(No Model.)

M. S. BREWER.

FORCE PUMP.

No. 363,721. Patented May 24, 1887.

Fig. 1.

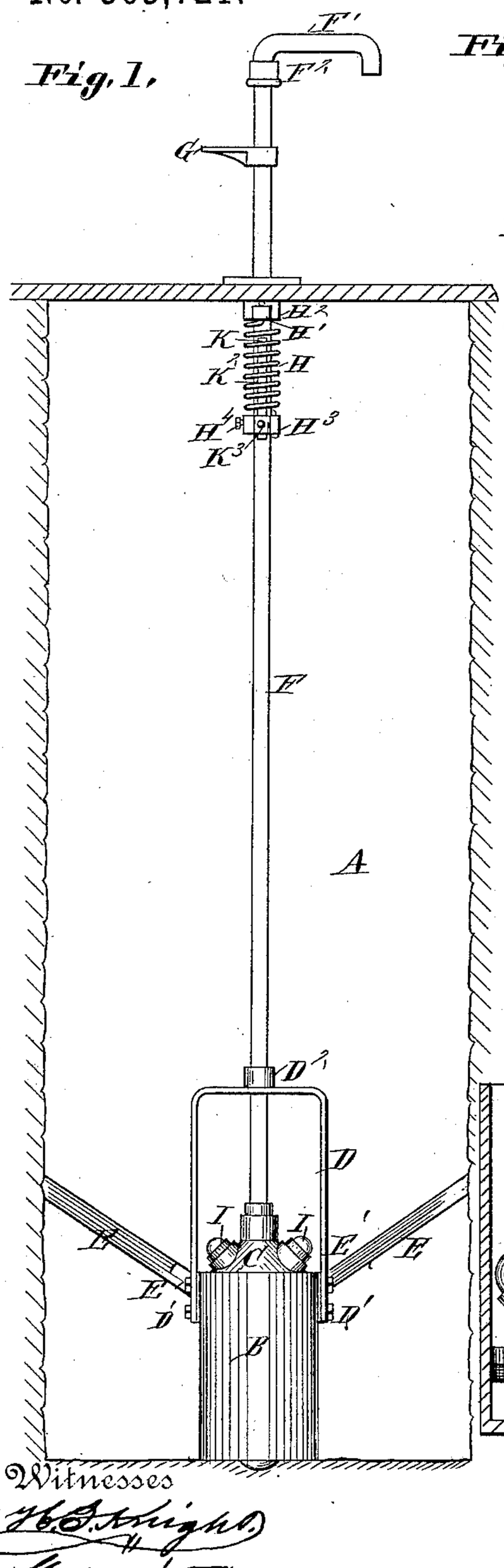

Fig. 2.

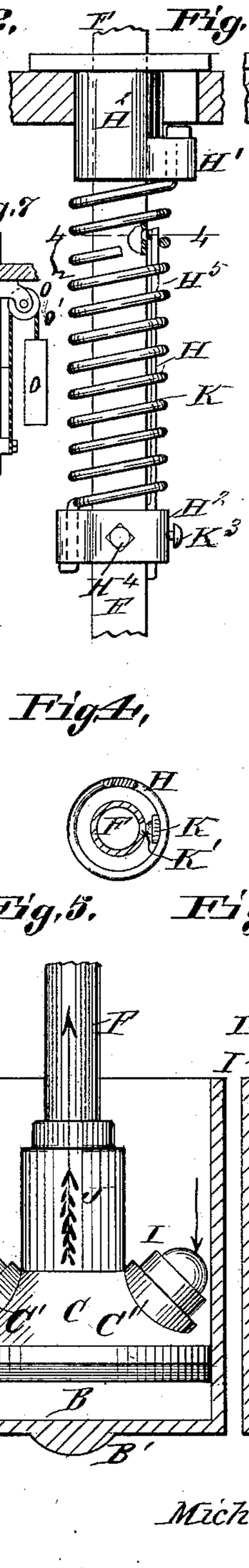

Fig. 3.

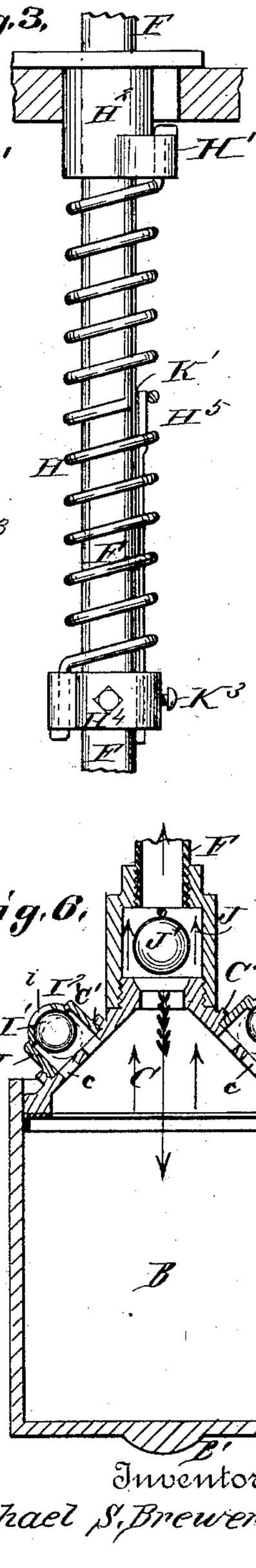

Fig. 7

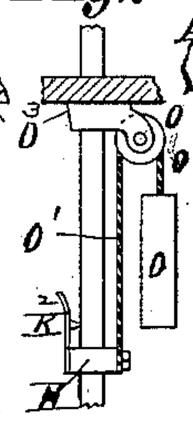

Fig. 4.

Fig. 5.

Fig. 6.

Witnesses

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UNITED STATES PATENT OFFICE.

MICHAEL S. BREWER, OF ST. JAMES, MISSOURI.

FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 363,721, dated May 24, 1887.

Application filed August 21, 1886. Serial No. 211,539. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL S. BREWER, a citizen of the United States, residing at St. James, in the county of Phelps and State of Missouri, have invented certain new and useful Improvements in Force-Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, and in which—

Figure 1 illustrates a vertical section of a well, showing my improved pump in side elevation. Fig. 2 is a detail view showing the frost-valve in its closed position and the piston-rod elevated. Fig. 3 is a similar view showing the piston-rod in its lower position. Fig. 4 is a section taken on line 4 4, Fig. 2, showing the frost-valve and a section of the lifting-spring pressing on the valve. Fig. 5 is an enlarged section of the pump-cylinder and the piston down and shown in side view. Fig. 6 is an enlarged section of the cylinder and piston shown. Fig. 7 illustrates a modification.

My invention relates to that class of force-pumps with submerged cylinders and tubular pistons; and my invention consists in features of novelty, hereinafter fully described, and pointed out in the claims.

Referring to the drawings, A represents a well in which one of my pumps is located.

B is the cylinder of the pump, which rests on a foot-block, and C is the conical plunger-head that operates in the cylinder.

D is the guide-frame securely bolted to the cylinder at D′, and is provided with a collar, D², above, to guide the piston-rod as it works.

E represents the drop or drag braces that are hinged to the cylinder at E′.

F represents the piston-rod, and F′ the spout, which is secured to the rod by a coupling, F².

G is the treadle attached to the piston-rod at a suitable distance above the platform to be convenient for the operator who pumps the water, and by which he forces the piston down.

H is a coil-spring secured to a lug, H′, on a collar, H², that surrounds the piston-rod immediately below the platform, to which latter it is secured. The lower end of this coil-spring is attached to a collar, H³, that also surrounds the piston-rod, and is adjustably secured thereto by set-screws H⁴, that work through the collar. The function of the coil-spring is to elevate the tubular piston on its return-stroke.

It will be seen that the piston C consists of a hollow frusto-conical shell, which is provided at its apex with a perforation for allowing communication between the interior of the cylinder B and the interior of the hollow piston-rod F, to which it is connected through the medium of the valve-chamber J. The interior of the cylinder B is also placed in communication with the water in which it is submerged through openings *c*, formed in the top side of the piston, and openings *i*, formed in the ends of casings I, which contain ball-valves I′, opening inwardly to permit the ingress of the water, and closing outwardly against seats I² to prevent its egress.

The valve-casing I consists of a simple casting, the body of which is cylindrical and provided on its exterior with screw-threads for engaging corresponding threads formed on the interior of an annular hub, C′, cast integrally with the frusto-conical piston C and surrounding the apertures *c*. I am thus enabled not only to make the piston much cheaper than when made solid and bored out to form valve-chambers, but I am also enabled to make it much lighter, which is quite a desideratum in pumps of this character. Furthermore, by forming the upper side of the piston of conical shape, the resistance which the water offers to its ascent is lessened.

The water in the latter action of the plunger is forced up within the conical head and through a ball-valve chamber, J, at the foot of the piston-rod and passes up the tube, being prevented from return to the cylinder as the piston again descends by the ball J′ descending to its seat in the chamber.

The cylinder and plunger-head may be made of porcelain, stoneware, or other imperishable material, and the other parts of any suitable material for the functions they have to perform.

An automatic frost valve or pin, K, acts in connection with a vent-hole, K′, in the tube, and is attached to and supported by a spring-rod, K², that is secured to the collar H³, that supports the coil-spring H, by a set-screw, K³,

that adapts the length of the rod carrying the frost-pin to rightly introduce the pin into the vent.

The seating and operation of my improved force-pump are as follows: The conical plunger-head is inserted in the cylinder and the guide-frame and pivot-braces hinged thereto. The tubular piston-rod is then screwed into its collar immediately above the ball-valve chamber that surmounts the apex of the plunger-head. The cylinder, with its attached parts, is then submerged in the well, the hemispheric foot-block B′, attached to the bottom of the cylinder, finding a footing even when the bottom of the well is uneven. The pivoted braces that are hinged to the top of the cylinder follow on down the well as the cylinder descends and firmly brace it both laterally and from being elevated. The lifting coil-spring and frost-pin may be now secured to the piston-rod by the attachment of the collars that command it, the treadle next placed in position, and the spout screwed into its collar, and when the platform is down the pump is ready to work. When the cylinder with its attached parts is submerged, the liquid is lifted by the direct action thereon of the tubular piston-rod instead of by suction. The tube conveying the water forms the connecting-rod between the piston on the one hand for forcing down and the lifting-spring for elevating.

It will be seen that as the piston works and the coil-spring expands longitudinally it contracts laterally and at the same time rides upon the shoulders H^5 of the frost-pin rod and forces it into the vent-hole in the tube, thus automatically forcing the frost-pin into its seat when the pump is in motion; but when the coil-spring again relaxes its hold when the pump is idle, the spring that carries the pin extracts it from the vent and the water escapes, not only removing all danger from frost, but also in summer the water is not heated in the pipe, as it is not confined in the metal tube above the platform.

It is frequently made an objection to frost-vents that they greatly increase the labor of pumping, so that frequently in early winter the frost-pin is neglected to be pulled out until some night a hard frost comes and the pipe bursts. All danger of such accidents is avoided by my automatic frost-pin.

In Fig. 7 I have shown a modification of the means for raising or lifting the piston and piston-rod to be used in place of the spring H. This consists of a weight, O, connected by a cord or chain, O′, to the collar H^3, the cord or chain passing over a pulley, O^2. It will be thus seen that when the piston is forced down the weight will act to lift the piston and rod. In this figure I have also shown a modification of the means for opening the vent, which consists of a cam, O^3, located at top of the well, which is engaged by an incline, N, on the upper end of the spring H, upon which the vent is formed. I have shown this cam formed upon the collar H^3, that supports the pulley O^2.

I am aware that it has been proposed to make the top sides of pistons slightly curved instead of flat; but I am not aware that it has ever been proposed to give them a decidedly conical shape for the purpose of lessening the resistance which the water offers to their ascent.

I claim as my invention—

1. In a pump, the combination of the stationary cylinder B, open at top, the piston C, working in said cylinder and provided with an opening, an outwardly-seated valve for permitting the ingress of fluid to said cylinder, but preventing its egress, a vertically-movable hollow piston-rod secured to said piston and communicating with said cylinder, and a valve for permitting fluid to enter and pass upward through said hollow rod on the descent of the piston, but preventing said fluid from flowing downward and back into the cylinder, substantially as set forth.

2. In a pump, the combination, with the cylinder, of a piston fitted therein and having a suitable port therethrough, a valve-casing secured to the piston so as to surround said port and be removable from the outside of the piston, said casing being provided with an opening for the passage of water, and a valve-seat surrounding said opening, and a valve placed within the casing and adapted to prevent the water passing the piston by closing against the seat formed on the valve-casing, substantially as set forth.

3. The combination of the cylinder B, the hollow frusto-conical piston C, having the outlet aperture at its apex, the inlet-apertures *c* in its top side, and the annular hubs C′, surrounding said apertures *c*, the valve-casings I, secured to said hubs C′ and having the apertures *i*, the valves I′, the valve-chamber J, secured to the apex of the said piston, the valve J′, and the hollow piston-rod F, all constructed and arranged to operate substantially as set forth.

4. In a pump, the combination, with the cylinder, the piston, suitable valves, and the hollow piston-rod having a leak-hole, of a frost-valve having a stem, and a spring surrounding said stem and the piston-rod, substantially as set forth.

5. In a pump, the combination, with the hollow piston-rod having a leak-hole, of a frost-valve, K, having a spring-stem, K^2, provided with a shoulder, H^5, and spring H, surrounding said piston-rod and stem, said spring being fixed at one end to a stationary part of the pump and at the other to the piston-rod, for the purpose set forth.

MICHAEL S. BREWER.

In presence of—
THOMAS STINSON,
J. G. HELLMUTH.