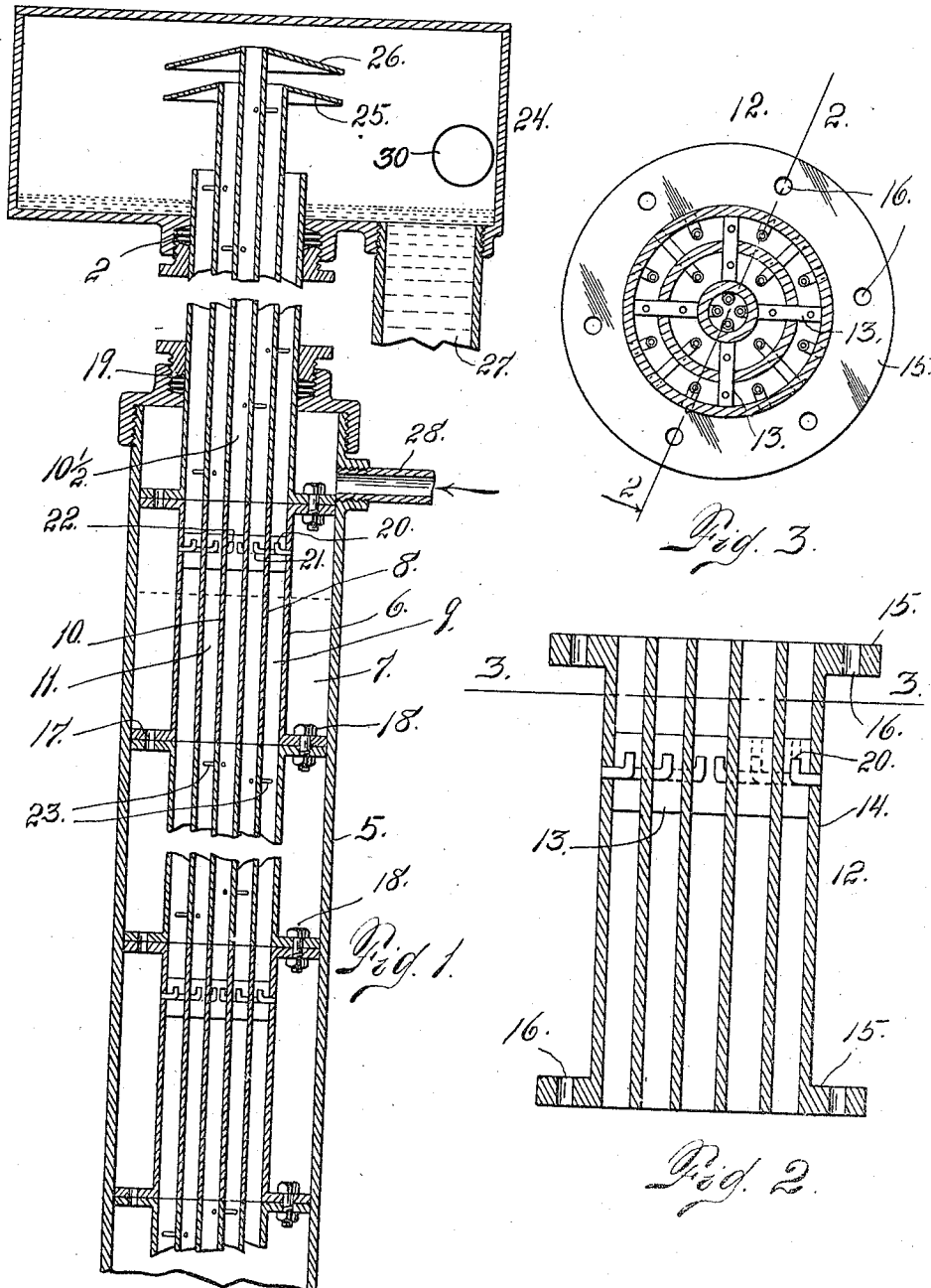


N. H. FREEMAN.
 APPARATUS FOR ELEVATING WATER.
 APPLICATION FILED OCT. 24, 1911.

1,035,955.

Patented Aug. 20, 1912.



Witnesses

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To all whom it may concern:

Be it known that I, NAT H. FREEMAN, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Apparatus for Elevating Water; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in apparatus for elevating water, in which is involved the principle of introducing air into a series of compartments of relatively small cross sectional volume, whereby the water forced upwardly through said compartments has its specific gravity reduced by the formation of air bubbles, resulting from the introduction of the air thereto. The various compartments, through which the water is raised, are formed within a standpipe in communication with a source of water supply, the outermost water-elevating compartment-forming member being suitably spaced from the inner surface of the standpipe, provision being made for introducing air into the standpipe around the outermost compartment-forming member, the upper extremity of the standpipe, through which the compartment-forming members protrude, being provided with a stuffing box forming a fluid-tight joint.

Space within the standpipe is in communication with the several compartments, through which the water is elevated, in such a manner as to supply the said compartments with relatively small jets of air, which mingle with the water as the latter passes upwardly through the various compartments, reducing specific gravity of the water, as aforesaid.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accom-

panying drawing, in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a vertical section, taken through my improved apparatus. Fig. 2 is a similar view of one section or member constituting the series of compartments within the standpipe. In this view, the construction is shown on a larger scale, and is a section taken on the line 2—2 of Fig. 3. Fig. 3 is a cross section, taken on the line 3—3, Fig. 2.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a standpipe, whose lower extremity is in communication with a source of water supply. Arranged within this standpipe is located a number of tubes of varying diameters, concentrically arranged one within the other, the outermost tube 6 being suitably spaced from this standpipe to form a compartment 7. A tube 8 is arranged within the tube 6, forming a compartment 9 between the tubes 7 and 8; while, within the tube 8 is located a comparatively small tube 10, forming a compartment 11 between the tubes 8 and 10, the tube 10 forming a central compartment 10½. The portion of these tubes within the standpipe may be composed of cast sections 12 connected by radially-arranged webs 13, the outermost part 14 of each section having flanges 15 at the top and bottom having perforations 16 to receive bolts 18, which connect the meeting flanges of the various members 12 when arranged one above another within the standpipe 5. Certain perforations 17, formed in the meeting flanges of the various tube-forming members 12, are left open so that the air can circulate freely above the water in the standpipe.

The various tubes, forming the compartments 9, 11 and 10½ protrude through a stuffing box 19, with which the top of the standpipe is provided to form a fluid-tight joint. The various tubes constituting the aforesaid compartments are equipped with air jet nozzles 20, 21 and 22, which, at their outer extremities, are in communication

with the air space 7 within the standpipe, whereby jets of air are introduced to the various compartments to which the water is raised for the purpose of forming air bubbles in the water and diminishing its specific gravity. The different pipe sections, except where the members 12 are employed, are spaced from each other by the use of pins 23. These pins are employed as illustrated in the drawing in the upper portion of the compartment-forming pipe structure, as well as in one of the sections located entirely within the standpipe, where the nozzles are not required. Where the air jet nozzles are required, it is preferred to form the pipe structure, through which the water is to be elevated, of members 12 arranged one above another and suitably connected, as heretofore explained. It is evident, however, that the compartment-forming pipe structure may be of any suitable formation.

The upper extremity of the compartment-forming pipe structure protrudes into a reservoir 24, the tops of the pipe members 8 and 10 being equipped with outwardly-projecting flanges or hoods 25 and 26, whereby the water, escaping from the compartments 9 and 11, is deflected downwardly within the reservoir. The bottom of the reservoir is provided with an outlet pipe 27, which may lead to a storage tank or other receptacle, as may be desired. The upper portion of the standpipe is in communication with a conduit 28 through which air under pressure may be delivered to the standpipe. This air passes downwardly in the standpipe, and, acting upon the water within the standpipe, forces the latter downwardly and causes it to rise within the compartments of the interiorly-located pipe structure, said water being caused to rise and overflow in the upper extremities of the said compartments within the reservoir 24. As the water rises within the said compartments, air from the jet nozzles 20, 21 and 22 enters the said compartments and mingles with the water, forming air bubbles and diminishing specific gravity of the water, according to the volume of air introduced. These air jet nozzles must be relatively small, so as not to allow a sufficient quantity of air within the compartments above the water level, as to interfere with the raising of the water within the compartments by the pressure of the air upon the water within the standpipe.

The bottom of the reservoir 24 is provided with a stuffing box 2, through which the compartment-forming pipe structure passes, the said stuffing box forming a water-tight joint around the said pipe structure. This reservoir is also provided with an outlet 30, through which the air that accumulates within the said reservoir may escape.

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

1. The combination with a standpipe, whose lower extremity is in communication with a source of water supply, of a pipe structure within the standpipe forming the central portion of the space within the pipe into a plurality of compartments of relatively small cross sectional area, both extremities of the said compartments being open, their lower extremities being in communication with a source of water supply within the standpipe, means for introducing air under pressure within the standpipe above the level of the water, the various compartments of the pipe structure being in communication with the air within the standpipe to permit the entrance of relatively small air jets, for the purpose set forth.

2. The combination with a standpipe, whose lower extremities are in communication with a source of water supply, a pipe structure located within the standpipe and forming a portion of the space within the pipe into a plurality of compartments, whose lower extremities are in communication with the source of water supply, a reservoir in which the upper extremities of the said compartments are located, the top of the standpipe being provided with a stuffing box surrounding the pipe structure, where it leaves the standpipe, the bottom of the reservoir being also equipped with a stuffing box where the said pipe structure enters the reservoir, being provided with a water outlet, for the purpose set forth.

3. The combination with a standpipe, of a number of compartments formed within the standpipe, and composed of compartment members arranged one above another, and suitably connected within the standpipe and properly spaced from the latter, the compartment-forming members above the water level being equipped with air jet nozzles leading to the various compartments at their inner extremities, their outer extremities being in communication with the standpipe, the upper extremities of the compartments being open for the escape of the water, while their lower extremities are open to receive the water from the standpipe, means for introducing air under pressure to the standpipe above the water level in the latter, whereby water is caused to rise in the various compartments of the pipe structure, the specific gravity of the water being diminished by the air bubbles formed in the said compartments, substantially as described.

4. The combination with a standpipe in communication with a source of water supply, of means for subdividing a portion of the space within the standpipe to form a

number of compartments of relatively small cross sectional area, the said compartments being in communication with the water at their lower extremities, their upper extremities extending above the standpipe and being open for the escape of the water, the standpipe being provided with a stuffing box forming a fluid-tight joint around the outermost compartment-forming member, the various compartments being in communication with the space within the standpipe

to allow relatively small jets of air to enter the various compartments, and means for introducing air under pressure to the standpipe, for the purpose specified. 15

In testimony whereof I affix my signature in presence of two witnesses.

NAT H. FREEMAN.

Witnesses:

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