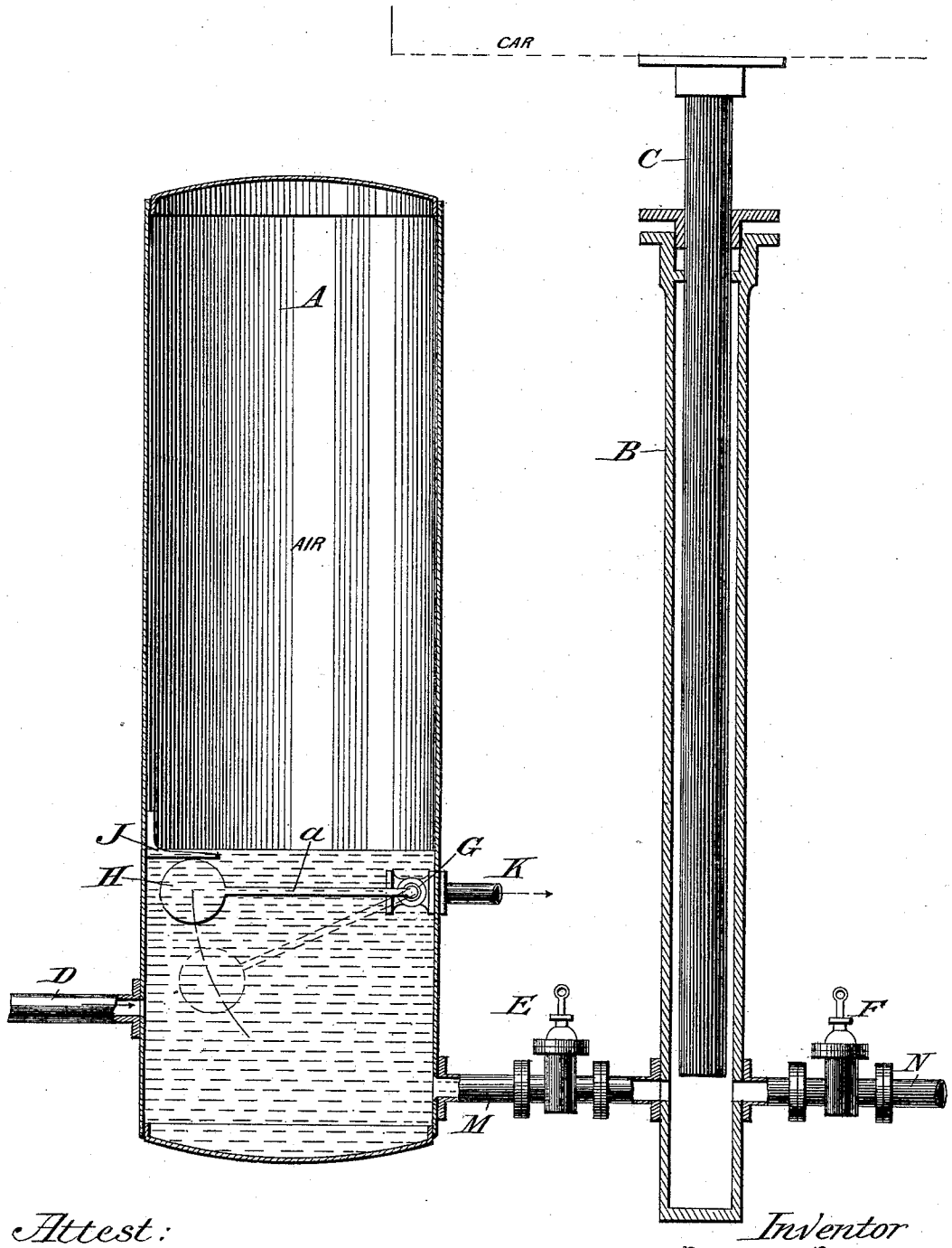
(No Model.)

W. F. TOOTHAKER.

HYDRAULIC ELEVATOR.

No. 408,149. Patented July 30, 1889.



Attest:

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UNITED STATES PATENT OFFICE.

WILLIAM FRANKLIN TOOTHAKER, OF SAN FRANCISCO, CALIFORNIA.

HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 408,149, dated July 30, 1889.

Application filed March 23, 1889. Serial No. 304,492. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM FRANKLIN TOOTHAKER, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Hydraulic Elevators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to an improvement in hydraulic elevators, the object being to promote and insure safety in the operation of the same; and the invention consists in the escape mechanism for permitting the air to have exit from a hydropneumatic accumulator whenever the water in the vessel thereof falls to such a level as to cause a possibility or liability of allowing the air to pass into the hydraulic apparatus, thus permitting a sudden or elastic movement which endangers the life of passengers on the platform or in the car and renders liable the destruction of property, all substantially as hereinafter described and claimed.

The accompanying drawing, illustrating my invention, represents my improved hydraulic elevator in vertical section.

A denotes the accumulator-vessel used with my improved elevator and containing air and water, as shown. The water is supplied to the vessel through the inlet-pipe D, which proceeds from any suitable forcing mechanism. Said pipe D enters the vessel A preferably toward the lower end thereof.

B indicates the cylinder of the hydraulic lifting mechanism. This cylinder is commonly sunk in the earth a greater or less distance. It contains the piston or ram C, on the top of which is mounted a platform cage or car for the purpose of carrying passengers or goods. A suitable stuffing-box in the upper end of the cylinder B affords a tight joint for the piston where it emerges from the cylinder.

Water passes from the accumulator A into the lower end of the cylinder B through the pipe M. This pipe contains a valve E, which controls the passage of the water therethrough. Water is discharged from the cylinder B through the discharge-pipe N, which has an escape-valve F for controlling the outflow of the water. It will hardly be necessary to state that water passing from the accumulator A into cylinder B beneath the piston will lift the piston, while the discharge of the water through valve F will cause said piston to descend.

In hydraulic pneumatic accumulators of the class with which my present invention is employed the elasticity of a body of air is used as a relay of power in case the water-forcing apparatus for supplying water and the necessary pressure to the apparatus is temporarily stopped, or in case its capacity should not be sufficient to supply the sudden use of a large quantity of water to the cylinder B. The body of air supplements the water-pressure so that these fluctuations are avoided and the pressure equalized. There is a certain amount of danger, however, attending this use of air. In some cases, when the forcing machinery is stopped by accident, or the supply of water is for any reason wanting, the water-level in the accumulator will fall so low as to permit the air above the same to pass into cylinder B. The air being elastic, if it gets beneath the ram C the latter will be driven upward with great velocity. But perhaps the greatest danger from this straying of the air beyond its proper confines occurs when the valve F is opened to permit the descent of the ram. The rate of this descending movement is in the normal working of the machine controlled by the speed at which the escaping water can pass through the valve F; but in the abnormal condition just referred to the flow of the air which passes from the accumulator into the cylinder B, offering but little resistance, permits the piston or ram C to fall violently, just the same as though there were no opposing force beneath it. My invention aims to obviate and overcome this danger, which is such a serious one, and I proceed to carry my purpose into practical effect by providing an escape-valve G, located in the side of the accumulator A, at a proper distance from the bottom of the same, and at end of pipe K. This escape-valve G is actuated by a float H, suitably constructed and connected to the valve by means of a lever or handle *a*.

J denotes a stop secured to the inside wall of the accumulator to keep the float H from rising too high when the water-level is above it. (See drawing.)

The operation of this valve device will be manifest to those skilled in the art to which this invention belongs. When the water has been withdrawn sufficiently from the vessel A to sink the water-level down to a dangerous point—that is to say, a point below which should the water fall air would be likely to enter cylinder B—then the valve G will be automatically opened by the sinking of the float H, (see dotted lines in the drawing,) and the air above the water escapes at G through the pipe K, thus relieving the pressure and arresting the motion of the ram or piston C. After a new supply of water has been forced in through the pipe D the float H will rise again until it comes in contact with stop J, at the same time closing the valve G and permitting the pressure to rise again to the degree required for operating the ram C.

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

1. In a safety appliance for hydraulic elevators, the combination, with the pneumatic hydraulic accumulator, of a safety-valve, the air-exit pipe, the float for operating the valve connected thereto, and the stop for limiting the ascent of the float, substantially as described.

2. In a hydraulic elevator, the combination, with the pneumatic hydraulic accumulator, the hydraulic cylinder, the ram within the latter, and the inlet and outlet valves for the hydraulic cylinder, of the safety appliance consisting of an air-escape valve within the accumulator and a float connected thereto by a lever, and the stop for limiting the ascent of the float, substantially as described.

3. The combination of the accumulator A, having air-escape valve G and air-outlet K, and the float H, connected to valve G by lever *a*, substantially as described.

4. The combination, with accumulator A, of the safety-valve G, air-outlet K, water-supply D, float H, connected to valve G by lever *a*, and the stop J, all substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM FRANKLIN TOOTHAKER.

Witnesses:
LINCOLN SONNTAG,
WALTER J. GARRICK.