A. T. HAFFORD.

Submerged Force-Pumps.

No. 139,003. Patented May 20, 1873.

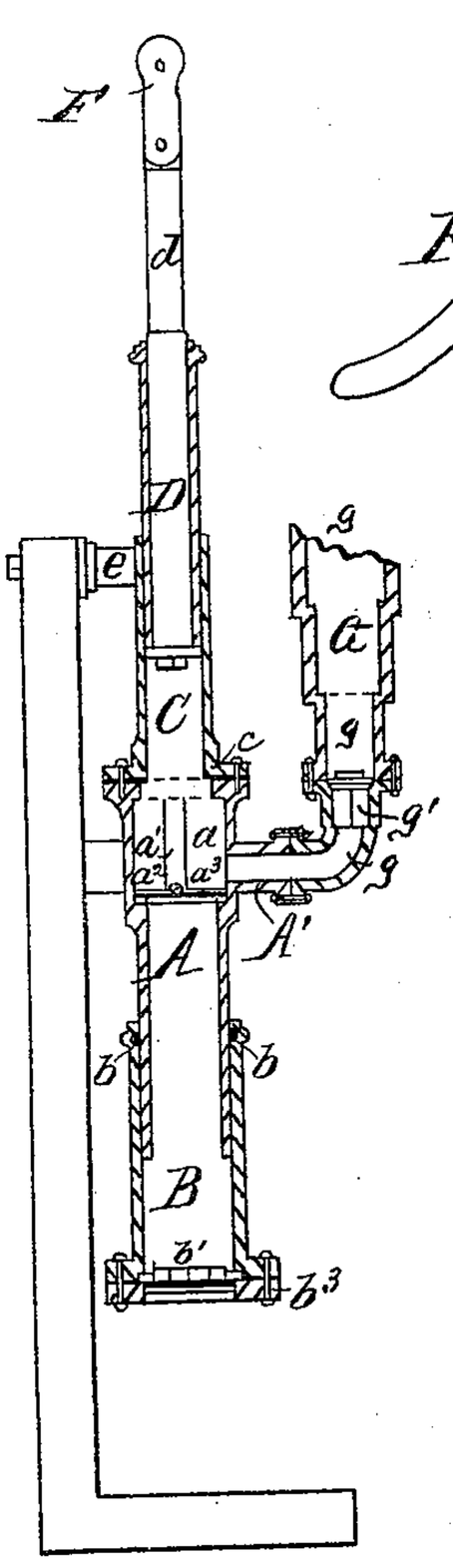

FIG. 1.

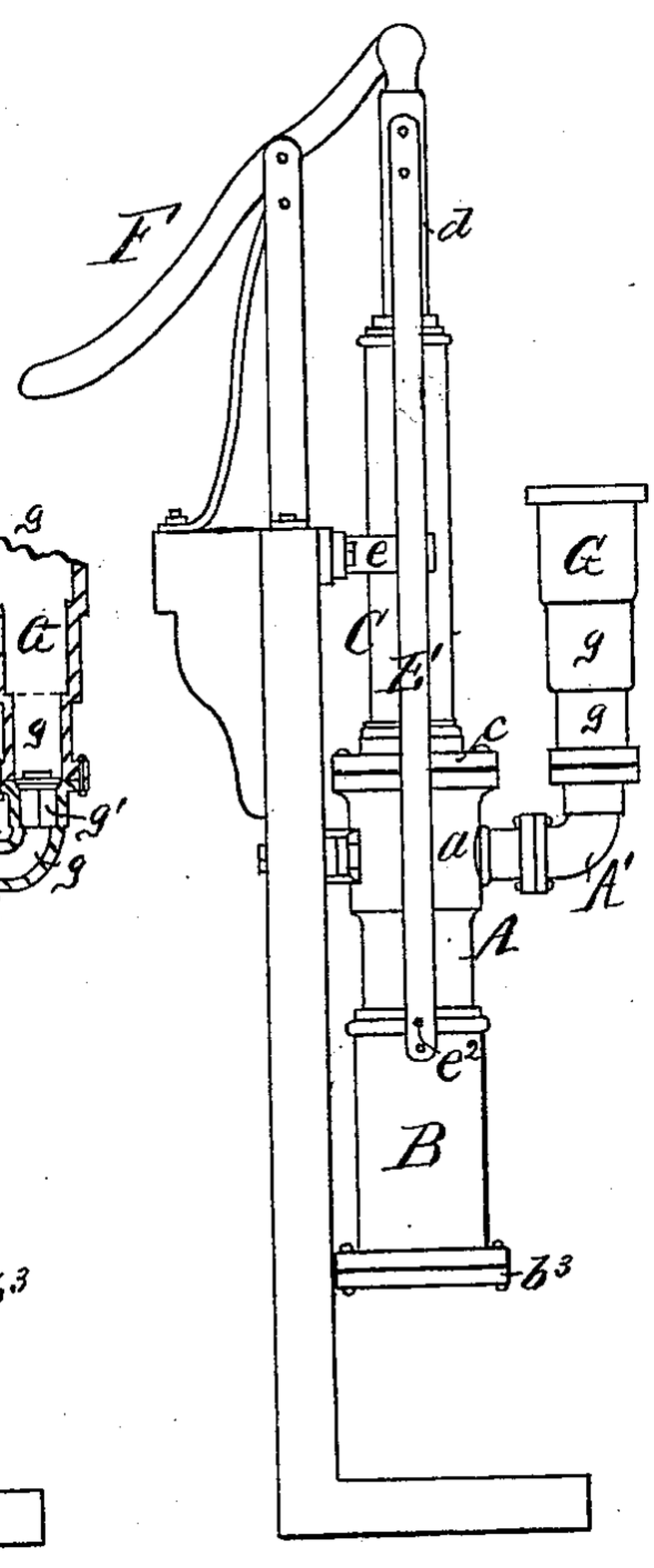

FIG. 2.

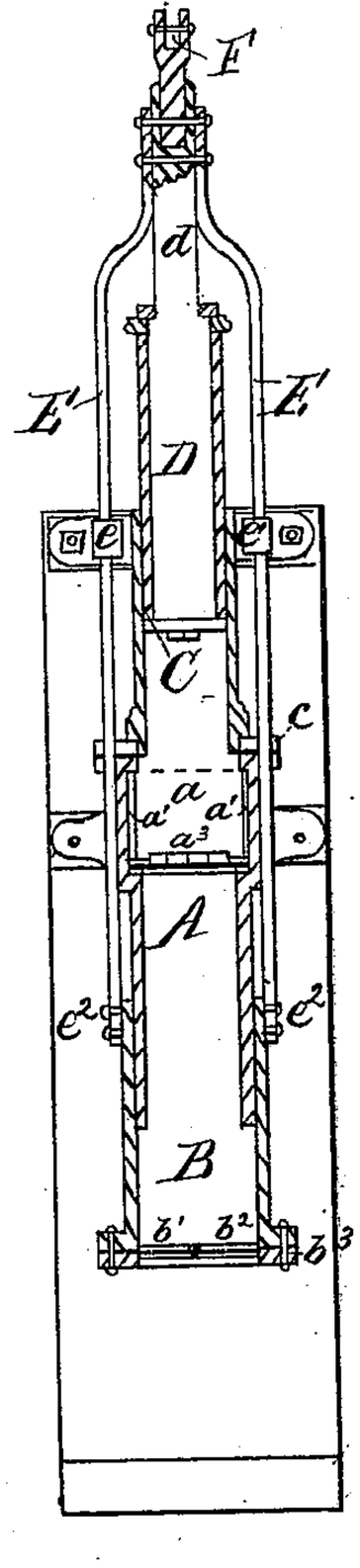

FIG. 3.

WITNESSES:

Charles Meisner.

Ch^s Rousseau

INVENTOR;

Abiel T. Hafford

per Serrell & Co

Attys.

UNITED STATES PATENT OFFICE.

ABIEL T. HAFFORD, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF HIS RIGHT TO FRANK J. DONOVAN, OF SAME PLACE.

IMPROVEMENT IN SUBMERGED FORCE-PUMPS.

Specification forming part of Letters Patent No. **139,003**, dated May 20, 1873; application filed March 25, 1873.

To all whom it may concern:

Be it known that I, ABIEL T. HAFFORD, of St. Louis, in the county of St. Louis and State of Missouri, have invented an Improved Submerged Force-Pump, of which the following is a specification:

My invention consists in providing the main pump cylinder or barrel with a top and lower additional cylinders, so as to form what I term a telescopic force-pump. The main and top cylinders are stationary, the lower cylinder and piston at top being movable, so that the former shall inclose the greater part of the main cylinder, while the latter or piston works in the top cylinder, when both said movable parts are actuated by connecting-rods. The valves in the cylinders are so arranged that while one set is discharging the other is receiving.

To enable those herein skilled to make and use my said invention, I will now more fully describe the same, referring to—

Figure 1 as a sectional elevation; to Fig. 2 as a side elevation; Fig. 3 as a front sectional elevation.

A represents the main cylinder, formed with an enlarged upper chamber, *a*, to afford increased escapement of water. Also, forming part of the cylinder A is the outlet-pipe A′. The cylinder A is made stationary, being properly secured to a suitable frame, wall, or support. The bottom cylinder B is fitted to slide up and down over the main cylinder A. At *b*, the main cylinder B is provided with suitable packing to form the required water-joint. At bottom the cylinder B is provided with ordinary semicircular valves, b^1 b^2. (See Figs. 1 and 3.) The valves b^1 b^2 turn upon a pivot which engages the sides of the cylinder, and said parts are retained in position by a screw-flange, b^3, which, with packing between, is properly bolted to the bottom flange of said cylinder. Within the cylinder A, and seated in its upper chamber *a*, is a valve-seat, a^1. The seat a^1 consists of an annular collar having side extensions, to which valves a^2 a^3 are hinged, as shown in Figs. 1 and 3. The valves a^2 a^3 control the ingress of water into the upper chamber, and prevent the return thereof. The top cylinder or barrel C is secured by its flange *c*, with packing between, to the top flange of the main cylinder A. The top cylinder C is provided with a suitable piston, D, and this, by its rod *d*, is connected with the actuating rods E. The side rods E are guided in their vertical movement by side guides *e* e^1 secured to the support or frame; at their lower ends said rods are properly connected at e^2 to the lower cylinder B. The rods E work simultaneously in the same direction, and, as they make their up and down strokes at the same time, the pump is rendered double acting. A proper handle, F, is attached to both rods, which connect at top. The discharge-pipe G I construct with enlarged sections *g*, as indicated in Figs. 1 and 2. The pipe G can be carried to any required height, or effect the discharge as required. I provide the pipe G, at its connection with pipe A′, with a check-valve or float-valve, *g*′, (see Fig. 1,) so as to check and control the discharge of water out of the pump.

The cylinder B is submerged, and first receives and carries the water to the working portions of the pump. While the cylinder B makes its first downward stroke the valves b^1 b^2 open to allow water to enter and fill the said cylinder. As soon as the lower cylinder B is operated on the upstroke, its valves b^2 b^3 close, preventing the return of the entered water, and forcing same to rise into the main cylinder A, which action opens its valves a^1 a^2, thus permitting said water to enter and fill the upper chamber *a* and top cylinder C. On the following down-strokes the valves a^2 a^3 close, preventing the reflow downward of the lifted water; and, at the same time, as the lower cylinder B is actuated to refill, the piston D, in its down-stroke into the top of cylinder C and chamber *a*, forces the water out through the pipe G; and in doing so the valve *g*′ is operated to permit said escapement for the water to take place.

It is apparent there are but two movable sections for the pump, viz., the lower cylinder B passing up and down over the stationary cylinder A, and the other, the piston D, on top reciprocating in the cylinder C. Further, as these two movable sections, B D, are united by side bars, they act in concert,

so that while the upstroke of B lifts the water through A into C, the down-stroke of D forces the water out of the upper chamber into the discharge-pipe, from which it is finally discharged. My improved pump possesses great power, and forces a great volume of water by way of a continuous stream; utilizes the strokes of the piston; requires few valves; and the entire arrangement is both simple and practical.

Having thus fully described my said improvements, what I claim is—

1. An improved submerged force-pump, consisting of a main cylinder provided with top and bottom cylinders, having valves, the piston being connected to side rods which further connect to said bottom cylinder, said parts being arranged and constructed to operate as and for the purpose set forth.

2. The combination of cylinders A B C, valves b^1 b^2, and valves a^2 a^3, piston D, as and for the purpose set forth.

3. The combination and arrangement of cylinders A B C, valves b^1 b^2, a^2 a^3, piston D, rods E, and discharge-pipe G, all constructed to operate as and for the purpose set forth.

In testimony of said invention I have hereunto set my hand.

ABIEL T. HAFFORD.

Witnesses:

WILLIAM W. HERTHEL,

CHAS. MEISNER.