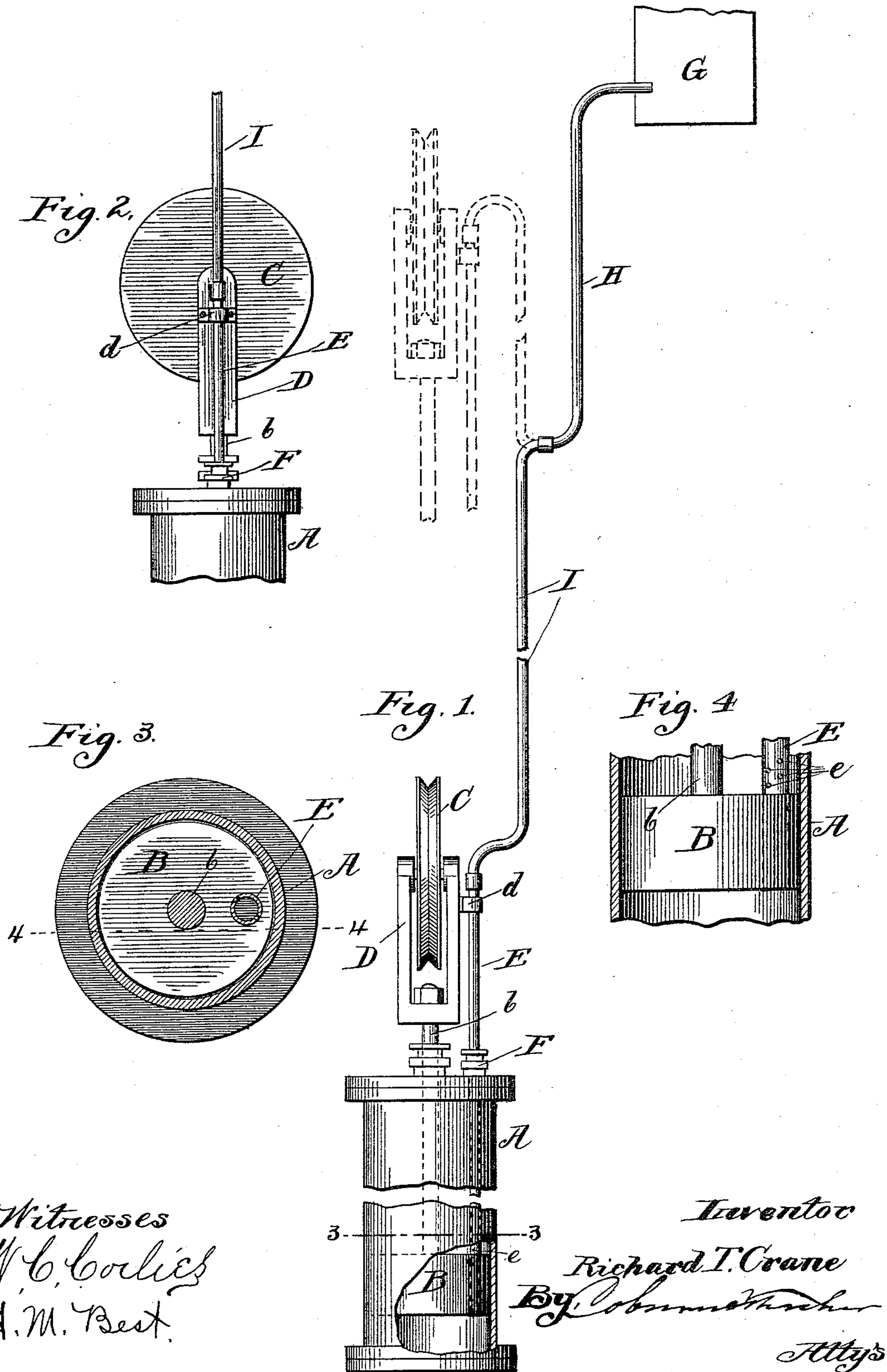


(No Model.)

R. T. CRANE.
HYDRAULIC ELEVATOR.

No. 458,223.

Patented Aug. 25, 1891.



UNITED STATES PATENT OFFICE.

RICHARD T. CRANE, OF CHICAGO, ILLINOIS.

HYDRAULIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 458,223, dated August 25, 1891.

Application filed November 3, 1890. Serial No. 370,183. (No model.)

To all whom it may concern:

Be it known that I, RICHARD T. CRANE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Hydraulic Elevators, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of a portion of a hydraulic elevator embodying my invention; Fig. 2, a detail side elevation of the same at the upper end of the cylinder; Fig. 3, a plan section taken on the line 3 3 of Fig. 1 and on an enlarged scale, and Fig. 4 a detail section with the piston in elevation, taken on the line 4 4 of Fig. 3 and on the same scale.

My invention relates to hydraulic elevators of any ordinary and usual construction, and has for its object the relief of the lifting-cylinder from air which gradually accumulates above and below the piston and in time forms a cushion that interferes with the proper action of the apparatus.

The invention consists in a supplementary pipe connected to and passing through the piston, by which the air is discharged.

I will proceed to describe the construction and operation of so much of a hydraulic elevator embodying my invention as is necessary to an understanding of the latter, and will then point out more definitely in claims the special improvement which I believe to be new and wish to secure by Letters Patent.

In the drawings, A represents an upright lifting-cylinder, broken away centrally, of a hydraulic elevator, and B the piston which is fitted therein, with its rod *b* passing out through the upper head of the cylinder, as usual. A pulley C is mounted on the upper end of the piston-rod by means of a yoke-frame D, in which it is journaled and which is secured to the end of the piston. All these parts are of well-known construction and their operation perfectly well understood in this class of elevators. Now it is well known that air will gradually accumulate within the cylinder above and below the piston. Water carries more or less air. In the ordinary construction of this cylinder and piston there is no means of escape for this air, and in time

its volume will become so great as to seriously interfere with the operation of the lifting-apparatus, resulting in an unsteady jumping movement of the car. It is the purpose of the present invention to overcome this difficulty by providing for the discharge of this accumulation of air. For this purpose I provide a small pipe E, the lower end of which is passed down entirely through the piston, so as to open into the cylinder-space below. The pipe is secured in this position and is extended upward through the upper head of the cylinder, passing out through a stuffing-box F, inserted in this cylinder-head. At one side of the yoke-frame D is a fastening-loop *d*, through which the upper end of the pipe E passes and by which it is fastened to the said yoke-frame and so will move up and down with the piston, for it will be understood, of course, that as the yoke is secured to the piston it must have a vertical movement with the latter. The upper end of this pipe is connected with a tank or reservoir G. It will be understood that this connection must be flexible, either wholly or in part, to accommodate the vertical movement of the piston and pipe carried with it.

In the drawings the connecting device is shown as composed of an upper section H, which is an ordinary pipe and therefore stationary, and a flexible section I, of rubber or any other flexible tubing, which is joined at one end to the pipe E and at the other to the outer end of the pipe H. Obviously this section of flexible tubing will accommodate the vertical movement of the piston and its pipe without deranging the connections, as illustrated in Fig. 1, in which the upper portion of the piston and pulley is shown in dotted lines. The flexible tubing may compose the entire connection between the piston-pipe and tank, if desired, and in any event it must be of sufficient length to provide for the entire stroke of the piston. The pipe E is also provided with a number of perforations *e* above the piston. The area of this pipe is also exceedingly small as compared with the area of the supply and discharge to the cylinder, and therefore the escape of water from one side of the piston to the other will be so slight as not to materially affect the operation of the motor. Now it is apparent that with this re-

lief-pipe there can be no permanent accumulation of air above or below the piston, for as the air is of less specific gravity than the water and both are under substantially the same pressure the air will escape up through the pipe, rising up through the water for this purpose, and so the bad effect of air gathering in the cylinder will be obviated. It will be understood, of course, that the exhaust is arranged with this cylinder in the usual way with upright elevator-cylinders. This supplementary discharge or relief pipe may be connected with the tank or reservoir commonly used with this kind of apparatus or with any special tank or reservoir adapted to the purpose, and in other particulars there may be modifications in the construction and arrangement of the devices, and for this reason I do not wish to be understood as limiting my invention to the precise construction herein shown and described.

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

1. In a hydraulic elevator, the piston of the lifting-cylinder, in combination with a relief-pipe connected to and passing down through the piston and arranged to slide back and forth in the cylinder-head with the movement of the piston, whereby the accumulation

of air below the piston is driven out, substantially as and for the purposes specified.

2. In a hydraulic elevator, the upright or lifting cylinder A, in combination with its piston B, air-pipe E, having its lower end passed through the piston and connected thereto, and with perforations *e* above the piston, tank G, and a connecting pipe or tube between the said air-pipe and tank either wholly or in part flexible, substantially as and for the purposes specified.

3. The piston B of the upright lifting-cylinder, in combination with the pipe E, set into and through the piston and moving back and forth therewith, the tank G, pipe H, and flexible tube I, connecting said pipe H and the upper end of the air-pipe E, substantially as and for the purposes specified.

4. The piston B of the lifting-cylinder, in combination with the pulley yoke-frame D on the upper end of the piston-rod, the air-pipe E, passing through the piston and out through the cylinder-head, and a loop-fastening *d*, attached to the yoke-frame and securing the upper end of the pipe thereto, substantially as and for the purposes specified.

RICHARD T. CRANE.

Witnesses:

CARRIE FEIGEL,
A. M. BEST.