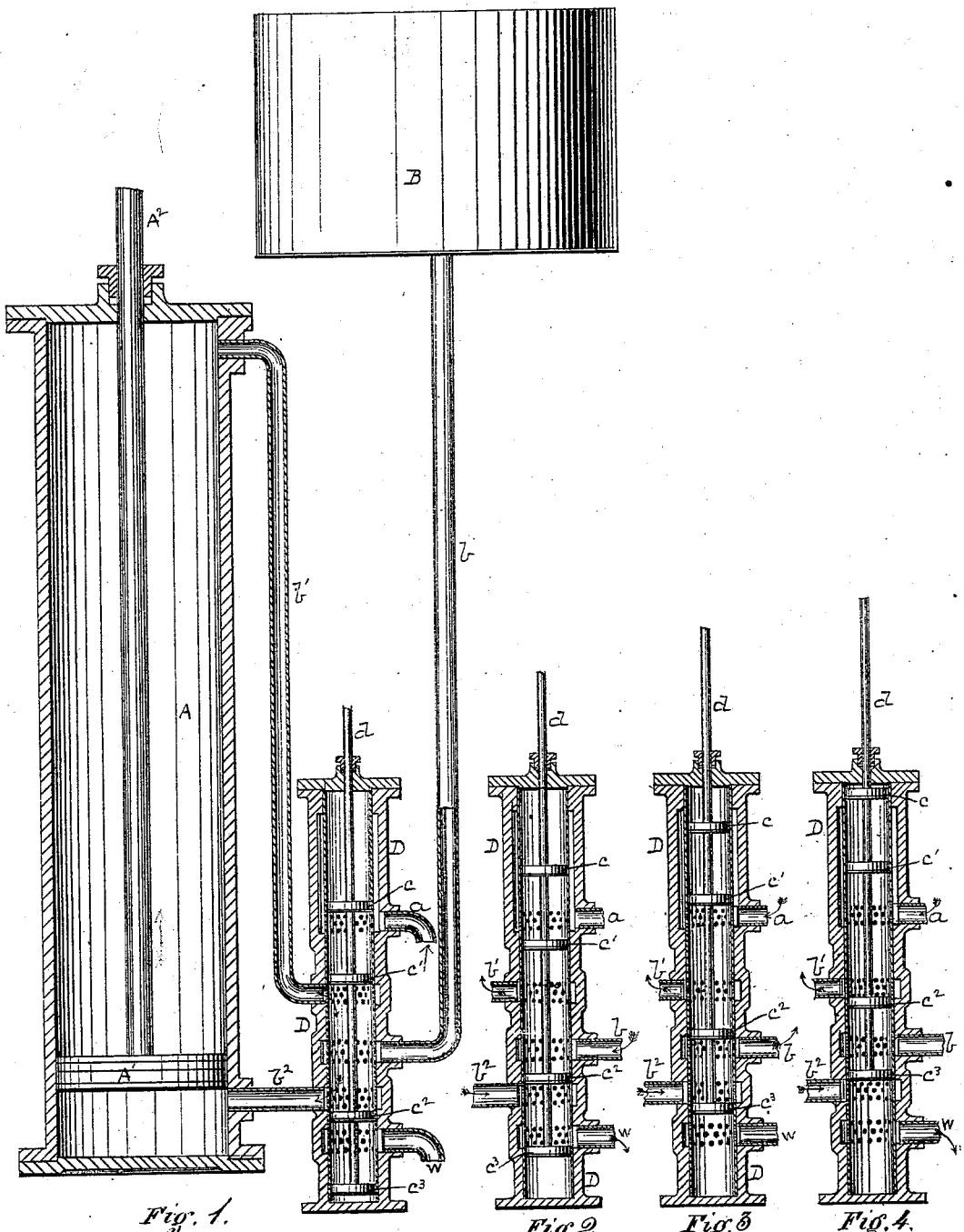


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN HYDRAULIC ELEVATORS.

Specification forming part of Letters Patent No. **208,282**, dated September 24, 1878; application filed May 9, 1878.

*To all whom it may concern:*

Be it known that I, GEORGE H. BAILEY, of Newark, county of Essex, State of New Jersey, have invented or discovered a new and useful Improvement in Hydraulic Elevators; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a vertical sectional view of such parts of a hydraulic elevator as are necessary to illustrate the present invention; and Figs. 2 to 4 are like views of the valve-case and valves employed in operating the same, and showing different positions or adjustments of the valves for different motions.

A represents a hydraulic cylinder, the piston $A^1$ of which is operated by hydraulic pressure in raising a car attached to a suspensory rope, cable, or chain. The interposed mechanism of pulleys, sheaves, &c., by which connection is made with the piston-stem $A^2$, may be made in any of the ways known to the art whereby the desired result shall be secured.

With the arrangement of pipes, ports, and valves shown in the drawing, the car is to be raised by a downward motion or stroke of the piston. The reverse or downward motion of the car is secured by allowing the water to flow or circulate from one side of the piston to the other, which feature of operation is more particularly set forth in the Baldwin hydraulic elevator patents.

The present invention differs from the Baldwin elevators chiefly in the fact that, when raising a load somewhat inside of or less than the maximum capacity of the elevator, I store up the otherwise waste water in what I term a "low-pressure tank or receiver," at such elevation or under such pressure that at the next or any desired upward movement of the car with a light load such light load may be raised by the water from the low-pressure tank alone. Such low-pressure tank or receiver is represented at B, and it may be arranged at any desired height above the upper end of the cylinder, or, if used with a weighted diaphragm, it may be arranged at a lower level. A valve-case, D, of any suitable construction, is also employed.

The main working or high pressure enters from the street-main or other "head" by a pipe, *a*. The pipe *b* leads from the valve-case to the low-pressure tank B, and the valve-case is also connected with the opposite ends of the cylinder by pipes $b^1$ and $b^2$. A waste-pipe is represented at *w*.

The pipes thus designated enter the valve-case in about the relative relation shown. Preferably the entrance and exit ports are covered by strainers, as shown. The inside of the valve-case contains the series of piston-valves $c$ $c^1$ $c^2$ $c^3$ on a common stem, *d*, which stem is operated from the car or otherwise in any known way. These valves are so arranged in relation to each other and to the water-ports as to perform the functions hereinafter stated, or one or more of them.

Assuming the devices to be in the position shown in Fig. 1, and the entire apparatus to be fully charged with water under pressure, it will be obvious that the car will descend by its own weight, the water above the piston $A^1$ passing around under the piston. The waste is entirely closed.

If the load to be raised is quite a light one, I then shift the valves to the position shown in Fig. 2. The high-pressure pipe *a* is then cut off, the waste is open, and the low-pressure tank is brought into communication with the pipe $b^1$, which leads to the upper end of the cylinder A, so that the pressure of the water stored up in the tank B shall be made operative in raising the car.

If the load at any time be somewhat heavier, but still inside the maximum capacity of the elevator, or if there be no water in the low-pressure tank, I shift the valves to the position indicated in Fig. 3. The high-pressure pipe is then brought into communication with the upper end of the cylinder, the waste is closed, and the pipe $b^2$, by which water passes from the lower end of the cylinder, is brought into communication with the pipe *b*, which leads to the low-pressure tank. In this way the latter is recharged or originally charged, and so much water is saved and stored up for subsequent use in the manner previously described. But when the maximum operative capacity of the elevator is required the low-press-

ure tank is cut off by shifting the valves to the position shown in Fig. 4. One end of the cylinder then takes the maximum pressure, and the other end is open to the waste.

It will be observed that the valves are all perfectly balanced in all adjustments; and it will also be obvious that the position of the cylinder, whether vertical or horizontal, is not material, the terms "upper" and "lower" being purely relative.

The preferable height for the low-pressure tank is about one-half that represented by the static force of the main pressure, and it should also be supplied with an overflow-pipe or other equivalent device by which to guard against accidents.

In function and effect this apparatus gives me what is known as a "double-lift elevator" at small expense; and by virtue of its operation of saving and reusing the otherwise waste-water, it is especially valuable where water under pressure is scarce or costly; or, looking at it in another aspect, the low-pressure tank may be considered as auxiliary to the main pressure or main cylinder, in that it stores up and provides for reusing the otherwise waste-water, as already stated; but in respect to the height of the low-pressure tank I do not limit myself, provided only it be so far above the operating-point as to give an effective pressure capable of doing or of aiding in doing some useful work.

It will also be seen that the waste hydrant-water used in the upper part of a building may be gathered into the tank and utilized as auxiliary to the main pressure.

I claim herein as my invention—

1. In a hydraulic elevator, the combination of a main cylinder, a high-pressure pipe from the street-main or other head communicating with one end of the main cylinder, a low-pressure tank or receiver, and a pipe-communication from such low-pressure tank or receiver to the opposite end of the main cylinder, for the purpose of charging the low-pressure or auxiliary reservoir while the elevator is being operated from the high-pressure supply, substantially as set forth.

2. The valve-case D, having two water-supply ports, two ports connected with the elevator-cylinder, and a waste-port, all brought into or cut off from proper communication for the raising or lowering of the car by a simultaneous motion of a single series of valves, substantially as set forth.

3. The valve-case D, having two water-supply ports, two ports leading to the main cylinder, and an exhaust-port, substantially as set forth.

In testimony whereof I have hereunto set my hand.

GEO. H. BAILEY.

Witnesses:
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