UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELEVATING LIQUID.

1,268,594.


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To all whom it may concern:

Be it known that I, JAMES A. MACKENZIE, a citizen of the United States, residing at Rochester, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Elevating Liquid, of which the following is a specification.

My invention consists of an improved apparatus for elevating liquid from a main tank or reservoir and delivering it through a pump-controlled holder into a vending tank or reservoir, at any desired level or any desired location, and has in view to provide means for conveying a practically continuous stream by utilization of atmospheric pressure.

The apparatus comprises a pair of vessels into which the liquid is elevated alternately and from one of which it is delivered while the other is being filled, with other associated mechanism.

One preferred construction is illustrated in the accompanying drawings, in which:

Figure 1 is a view of the apparatus in elevation, partly broken away and showing it in operative position with relation to a main storage reservoir.

Fig. 2 is a similar view in side elevation.

Fig. 3 is an enlarged sectional view of the upper portion of the receiving vessels, illustrating the float-controlled operating mechanism.

Fig. 4 is a plan view of the construction shown in Fig. 3.

Fig. 5 is a further enlarged sectional detail view of the float-actuated controlling valve and the surrounding construction.

Fig. 6 is a similar view showing the means for opening the check valve in the feed line to permit return of excess liquid to the main tank.

Fig. 7 is a detail view illustrating the main feed pipe provided with a plurality of branches for collecting liquid of different grades from different compartments.

In the drawings, A and B represent two independent vessels as tanks which are super-imposed at any convenient location above a main reservoir or tank C, which may be a cistern, compartment of a tank wagon, or the like.

The apparatus is actuated by normal atmospheric pressure, operating to elevate the liquid in a reservoir C upwardly through a main pipe 2 through one or the other of branch connections 3, 3, each having an interposed check valve 4 and leading directly by branch pipe 5 to the bottom of one or the other vessel, A or B.

It is designed that the pipe 5 of each vessel shall be used for both supplying and withdrawal, for which purpose, by a T-coupling 6, each pipe 5 is provided with a laterally arranged pipe 7 and a check valve 8. These branch connections lead by pipe 9 and coupling 10 to a common outlet or delivery pipe 11, which is provided with an ordinary globe-valve 12 for controlling the flow, pipe 11 being provided with any suitable terminal as a hose by which the liquid may be delivered to any desired point, as a gasoline reservoir of a garage or other dispensing agency.

Each vessel A and B is provided at its central top portion with an upwardly extending cage or conduit 13, in the lower portion of which is provided a valve seat 14 adapted to receive a vertically adjustable valve 15 to seal the opening through conduit 13 upon rising of a float 16. Said float has a limited vertical movement and is raised by the rising liquid in its vertical reservoir, and is in operative engagement with the suction-controlled valve 18, the float and valve falling by gravity when the liquid is withdrawn.

Float 18 of chamber A alternates in its action with float 16 of chamber B. Each float is adjustable connected with a vertically movable hollow stem 17, which stem is mounted within a conduit 13 which is in communication with the air exhausting mechanism as hereinafter described.

Valve 15 is secured to the lower end of hollow stem 17 by threaded or other connection and within the stem 17 is mounted the threaded adjusting rod 18. Said rod is provided with a thumb nut terminal 19 at its upper end and extends through the cen-
tral portion of float 16 by its other end, being secured thereto by lock nuts 20 and 21 respectively. By this means the position of the float may be varied with relation to the sleeve 17, and secured in such position by a lock nut 22 on stem 18, engaging the upper end of said sleeve. The sleeve or tube and its valve 15 are positively actuated by the rising buoyant movement of float 16 in the particular chamber into which the liquid is being introduced, the float and valve in the other chamber correspondingly lowering upon the emptying of said other chamber.

I provide also for the positive un-seatting of the valve 15 in the other chamber, as B, when the valve in chamber A is seated, and vice versa, by means of a connecting walking beam 23. Said beam is pivotally mounted at 24 on a bracket 25 extending upwardly from the upper portion of the structure and is provided at each end with bifurcated terminals 26. These terminals embrace and engage by means of pivoting studs 27, a clevis 27" which is threaded or otherwise secured to the tube 17, as shown in Fig. 5. By this means the tube is free to be adjusted within the clevis up or down and in connection with adjusting stem 18, the parts may be exactly set to position and with relation to the walking beam to effect their desired operation, as will be readily understood.

It will also be understood that during the exhaustion of the air from one or the other chamber A or B, it is necessary to seal the chamber against entrance of atmospheric air to insure the suction effect of the partial vacuum created within the chamber and for such purpose each chamber is provided with an air inlet valve cage or casing 28 and a valve seat 29, cooperating with which is an air inlet valve 30, at the upper portion of each chamber.

Valve 30 is connected by stem 31 and link 32 with walking beam 23 by pivot 33, the connection between the link 32 and valve 30 being loose, as by slot 34. By this means, when valve 15 is lowered to open the suction conduit to the empty chamber and into which liquid is about to be introduced, the connection with the atmosphere will be cut off.

On the contrary, when valve 15 is closed, sealing the suction, air inlet valve 30 will be simultaneously raised, allowing entrance of atmospheric air and equalizing the pressure to permit the contents of that particular chamber to flow by gravity through the one of the conduits 9 to the point of collection or storage. These two conduits lead into the common outlet conduit 11 as shown in Figs. 1 and 2.

For the purpose of exhausting the air from each chamber alternately as described, and creating the desired partial vacuum therein, each casing 13 is in suction communication with an air pump 35 by branch pipes 36 and pipe 37, preferably provided with a vacuum gage 38. Pump 35 is driven by any suitable means, as a belt and pulley 39, and operates to effect continuous exhaust of air by pipes 36 from one chamber or the other, alternately.

As stated, supply pipe 2 by branches 3, is in direct communication through couplings 6 and pipes 5 with the lower end of each chamber A and B, and said pipes 5, operating as inlet and outlet pipes alternately, return the liquid by gravity to delivery pipe 11 through check valve 8, check valve 4 being seated against return of the liquid downwardly through pipe 3.

When at any time it is desired to return the contents of either chamber A or B to the main reservoir C without delivery through pipe 11, globe-valve 15 is closed and check valve 4 is positively opened for such return flow. This operation is by manipulation of adjusting stem 40, mounted within the pipe 3 and extending downwardly beyond coupling 41 and through a stuffing box and gland 42 thereof and having a thumb nut or other terminal 43. The stuffing box and gland may be used to provide sufficient friction for stem 40 to hold it where set, and the stem may be thrust upwardly to open the valve element 4 to effect such withdrawal. Lowering of stem 40 will leave the check valve in its normal condition of operation.

When it is desired to use the apparatus for the purpose of delivering quantities of liquid of different kinds, or different gravity, as in the case of gasolene, the main supply pipe 2 is provided with a plurality of branch connections 2 each having a controlling globe-valve 2 as clearly shown in Fig. 7. By this construction the particular branch 2 which is in communication with the desired liquid, as in the case of a compartment tank wagon or the like, is opened by valve 2, the other several valves being closed, so that the compartment of the particular liquid desired is thus placed in communication with the machine.

The construction and operation of the invention will be readily understood and appreciated from the foregoing description. It provides a cheap, rapid, and efficient means for transmitting liquid from one holder to another, and the construction of the apparatus as a whole, adapts it to various combinations and uses which will be recognized by all those familiar with the use of apparatus of this type.

The invention may be variously changed or modified by the skilled mechanic in various details of construction or otherwise but
all such changes are to be understood as within the scope of the following claims.

What I claim is:

1. In combination with a containing vessel having a fluid supply and discharge connection; an air suction conduit opening into the upper portion of the vessel provided with a valve seat, a float within the vessel having a threaded stem extending upwardly through said conduit and provided with a relatively adjustable tubular stem, a valve on said tubular stem, a clevis engaging said stem, and a lever arm pivotally engaging said clevis, substantially as set forth.

2. In combination with a containing vessel having a fluid supply and discharge connection; an air suction conduit opening into the upper portion of the vessel provided with a valve seat, a float within the vessel having a threaded stem extending upwardly through said conduit and provided with a relatively adjustable tubular stem, a valve on said tubular stem, a clevis engaging said stem, and a lever arm pivotally engaging said clevis, said threaded stem having an adjusting terminal and provided with holding nuts engaging the float, substantially as set forth.

3. An apparatus for elevating liquid comprising a pair of receiving vessels each having an inflow conduit provided with a check-valve and connected with a common supply pipe, a return flow conduit leading from each of said inflow conduits above said check-valves and each being provided with a check-valve and connected with a single delivery conduit, in combination with a means for inducing flow into said vessels, said means comprising an air suction conduit opening into said vessels, a valve adapted to close said air suction conduit, and a float adapted to operate said valve, said float and valve being adjustable relative to each other and to said air conduit.

4. In an apparatus for elevating liquid, an upwardly delivering conduit having a pair of branch pipes each provided with a check-valve and leading into a receiving vessel, a pair of said vessels each provided with a valve-controlled suction conduit and a float having a sealing valve therefor, said float and valve being adjustable relative to each other, and a valve-controlled air circulation port, means connecting said floats and valves whereby the suction conduit valve will be closed and the air circulation valve will be simultaneously opened on one vessel while the reverse movement of the valves will be effected on the other vessel, and a valve-controlled delivery pipe leading from each of said branch pipes above said check valves and connected with a common delivery pipe.

5. In combination with a containing vessel having a fluid supply and discharge connection; an air suction conduit opening into the upper portion of the vessel provided with a valve seat, a float within the vessel having an adjustable stem extending upwardly through said conduit and provided with a relatively adjustable tubular stem, a valve on said tubular stem, a lever arm pivotally engaging said tubular stem, and means for holding said threaded stem in its adjusted position, substantially as set forth.

6. In combination with a containing vessel having a fluid supply and discharge connection; an air suction conduit opening into the upper portion of the vessel provided with a valve seat, a float within the vessel having an adjustable threaded stem extending upwardly through said conduit and provided with a relatively adjustable tubular stem, a valve on said tubular stem, and a lever arm pivotally engaging said tubular stem.

7. An apparatus for elevating liquid comprising a pair of receiving vessels each having an inflow conduit provided with a check-valve and connected with a common supply pipe, a return flow conduit leading from each of said inflow conduits above said check-valves and each being provided with a check-valve and connected with a single delivery conduit, an air suction conduit opening into each of said vessels, a valve in each vessel adapted to close said air suction conduit, a float in each vessel adapted to operate said valve, said float and said valve being adjustable relative to each other, and an air inlet valve for each vessel adapted to be opened by said float simultaneously with the closing of said air suction conduit valve.

8. An apparatus for elevating liquid comprising a pair of receiving vessels each having an inflow conduit provided with a check-valve and connected with a common supply pipe, a return flow conduit leading from each of said inflow conduits above said check-valves and each being provided with a check-valve, means for inducing flow into and out of said vessels, said means comprising an air suction conduit opening into each of said vessels, an adjustable float within each of said vessels, valves adapted to be operated by said floats to close said suction conduit in their respective vessels, and an air inlet valve in each of said vessels, said air inlet valves being connected with the floats and adapted to be opened simultaneously with the closing of the suction conduit in the same vessel.

9. An apparatus for elevating liquid comprising a pair of vessels having individual conduits provided with check-valves and connected with a main supply conduit, a return flow conduit leading from each of said individual conduits above the check-
valve and each of said return flow conduits being provided with check-valves, lifting stems for said check-valves in said individual supply conduits adapted to positively open said check-valves, means for inducing a flow into said vessels, said means comprising an air suction conduit opening into said vessels, a valve adapted to close said air suction conduit, and a float adapted to operate said valve, said float and valve being adjustable relative to each other and to said air conduit.

In testimony whereof I hereunto affix my signature.

JAMES A. MACKENZIE.