

(No Model.)

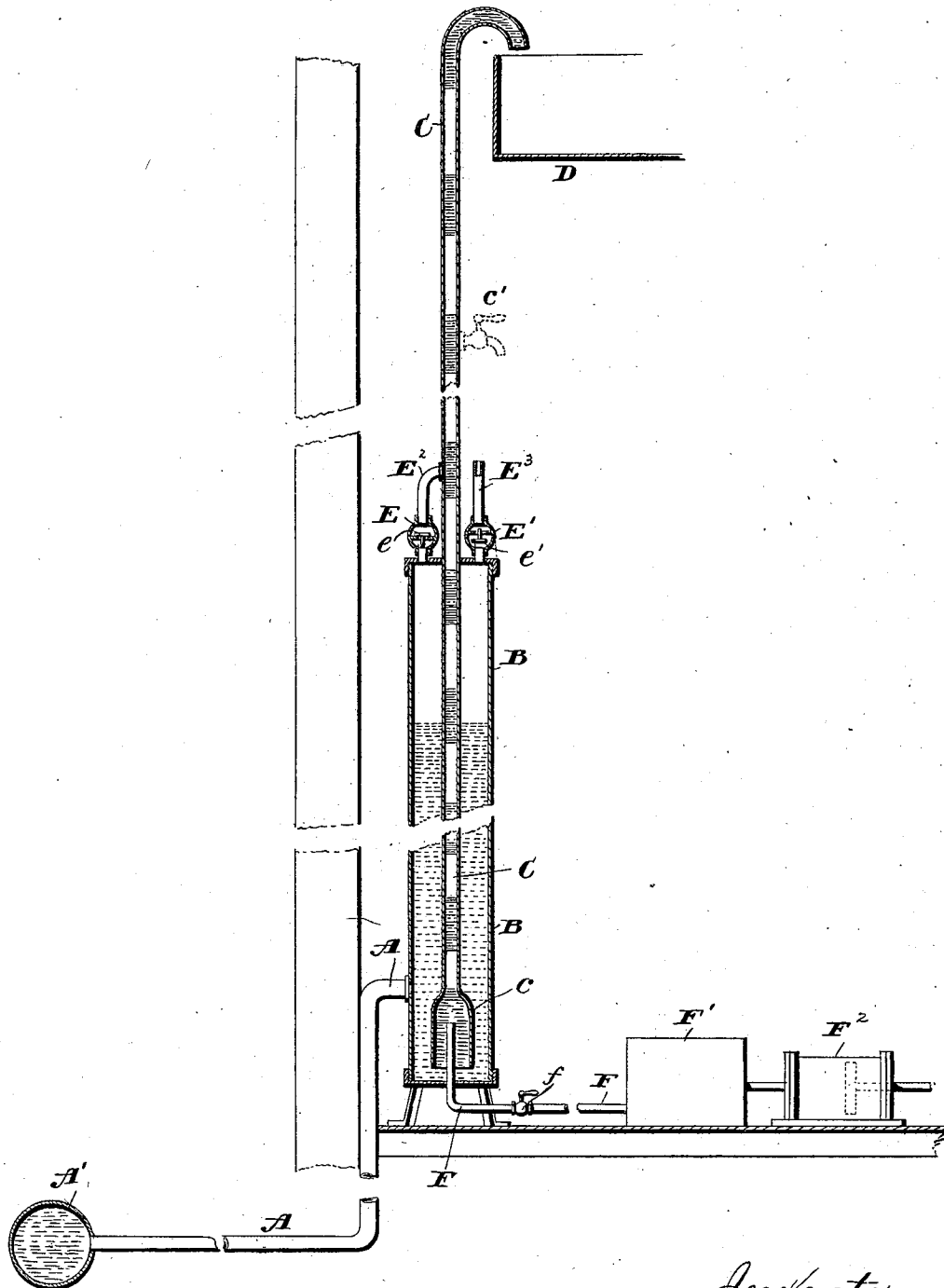
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APPARATUS FOR ELEVATING LIQUIDS.

No. 556,436.

Patented Mar. 17, 1896



Witnesses
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ELEVATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 556,436, dated March 17, 1896.

Application filed June 10, 1893. Renewed August 13, 1895. Serial No. 559,144. (No model.)

To all whom it may concern:

Be it known that I, JULIUS G. POHLÉ, a citizen of the United States, residing at New York city, in the county of New York and in the State of New York, have invented certain new and useful Improvements in Apparatus for Elevating Liquids; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, in which is shown a view of a vertical section of my apparatus.

The object of my invention has been to provide an improved apparatus for elevating water or other liquids by means of compressed air or other gaseous fluid; and to this end my invention consists in the apparatus and the parts thereof constructed, arranged, and combined as hereinafter specified.

The special purpose of my invention has been to provide a cheap, simple, and economical means for raising the water in house-service pipes above the height to which it would normally rise under the influence of the head or pressure in the main from which such pipes are supplied; but I desire it to be understood that my apparatus can be used also to advantage for raising water or other liquids in other than house-service pipes wherever the pressure or head from the source of supply is not sufficient to cause the liquid to rise normally to the desired height.

My apparatus, as shown and described, is intended and adapted for use not only where the head or pressure on the liquid is never enough to secure the desired elevation without aid, but also where, as is very often the case in the water-service of cities, there are variations in the head, so that at times the water will not rise high enough in the house-pipes.

In the drawing A designates the service-pipe coming from a street main or conduit A', connected with any source of supply of liquid under pressure which will make it rise up in the service pipe or pipes of the water-supply system.

B designates an upright larger pipe or cylinder, closed at its top and bottom, into which the service-pipe A discharges. This cylinder B is so situated that the liquid as supplied to it by pipe A will, under the lowest head or pressure to which such liquid is or may be subjected during use of the water-

supply system, rise well up within it toward but not to its upper end. Extending down within the cylinder is the open-ended pipe C, having its lower end situated near the bottom of the cylinder, preferably, but not necessarily, provided with the enlargement *c*. From the interior of the chamber formed by cylinder B this pipe extends up through the closed cylinder-top to the highest point to which the liquid is to be raised. At its extreme upper end it is shown as bent over in a goose-neck, so as to discharge into a tank D, from which water can be drawn to supply any desired points below the level of the tank contents.

If desired, the pipe C can be tapped at different points, as indicated by dotted lines, by suitably-valved outlets or spouts *c c*, through which the water can be taken at different levels.

In the top of cylinder B are two openings connected with the two valve-chambers E E', respectively, the former containing an upwardly-opening check-valve *e* and the latter having a check-valve *e'*, which opens downwardly. From the top of valve-chamber E a pipe E² extends upward a short distance and then enters pipe C, as shown. Chamber E' is also shown as provided with a pipe E³; but this is open to the atmosphere and is not necessary, but can be dispensed with if desired.

The check-valves *e e'* can be of any of the well-known constructions of such devices, adapted to open automatically to pressure in one direction and to close against pressure in the other.

A pipe F, connected with any suitable source of supply of air or other gaseous fluid under pressure, extends up into the lower end of the pipe C, so that the compressed air or gaseous fluid issuing from it will rise up in the said pipe C, and forming therein a series of piston-like layers of air between similarly-shaped bodies of liquid will cause the liquid rising in the pipe from the surrounding body within chamber or cylinder B to be elevated up pipe C, above the latter, in the manner fully explained in my United States Patent No. 487,639.

If at any time the pressure in the service-pipe A from the main should be increased, so as to raise the water normally in said pipe

above the cylinder or chamber B, the liquid entering the latter and filling the same will open valve *e* and flow through pipe F² into pipe C. Any air collecting in the upper part of the cylinder will also be forced out and into pipe C when the liquid rises in the cylinder. An easy escape for the air is thus afforded, so that it will not interfere with the rising of the liquid to its desired normal height within the cylinder under the usual pressure in the service-pipe and main.

In order that the body of liquid within the cylinder may, by its own gravity, flow freely up into the lower end of pipe C, the downwardly-opening check-valve *e'* is provided, which will open and allow the ingress of air as the level of the liquid surrounding pipe C tends to fall. There can then be no vacuum or partial vacuum within the cylinder B, which would interfere with the free flow of liquid into the pipe C, as that already in the latter is forced up and out of the same.

The compressed-air or gaseous-fluid pipe F is provided with a suitable cock *f* to regulate the flow of air or fluid through it to pipe C, and is to be connected with any suitable source of supply, whether a reservoir F¹ filled by pump F², as indicated conventionally in the drawing, or an air-main, which, like the main A¹ supplying service-pipe A with liquid, can be connected with some central source of supply of air or gaseous fluid under pressure, to be furnished, where wanted, by suitable service-pipes.

The operation of my apparatus, which will be understood from the above-given description and the drawing, is briefly as follows: With the water or other liquid supplied to the cylinder or chamber B so as to stand well up within while not rising to the top of the same, if air or other gaseous fluid under pressure be admitted through pipe F it will enter pipe C, and after forcing out the liquid first standing in the latter will divide the liquid subsequently rushing up in the pipe from the surrounding body into small bodies separated from each other by piston-like layers of the gaseous fluid, which bodies will be carried rapidly upward in the pipe to a height much above the cylinder B, the extent of this raising depending materially upon the amount of submergence of the pipe C in the body of liquid in the cylinder or the head or pressure which tends to force the liquid in the lower part of the latter up through the lower end of said pipe C, all as explained fully in my patent referred to. The valve *e* at the upper end of the cylinder allows the escape of air or liquid, which may become necessary as the liquid rises in the cylinder, but all such escaping air or liquid is guided into the pipe C.

The air-check valve *e'* effectually prevents the formation of a partial vacuum to interfere with the free flow of liquid from the cylinder or chamber B into the lower end of the pipe if at any time the raising of the

liquid up through such pipe by the compressed air or gaseous fluid should be more rapid than its inflow into the cylinder or chamber by pipe F. This arrangement of valve *e'* insures that the head or pressure acting to force the liquid from within chamber B shall never fall below that which would be due to the full weight of a column of water extending from the top of the liquid body around pipe C to the lower end of the latter.

The action of my apparatus can therefore be made a continuous one, which will not be liable to be stopped by variations in pressure within the supply-main and service-pipe as long as enough water flows into the cylinder or chamber B to keep a sufficient portion of pipe C submerged to secure the desired elevation of the liquid within the latter by the described action of the compressed air or other gaseous fluid. The result is that with my apparatus, as described, and a continuous supply of the compressed air or gaseous fluid to pipe E, I get a substantially continuous flow of liquid up and out of the pipe C as long as there is enough liquid in the chamber to submerge the proper extent of said pipe.

With a one-half or three-fifths submergence the best result is obtained, the pipe C being kept full of a series of rapidly upward traveling alternate short piston-like layers of liquid and the compressed gaseous fluid used, and the flow being so rapid that there will be a substantially continuous outflow of liquid from the upper end of the pipe, or from any one of the valved outlets *c c* at different heights.

Having thus described my invention, what I claim is—

1. In an apparatus for elevating liquids by compressed gaseous fluid, in combination with a closed chamber, a source of supply of liquid to be raised, connected with the chamber, an eduction-pipe having its lower open end communicating with the body of liquid in the chamber at a point well below the top of such body, connections between the upper end of the chamber, and the eduction-pipe, the outwardly-opening automatic check-valve interposed in such connections, an air-inlet opening at the upper part of the chamber, the inwardly-opening check-valve, for closing such opening, and a pipe connected with a source of supply of gaseous fluid under pressure, discharging into the eduction-pipe at a point below the level of the liquid within the closed chamber, substantially as and for the purpose described.

2. In an apparatus for elevating liquids by compressed gaseous fluid, in combination with a closed chamber, the liquid-supply pipe connected with the source of supply of liquid discharging into the chamber, the open-ended eduction-pipe having its lower end situated in the chamber below the point to which the liquid tends to rise under the head or pressure from the source of supply, the two valve-chambers connected with the upper part of

the closed chamber, and with automatic check-
valves which open outwardly and inwardly
respectively, a pipe connecting the valve-
chambers containing the outwardly-opening
5 valve, with the eduction-pipe, and a pipe con-
nected with a source of supply of air or other
gaseous fluid under pressure, discharging into
the lower portion of the eduction-pipe below
the level of the body of liquid in the closed
10 chamber, so as to divide the liquid flowing
up into the pipe, into a series of piston-like

bodies separated from each other by piston-
like layers of the gaseous fluid, substantially
as and for the purpose described.

In testimony that I claim the foregoing I 15
have hereunto set my hand this 25th day of
April, 1893.

JULIUS G. POHLÉ.

Witnesses:

JAS. E. HUTCHINSON,
CHAS. J. WILLIAMSON.