W. B. MOORE.

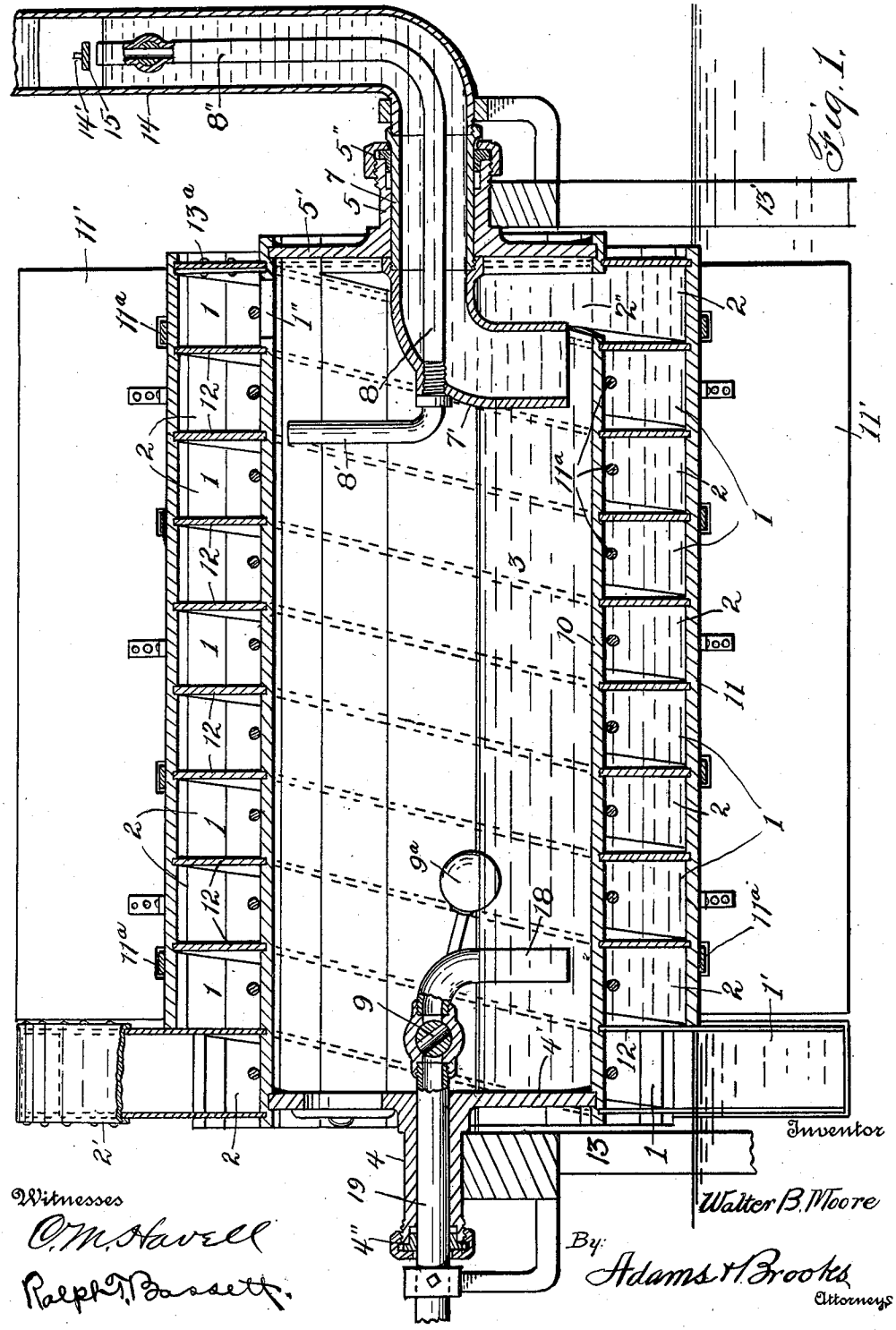
AIR LIFT PUMP.

APPLICATION FILED FEB. 28, 1911. RENEWED JAN. 11, 1912.

1,035,993.

Patented Aug. 20, 1912.

2 SHEETS—SHEET 1.



W. B. MOORE.

AIR LIFT PUMP.

APPLICATION FILED FEB. 28, 1911. RENEWED JAN. 11, 1912.

1,035,993. **Patented Aug. 20, 1912.**

2 SHEETS—SHEET 2.

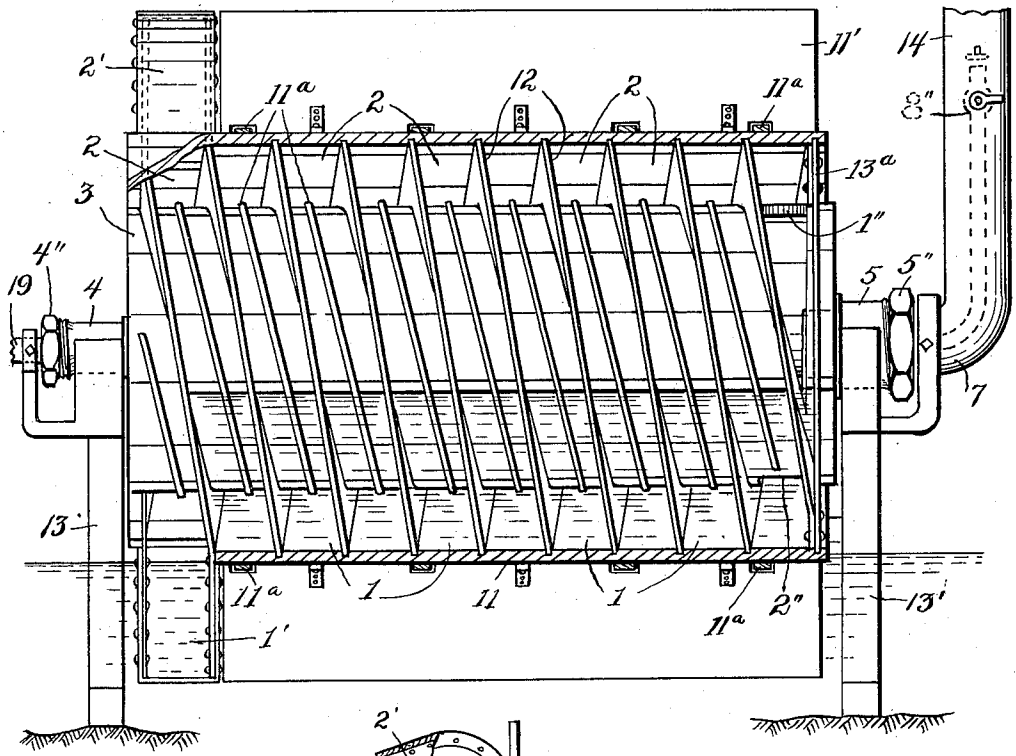


Fig. 3.

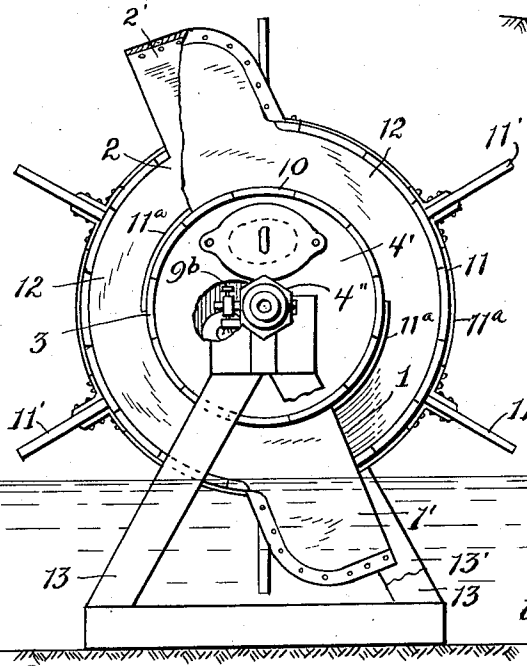


Fig. 2.

Witnesses

O. M. Harrell.

Ralph S. Bassett.

Inventor

Walter B. Moore

By Adams & Brooks.

Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WALTER B. MOORE, OF SEATTLE, WASHINGTON.

AIR-LIFT PUMP.

1,035,993. Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed February 28, 1911, Serial No. 611,512. Renewed January 11, 1912. Serial No. 670,728.

To all whom it may concern:

Be it known that I, WALTER B. MOORE, a citizen of the United States of America, and a resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Air-Lift Pumps, of which the following is a specification.

The present invention pertains to a combined air-lift pump adapted to entrain liquid and air in alternate charges and utilize the air for both a direct lift and an expansion lift.

The invention embraces certain novel features pertaining to air control and load regulation primarily devised to increase the efficiency of spiral-intake pumps and herein disclosed as auxiliary features in a spiral pump of improved design.

The invention consists in the novel features and combinations of parts as set forth in the following description and succinctly defined in my annexed claims.

In the accompanying drawing, wherein similar reference characters designate corresponding parts throughout the several views: Figure 1 is a vertical, longitudinal section of a current-power pump embodying the features of my invention. Fig. 2 is an end elevation of the same viewed from the intake end, and Fig. 3 is a sectional side elevation.

My improved pump includes a plurality of intakes devised to entrap air with liquid and herein shown as induction passages 1, 2 of spiral form communicating with respective oppositely disposed scoops 1′, 2′ and extending side by side about a rotatable cylindrical pressure-chamber 3 which is equipped with tubular axles 4, 5 and provided with a liquid eduction pipe 7, an air delivery pipe 8 and a load regulator 9.

In the construction shown the passages 1, 2 extend between concentric sectional walls 10, 11 separated by parallel, spiral partitions 12 which are connected with the side walls of the scoops 1′, 2′ and with an end flange 13^a whereat the passages 1, 2 communicate with respective opposite intake openings 1″, 2″ of chamber 3. The axles 4, 5, as will be observed have peripheral flanges 4′, 5′ which extend into internal grooves of wall 10, while the partitions 12 and flange 13^a are seated in external grooves of this wall and engaged in internal grooves of wall 11, to which wall the driving blades 11′ are secured. The sections comprising the walls 10, 11 are preferably wooden staves assembled, in constructing the apparatus, in respective series and secured in place by suitable binders 11^a.

The axles 4, 5 are journaled on suitable supports, as end frames 13, 13′, arranged to support the pump in the stream for rotation by undershot action of the water against the blades 11′. During each rotation of the pump the scoops 1′, 2′ are carried through the water and air, each scoop taking up a load of water which passes into its respective induction passage to be followed by air which is cut off from return by the next load of water delivered into the passage by the scoop. The charges of water and air taken in are conveyed in the induction passages toward the opposite end of the pump and released to chamber 3 through the openings 1″, 2″ in the same alternating manner as taken in.

Pipe 7, which, as will be observed, extends through a stuffing box 5″ on axle 5 and is connected with a rising main or flow-pipe 14 secured to a bracket extension of frame 13′, is provided with an intake elbow 7′, extending into the liquid space of chamber 3, while pipe 8, which extends through pipe 7 and is secured thereto, is provided with angular intake and delivery end portions or extensions 8′, 8″ which extend, respectively, into the air space of chamber 3 and upwardly in pipe 14.

Combined with pipe 8 is an air spreading device consisting of a circular disk 15 disposed horizontally over the discharge orifice of the pipe and secured to a cross piece 14′ of pipe 14. This device serves to spread the air, in its delivery from pipe 8, well out into the liquid column in pipe 14 for a more perfect dividing action.

The load regulator 9, as shown, is a float valve connected in an outlet pipe secured to a bracket extension of frame 13 and consisting of sections 18, 19 which lead, respectively, from the liquid space in chamber 3, and outwardly through a stuffing box 4″ on axle 4. The particular function assigned to this valve in the present instance is the automatic release of liquid from the pump chamber in operating the pump for an extended lift. The valve is therefore so adjusted or set with respect to its float 9^a, by first loosening the set screw 9^b of the float stem, that it will respond to abnormal floods

in chamber 3 with an opening movement, but maintain under normal conditions a closed passage between the pipes 18, 19. This provision enables the pump to regulate itself for an extended lift, under normal speed, as valve 9 will release the excess liquid and thereby maintain a working condition in the pump chamber.

In operation, the pump provides the water and air under pressure, due to the spiral intakes, and utilizes the inherent expansion value of the air against the liquid in the chamber for a direct lift and also for cut in of air in the liquid column arising in the main.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is:

1. A pump comprising a rotatable pressure chamber having a plurality of spiral induction passages, a relatively fixed eduction pipe communicating with the lower portion of said chamber, and a delivery pipe communicating with the upper portion of said chamber.

2. An air-lift pump comprising a rotatable pressure chamber having a spiral induction passage, a relatively fixed liquid eduction pipe communicating with the liquid side of said chamber, and an air delivery pipe leading from said chamber and communicating with the rising main.

3. An air-lift pump comprising a rotatable pressure chamber having a spiral induction passage, a relatively fixed eduction pipe extending downwardly into the liquid space of said chamber and connected with the rising main, and an air delivery pipe leading from said chamber and communicating with said main.

4. An air-lift comprising a pressure chamber having a spiral induction passage, and separate outlet passages for liquid and air communicating with the rising main.

5. An air-lift comprising a pressure chamber having a common induction passage for liquid and air, and separate outlet passages leading from respective portions of the chamber and communicating with the rising main.

6. An air-lift comprising a rotatable pressure chamber having a spiral induction passage, and separate liquid and air passages leading from respective portions of the chamber and communicating with the rising main.

7. A pump of the character described comprising a pressure chamber, means supporting said chamber for rotation, a scoop arranged externally of said chamber and connected for movement therewith, a spiral induction passage leading from said scoop and communicating with said chamber, and separate liquid and air passages leading from respective portions of said chamber and communicating with the rising main.

8. A pump of the character described comprising a pressure chamber, means supporting said chamber for rotation, a wall inclosing said chamber and spaced therefrom, a spiral partition between said chamber and inclosing wall forming in conjunction therewith a spiral induction passage, said passage communicating at one end portion with said chamber, a scoop projecting from said wall and communicating with said induction passage, and separate liquid and air passages leading from respective portions of said chamber and communicating with the rising main.

9. A pump of the character described comprising a pressure chamber, means supporting said chamber for rotation, a wall inclosing said chamber and spaced therefrom, a spiral partition between said chamber and inclosing wall forming in conjunction therewith a spiral induction passage communicating at one end portion with said chamber, a scoop projecting from said wall and communicating with said induction passage, fluid impact driving blades fixed to and projecting from said wall, and separate liquid and air passages leading from respective portions of said chamber and communicating with the rising main.

Signed at Seattle, Washington, this 8 day of February 1911.

WALTER B. MOORE.

Witnesses:
ARLITA ADAMS,
JAMES E. SPROLL.