(No Model.)

J. E. BACON.

PNEUMATIC WATER ELEVATOR.

No. 542,621. Patented July 16, 1895.

Fig. 1.

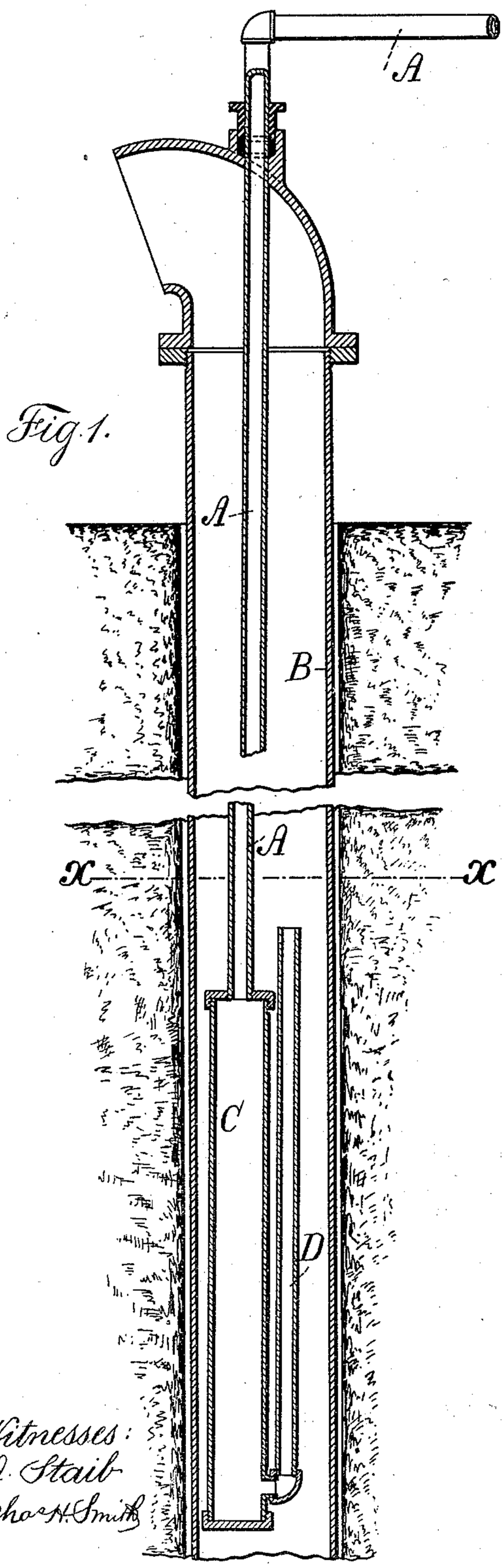


Fig. 2.

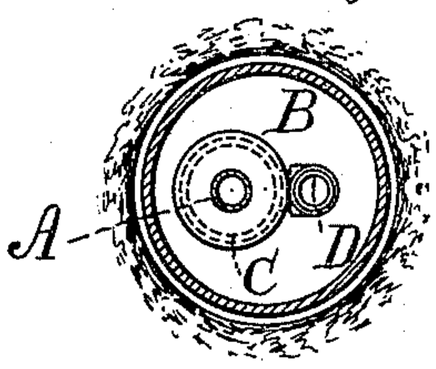
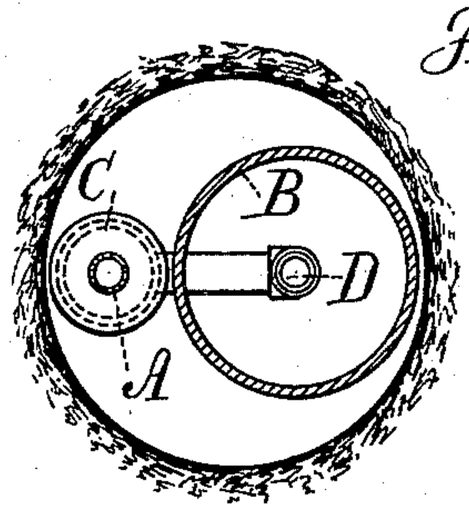


Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES E. BACON, OF RICHMOND, VIRGINIA.

PNEUMATIC WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 542,621, dated July 16, 1895.

Application filed July 5, 1894. Serial No. 516,548. (No model.)

To all whom it may concern:

Be it known that I, JAMES EDWARD BACON, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented an Improvement in Pneumatic Water-Elevators, of which the following is a specification.

Water has been elevated from wells by the action of air passing into the bottom of the column of water and displacing the water in such a manner that the uptake-column extending to the desired height is not heavier than the column of water in the well itself, and the pipe which conveys the air down to the lower end of the uptake-pipe has usually been of the same size, or nearly so, all the way down, and for this reason it has become necessary to employ a separate reservoir or receiver at or near the surface of the ground in order that the flow of air down the well-pipe may be as nearly uniform as possible, so as to prevent the reciprocations of the air-compressing piston causing the air to pass out from the upward ejector intermittently or with greater force at one moment than at another.

The object of the present invention is to render the discharge of the air into the uptake-pipe as nearly uniform as possible and without the necessity of employing a receiver above the ground and between the well and the air-compressor.

In carrying out this invention the pipe which leads the air from the air-compressor is passed down into the well and into the upper end of an elongated tubular chamber, from the lower part of which the air issues through a nozzle and passes into the uptake-pipe to aerate or lighten the column of water so that the same rises to the desired height and flows away.

In the drawings, Figure 1 is a vertical section of the present improvement. Fig. 2 is a horizontal section at the line *x x*. Fig. 3 is a diagram of a modification.

The uptake-pipe B is of any desired character, and the pipe A leads from the air-compressor down into the well to the top of the elongated chamber C, which is in the form of a tube, and the discharge pipe or nozzle D passes upwardly from the lower end of the chamber C and delivers the air into the uptake-pipe B.

I have shown the uptake-pipe B as sufficiently large to contain within it the pipe A, and also the elongated tubular chamber C; but where the size of the well is sufficient the pipe A may pass down outside of the uptake-pipe B, and the tubular chamber C may also be outside of the uptake-pipe B, as illustrated in the diagram, Fig. 3.

Under all circumstances the air from the compressor reaches the tubular chamber C, and any pulsations of the air cease to be appreciated at the bottom of the tubular chamber C in consequence of the length of the same and the air acting similarly to a spring. Hence the flow of atmosphere upwardly from the discharge pipe or nozzle D will be substantially uninterrupted and uniform, and the action of the same in aerating or lightening the column will be more uniform and reliable than in cases where the pulsations in the air-supply may reach the discharge pipe or nozzle at the bottom of the well; and this apparatus is cheap to construct, and it is out of the way and at a point where the atmosphere is confined under the pressure due to the head of water, so that the efficiency of the air in the chamber C as a spring in neutralizing the pulsations of the air-compressor is fully obtained.

It will de observed that the discharge pipe or nozzle D rises to a considerable height within the uptake-pipe. In Fig. 1 it is represented as coming above the top of the air-chamber C. The object of this construction is twofold: First. That the upward discharge of the air in a continuous jet may fill the column of water with numerous and comparatively small air-bubbles in that portion of the well which only contains the comparatively small air-pipe A, and hence there will be nothing to interfere with the uniform rise of the column of water in the uptake-pipe, whereas any obstruction in the uptake-pipe might tend to detain either the air or the water and cause the numerous bubbles of air to unite in larger bubbles and interfere with the proper aerating of the whole mass of water.

The second object in employing a long nozzle D is that after the well has remained qui-

escent the water will pass through the nozzle D, fill the chamber C and the pipe A up to the level of the exterior water in the well, and when the compressed air is admitted in the pipe A it has to drive down the column of water to the lower end of the nozzle D, and in so doing a greater pressure of air than that subsequently required to raise the water is required, because the column of water displaced is higher than the column of water above the upper end of the nozzle D. For this reason the superior pressure of air which is required to displace this column escapes suddenly by the nozzle D and acts violently upon the water in the well, and not only aerates the same and causes it to rise, but acts with sufficient suddenness to stir up any sediment or mud that there may be in the well and cause a more perfect flow of the water than would be the case were it not for the violent ebullition, and during the operation of the elevating device, after the same has been started as aforesaid, the pressure required of the air is only sufficient to displace the column of water above the top of the nozzle D, and the jet of air so escaping is purposely caused to be continuous in order that the column of water in the uptake-pipe may be filled with a very large number of comparatively-small air-bubbles, which, permeating the entire column of water, lessens the weight of that column sufficiently to cause it to rise to the point of delivery, and the efficiency of this water-raising apparatus is largely augmented by the fact that the force exerted by the continuously-issuing jet of air is effective in drawing the water at the bottom of the uptake-pipe and in sustaining the column of water above the issuing jet of air, and, the air-bubbles being very numerous and small, break at the surface of the water without interfering with the continuous and uninterrupted flow of the water from the discharge-opening.

I claim as my invention—

1. In an ejecting apparatus for wells, the combination with the uptake pipe of a long air chamber near the lower end of the uptake pipe, a tube for supplying air into such chamber and a pipe open at both ends and extending up from near the lower end of the air chamber into the uptake pipe above such air chamber and delivering a continuous jet of air into the water in the uptake pipe, substantially as specified.

2. A tubular well lining forming an uptake pipe and having a delivery upper end, in combination with an air forcing pipe a long air chamber within and near the lower end of the tubular lining and to which the lower end of the air forcing pipe is connected and a discharge pipe or nozzle receiving air from the lower part of the chamber and delivering the same as a continuous jet into the uptake pipe above such air chamber substantially as specified.

Signed by me this 2d day of July, 1894.

J. E. BACON.

Witnesses:
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