

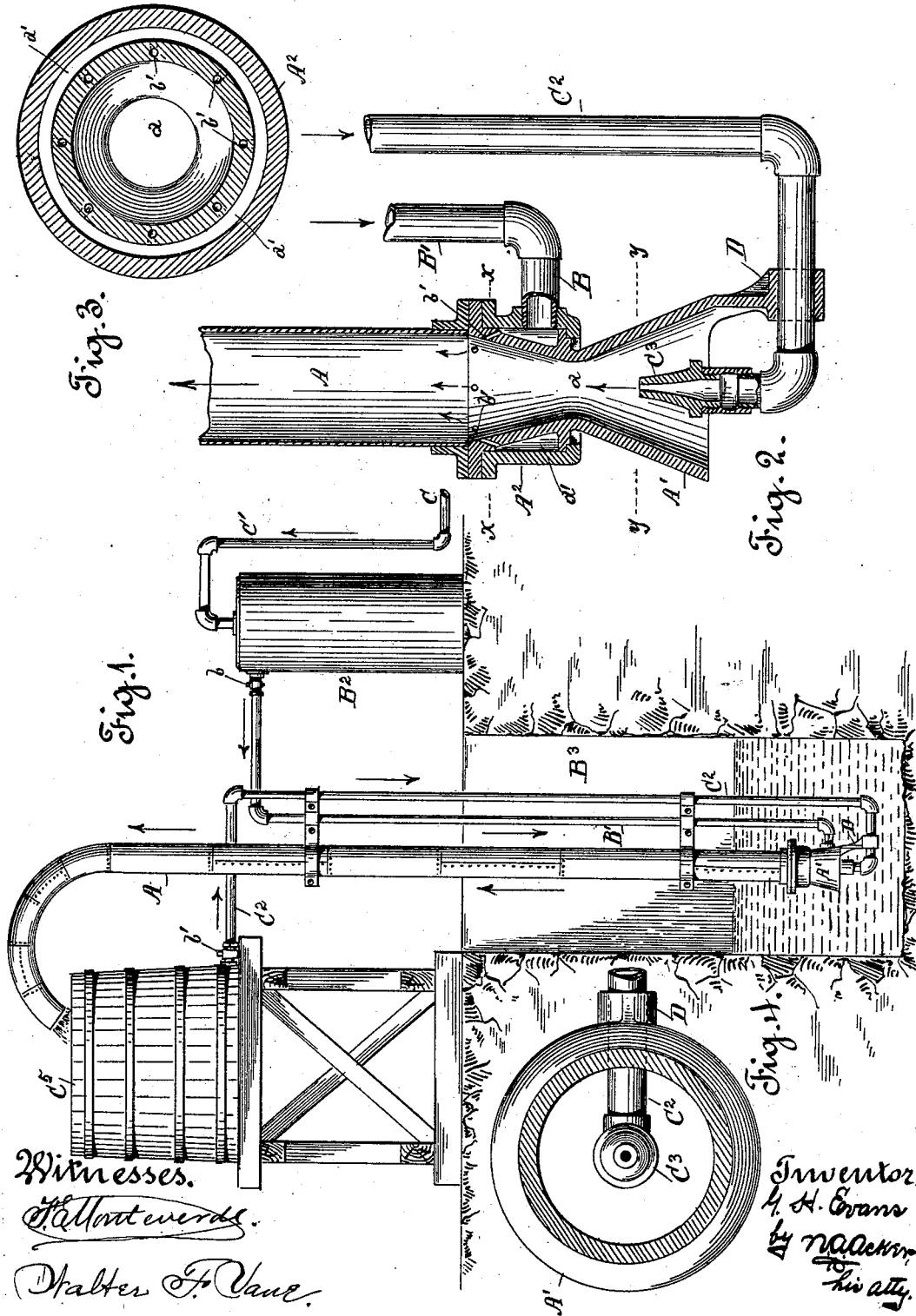
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Patented Apr. 3, 1900.

G. H. EVANS.
AIR LIFT PUMP.

(Application filed Jan. 26, 1899.)

(No Model.)



Witnesses.

H. Monteverde.

Shalter F. Vane.

Inventor.
G. H. Evans
By *W. A. Adams*
his atty.

UNITED STATES PATENT OFFICE.

GEORGE HENRY EVANS, OF OROVILLE, CALIFORNIA, ASSIGNOR OF ONE-HALF TO THE RISDON IRON AND LOCOMOTIVE WORKS, OF SAN FRANCISCO, CALIFORNIA.

AIR LIFT-PUMP.

SPECIFICATION forming part of Letters Patent No. 646,640, dated April 8, 1900.

Application filed January 26, 1899. Serial No. 703,429. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HENRY EVANS, a subject of the Queen of Great Britain, residing at Oroville, in the county of Butte and State of California, have invented certain new and useful Improvements in Air Lift-Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof.

The present invention relates to certain new and useful improvements in that class of hydraulic mechanism known as "air lift-pumps;" and it consists in the arrangement of parts and details of construction as will be hereinafter set forth in the drawings and described and pointed out in the specification. In this class of pumps, as is well known, the operation is dependent entirely upon the buoyancy of the air forced into the column-pipe, the same acting as a piston by means of which the water is forced or lifted upward and expelled from the said column-pipe. With the air lift-pumps as now constructed the efficiency of the same is dependent upon the submergence given to the column-pipe, which must be to such an extent or depth that the hydraulic pressure due to the immersion does not quite equal the pressure of the compressed air forced into the bottom of the column-pipe. With the present air lift-pumps the height to which the water may be elevated is entirely dependent upon the submergence given to the column-pipe—i. e., if it is desired to elevate the water fifty feet from a well a submergence of about seventy-five feet should be provided for. Inasmuch as it is not at all times possible to obtain the required submergence, at least not without going to considerable expense, the use of this form or style of pump is considerably limited.

The object of my invention is to dispense with this excessive submergence now required and so arrange that a submergence of the column-pipe of a few feet will give the same efficiency to the air lift-pump as is now obtained by a submergence proportionate about one and a half to one. However, the main object is to dispense with the submergence at present required and to overcome the expense attached to the sinking of a well to such depth to obtain the required submergence.

In order to comprehend the invention, reference must be had to the accompanying sheets of drawings, forming a part of this application, wherein—

Figure 1 is a side view in elevation, showing the arrangement of the air lift-pump within a well. Fig. 2 is a similar view illustrating in vertical section the column-pipe, its base, and water-ejector nozzle. Fig. 3 is a top plan view taken on line *x x*, Fig. 2; and Fig. 4 is a similar view taken on line *y y*, Fig. 2.

The letter A is used to indicate the column-pipe, to the lower end of which is attached the flared or bell-mouth base A'. This base is provided with a throat *a* and an outer air-chamber *a'*, which is formed in the present case by means of the circular flanged ring A², which surrounds the upper portion of the base and is attached thereto in any well-known manner. Into this air-chamber extends the air-inlet pipe B, to which the lower end of the air-supply pipe B' is connected. This pipe leads from a receiver B², which receives air from an air-compressor located at C, the air being conveyed to the receiver through connection C'. The flow of air from the receiver is controlled from the cock *b*. The air entering the chamber *a'* escapes therefrom into the column-pipe through the air-outlet openings *b'*, Fig. 2.

At any suitable height above the well B³ is located a water-tank C⁵, into which the water forced through the column-pipe is discharged. From this tank leads a water-supply pipe C², which pipe extends downward alongside of the air-pipe B and connects with an ejector or discharge-nozzle C³, fitted within the enlarged opened mouth of the base A', the said pipe being held in place at its lower end by means of the bracket D, depending from the base. By means of this pipe C² water is conveyed from the receiving-tank C⁵ and discharged into the base through the ejector or nozzle C³, the flow of water being controlled by the cock *b'*. By preference a water-supply pipe of about two inches in diameter is employed and an air-supply pipe of about one and one-half inches in diameter, while a ten-inch column-pipe is utilized. The pres-

sure of the water discharged from the ejector C³ into the base is dependent upon the elevation of the body of water within the receiving-tank. This should be so arranged that the pressure of the water slightly exceeds that of the air. The pressure of water forced into the column-pipe through the base serves the same purpose as the body or pressure of water obtained by deep submergence of the column-pipe. Hence I am enabled, the pressure of the ejected water being proportionate to the lift required, to dispense with such deep submergence and obtain the same result by a submergence of only a few feet of the column-pipe—say from two to five feet. By this “auxiliary” pressure-column, so to speak, the expense of digging a deep well in order to secure the usual depth for submergence is obviated and the same result accomplished as is now obtained by the deep submergence. If so desired, the base and auxiliary pressure-pipe may be attached to existing air lift-pumps. As the water is ejected from the auxiliary pipe into the column-pipe a vacuum is created, which draws the water from the well into the column-pipe, the pressure of the ejected stream of water serving to lift the body of water inward and hold it against downward movement until acted upon by the current of air ejected into the column-pipe above the water-ejector. The water is then acted upon by the compressed air forced there-

in, which answers as a piston, by means of which the water is elevated to the required height.

It is obvious that in place of water being ejected under pressure into the column-pipe through the base steam may be forced through the auxiliary pipe with equally good results. However, I prefer to utilize a column of water, owing to the simplicity in the arrangement of the parts required for the air-lift.

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

In an air lift-pump the combination with a discharge or column pipe having an inlet-opening in its base, and a series of air-jet openings above the inlet-opening, means for forcing air through the jet-openings, a tank above the pump and into which the pipe discharges, and a hydraulic water-supply pipe leading from the tank to the base of the column-pipe having an upturned nozzle on its lower end arranged in line with the interior of the column-pipe for the purpose specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 16th day of January, 1899.

GEORGE HENRY EVANS.

Witnesses:

JOHN H. SANSFIELD,
EDMUND HARVEY.