

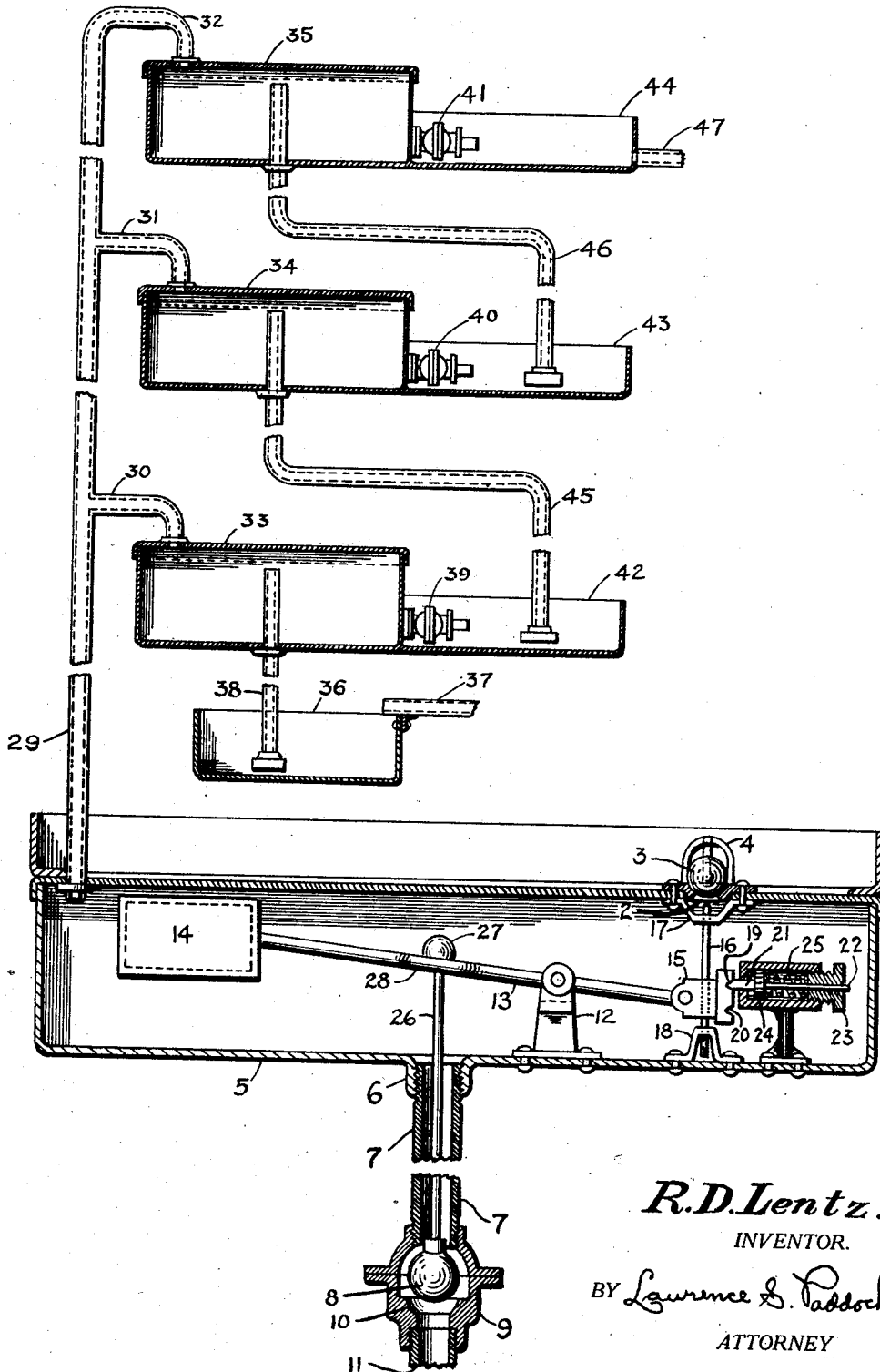
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AUTOMATICALLY OPERATING MECHANISM FOR ELEVATING LIQUIDS

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AUTOMATICALLY-OPERATING MECHANISM FOR ELEVATING LIQUIDS

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This invention relates to an apparatus of the class disclosed in my Patent #1,591,135 granted July 6, 1926.

The object of my invention is to provide an apparatus capable of elevating water or other liquid to a higher level by the utilization of the fall of a body of water or other liquid through a moderate distance and to accomplish this object in an automatic and continuous manner without assistance from outside sources of power.

A further object of my invention is to provide an apparatus which will intermittently produce a vacuum or condition of rarified air pressure in a series of closed receptacles situated one above the other and utilize said vacuum or condition of rarified air pressure to cause a liquid to be elevated successively into said closed receptacles.

It is also an object of my invention to provide a means whereby the liquid may be discharged from said closed receptacles into separate receptacles by the action of gravity and elevated from said separate receptacles to the succeeding higher closed receptacle, in a simultaneous manner.

It is also an object of my invention to produce said vacuum or condition of said rarified air pressure in an intermittent manner by means of a single apparatus for this purpose.

A further object is to provide an apparatus in which the vacuum producing apparatus may be located at any convenient place where a moderate fall of water or other liquid is available.

A further object is to automatically control the operation of the vacuum producing apparatus by mechanism responsive to the level of the liquid therein which will be alternately collected and discharged to a lower level, thus producing the desired vacuum by the withdrawal of liquid and its descent to the lower level.

A further object of the present invention is to provide a single unit having a single vacuum producing element which is connected to a series of superimposed closed receptacles in such a manner as to produce a vacuum in said closed receptacles simultane-

ously, as distinguished from my Patent #1,591,135 wherein a plurality of vacuum producing elements are separately connected to separate closed receptacles.

A further object is to provide a simple controlling mechanism in the vacuum producing element which will be positive and automatic in its action and composed of few parts.

A further object is to provide a controlling mechanism in which the parts which control the inlet and outlet valves are held from movement until the actuating force increases to a desired amount, when said parts are released and the valves actuated with a sudden rapid movement.

Further objects will appear hereinafter in the following detailed description.

In the drawings, the figure is a side elevation, partly in section of my liquid elevating mechanism.

A supply of water or other liquid is delivered from a moderate elevation to an open tank 1. The tank 1 is provided with an outlet 2, which is controlled by a valve 3, operating in a cage 4. Beneath the open tank 1, is located a closed tank 5, having an outlet 6, in the bottom thereof. A discharge pipe 7 leads from the outlet 6, and is provided with a control valve 8 at the lower end thereof. The valve 8 is provided with a cage 9, having a seat 10 therein, on which the valve 8 operates. A drain pipe 11 leads from the cage 9, to any desirable lower point of discharge.

On the bottom of the tank 5, is located a bearing block 12, in which is pivoted a lever 13. On the end of the lever 13, is located a float 14. A block 15 is pivotally attached to the other end of the lever 13. The block 15 is attached to a rod 16, which operates in guides 17 and 18. The upper end of the rod 16 is located beneath the valve 3 and when in raised position, lifts the valve 3.

The block 15 is provided with a pair of V-shaped notches 19 and 20 in which operates a latch 21. The latch 21 has a beveled end formed so as to conform to the V-shaped notches in the block 15. The latch 21 is mounted in a housing 22, having a bushing 23 in one end thereof through which passes

one end of the latch 21. The latch 21 is provided with a collar 24. A compression spring 25 is positioned between the collar 24 and the bushing 23. By adjusting the bushing 23, which is threaded into the housing 22, the pressure of the spring 25 may be regulated. To the valve 8 is attached a rod 26 which is provided at its upper end with a ball 27, seated in a saddle 28 on the lever 13.

The operation of the vacuum producing mechanism thus described is as follows: With the mechanism in the position shown in the drawing the tank 5 has been substantially filled with liquid from the open tank 1. The float 14 has been raised so as to open the valve 8 and the liquid is discharging through the pipe 7, past the valve 8 into the drain pipe 11. The latch 21 is now in the upper notch 19, and holds the lever 13 and valve 8 in the raised position shown until the liquid in the tank 5 falls away, due to the discharge through the outlet 6, sufficiently to cause the unsupported weight of the float 14 to overcome the pressure of the latch in the notch 19, whereupon the float 14 will suddenly fall, and the latch 21 will become engaged in the lower notch 20. The falling of the float 14 allows the valve 8 to become seated on its seat 10, thus closing off the discharge pipe 7 and stopping the flow of liquid therethrough. Simultaneously with the falling of the float 14 and the closing of the valve 8, the block 15 and rod 16 are raised. The rod 16 comes in contact with the valve 3 in its upward movement and raises the valve 3 thus permitting a fresh supply of liquid to pass from the upper tank 1 into the closed tank 5. The liquid will rise in the tank 5 until the float is submerged enough to cause sufficient downward pressure on the block 15 to force the latch 21 out of the notch 20. The float 14 will then suddenly rise to the position shown in the drawing, when the outlet valve 8 will be opened and the inlet valve 3 closed. Thereupon the described operation will be repeated automatically.

In the operation of the apparatus herein shown, the tank 5 is not completely filled or emptied in one cycle of operation. Regulation of the action of the valves is accomplished by varying the tension on the spring 25. A greater tension will cause a longer period to elapse between the opening and closing of the valves and vice versa a lesser pressure will shorten said period. In consequence of the length of the period between the opening and closing of the valves a greater or less amount of liquid may be received and discharged from the tank 5.

A pipe 29 is connected with the upper part of the tank 5 and is provided with branch pipes 30, 31 and 32 leading into a series of superimposed closed receptacles 33, 34 and 35 respectively. An open tank 36 is located below the closed tank 33. The tank 36 is

supplied with liquid to be raised by means of a pipe 37. A pipe 38 extends from the lower part of the tank 36 to the upper part of the tank 33. Tanks 33, 34 and 35 are provided with outwardly opening check valves 39, 40 and 41 which discharge into open tanks 42, 43 and 44 respectively. A pipe 45 connects the open tank 42 with the upper part of the closed tank 34, and a pipe 46 connects the open tank 43 with the upper part of the closed tank 35. A discharge pipe 47 leads from the open tank 44 to the point at which it is desired to deliver the elevated liquid. The lower ends of the pipes 45 and 46 are sealed in the water in open tanks 42 and 43.

The operation of the unit herein described is as follows: The intermittent discharge of the liquid from the tank 5 causes an intermittent vacuum to be formed in the closed tanks, 5, 33, 34 and 35. The vacuum in the tank 33 will cause liquid to be raised from the tank 36 into the tank 33, through the pipe 38. When the vacuum ceases and the liquid rises in tank 5, the liquid in the tank 33 will be discharged through the outlet check valve 39 into the open tank 42. The next formation of the vacuum will cause liquid to be raised from the tank 42 through the pipe 45 into the closed tank 34, as well as from the tank 36 into the closed tank 33. When the vacuum ceases, liquid will be discharged from the closed tanks 33 and 34 into the open tanks 42 and 43 through the discharge check valves 39 and 40. On the next formation of the vacuum, liquid will be raised from the open tank 43 through the pipe 46 into the closed tank 35 as well as from the tanks 36 and 42 into the closed tanks 33 and 34. When the vacuum ceases, liquid will be discharged from the closed tanks 33, 34 and 35 into the open tanks 42, 43 and 44 respectively. This filling and discharging of liquid from closed tanks 33, 34 and 35 into open tanks 42, 43 and 44 will now be repeated as long as the machine is in operation. The rise of the liquid in the tank 5 will expel any air that may be collected therein and this expelled air will assist in discharging the liquid from the closed tanks 33, 34 and 35 into the open tanks 42, 43 and 44. The liquid in the tank 44 may be withdrawn at will through the pipe 47.

The movement of the controlling mechanism in the vacuum producing apparatus is rapid and positive and permits a large number of deliveries of liquid to be made into the tank 44 in a short space of time, thus insuring a uniform and ample supply of liquid at an elevated position.

Having described my invention, what I claim is:

1. In a device of the class described the combination of a closed receptacle provided with an inlet and a valve adapted to control said inlet, a discharge outlet for said recep-

tacle, a controlling valve for said outlet, means for supplying a liquid to said receptacle through said inlet, a float in said receptacle adapted to be actuated by said liquid therein, means between said float and said inlet and outlet valves adapted to actuate said valves by the movement of said float and adjustable resilient means for restraining the movement of said float until the liquid level in said receptacle reaches a predetermined point.

2. In a device of the class described the combination of a closed receptacle provided with an inlet and a valve adapted to control said inlet, a discharge outlet for said receptacle, a controlling valve for said outlet, means for supplying a liquid to said receptacle through said inlet, a float in said receptacle adapted to be actuated by said liquid therein, means between said float and said inlet and outlet valves adapted to actuate said valves by the movement of said float and spring pressed means for restraining the movement of said float until the liquid level in said receptacle reaches a predetermined point.

3. In a device of the class described the combination of a closed receptacle provided with an inlet and a valve adapted to control said inlet, a discharge outlet for said receptacle, a controlling valve for said outlet, means for supplying a liquid to said receptacle through said inlet, a float in said receptacle adapted to be actuated by said liquid therein, means between said float and said inlet and outlet valves adapted to actuate said valves by the movement of said float, spring pressed means for restraining the movement of said float until the liquid level in said receptacle reaches a predetermined point and means for adjusting the pressure of said spring.

4. In a device of the class described the combination of a closed receptacle provided with an inlet and a valve adapted to control said inlet, a discharge outlet for said receptacle, a controlling valve for said outlet, means for supplying a liquid to said receptacle through said inlet, a float in said receptacle adapted to be actuated by said liquid therein, a pivoted lever attached at one end to said float, a member attached to the other end of said lever, provided with a plurality of notches, resilient means engaging said notches and means actuated by the movement of said lever for operating said valves.

5. In a device of the class described the combination of a closed receptacle provided with an inlet and a valve adapted to control said inlet, a discharge outlet for said receptacle, a controlling valve for said outlet, means for supplying a liquid to said receptacle through said inlet, a float in said receptacle adapted to be actuated by said liquid therein, a pivoted lever attached at one end to said float, having a member at the other

end provided with a pair of V-shaped notches, a latch having a beveled head adapted to engage said notches, a spring adapted to press said V-shaped head into said notches, means for adjusting the pressure of said spring and means actuated by the movement of said lever for operating said valves when the force applied to said lever by said float is sufficient to force said head out of one of said notches.

6. In a device of the class described, the combination of a closed receptacle provided with an inlet and an outlet, a valve adapted to control said inlet, a rod adapted to actuate said inlet valve, a discharge pipe leading from said outlet, having an outlet valve therein, a rod adapted to actuate said outlet valve, means for supplying a liquid to said receptacle through said inlet, a float in said receptacle adapted to be actuated by the liquid therein, a pivoted lever attached to said float, means on said lever adapted to actuate said rods by the movement of said lever and adjustable resilient means for restraining movement of said lever until the level of the liquid in said receptacle has reached a predetermined point.

In testimony whereof, I have signed my name to this specification, this 18th day of October, 1926.

REA D. LENTZ.

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