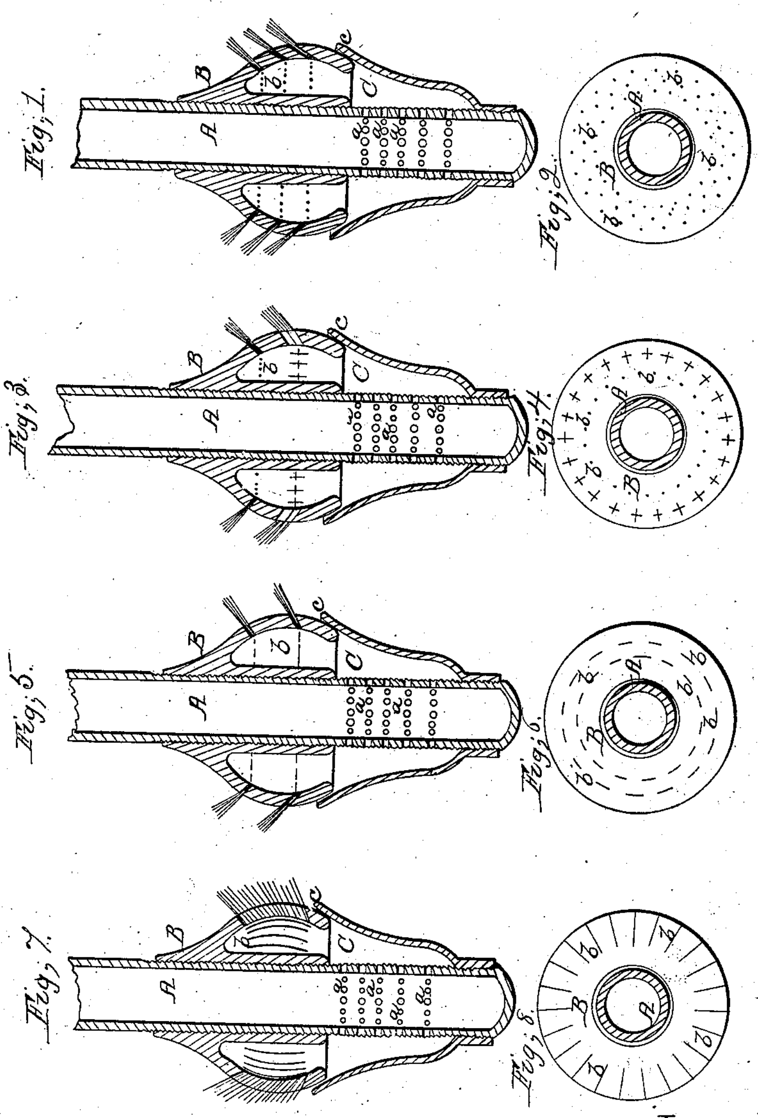
3 Sheets-Sheet 1.

G. M. Mowbray,

Ejecting Pump.

No. 46,485. Patented Feb. 21, 1865.



Witnesses,

Inventor,
Geo. M. Mowbray
By Munn & Co
Atty

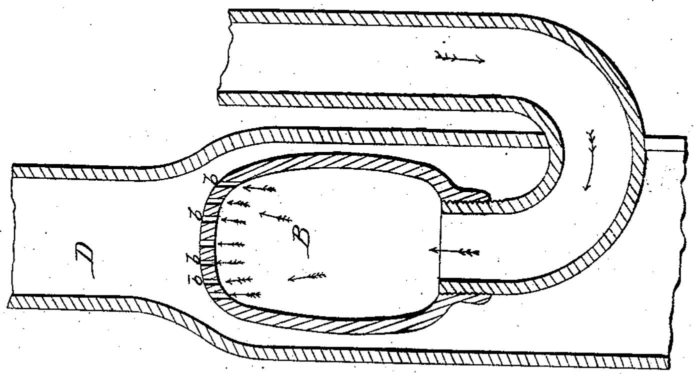
3 Sheets-Sheet 2

G. M. Mowbray.

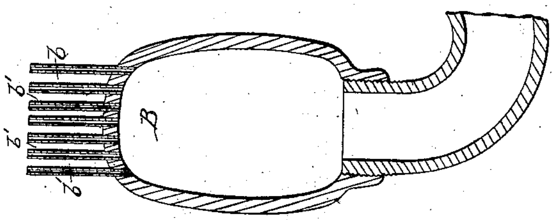
Ejecting Pump.

No. 46,485. Patented Feb. 21, 1865.

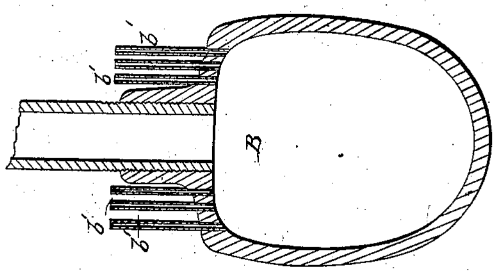
Fig; 12.



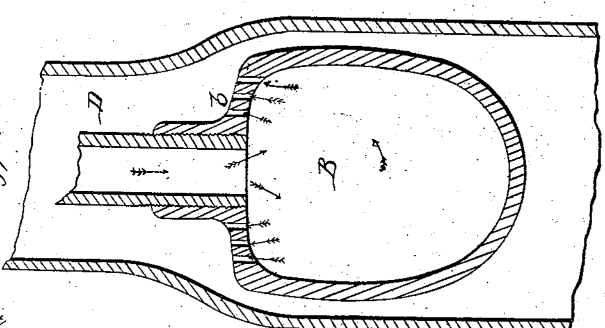
Fig; 11.



Fig; 10.



Fig; 9.



Witnesses;
C. D. Smith
G. Schroth

Inventor;
Geo. M. Mowbray
By Munn & Co
Atty

3 Sheets-Sheet 3

G. M. Mowbray,

Ejecting Pump.

No. 46,485. Patented Feb. 21, 1865.

Fig. 13.

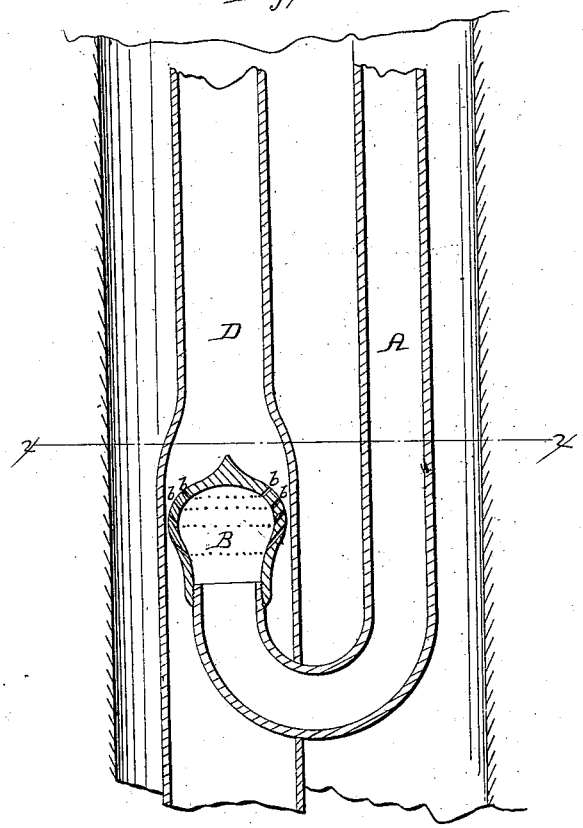
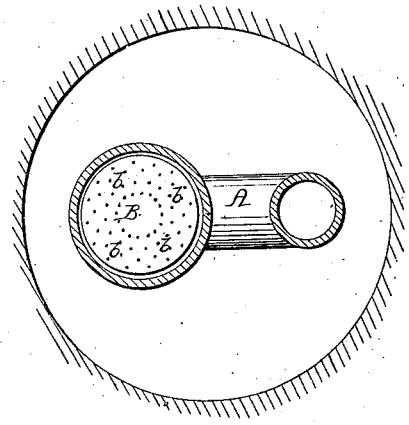


Fig. 14.



Witnesses;
C. D. Smith
A. Schutter

Inventor;
Geo. M. Mowbray
By Munn & Co
Attys

UNITED STATES PATENT OFFICE.

GEORGE M. MOWBRAY, OF TITUSVILLE, PENNSYLVANIA.

IMPROVEMENT IN EJECTORS FOR OIL-WELLS.

Specification forming part of Letters Patent No. **46,485**, dated February 21, 1865.

To all whom it may concern:

Be it known that I, GEORGE M. MOWBRAY, of Titusville, in the county of Crawford and State of Pennsylvania, have invented certain new and useful Improvements in Ejectors for Oil and other Wells; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figures 1, 3, 5, 7, 9, and 10 are vertical sections illustrating my invention under varying forms as applied to ejectors with concentric tubes. Figs. 2, 4, 6, and 8 are plans of the nozzles illustrated in Figs. 1, 2, 3, and 4, respectively. Figs. 11, 12, and 13 are longitudinal sections illustrating the invention as applied to ejectors in which the tubes are not concentric. Fig. 14 is a horizontal section at *x x*, Fig. 13.

Similar letters of reference indicate corresponding parts in the several figures.

The object of my invention is to economize the compressed air necessary to operate the apparatus known as an "ejector," used in Artesian or other wells for the purpose of raising liquids from considerable depths. For this purpose the nozzle of the blast-pipe or ventage of an ejector is so constructed that in lieu of one solid stream or one sheet of air the compressed air, when it issues to perform its work, may be separated and delivered in two or many streams, or so divided as to present the greatest possible operating-surface consistent with the velocity or power of the blast.

In order to raise the greatest possible quantity of liquid with the least possible expenditure of compressed air, the apertures of the ejector are so shaped as to split the issuing compressed air into two or more fine streams of any desired form or forms upon a principle analogous to that employed in various descriptions of gas-burners, the intention being to expose the largest possible surface of the issuing fluid to contact with that which surrounds it.

Instead of the air-tube of the ejector terminating in a single conical nozzle or in an annular ring, I have found various perforations more effective.

The following description will enable any one skilled in the art to which my invention appertains to fully understand and use the same.

Figs. 1 to 8, inclusive, show various forms of nozzles to be used with concentric tubes and requiring no contraction in the outer or discharge tube above the nozzle of the air-tube.

A represents the air-tube, provided at *a* with perforations, the sum of whose area may equal that of the tube itself.

B is a bulb, of conoidal or other form, screwed or otherwise secured to the tube A and surrounding the same above the perforations *a*.

C is a cup secured adjustably to the tube (by a screw-thread) below the perforations *a* and inclosing the same, a contracted annular space, *c*, being left between the edges of the cup and bulb, which space may be regulated by turning the tube up or down within the cup C, or in any other manner adjusting the bulb or cup in relation to one another. The sides and upper surface of the bulb B are provided with vertical or inclined apertures *b b b*, so formed and arranged that air issuing from them will be directed upward within the surrounding tube. (Not here shown.) In Figs. 1 and 2 these apertures are simply perforations, which may be inclined, but are in preference made vertical. In Figs. 3 and 4 one circular range of the apertures is represented elongated vertically and horizontally. In Figs. 5 and 6 the apertures consist of horizontal, and in Figs. 7 and 8 of vertical, slits. The remaining figures illustrate nozzles of various forms intended for use with tubes contracted above the nozzle. In each case the nozzle is of larger area than the tube, affording room upon its upper surface for apertures which will emit the air in vertical direction. In Fig. 9 these apertures *b b b* surround the air-tube. In Fig. 10 a series of vertical tubes, *b′ b′ b′*, are employed. In Fig. 11 similar tubes *b′* and in Figs. 12, 13, and 14 apertures *b* are shown in connection with a discharging or elevating tube not concentric with the air-tube. D in each case represents the discharge-tube through which the liquid is elevated by the blast of compressed air or other fluids issuing from the nozzles and ascending continuously.

The apertures *b* may, if preferred, be formed in a bulb or nozzle whose upper surface is a

plane, and may extend over the edges and more or less down the sides of the same, as convenience of mechanical construction or effectiveness in use may prove to be desirable.

Having thus described my invention, I wish it distinctly understood that I do not restrict myself to any specific number or form of perforations.

I do not claim, broadly, in this application a deflector for oil-ejectors; neither do I claim the use of compressed air or steam for elevating liquids from wells; but

What I do claim as my invention, and desire to secure by Letters Patent, is the following:

1. In ejectors for elevating liquids and other substances from wells, the combination and arrangement of the following specified parts: first, a pipe through which to force air down into a well; second, a surface at the bottom of such pipe to resist the air so forced down and give it an upward motion; and, third, the combination and arrangement of the plurality of pipes and passages, whereby to divide and distribute and conduct the air upward, so that it shall act upon the oil or other liquids and obstructing substances in its ascent, substantially as described.

2. The combination and arrangement of the above-mentioned three parts with an inclosing-pipe, into which they are to be placed, and between the inner surface of which and the outer surface of the pipe through which air is to be forced down the liquid to be elevated is to ascend.

3. A bulb or inverted cup or nozzle, B, of any suitable form, screwed or otherwise attached to or formed upon the blast-pipe, and provided on its upper surface with a plurality of apertures to deliver the air in attenuated form, substantially as set forth.

4. In combination with the aforesaid pipe, closed at bottom, and bulb B, with a plurality of apertures, the cup C, adjustable in the relation to the said bulb, substantially as and for the purposes set forth.

5. In combination with a blast-pipe, A, the cup or bulb B, having upon its upper surface a plurality of perforations, slits, or tubes surrounding the said blast-pipe, substantially as and for the purpose set forth herein.

The above specification for my improvement in ejectors for oil and other wells signed this 9th day of November, 1864.

GEO. M. MOWBRAY.

Witnesses:

JAMES H. GRIDLEY,

THOS. N. CHASE.