April 22, 1924.

1,491,057

B. F. MYERS

PUMP

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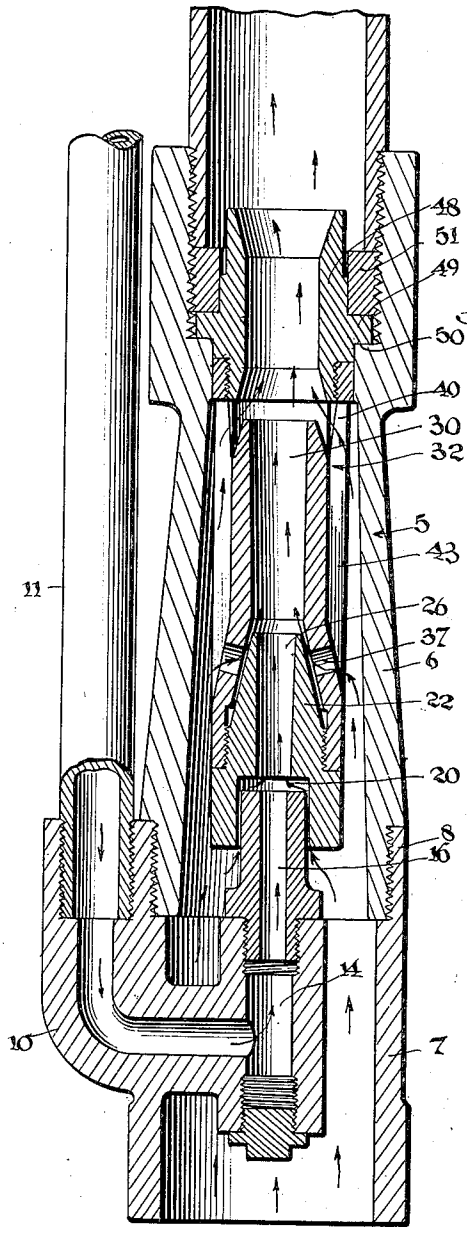


Fig. 1.

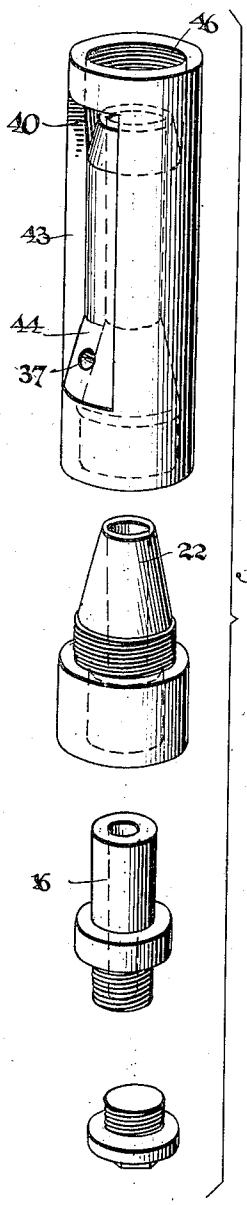


Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, BENJAMIN F. MYERS, a citizen of the United States, and resident of Marshall, in the county of Harrison and State of Texas, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to air lift pumps especially adapted for pumping water from great depths.

An important object of this invention is to provide an air lift pump consisting of a series of spaced nozzles by means of which the air is employed expansively for setting the water in motion and elevating the same.

A further object is to provide an air lift pump which will operate with a high degree of efficiency and which requires a minimum amount of air at a low pressure to elevate the water in the desired quantity.

A further object is to provide an air lift which is of highly simplified construction, free of moving parts and which is comparatively cheap to manufacture.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawing forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a vertical sectional view through the improved air lift device.

Figure 2 is a group perspective of the several nozzles embodied in the invention and which are employed to use the air expansively.

In the drawing wherein for the purpose of illustration is shown a preferred embodiment of the invention the numeral 5 generally designates the body of the improved air lift pump, the said body consisting of upper and lower sections 6 and 7 threadedly connected as indicated at 8.

The improved air lift device and more specifically the lower section 7 is provided with a lateral branch 10 with which an air inlet pipe 11 has connection and it is believed to be obvious that the air supply pipe 11 extends from a pump at the surface so that the air forced through the pipe under pressure will pass through the branch 10 and into the body 5.

Figure 1 illustrates that the inlet branch 10 has connection with a centrally arranged longitudinally extending branch 14 to which an outlet member or nozzle 16 is connected. The air which passes under pressure through the uniform bore of the nozzle 16 is discharged into the enlarged bore 20 at the rear end of an intermediate nozzle 22. More specifically the numeral 20 indicates the enlargement in the rear portion of the bore of the bushing 22 and the upper portion of the outlet member 16 is freely received in the enlargement 20.

As the upper portion of the nozzle 16 is freely received in the enlarged bore 20 a quantity of water may pass between the nozzle and the wall of the enlarged portion 22 and mingle with the air, thereby setting up motion in the entire body of water.

The water which issues from the nozzle 16 enters the longitudinally extending bore 26 of the intermediate nozzle 22 and it will be seen that the bore 26 is gradually and uniformly enlarged in the direction of travel of the air and water so that the air may be used expansively.

The air and water which issues from the intermediate nozzle 22 is discharged into the bore 30 of a second intermediate nozzle 32 and the bore 30 of the nozzle 32 is also gradually and uniformly enlarged so that the air may further expand. The air which issues from the nozzle 22 acts upon the water drawn through the radial openings 37 and when the water is sucked in through the openings 37 the movement of the water is, of course, further accelerated.

The major quantity of water is elevated by the finally expanding air issuing from the upper end of the nozzle 32 at which point the air acts upon the water entering by way of the oppositely located openings 40.

Attention is especially directed to the fact that the opposite sides of the nozzle 32 are formed with elongated recesses 43 which communicate with the openings 40 and thereby form what might be said to be feeders or passages for the water entering the openings 40. In this manner the movement of the water through the openings 42 is greatly accelerated. Also the lower walls of the openings 40 are beveled so that the water may pass through the openings with a minimum of resistance. Figure 2 illustrates that the openings 37 are extended in from

the inclined bottom wall or lower end walls 44 of the recesses or passages 43.

The upper portion of the nozzle 32 is interiorly screw threaded as indicated at 46 and has connection with the lower portion of the discharge nozzle 48. The nozzle 48 is provided with an annular flange 49 which is seated upon an annular shoulder 50 in the upper portion of the body 5. A bushing or ring nut 51 may be employed for securing the upper nozzle 48 and associated elements securely in position.

Figure 1 clearly illustrates that the inlet and outlet ends of the discharge nozzle 46 are flared or bell-shaped so as to allow for the movement of the air and water at a maximum speed.

With reference to the foregoing description it will be seen that the water under pressure will pass through the nozzle 16 and pick up a small quantity of water coming in through the enlarged portion of the bore of the intermediate nozzle 22 and a further quantity of water will be picked up as the air issues from the enlarged upper end of the intermediate nozzle 26.

The principal expansion of the air takes place in the intermediate nozzles 22 and 32 and the major quantity of water is taken in by way of the openings 40—40 and elevated to the surface. The water is started in its travel and is elevated with a high degree of efficiency and with a minimum of air pressure. Furthermore the water will not be rendered muddy as the result of the action of the air as the air merely creates a suction which acts upon the water. No stirring action takes place in the water and the water is not agitated.

Having thus described the invention, what I claim is:—

1. An air lift pump comprising a nozzle having external elongated recesses constituting feeders and openings to receive the liquid from said elongated recesses.

2. A water lift pump comprising a tubular body having a longitudinally extending air outlet member, a nozzle having a longitudinally extending bore enlarged at its rear end to freely receive said outlet member, the wall of the enlarged portion of said bore being spaced from said outlet member whereby water may enter and mingle with the air, the bore of said nozzle being uniformly enlarged in the direction of travel of the air and water whereby the air may be employed expansively, and a second nozzle supporting the first named nozzle and having water inlet openings adjacent the outlet end of said first named nozzle, said second named nozzle being provided with major water inlet openings and with longitudinal depressions to feed substantial quantities of water to said major inlet openings.

3. A water lift pump comprising a tubular body having a longitudinally extending air outlet member, a nozzle having a longitudinally extending bore enlarged at its rear end to freely receive said outlet member, the wall of the enlarged portion of said bore being spaced from said outlet member whereby water may enter and mingle with the air, the bore of said nozzle being uniformly enlarged in the direction of travel of the air and water whereby the air may be employed expansively, a second nozzle supporting the first named nozzle and having water inlet openings adjacent the outlet end of said first named nozzle, said second named nozzle being provided with major water inlet openings and with means to feed substantial quantities of water to said major inlet openings, and a final discharge nozzle connected to the body and supporting said first and second named nozzles.

4. A water lift device comprising a body having air supply means extending longitudinally thereof, a nozzle freely receiving said air supply means, there being means between the nozzle and the air supply means to allow a small quantity of water to enter the nozzle, said nozzle being gradually and uniformly enlarged interiorly to allow of the expansion of the air, a second nozzle having connection with the first named nozzle and being internally enlarged toward its outlet end, the upper portion of the second named nozzle being provided with major water inlet openings, said second named nozzle being provided with longitudinally extending recessed portions constituting feeders for said major water inlet openings.

5. A device of the character specified comprising a nozzle having water inlet openings and elongated longitudinal external depressions constituting feeders by means of which water is supplied to said openings.

6. A device of the character specified comprising a nozzle having water inlet openings and elongated longitudinally extending depressions forming feeders by means of which water is supplied to said openings, the end walls of said openings being beveled for the free passage of water, and means whereby to supply air under pressure to said nozzle.

7. A device of the character specified, comprising a body, a nozzle arranged therein and having a bore gradually enlarged toward its outlet end, the nozzle being provided with major liquid inlet openings and with longitudinal recesses constituting feeders for the free passage of liquid, a second nozzle supporting said first named nozzle and having its ends flared, and an air supply nozzle connected to said first named nozzle and provided with a gradually enlarged bore.

8. A device of the character specified, comprising a body, a nozzle arranged there-

in and having a bore gradually enlarged toward its outlet end, the nozzle being provided with major water inlet openings and with longitudinally extending recessed portions constituting feeders for the free passage of water, a second nozzle supporting said first named nozzle and having its ends flared, an air supply nozzle connected to said first named nozzle and provided with a gradually enlarged bore, the body being provided with a gradually restricted bore receiving said nozzles.

BENJAMIN F. MYERS.