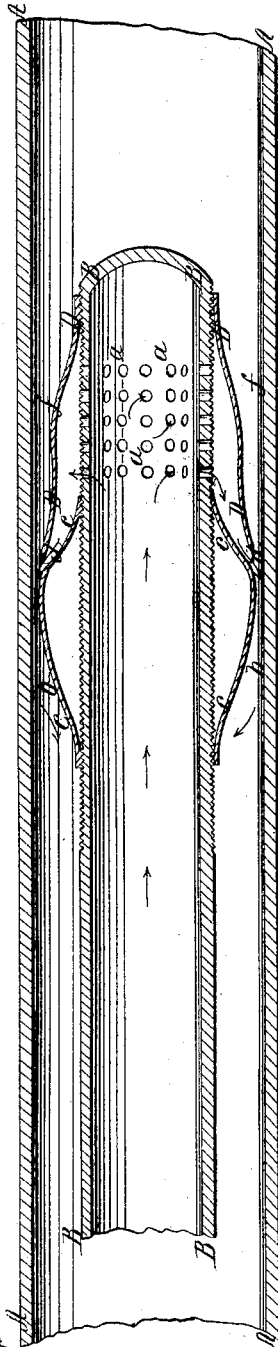


G. M. Mowbray,

Ejecting Pump,

N^o 45464.

Patented Dec. 13, 1864.



Witnesses

Am. P. M. Samara
Theo. Fusch

Inventor

Geo. M. Mowbray

UNITED STATES PATENT OFFICE.

GEO. M. MOWBRAY, OF TITUSVILLE, PENNSYLVANIA, ASSIGNOR TO J. D. ANGIER AND F. CROCKER, OF SAME PLACE.

IMPROVEMENT IN EJECTORS FOR OIL-WELLS.

Specification forming part of Letters Patent No. **45,464**, dated December 13, 1864.

To all whom it may concern:

Be it known that I, G. M. MOWBRAY, of Titusville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Improvement in Ejectors for Oil and other Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

The drawing, consisting of one figure, illustrates the application of my invention within the tubing of an oil-well.

My invention relates to that kind of ejector or apparatus for raising liquids from deep wells in which two tubes and a deflector are employed, a blast of air being forced down through one tube and its direction deflected upward, (by a deflector,) and the contents of the well caused to ascend through the other tube.

The object of my invention is to render this kind of machine capable of such an adjustment of its parts as to admit of the annular space through which the blast escapes from the deflector being varied or regulated to suit the variable conditions of the same or different wells; and to these ends my invention consists in the employment, in combination with the blast-tube and deflector, of an adjustable bulb, or its equivalent, which can be placed nearer to or farther from the mouth of the deflector, to increase or diminish the air-passage, all as hereinafter more fully explained.

Assuming a well to have been bored to the necessary depth to obtain the oil or other object sought, varying in the case of oil-wells from four hundred to one thousand or more feet, according to the stratification, it is next to be tubed in the ordinary manner with a tube two inches in diameter, more or less, of iron, copper, or brass. This tubing is provided with the ordinary seed-bag, fixed at such a point as will effectually cut off the fresh or surface water from the oil or salt bearing or other strata. To the upper part of this tubing an elbow is to be secured, so as to give an outlet for the ejected liquids and air.

I prefer to make this elbow of curved form rather than of the form of a right angle. A stuffing-box and gland with a tightening-screw are attached to a screw-thread cut upon this elbow, to enable me to secure within it a smaller tube of about one-half the diameter of the outer tube—say one inch—which is passed down within said outer tube to a point near its termination. I have not thought it necessary to show this mode of attachment, because it is familiar to mechanics, and is not my invention. This point may vary in its distance from the termination of the outer tube. For instance, it may reach to within one foot or ten feet or one hundred feet or more of the lower end or bottom of the outer tube, as circumstances may show to be desirable or necessary. Good results are obtained at different distances in different wells. The mouth of the inner tube is to be connected with a force-pump whose fittings must be able to sustain a pressure equal to the weight of the column of oil or other liquid in the well—say a column four hundred to one thousand feet in height. The inner tube is closed at its extreme lower end, and its sides near its end are perforated with numerous small holes—say one eighth of an inch in diameter and some sixty in number—the intention being to have the sum of the areas of the perforations equal the capacity of the inner tube. These perforations are to be arranged in close circular or other order, so as to produce the best effect by means of the air escaping therefrom, and the lowest holes are to be far enough from the bottom of the tube to allow a conical cup, hereinafter described, to be screwed or otherwise firmly attached upon the tube between them and its extreme end. A screw-thread is formed upon the lower end of the inner tube from its end up to a point several inches above the topmost row of holes—say on a tube one inch in diameter to a point six inches above its end. An open brass or other metallic tube whose ends are of a diameter to fit over the tube, and which have an internal screw-thread cut in each, is now to be screwed upon the tube, so as to be entirely above and clear of the perforations. This tube nearly resembles a

form described as made up of two truncated cones united at their bases. Its diameter increases from each end toward the center of its length, where it is enlarged to a bulb, which so nearly fills the outer tube that an annular space only one-sixteenth to one-eighth of an inch in width is left between their sides. Another brass or other metallic tube, in form resembling a truncated cone with irregular sides, is next screwed upon the end of the inner tube below the perforations, and it is to be of such a length as to extend nearly to the bulb or enlarged diameter of the tube above the holes, and its diameter at its base is to be about equal to the diameter of the bulb, leaving, also, a like annular space between its sides and the interior of the outer tube, and of about the same width. This tube I designate a "deflector."

The adjustment of the parts of the above-described ejector and bulb and their relative distances apart and the relative diameters of the outer and inner tubing are dependent upon the height of the column of liquid to be lifted, having reference always to the power and capacity of the air-forcing pump.

This invention is likewise applicable where the rock is of a compact nature, so that the outer tubing can be dispensed with, it only being necessary in such cases to use an air tube and ejector of suitable proportions combined with an air-pump of the necessary capacity.

A in the figure represents a portion of the outer tube, B, the lower portion of the inner tube having a screw-thread cut upon it. D is the conical brass tube, screwed to the end of the inner tube, B. It extends upward over the perforations *a*, and nearly up to the bulb or enlarged diameter of the brass tube *e*, whose ends or necks are screwed up to their proper places upon the inner tube, B, and whose sides expand nearly to the inner circumference of the outer tube, A.

The operation of the apparatus is as follows: The tubes being in proper position in the well, air is forced into the inner tube, B, by means of an air-forcing pump. The air will become compressed in the tube B, and will issue therefrom at the perforations *a* into the channel formed by the brass tube D, which incloses them, and will be discharged at its mouth *d* into the annular space *b* with great velocity, causing a vacuum to be formed in the annular space *f*, formed between the conical tube D and the outer tube, A, and thereby compelling an upward current of any fluid or liquid which may be found in the said annular space *f*. The continued pressure of the air in the inner tube, B, causes the air-currents issuing from the mouth *d* of the ejector to lift mechanically the column of air, or water, or oil which may occupy the annular space *b* at the commencement of the operation, and to discharge it at the place of discharge of said outer tube, A. A current of whatever fluid may be present in the space *f* below the ejector will be established in an upward direction to supply the space of that forced upward, as already described, and thus, so long as the pump is worked, a continuous discharge will take place at the outlet of the annular space of oil or other liquid mixed with the ascending forced current of air.

Having fully described the construction and operation of my improved ejector, what I claim therein as new, and desire to secure by Letters Patent, is—

The employment, in connection with the blast-tube and deflector, of an adjustable bulb, or its equivalent, substantially as described, for the purpose set forth.

GEO. M. MOWBRAY.

Witnesses:

WM. I. McNAMARA,
THEO. TUSCH.