

E. C. PLUMER.
Steam Water-Elevator.
No. 212,978. Patented Mar. 4, 1879.

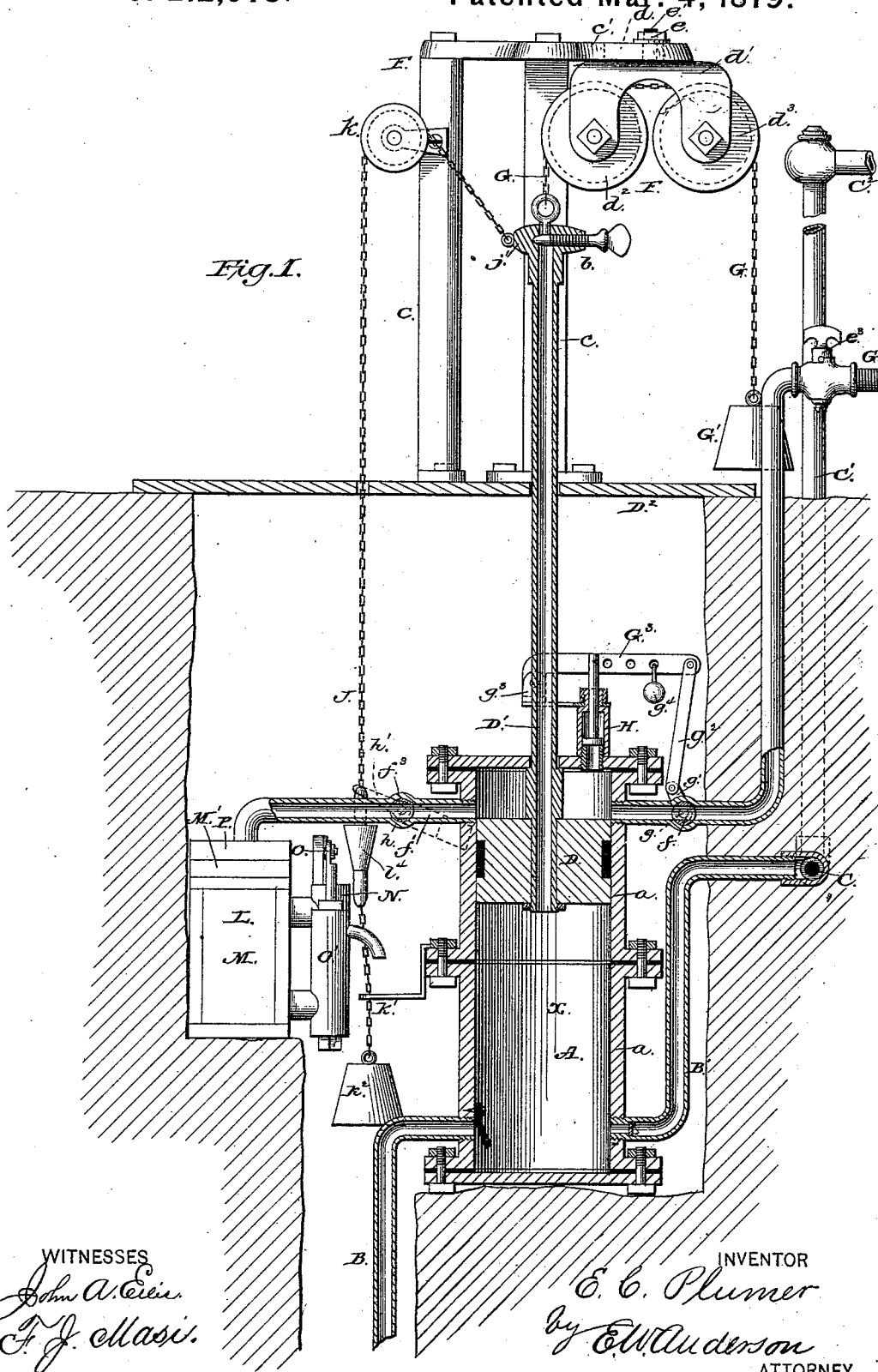


Fig. 1.

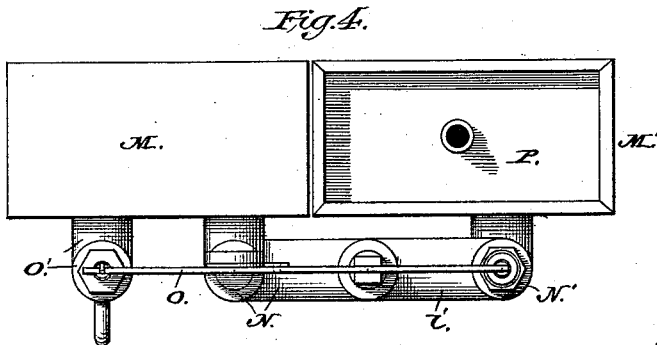
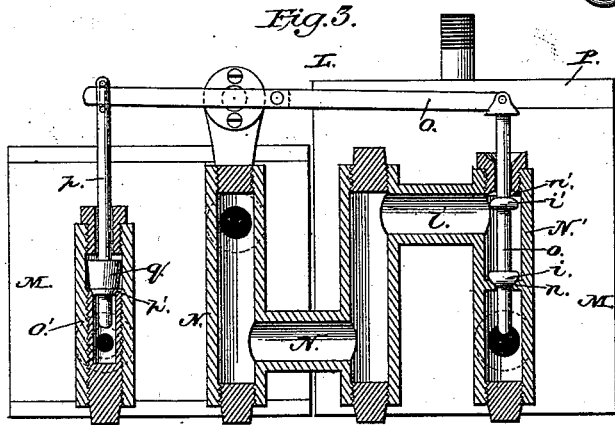
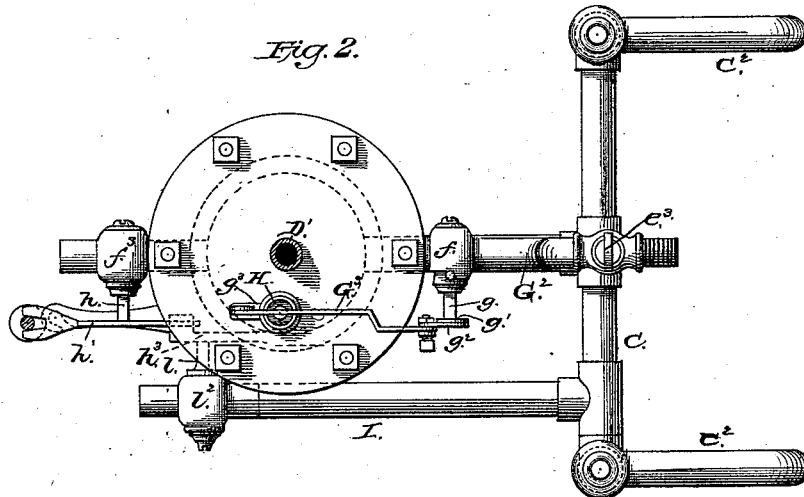
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UNITED STATES PATENT OFFICE.

EUGENE C. PLUMER, OF COLUMBIA, SOUTH CAROLINA.

IMPROVEMENT IN STEAM WATER-ELEVATORS.

Specification forming part of Letters Patent No. **212,978**, dated March 4, 1879; application filed January 11, 1879.

To all whom it may concern:

Be it known that I, E. C. PLUMER, of Columbia, in the county of Richland and State of South Carolina, have invented a new and valuable Improvement in Steam Water-Elevators; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a vertical central section of my improved water-elevator. Fig. 2 is a top view of the main cylinder and its attachments. Fig. 3 is a sectional view of the condenser, and Fig. 4 is a top view thereof.

This invention has relation to improvements in means for supplying feed-water to locomotive-engines.

The object of the invention is to dispense with raised tanks, the lifting-pumps in common use, and the necessary attendants, and to substitute therefor devices, substantially as hereinafter set forth, which will supply water to the tenders from wells by utilizing the steam from the locomotive-boiler and atmospheric pressure, thus securing a great saving in expense and labor.

The nature of the invention consists in certain novel combinations of mechanical devices, as will be hereinafter more fully set forth.

In the annexed drawings, the letter A designates an ordinary cylinder arranged in a well, cistern, or other reservoir a sufficient distance below the surface of the soil to be beyond the reach of frost. Usually the cylinder will be made up of connected sections *a*, of short length, and it will be closed at top and bottom by the usual heads. B indicates an induct-pipe reaching down into the water and opening into the cylinder near its lower end. This pipe is provided with a valve opening upward. B' indicates an educt-pipe also opening into the lower part of the cylinder, and, extending upward, leading into a horizontal pipe, C, having at one or both ends an erect pipe, C¹, to the upper ends of which are applied the spout-pipes C². These are swiveled to the upper ends of pipes C¹, so as to have free horizontal vibration, by which they may

be adjusted to the well-hole of the tender. Within the cylinder is a packed piston, D, having the usual rod D¹, that extends through an ordinary stuffing-box in the upper head of the cylinder, as shown in Fig. 1. The rod D¹ is tubular, and it extends through the head D. It is provided at its upper end with a cock, *b*, the object of which will be hereinafter set forth.

The cylinder A is covered in at its upper end by the curb D², that is supported by suitable beams extending across the well or cistern, and upon which is erected a derrick, F, composed of uprights *c* and a platform, *c'*, usually of iron. The platform is slotted, as shown at *d*, and a frame, *d'*, carrying the pulleys *d*² *d*³, is secured to said platform by means of a nut, *e*, applied upon the screw-threaded end of a tang, *e'*, of said frame, extending through the slot *d*. The frame is thus capable of being adjusted so as to bring the prolongation of the piston-rod tangential to the inner pulley, *d*². A strong chain, G, passes over these pulleys and is rigidly secured at one end to the said rod, and carries upon its other end a weight or weights, G¹, that counterbalance the piston and rod. The steam-space of the locomotive-boiler is connected to a fixed pipe, G², leading into the upper end of the cylinder or barrel A by a flexible pipe, usually carried as a fixture by the engine, and this pipe G² being opened by turning a cock, *e*², steam rushes into the cylinder above its piston, and by forcing it down expels all air from the chamber X, below said piston, out of the educt-pipe, and its connections, the said pipe being provided with a valve for the purpose, which opens outward. Steam is regulated automatically by means of a valve, *f*, in pipe G², and cut off by cock *e*², and exhausted therefrom in like manner through a pipe, *f*¹, at the upper end of the cylinder through a valve, *f*³.

A vacuum is thus created in the upper chamber, causing the piston to rise and draw up water until the cylinder is filled, the valve in the educt having closed as the piston rises, and the cock *e*² being closed by hand. This cock is again opened, steam rushes into the cylinder, and (the valve in the induct being closed, that in the educt being opened, and

that in the exhaust-pipe closed) the water is forced through the educt and its connections into the tender.

The valve f of the pipe G^2 is opened and closed as follows: It is provided with a stem, g , having on its end a crank-arm, g^1 , that is flexibly connected to a vertically-vibrating lever, G^3 , by means of a link, g^2 . This lever is carried across a small cylinder, H , in the upper head of the main cylinder, and its free end is fulcrumed in a bracket, g^3 , at the farther side of said cylinder H . This cylinder has a piston of the superficial area of an inch or more, and its rod passes under and straddles the lever G^3 , which is provided with an adjustable weight, g^4 . When steam is passed into the cylinder and overbalances weight g^4 , the head in cylinder H rises, raises the said lever, and closes valve f , through the medium of the link g^2 and the arm on the end of the valve-stem. As the pressure in the cylinder falls a reverse movement of the lever is had, and valve f again opened, and steam readmitted to the barrel A . By this means a regular pressure is maintained in the cylinder, which may be increased or diminished by shifting the weight g^4 farther from or nearer to the small cylinder H .

The valve of the exhaust-pipe, f^1 has a stem, h , to which is attached a cross-arm, h^1 , one end of which is forked, and the other engages a crank-arm, h^3 , on the end of the stem l of a valve, l^2 , placed in an escape-pipe, I , leading from the horizontal pipe C , on which are the spout-pipes aforesaid. The cross-arm h^1 is raised or lowered automatically, thus opening or closing the valves of the escape and exhaust pipes simultaneously, by means of a chain, J , secured at one end to an arm, j , projecting horizontally from the piston-rod of the main cylinder, passing upward over a pulley, k , on the derrick, thence downward between the fork of arm h^1 , and through a guide, k^1 , down into the well. It is provided at its lower end with a weight, k^2 , and with a conical shouldered catch, k^3 . When steam is let on by turning cock e^3 , it forces the piston down to the bottom of the cylinder, chain J is drawn over pulley k , and the shoulder of the catch comes in contact with the forked end of the arm h^1 , raising it up and opening the exhaust-pipe and waste, simultaneously. Steam rushes out of the former, the cock e^3 being closed by the brakeman, and creates a vacuum above the piston, which necessarily rises and draws up a fresh charge of water, this result being accelerated by the counterbalancing-weight G^1 . During the descent of the piston the water below it is forced through the educt and its connections into the tender.

The steam-exhaust pipe f^1 extends to a condensing apparatus, L , in the well. This is composed of two independent chests or vessels, M M' , communicating with each other only through a pipe, N , forming a water-seal.

The pipe N is connected, by a short tube, l^1 , with a cut-off device consisting of a cylin-

der, N' , closed at each end, and opening by a short connection into chest M' , and provided above and below the opening with the valve-seats n n' , respectively, and of an endwise-movable rod, o , having the collars i i' , acting as valves, in connection with the valve-seats n n' , respectively.

The end of rod o bears against the under side of a vertically-vibrating lever, O , fulcrumed on the water-seal pipe N , and having on its other end a plunger, p , that extends down a tube, O' , opening into the chest M , and having above said opening a seat, p' , upon which the collar q on said plunger rests, acting as a valve.

The chest M is provided with a suitable vent and chest, M' , with a trough, P , at its top; or it may have a water-jacket instead.

The operation of the condenser is as follows: The exhaust-steam rushes into the chest M' and the waste water into the trough P at the same time through the simultaneous opening of the valves of the exhaust and waste pipes. The steam is here rapidly condensed, and the water is forced through the cut-off and the water-seal pipe N into chest M as long as the pressure of steam in chest M' exceeds the atmospheric pressure in chest M , the valve i' being against the upper seat, n' . The moment this ceases to be the case, atmospheric pressure, acting through the chest M , the water-seal pipe, and the connection thereof with the cut-off, forces valve i upon the lower seat, allows the lever O , the free end of which is weighted, to vibrate, raises valve q off its seat, and allows the water of condensation to flow out of tube O' back to the well. As the piston descends any body of air below it will pass upward through the hollow piston-rod if the valve at its upper end be opened; but this feature is only useful at the commencement of work, and is not deemed indispensable.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for supplying feed-water to engines, the combination, with a cylinder, A , having the valved induct and educt pipes B B' , the piston D , and rod D^1 , of a curb, D^2 , surrounding said cylinder, a derrick erected thereon, the pulleys d^2 d^3 , a chain, G , secured to the end of the piston-rod, passing over the pulleys, and carrying a counterbalancing-weight, substantially as specified.

2. The combination, with a cylinder, A , having a valved induct and educt and a counterbalanced piston, of a pipe opening into said cylinder above the piston, and leading to the steam-space of a boiler, and a valved exhaust-pipe leading from the upper part of said cylinder into a condenser, all constructed and arranged substantially as shown and specified.

3. The combination, with the cylinder A , having steam-pipe G^2 , leading to the steam-space of a boiler, and a valve, f , in said pipe provided with a stem, g , and an arm, g^1 , of a cylinder, H , in the top of the main cylinder,

its piston and rod, a lever, G^3 , extending across said cylinder and engaging the said rod, and a link connecting the arm g^1 and lever, substantially as set forth.

4. The combination, with a cylinder having a counterbalanced piston and a valved pipe leading from said cylinder above the piston to a steam-boiler, of a subsidiary cylinder on top of the main cylinder, its piston and rod, and a vibrating weighted lever operated by the subsidiary cylinder, and controlling the said valve, substantially as specified.

5. The combination, with the cylinder A, having a counterbalanced piston, a valved steam-pipe, and valved inducts and educts, of an exhaust-pipe having a valve, with stem h and forked cross-arm h^1 , and a waste-pipe, I, opening into the educt, its valve l^2 , stem l , a crank-arm, h^3 , on said stem engaging the cross-arm h^1 , the chain J, having shouldered stop l^4 and weight h^2 , secured at one end to the rod

of the cylinder, passing over a raised pulley, k , and extending down into the well, substantially as specified.

6. The condenser L, composed of the independent chests M M', provided, respectively, with a vent and a water-trough or jacket, the U-shaped pipe N, connecting said chests, the cylinder N', opening into chest M', and having upper and lower-seats, $n n'$, the rod o , having collars $i i'$, the vibrating lever O, rod p , having collar q , tube O', having seat p' and opening into chest M, all combined, arranged, and operating as set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

EUGENE C. PLUMER.

Witnesses:

WATTS CALLASI,
JOHN A. ELLIS.