J. NEIL.

Liquid Forcing Apparatus.

No. 204,680. Patented June 11, 1878.

Fig.1

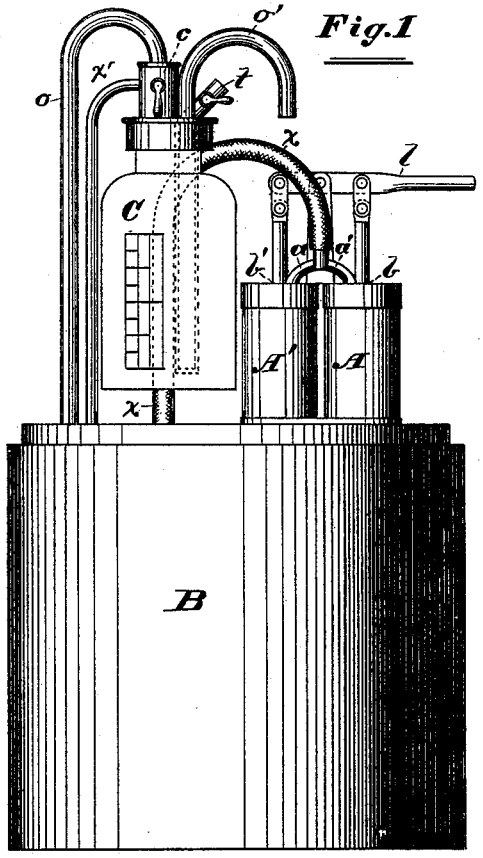


Fig.2

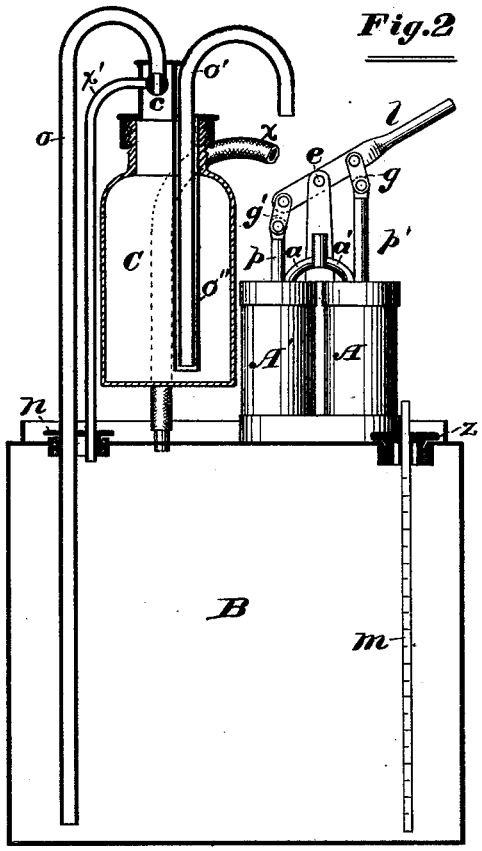
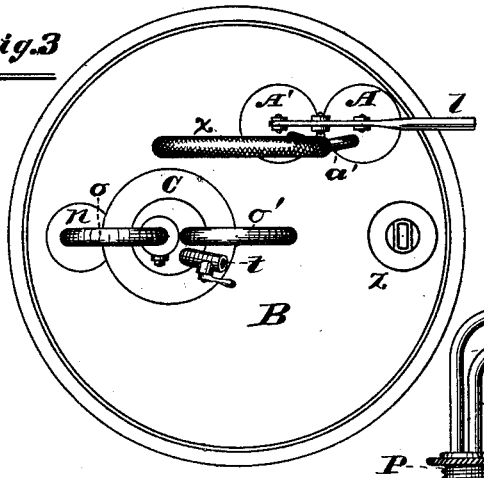


Fig.3



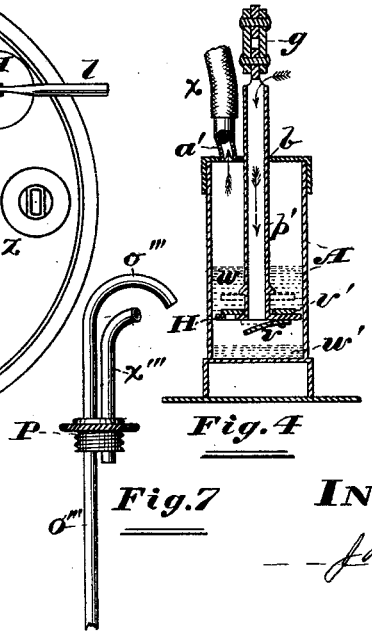
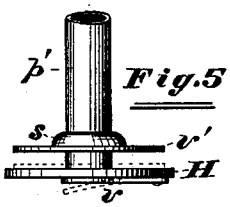


Fig.4

Fig.5



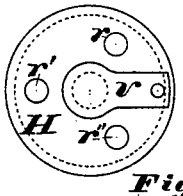


Fig.6

Fig.7

Attest:

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JOHN NEIL, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN LIQUID-FORCING APPARATUS.

Specification forming part of Letters Patent No. **204,680**, dated June 11, 1878; application filed March 12, 1878.

To all whom it may concern:

Be it known that I, JOHN NEIL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Liquid-Forcing Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, which 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 letters of reference marked thereon, which form a part of this specification.

My invention relates to that class of portable tanks used by merchants for holding liquids to be dispensed to customers; and consists of a tank provided with a special apparatus for forcing liquids from barrels or any similar vessels into the tank, from the tank into a fixed measuring-jar, and therefrom into any receptacle, the whole constituting a portable apparatus for forcing liquids by the use of compressed air.

The same letters indicate the same parts in the accompanying drawings.

Figure 1 represents a tank with air force pump and measuring-jar adjusted. Fig. 2 represents a vertical cross-section of the tank, measuring-jar, and connecting-pipes. Fig. 3 represents a top view or plan of Fig. 1. Fig. 4 represents a vertical cross-section, illustrative of my improvement in the air-pump. Fig. 5 represents an enlarged view of the lower part of the pump's piston and piston-rod with their valves. Fig. 6 represents bottom view of Fig. 5. Fig. 7 represents the attachment for transferring contents of barrels or similar vessels into the tank.

In Figs. 1 and 2, *l* is the usual lever used in pumps, with its fulcrum or pivot at *e*, and having attached the piston-rods *p p'* by means of the joints *q' q*, which, by their operation, permit the piston-rods *p p'* to work through the air-tight stuffing-boxes *b b'* without undue friction. The piston H, Fig. 4, is snugly fitted to the cylinder A, there being no packing required, though packing may be used, and has through it one or more valveways, *r r' r''*, Fig. 6.

The valve *v'* is a perforated disk, having the piston-rod *p'* through its perforation, and having its lower surface dressed so as to lie tightly upon the dressed upper surface of the piston, closing thereby the valveways *r r' r''*. The piston-rod serves as a guide to the valve, upon which it plays, limited in its movement by the shoulder *s* and the piston H. The piston-rods *p p'* are hollow, and have at their lower ends valves, (see *v*, Fig. 6,) which open downward, but when at rest are kept closed by force of springs.

In Fig. 1, *a a'* are outlets for the air from the cylinders, which, as indicated by the arrows in Fig. 4, enters through the hollow piston-rod *p'* and valve *v*, thence by force of action of the pump through pipe *x* into tank B. The tank B is air-tight when all the ports are adjusted, and should be strongly constructed, to insure durability. The flow-pipe *o* leads from a very short distance from the bottom of the tank up through it into jar C, Fig. 2. The air-flow pipe *x'* leads from just within the tank into the jar C, Fig. 2.

The cock *c* is a combined cut-off for the two pipes *o* and *x'*, and is so constructed that the pipe *o* may be open and the pipe *x'* closed, or the reverse; or both may be closed at the same time, but both cannot be opened at the same time.

The jar C is air-tight except through the flow-pipe *o'*, which runs from very near the bottom of jar C up through and out of it.

The valve *t* is an ordinary air-valve, for escape of the air from the jar C when liquid is flowing in. The jar C may be constructed of glass and graduated, or of any suitable material or materials and graduated, or having graduated register attached or attachable.

The flow-pipe *o* and air-flow pipe *x'*, Fig. 2, are fitted into the screw *n*, so that the pipe *o* and *x'* and measuring-jar may be detached from tank. The pump is permanently bolted to the tank, but may likewise be detached.

The stop-cock *c* may be so constructed as to combine the air-valve *t* by making the cock with an air waste or vent, so that when the pipe *o* is open the vent is open, and when the pipe *o* is closed the vent is closed; or the stops for the two pipes *o* and *x'* and the vent *t* may each be entirely separate from the other.

The flow-pipe *o'* is an elongating pipe, sliding tightly in the pipe *o''*, so that it can be raised to place a taller vessel under its outlet,

and the lower end of o'' still be near the bottom of the jar C, so that all the liquid may be forced out.

The screw z fits tightly in the tank B, and has attached to its top the measuring-stick m, to indicate the contents of the tank at any time.

The plug P, Fig. 7, is so constructed as to fit air-tight (not necessarily threaded) in the bung-hole of a barrel or similar vessel. The pipes o''' and x''' fit tightly in and pass through plug P, the pipe o''' extending to or close to the bottom of vessel to which the plug is adjusted.

In Fig. 4, w and w' indicate two parts of a liquid separated by the ascending movement of the piston H, forming a space between, which is filled by air admitted through the hollow piston p' and valve v.

In the construction and adjustment of my pistons and cylinders, I have in view the use of a liquid to answer the purposes of the usual packing, the principle involved being that air will readily flow or waste where the proper liquid will not in detrimental quantities. I therefore pour into my cylinders, Fig. 4, a sufficient quantity of liquid to keep my pistons submerged in any position of their operation, so that the liquid will intercept the escape of air between the pistons and the cylinders when the former, ascending, are operating against the force of the compressed air in tank B through pipe x.

By this arrangement I am enabled to construct an air-pump combining cheapness and durability with thorough efficiency in a remarkable degree.

In the reduction of this principle to practice two entirely new features are invoved. First, the intentional formation of the air-space between the body of liquid above the piston and that below in the cylinder, Fig. 4; second, the outlet a', so constructed and located at any point in the cylinder as to admit the escape of the air filling the said air-space, and not the said liquid. And I should regard an opening with check-valve leading into the cylinder for admission of air beneath a submerged piston as the mechanical equivalent of my hollow piston-rod p' and valve v; and I should regard an air-outlet with check-valve opening into the air-space aforesaid as the mechanical equivalent of the valve v' and air-escape a'.

The operation of my apparatus may be described as follows: By working the lever l motion is imparted to the piston H, which, by its ascending movement, tends to create a vacuum in the cylinder beneath, but which is relieved by the air flowing in through the hollow piston-rod p' and valves. Instantly upon reversal of the movement of the piston the valve v closes, and the air beneath forces up the valve v', Fig. 5, and passes through the piston. The piston next ascending, the valve v' being closed, the air is forced through the outlet a' and pipe x into the tank B. It is evident that by continuing this operation, air is compressed in the tank B; and if there be liquid in the tank, as soon as cock c is opened the sufficiently-compressed air forces the liquid up through the pipe o into the jar C, the valve t being open. A force may thus be stored, so that it will not be necessary to resort to pumping every time a little liquid is to be drawn; and the tank B being air-tight, much of the danger connected with the sale of highly-inflammable liquids is averted.

As soon as the desired quantity of liquid has flowed into the jar C, the cock c is turned, the liquid cut off, and the air-pipe x' is opened. The compressed air thereupon flowing into the jar, the valve t being closed, the liquid is forced out through the flow-pipe o' into any receptacle.

To transfer liquid contents of any barrel or similar vessel into tank B, first adjust the plug P into the bung of said vessel, sitting beside the tank, disconnect the pipe x from the tank, and adjust it to the pipe x'''. Having placed the mouth of pipe o''' in any opening in the tank, by operating the lever l air is compressed in the said vessel, and its liquid contents forced therefrom through pipe o''' into the tank, the operation being the same as that described for filling jar C.

What I claim as new, and for which I desire Letters Patent, is—

1. The cylinder A, provided with air-escape a', in combination with the submerged piston H within the cylinder A, as described, and for the purpose set forth.

2. The hollow piston-rod p', provided with air-valve v, or their mechanical equivalents, in combination with the cylinder A, directly fixed to tank B, liquid flow-pipe o, and liquid cut-off c, substantially as described, and for the purposes set forth.

3. The hollow piston-rod p', provided with valve v, or their described mechanical equivalents, in combination with the submerged piston H and air-escape a', substantially as described, and for the purpose set forth.

4. The cylinder A, directly fixed to tank B, flow-pipe o, provided with screw N and liquid cut-off c, substantially as described, and for the purpose set forth.

5. The combination of the tank B, adjustable pipe x, cylinder A, pipes o''' and x''', and plug P, substantially as described, and for the purpose set forth.

6. The combination of the measuring-jar C, air-valve t, and flow-pipe o', substantially as described, and for the purpose set forth.

7. The combination of tank B, flow-pipe o, and graduated measuring-jar C, substantially as described, and for the purpose set forth.

8. The combination of tank B, air-pipe x', jar C, air cut-off c, and pipe o', substantially as described, and for the purpose set forth.

9. The combination of screw Z, measuring-

rod *m*, and tank B, substantially as and for the purpose set forth.

10. The combination of jar C and the elongating flow-pipe, consisting of the two pipes *o'* and *o''*, as described, and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN NEIL.

Witnesses:
EVERT M. THOMPSON,
THOMAS WILKENS.