No. 665,567. Patented Jan. 8, 1901.

C. M. KEMP.

GASOLENE PUMP.

(Application filed May 16, 1899.)

(No Model.)

Fig. 1.

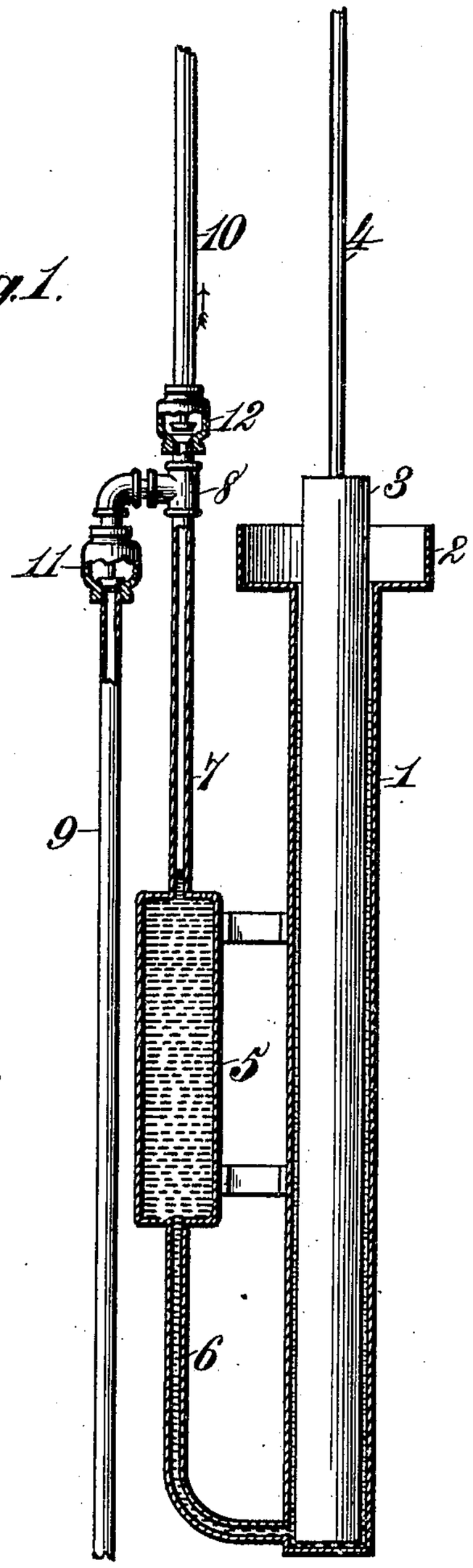
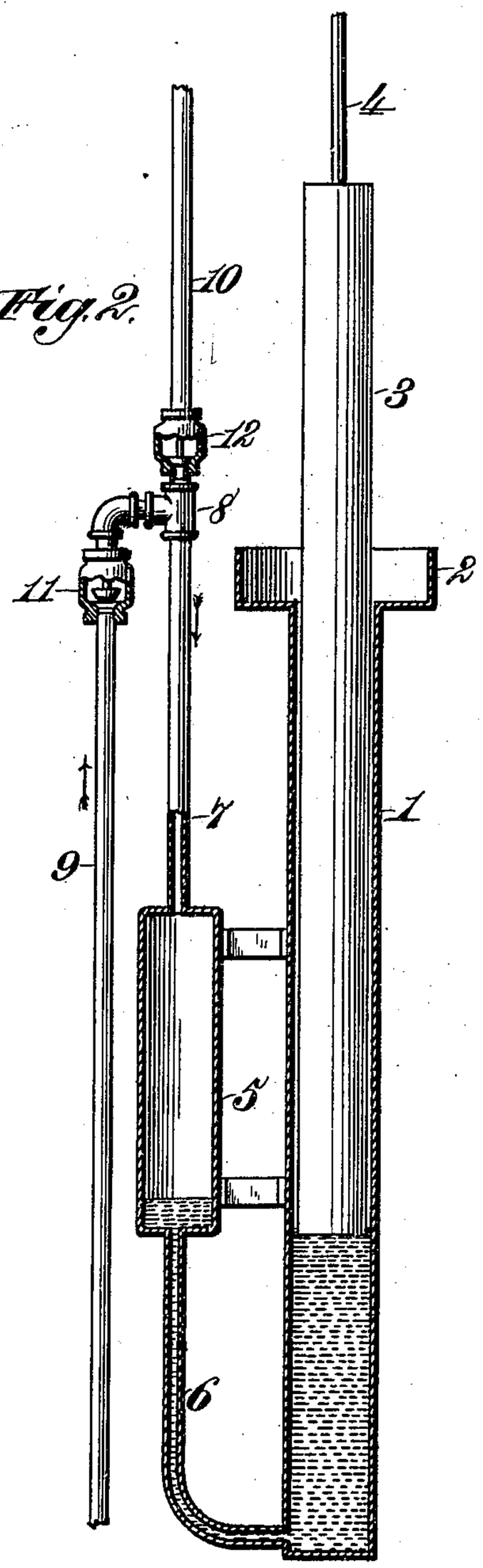


Fig. 2.



Witnesses.
Robert Everett.
W. C. Tredger.

Inventor:
Clarence M. Kemp.
By J. Granville Meyers Jr
Atty

UNITED STATES PATENT OFFICE.

CLARENCE MAY KEMP, OF BALTIMORE, MARYLAND.

GASOLENE-PUMP.

SPECIFICATION forming part of Letters Patent No. 665,567, dated January 8, 1901.

Application filed May 16, 1899. Serial No. 717,116. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE MAY KEMP, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Gasolene-Pumps; and I do hereby 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.

This invention relates to gasolene-pumps, and has for its object to provide a pump for elevating gasolene from a lower to a higher level by means of alternately transferring from one column to another a body of heavy liquid, such as mercury, the weight of the liquid operating to alternately produce a vacuum to draw in a charge of the gasolene and then a forcing action to discharge the previously-drawn-in charge of gasolene and elevate it to the point of delivery.

Volatile liquids, such as gasolene, are exceedingly difficult to move from one place to another automatically, as by a pump, in view of the fact that the movements of the liquid tend to volatilize them to a certain extent, the resulting gases expanding within the pipes and chambers through which they pass and this expansion tending to gradually reduce the amount drawn into the forcing or suction chamber of the pump until the movements of the piston have no appreciable effect on the liquid being pumped, the gases themselves absorbing by compression and expansion the entire movements of the piston. For this reason, together with the fact that the liquids attack the packing and the piston gradually injuring them and impairing their usefulness, it has been found by experience that the ordinary form of pumps suitable for non-volatile liquids and air are practically worthless for this purpose, there being no absolute certainty as to the quantity of liquid being forced through the pump (owing to the formation of gases, as above stated) and the gradual ceasing of the pumping operation. As pumps of this character are intended to be used in the feeding of gasolene or other volatile liquids to engines, &c., where the charge is necessarily required to be substantially the same with each feed, the question of the volatilizing of the liquid during its pumping movements with the deleterious results, as above pointed out, becomes of vital importance. As far as I am aware there has never been constructed a pump for this purpose in which any attempt has been made to reduce the effect of this volatilization to a minimum, thus enabling the liquid to be pumped with any probability of a predetermined charge being successively forced into the receiving vessel or chamber, and it is therefore my object to construct a pump in which the volatilization is reduced to a minimum, yet without sacrificing any of the construction necessary to impart the required force to the piston which operates the pump. I also dispense with the use of packed valves and tightly-fitting pistons, thus reducing the cost of operation by reason of the non-requirement of expensive and intricate machinery to operate the parts and the expense of providing a closely-fitting cylinder and piston.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and afterward particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a vertical central sectional view of my improved apparatus, the piston being shown at the end of its downward stroke; and Fig. 2 is a similar view showing the piston at the end of its upward stroke.

Referring to the drawings, the numeral 1 indicates a vertical cylinder of uniform diameter throughout and surmounted at its upper end by a cup 2. Loosely arranged in the cylinder 1 is a solid or heavy plunger 3, which, as shown, is preferably somewhat longer than the cylinder in which it works. To the upper end of the plunger is attached a rod, cable, or other suitable connection 4, that is connected with any suitable or preferred means which operates to alternately raise and lower the piston or plunger at regular timed intervals. The plunger is preferably made from a solid metal casting or other solid body.

Arranged parallel with the cylinder is a vertical cylindrical suction-chamber 5, con-

nected to the lower end of the cylinder 1 by a pipe 6, and from the upper end thereof projects a contracted extension comprising a pipe 7, of small diameter, and which extends to a point at least slightly higher than the upper end of the cylinder 1. The upper end of the extension or pipe 7 is connected to a T-coupling 8, and connected to the other two branches of said coupling, respectively, are a suction-pipe 9 and a discharge-pipe 10, the latter having its inlet located in longitudinal alinement with said pipe 7. Arranged in the suction and discharge pipes, respectively, are upwardly-opening valves 11 and 12, of ordinary and well-known construction, said valves being preferably arranged adjacent to the T-coupling 8, as shown.

The operation of my improved apparatus is as follows: Let it be assumed that the suction-pipe 9 is connected with a vessel containing a supply of gasolene and that the upper end of the discharge-pipe 10 is likewise connected with a vessel into which the gasolene is to be discharged, also that suitable means are provided for alternately lifting and lowering the plunger 3. Let it also be assumed that a sufficient quantity of liquid of high specific gravity, preferably mercury, has been introduced into the cylinder 1 and the plunger 3 lowered thereinto in operative position. Then when the plunger lifting and dropping mechanism is put in action the operation will be as follows, assuming that the parts are in the position shown in Fig. 1 of the drawings: As shown in said figure, the plunger is at the extreme limit of its downward stroke, and hence the body of mercury 13 is displaced from the cylinder 1 and forced into the suction-chamber 5, excepting a thin film, which rises between the plunger and the interior of the cylinder. The height to which this film rises in the cylinder about the plunger is dependent upon the height of the column of gasolene in the discharge-pipe 10, or, in other words, the weight of the column of gasolene will cause the film of mercury to ascend about the plunger to a certain height, such height being dependent upon the distance the gasolene has to be raised. As the plunger is raised the film of mercury about the plunger quickly drops to a level with the mercury in the pipe 7, and upon the continued upward movement of the plunger the mercury drops by gravity from the suction-chamber and rises in the cylinder 1 until it rises to nearly the same level in the cylinder 1 that it occupies in the suction-chamber, the differences in the levels being occasioned by the influence exerted on the column by the suction caused by the formation of the vacuum in chamber 5. As the mercury falls in the suction-chamber 5 a partial vacuum is formed therein, thus causing the valve 11 to open and drawing the valve 12 to its seat. Hence a charge of gasolene is lifted and drawn into the suction-chamber. When the plunger 3 is moved downward, the mercury is displaced from the cylinder 1 and caused to run into the suction-chamber 5, thereby pushing the previously-drawn charge of gasolene up through the discharge-pipe 10, the valve 12 automatically rising to permit of the passage of the gasolene therepast. Owing to the extension 7 of the suction-chamber being contracted in the manner before explained, practically the entire charge of the inspirated gasolene will be forced up through the discharge-pipe at each descent of the plunger, and hence there will be but a small amount of gasolene left in the said chamber to expand upon the upstroke of the piston 3.

By this construction it will be seen that the tendency of the gasolene to volatilize is reduced to a minimum, there being no comparatively large chamber within which it might lodge. The extension 7 is relatively very small when compared with the chamber 5, in which the mercury (serving as the piston) operates. While the drawings show this extension of some length, yet it is apparent that it might be made of a shorter length, if desired, in which case the space therein would be reduced to a greater extent, although the parts as shown have been found to be in their most practical relation. It is of course to be understood that the limit of upward movement of the mercury within the extension 7 must be below the inlet-opening to prevent any of the mercury passing over onto the top of the valve 11. As the space within the extension 7 is extremely limited, there can be but a limited quantity of gases formed therein, this quantity being insufficient to impair the operation of the piston to draw into the suction-chamber a charge of liquid and to force out a substantially predetermined charge through the valve 12.

As heretofore set forth, the outlet from the chamber 7 to the discharge-pipe is located in longitudinal alinement with said chamber. This is advantageous by reason of the fact that the direct force of the upward movement of the piston is exerted only in one direction. This prevents the tendency of the gasolene to vaporize, as there is no requirement of forcing the gasolene which passes into the piston-chamber backward into the chamber from which it is drawn, such as would be the case were the inlet and outlet in alinement, in which case the molecular friction resulting would tend to rapidly volatilize the gasolene and vitiate the object to be attained by the use of the apparatus described—viz., the greatest possible elimination of the tendency to volatilize the gasolene, the disadvantages of which have been heretofore pointed out. It will therefore be seen that I have provided a pump for volatile liquids comprising a suction-chamber 5, having a contracted upper portion 7, a valved inlet-pipe 9, communicating with said chamber in juxtaposition to the upper end of said contracted portion, a valved discharge-pipe 10, having its inlet in longitudinal alinement with said chamber, whereby

the inlet and outlet to and from said chamber will be relatively close together, and a piston (mercury) operating within said chamber and said contracted upper portion, the upward limit of movement thereof being below the inlet-pipe opening, whereby the volatile gases will be limited and confined within a limited space adjacent to the discharge-opening.

Having described my invention, what I claim is—

1. A pump for volatile liquids comprising a suction-chamber having a contracted upper portion; a valved inlet-pipe communicating with said chamber in juxtaposition to the upper end of said contracted portion; a valved discharge-pipe having its inlet in longitudinal alinement with said chamber, whereby the inlet and outlet to and from said chamber will be relatively close together; and a piston operating within said chamber and said contracted upper portion, the upward limit of movement thereof being below the inlet-pipe opening, whereby the volatile gases will be limited and confined within a limited space adjacent to the discharge-opening.

2. A pump for volatile liquids, comprising a suction-chamber having a contracted upper portion; a valved inlet-pipe communicating with said chamber in juxtaposition to the upper end of said contracted portion; a valved discharge-pipe having its inlet in longitudinal alinement with said contracted portion of said chamber, whereby the inlet and outlet to and from said chamber will be relatively close together; a vertically-extending cylinder connected to the lower end of said chamber; a loosely-fitting reciprocating plunger mounted in said cylinder; and a liquid-piston operating within said chamber and its contracted portion and in said cylinder by the movements of said plunger, whereby the volatile gases will be limited and confined within a limited space.

3. A pump for volatile liquids, comprising the suction-chamber 5, having the upper contracted portion or extension 7; the valved inlet-pipe 9, communicating with said chamber in juxtaposition to the upper end of said contracted portion, as at 8; the valved discharge-pipe 10, in alinement with said chamber; the cylinder 1, connected to said chamber at its lower end by means of the pipe 6; the reciprocating plunger 3 the liquid piston operating within the chamber 5, the extension 7 and cylinder 1; and the concentrically-arranged cup 2, substantially as and for the purposes set forth.

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

CLARENCE MAY KEMP.

Witnesses:
CHAS. I. PURNELL,
JOHN S. COLE.