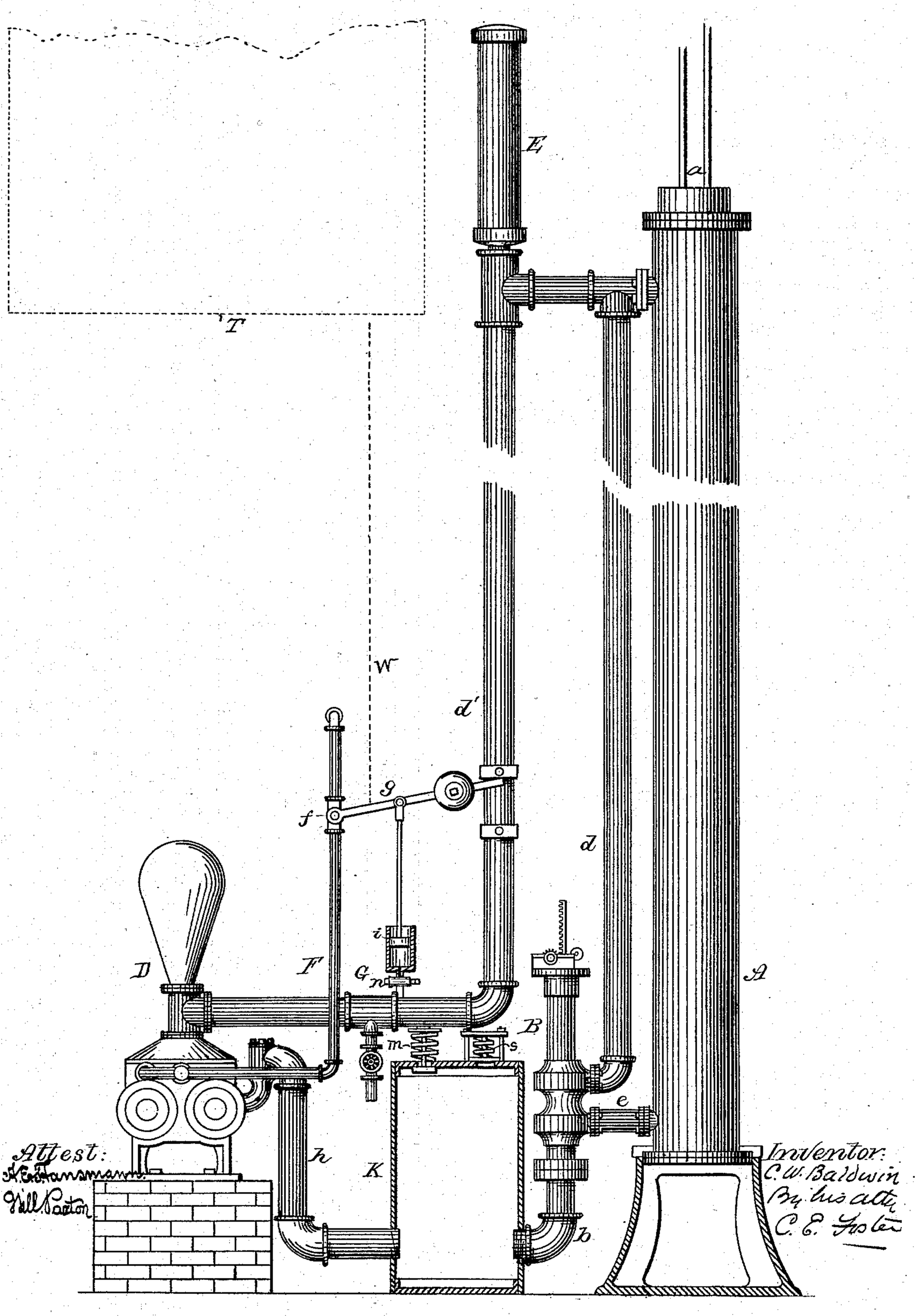
(No Model.)

C. W. BALDWIN.

ELEVATOR.

No. 276,332. Patented Apr. 24, 1883.



UNITED STATES PATENT OFFICE.

CYRUS W. BALDWIN, OF CHICAGO, ILLINOIS.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 276,332, dated April 24, 1883.

Application filed February 4, 1882. (No model.)

To all whom it may concern:

Be it known that I, CYRUS W. BALDWIN, of Chicago, Cook county, State of Illinois, have invented certain Improvements in Elevators, of which the following is a specification.

My invention relates to that class of elevators in which the pressure of water upon a piston actuates the latter to raise the cage, and has for its object to dispense with the usual elevated tank or water-reservoir and pump the water directly into the cylinder.

My invention includes other improvements hereinafter described.

My invention consists in means whereby to avoid the shocks and straining of the supports liable to result when the water is pumped directly into the cylinder of an elevator.

I have found that by interposing an air and water chamber between the pump and the piston the pulsations of the pump are absorbed and the irregular motion of the cage prevented. This arrangement may be embodied in apparatus of various forms. One which I have found to be most effective is illustrated in the acccompanying drawing, in which the figure represents in elevation a "Baldwin" hydraulic elevator with my improvements applied thereto.

A is the cylinder, containing the usual piston connected to the piston-rod *a*, and operating upon the cage. B is the valve-case, *b* the discharge-pipe, and *d e* the circulating-pipes connecting the case with the opposite ends of the cylinder. The construction of these parts is so well known that further description of the same is unnecessary.

The pump D is of any suitable character, and communicates with the cylinder; or it may communicate with the valve-casing B or with the pipe *d* in such manner that water may be pumped into the cylinder to move the piston and raise the cage.

With the water-passage, at some point between the pump and the piston, communicates a vessel or case, E, which, as shown, is closed at the top and filled or partly filled with air, which will be compressed when the pressure on the water increases from the increased action of the pump, and by thus yielding absorbs the pulsations that would otherwise be transmitted to the cage. I have found that by this means the water may be pumped directly into the cylinder without interfering with the steady, uniform motion of the cage.

When the valve in the case B is shifted to lower the cage the water circulates from one side of the piston to the other through the pipes *d e*. In the ordinary Baldwin elevator (where the pipe *d* communicates with a supply-tank) this is practicable, the tank supplying the additional water needed on the lower side of the piston and taking up the surplus when the piston descends; but it will be seen that if the communication with the supply is cut off during circulation, as will be the case where a pump is used, there would not be enough water from the space above the piston (contracted by the piston-rods) to fill the space below, and there would consequently be a vacuum formed below the piston, causing the car to jump, from the contraction of the air when the valve is opened. The use of the case E prevents this, as by the expansion and contraction of air therein the extra supply of water may be drawn from or forced into the pipes, which could not result if all the channels were full of water.

As shown in the drawing, the case E is at the upper end of a pipe, *d'*, leading from the pump to the upper end of the pipe *d*. When the pump communicates with the lower end of the pipe *d* or with the valve-case B the case E may be arranged at the upper end of the pipe *d*, or may communicate with the upper end of the cylinder.

It will be obvious that the case E need not be closed at the top when it is at such a height that the action of the pump will not expel the water therefrom.

It must be apparent that as the action of the pump starts the apparatus the pump should be controlled from the cage. This may be done directly by means of a cable, W, or other appliances extending from the starting-valve of the pump to the cage T, or indirectly. I prefer the latter plan, in which case I use the devices shown in full lines in the drawing.

F is the steam-pipe communicating with the valve-chest of the pump, and containing the butterfly-valve in a case, *f*.

With the pipe leading from the pump to

the cylinder communicates a vessel, G, open at the top, and containing a piston or diaphragm, *i*, the rod of which is connected with an arm, *g*, on the spindle of the butterfly-valve.

The parts are so set that the pressure in the pipe *d'* when the cage is not moving raises the piston *i* and turns the butterfly-valve so as to cut off steam from the pump. When the discharge from the valve-case B is opened this pressure is at once reduced and the piston *i* falls, opening the valve and setting the pump into operation, which continues until the closing of the discharge by the shifting of the valve in the case B increases the pressure in the vessel G and causes the steam-valve to be closed.

The shifting of the main valve from the cage thus both opens and closes the ports and starts and stops the pump. It will be obvious that various devices may be used to effect this result.

A cock, *n*, in the communication between the vessel G and the pipe *d'* serves to regulate the action of the appliances controlling the steam-valve.

It has been common in hydraulic elevators to discharge the water from the cylinder into an open tank, and to pump it thence to a tank at the top of the building. In place of the open tank, I prefer to use a closed tank, K, communicating with the discharge-pipe *b* and with the suction-pipe *h*, leading to the pump. As the pump exhausts the tank the rarefaction of the air or partial vacuum produced therein greatly facilitates the discharge of the water from the lower end of the cylinder and enables me to increase the speed of the cage.

A spring-loaded inlet or vacuum valve, *m*, prevents danger from too great a vacuum, and a weighted or spring-loaded relief-valve, *s*, prevents an excess of pressure within the tank, appliances being used whereby the pressure on each valve may be regulated.

It will be apparent that the vacuum-tank may be employed with hydraulic elevators of various constructions.

I claim—

1. In a hydraulic elevator operated by forcing the water by means of a pump directly against the piston in the cylinder, the air chamber or case interposed between the pump and the piston and above the induction to the cylinder, substantially as shown and described.

2. In a hydraulic elevator operated by pumping water against the piston, the combination of the pump and inlet-pipe, and cylinder and piston, and discharge-pipe, and air chamber or case arranged at or near the upper end of the cylinder and communicating with the water between the pump and piston, substantially as set forth.

3. The combination of the elevator-cylinder and its piston, inlet and discharge pipes, the pump and pipe leading therefrom to the inlet-pipe of the cylinder, and pump starting-valve, and cable or its equivalent, whereby the said valve is operated from the cage.

4. The combination, with the cylinder, pump, and starting-valve of the pump, of a case having a piston constructed to be operated by the pressure in the supply-pipes, and connected to the starting-valve to govern the latter, substantially as set forth.

5. In a hydraulic elevator where the piston is operated directly from the pump, the combination of the steam-pipe, the starting-valve, the pump, the pipe leading therefrom to the cylinder, the vessel attached to said pipe and communicating with the water therein, and having a piston with rod connecting with said starting-valve, substantially as shown and described.

6. The combination of the cylinder, pump, pipes, valve *f*, steam-pipe, vessel G, containing a piston connected to the valve, and cock *n*, substantially as specified.

7. In a hydraulic elevator where the piston is operated by water under pressure, elevated by a pump, the combination, with the discharge-pipe of the cylinder and the pump, of the closed tank having communication with such discharge-pipe and with the pump by means of its suction-pipe, substantially as shown and described.

8. In a hydraulic elevator where the piston is operated by water under pressure, the combination, with the discharge-pipe of the cylinder, and the pump, of the closed tank having communication with such discharge-pipe and with the pump by means of its suction-pipe, said tank having the relief-valves and vacuum-valves, substantially as set forth.

9. The combination of the cylinder A, pipes *d* and *e*, closed tank K, and pump communicating with the tank by means of the suction-pipe, and with the cylinder by means of a pipe, *d'*, substantially as set forth.

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

CYRUS W. BALDWIN.

Witnesses:
HOLMES HOGE,
HENRY L. KENT.