D. M. Shapley,

Ejecting Pump,

No. 54,615. Patented May 8, 1866.

Fig. 1.

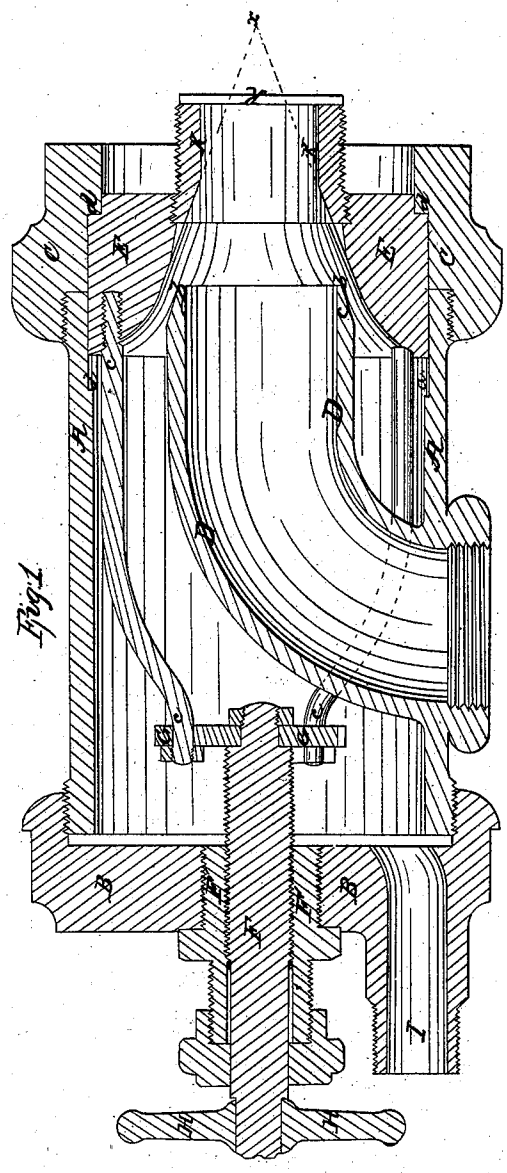
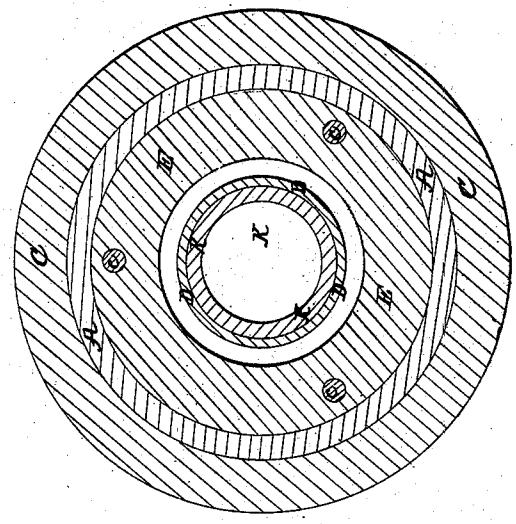


Fig. 2.



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UNITED STATES PATENT OFFICE.

D. M. SHAPLEY, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN PRESSURE-HEADS FOR SIPHON AND FORCE PUMPS.

Specification forming part of Letters Patent No. **54,615**, dated May 8, 1866.

To all whom it may concern:

Be it known that I, D. M. SHAPLEY, of the city and county of St. Louis, and State of Missouri, have invented a new Pressure-Head for Siphons and Force-Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Of the annexed drawings, Figure 1 is a sectional elevation of the improved pressure-head. Fig. 2 is a transverse section of same.

The object of this invention is to construct a pressure-head to be attached to any of the force-pumps or siphons now in use, by means of which a much larger volume of water can be thrown to any required distance or elevation, and with far greater economy of power than is now employed for like purposes.

In the case of siphons it is proposed to substitute a current of water or atmospheric air for the present expensive current of steam, to keep the water in motion. It is known to every engineer who has ever used any of the steam-siphons now in use that that is the most expensive mode of raising water that is ever employed, owing to the rapid condensation of the steam as it strikes the cold water in the pipe. The effect of such condensation is to fix a limit—and that a very low one, too, for the amount of steam used—to the volume of water thrown from any steam-siphon. If the same amount of steam now employed by direct pressure to force water through the siphon were used to propel an engine which worked a force-pump that forced a steady stream of condensed air or water through the siphon, the volume of water thrown by said siphon would be increased many times, and in fact would only be limited by the actual working capacity of the steam employed.

By forcing the current of steam, water, or air through an annular opening between conical surfaces which terminate at the point of the discharge of said current of steam, water, or air into the feed-pipe of said siphon, then the said steam, water, or air so forced through between such conical surfaces will continue forward, after leaving the end of said conical surfaces, in the direction thus imparted to it, and the converging sheet of steam, water, or air will meet in a focus at the apex of the cone of which the metal discharge-pipes at the base of the jet form frustums. The air which is contained within the hollow cone thus formed will partially escape by means of friction with the surrounding current, and a partial vacuum will thus be formed within the cone. Now, if the supply-pipe of the siphon is arranged to discharge into the base of this hollow cone, which by the above-described means has become a partial vacuum, then the water will rise in said supply-pipe by means of the pressure of the atmosphere on the surrounding surface, and the water so raised by atmospheric pressure will be a clear mechanical gain.

To enable those skilled in the art to make and use my improved pressure-head, I will proceed to describe its construction and operation.

I construct of cast metal the cylindrical shell of the chamber A, onto one end of which is screwed the head B and on the other end the annular base-piece C. The supply-pipe D enters one side of the chamber A, and continues, by an easy curve, toward the center of the chamber until the longitudinal axis of the pipe coincides with the longitudinal axis of the chamber.

The pipe D and the chamber A should be cast in one piece, and the discharge end *b* of the pipe should be in the same plane as the base end of the chamber.

The exterior surface of the pipe D, near its *b* end, should be turned off tapering toward the end, so that this end of the pipe will form a hollow frustum of a cone, the apex of which would be at *x*, from one to twenty inches (more or less) in advance of the end of the pipe. The distance of the apex *x* from the end of the pipe will of course vary widely, according to the size of the pipe and the angle of inclination that is given to the sides of the cone.

The orifice of the chamber A should be turned out near its base end so as to receive the valve E. The valve E should be made of brass or other soft metal, and, if not ground into the seat in the end of the chamber A, should be very nicely fitted in in a lathe, and care should be taken to have it rest firmly on its seat at *a* when closed. The valve E is annular in form, and the inner surface of it should be turned out so as to fit nicely up against the conical surface of the pipe D. When the valve

E is opened it should rest firmly on its seat at *d*, so as to thoroughly close the joint at that place.

The valve-rod F has screw-threads upon it, which fit into threads of the female screw in the stuffing-box F′, the stuffing-box being screwed onto the head B.

A short distance below the head B, and within the chamber A, the valve-rod has a swivel-head, G, from which three or more rods, *c*, pass down on different sides of the pipe D, and the lower ends of them are firmly fastened to the valve E, which they serve to open or shut.

The wheel H is fastened to the upper end of the valve-rod for the purpose of turning the rod. The valve E, then, will be opened or shut by screwing the rod F down or up. When the valve is shut the conical surface within it will fit tightly up against the conical surface of the end of the pipe D within it.

The valve E might, of course, be opened or shut by means of a lever; but the construction above described is considered preferable. In like manner what is now the valve E might be made a stationary portion of the chamber A, and the valve formed by making a portion of the *b* end of the pipe D movable, so as to slide up on the pipe and thus open the valve. This would be the preferable mode of construction in the case of force-pumps or rams, as the pressure on the end of the valve E in such case might be so great as to preclude the possibility of opening it by the means first herein described.

The supply-pipe I, introduced into the head B, is for the purpose of conducting the current of steam, water, or air into the chamber A.

In case it is desired to use this head for a force-pump or ram, it will be necessary to place the check-valve K below the valve E, so as to retain the water that may be in the pipe outside of or above it in case the operation should be stopped from accident or design.

As has been already described, a current of steam, water, or air may be introduced into the chamber A through the pipe I. Owing to the rapid condensation of the steam as it strikes the water at *b*, it becomes an expensive power. Therefore I propose, by the use of this head, to introduce a current of water or air for the purpose of supplying the motive power.

The valve E being open, and a strong current of water, for instance, introduced into the chamber A through the pipe I, it will be discharged through the annular opening at *b* in a conical jet, which will have its focus at *x*. The air which is in the pipe D will be partially carried out by friction with the jet of water that is forced through the annular opening at *b*, and a partial vacuum will thus be formed in the pipe D, when the water in which it is immersed will rise in the pipe until it comes in contact with the jet of water at *b*, when the whole volume will move forward together.

One great advantage of using water as a motive power in this connection is that the stream of water which is forced through the pipe I may be taken from the same reservoir that supplies the pipe D, which, in the case of wrecking-pumps, will be the hold of the vessel. A very economical arrangement will thus be effected, as the water that supplies the power to do the work will of itself lessen the amount of work to be performed.

Having described my invention, what I claim is—

1. The combination and arrangement of the feed-pipe D and the annular valve E, as herein set forth.

2. The valve E, in connection with the valve-rods F and *c*, or their equivalents, and with the chamber A, when used as hereinbefore set forth.

3. The check-valve K, in connection with the valve E, as hereinbefore set forth.

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