S. MURTA.

WATER ELEVATOR.

APPLICATION FILED APR. 14, 1911.

1,016,085.

Patented Jan. 30, 1912

Fig. II.

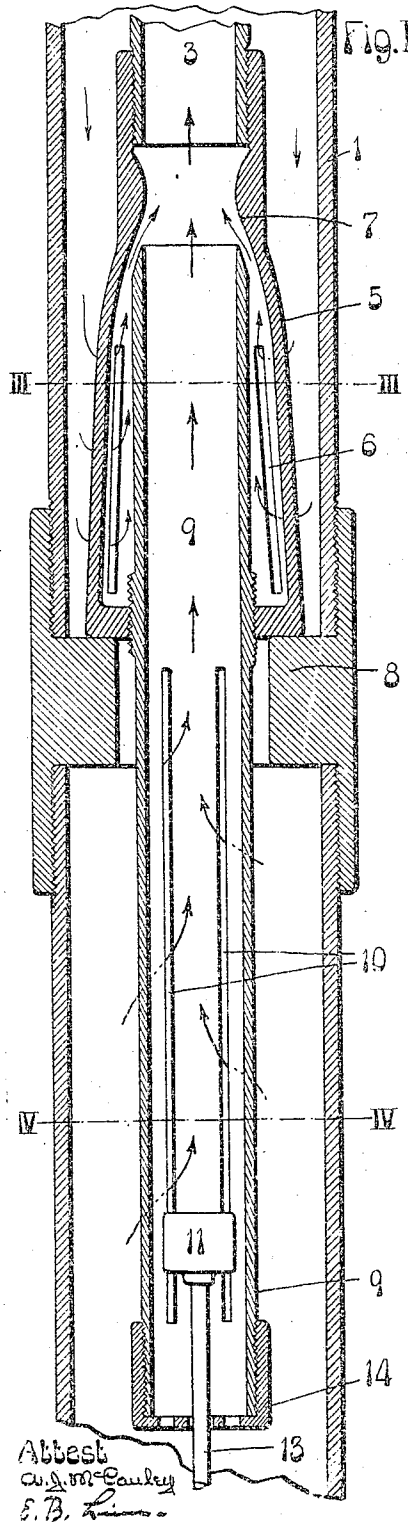


Fig. I.

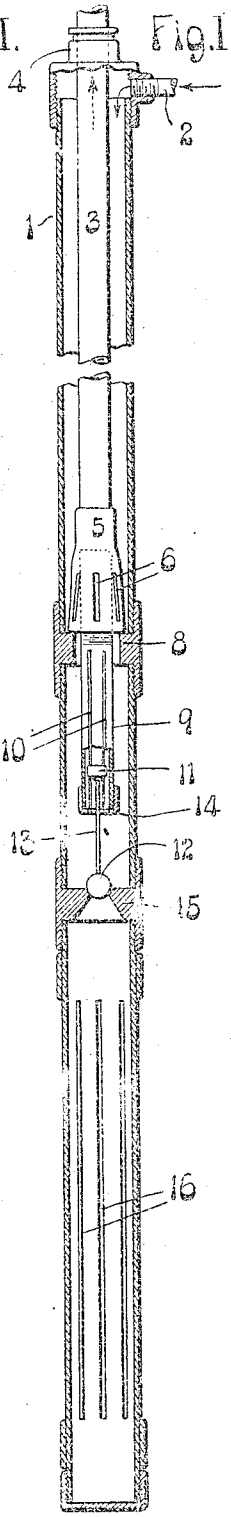


Fig. III.

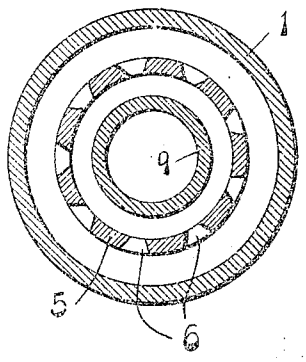
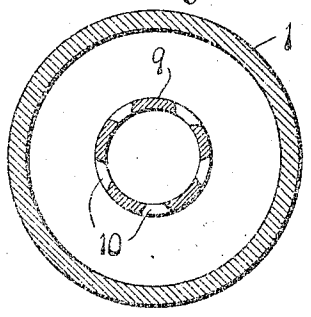


Fig. IV.



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UNITED STATES PATENT OFFICE.

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WATER-ELEVATOR.

1,016,085. Specification of Letters Patent. Patented Jan. 30, 1912.

Application filed April 14, 1911. Serial No. 620,963.

To all whom it may concern:

Be it known that I, SAMUEL MURTA, a citizen of the United States of America, residing in the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Water-Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to a water elevator of the type wherein a fluid under pressure is utilized to lift water or other liquids, the object being the production of a very simple water elevator having a high degree of efficiency.

Figure I is a vertical or longitudinal section of my improved water elevator. Fig. II is an enlarged vertical section through the ejector nozzle and parts adjacent thereto. Fig. III is a horizontal section taken on line III—III, Fig. II. Fig. IV. is a horizontal section taken on line IV—IV, Fig. II.

In the accompanying drawings: 1 designates a casing or shell for receiving compressed air or other fluid under pressure which may be delivered to the upper end of said pipe through a pipe 2. A discharge pipe 3 arranged within the casing 1 passes through a stuffing box 4 at the upper end of the casing 1 and has an ejector nozzle 5 fixed to its lower end. The nozzle 5 is provided at its lower portion with inlet slots or ports 6 extending longitudinally of the nozzle and therefore vertically arranged therein and the nozzle has a contracted throat 7 near its upper end.

8 designates an abutment secured to the outer pipe and forming a seat for the nozzle 5.

9 is a delivery pipe for conducting water to the nozzle 5. The pipe 9 is provided with a screw threaded portion which passes through a threaded opening in the base of the ejector nozzle. The upper end of delivery pipe 9 is located near the contracted throat 7 of the nozzle, and its lower portion is provided with slots or ports 10 in the form of slots for the admission of water at points below the nozzle 5. A float 11, arranged in the delivery pipe 9, is connected to a check valve 12 by a stem 13 passing through a perforated cap 14 at the lower end of the delivery pipe 9.

15 designates a valve seat fixed to the casing 1 below the check valve 12.

When the apparatus is in service, its lower portion is immersed in the water or other liquid to be elevated, and this liquid is admitted to the casing 1 through the ports 16 in the lower end thereof. The fluid under pressure introduced into the upper portion of the casing passes through the ports 6 in the ejector nozzle 5, through the annular space between the upper end of the delivery pipe 9 and the throat of said nozzle and is finally discharged through the inner discharge pipe 3. The fluid pressure tends to create a partial vacuum in the lower portion of the casing, below the ejector nozzle, with the result of causing the liquid to enter the ports 16, and pass upwardly through the delivery pipe 9, ejector nozzle, and discharge pipe 3. The check valve will be retained in its open position while fluid under pressure is passing through the ejector nozzle, by the upwardly moving current of liquid, but when the fluid pressure is removed, the liquid in the discharge pipe, tending to fall by gravity, will automatically close the check valve, thereby preventing the elevated liquid from passing back into the well. An advantage gained by holding liquid in the discharge pipe is that considerably less pressure is required to start the liquid moving when the discharge pipe contains water than it does when said pipe is empty and, furthermore, it would be a waste of energy to allow the elevated water to return to the well.

It should be noted that the discharge pipe 3, ejector nozzle 5, delivery pipe 9, and check valve 12 are all assembled and may be very easily inserted into or removed from the casing, all of these parts being supported by the abutment 8. This structure is also very desirable because it enables the lower portion of the casing to be thoroughly cleaned whenever desired by simply lifting the discharge pipe and the parts secured thereto a slight distance to separate the ejector nozzle from the abutment 8, lift the check valve from its seat, and then force fluid under pressure into the upper end of the casing. When the ejector nozzle is spaced away from the abutment 8, the fluid will pass freely between said parts and flow out through the ports

16 at the bottom of the casing, carrying with it, mud, sand, or any other foreign matter that may be present in the lower portion of the casing.

Highly important features in my water elevator are the ports 6 and 10 of slot form arranged vertically in the nozzle 5 and the delivery pipe 9. When an air lift water elevator is used in a well containing any considerable amount of mud that is drawn into the elevator, there is a constant tendency of the mud to clog the ports through which the water is intended to flow and, if the ports are round in shape, the mud becomes so wedged therein as to make it difficult to dislodge it from the ports, even when the inner members of the elevator are lifted and fluid is blown therethrough for the purpose of dislodging the mud. By making the ports of slot form, as in my improvement, there is a natural tendency of the mud in the ports to adhere to the mud surrounding the ported walls, when the latter are elevated, whereby the mud in such ports is caused to be extracted therefrom in a manner that is impossible when the ports are made round in shape.

I claim:—

1. A liquid elevator comprising a casing having an inlet at its lower end and a valve seat above said inlet; and a vertically movable inner device arranged within said casing, said vertically movable inner device including a check valve adapted to engage the valve seat on said casing.

2. A liquid elevator comprising a casing having an inlet at its lower end, a valve seat above said inlet, and an abutment above said valve seat; and a vertically movable inner device arranged within said casing and seated on said abutment to prevent fluid under pressure from passing between the engaging faces of said inner device and the abutment, said inner device including a check valve adapted to engage the valve seat on the casing when the inner device is seated on said abutment.

3. A liquid elevator comprising a casing, having an inlet at its lower end, and an abutment above said inlet, a vertically movable inner device arranged within and adapted to be withdrawn from said casing; said inner device comprising a pipe, an ejector nozzle fixed to said pipe and seating on said abutment, a ported pipe depending from said nozzle, a float operable in said ported pipe, and a check valve carried by said float.

4. A liquid elevator comprising a casing having an inlet in its lower end, a valve seat above said inlet, and an abutment above said valve seat; and a vertically movable inner device arranged within said casing and seated on said abutment, said inner device comprising an ejector nozzle, a discharge pipe leading from said nozzle to the upper end of said casing, and a check valve carried by said ejector adapted to engage said valve seat when said inner device is seated on said abutment.

5. A liquid elevator comprising a casing having an inlet at its lower end, a valve seat above said inlet, and an abutment above said valve seat; and a vertically movable inner device arranged within said casing and seated on said abutment; said inner device comprising an ejector nozzle, a discharge pipe leading from said nozzle to the upper end of said casing, a delivery pipe extending from the interior of said nozzle to a point below said abutment, the last named pipe having inlet openings in its lower end, and a check valve carried by said pipe adapted to engage said valve seat.

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In the presence of—
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