No. 741,508. PATENTED OCT. 13, 1903.

W. W. KUNTZ.

DOUBLE ACTING FORCE PUMP.

APPLICATION FILED JUNE 15, 1903.

NO MODEL.

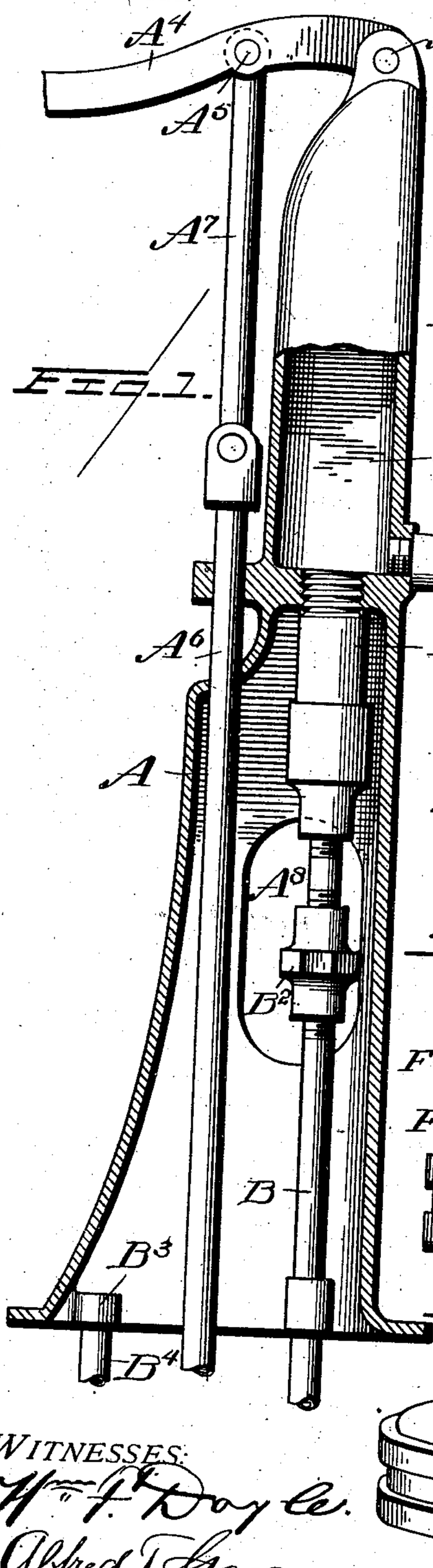

FIG. 1.

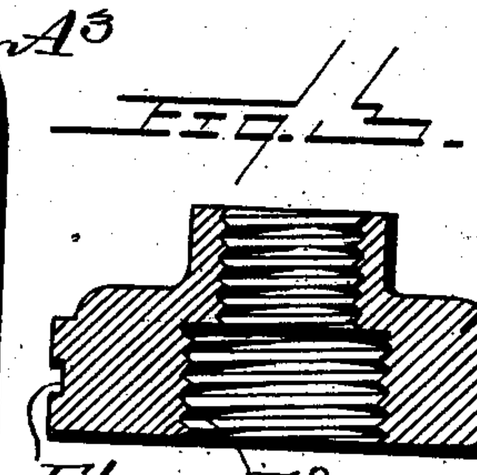

FIG. 3.

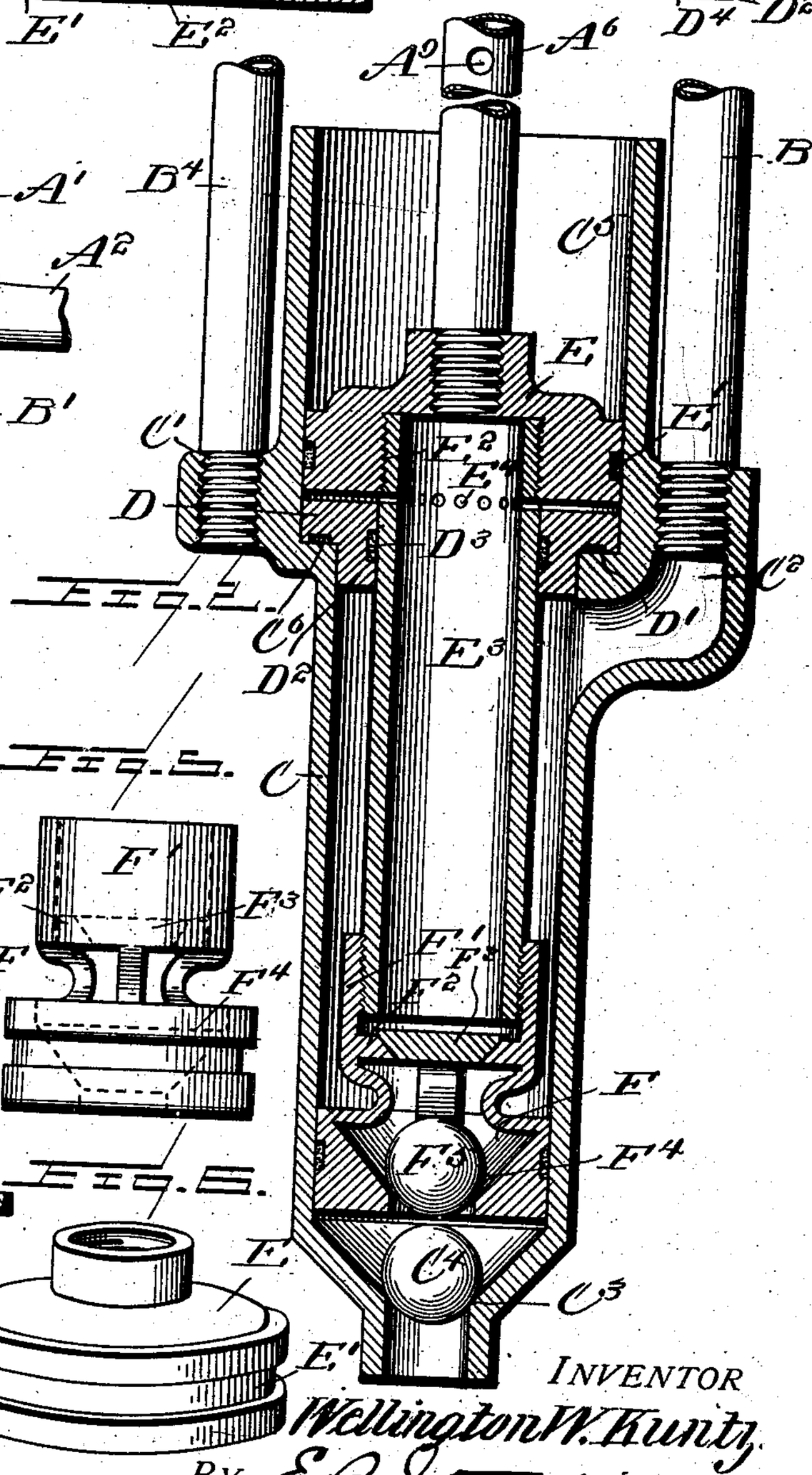

FIG. 2.

FIG. 4.

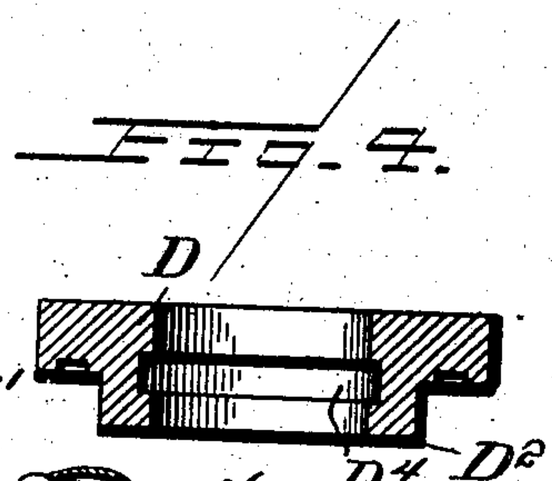

FIG. 5.

FIG. 6.

WITNESSES:

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No. 741,508. Patented October 13, 1903.

UNITED STATES PATENT OFFICE.

WELLINGTON W. KUNTZ, OF ALLENTOWN, PENNSYLVANIA.

DOUBLE-ACTING FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 741,508, dated October 13, 1903.

Application filed June 15, 1903. Serial No. 161,540. (No model.)

To all whom it may concern:

Be it known that I, WELLINGTON W. KUNTZ, a citizen of the United States, residing at Allentown, in the county of Lehigh, State of Pennsylvania, have invented certain new and useful Improvements in Double-Acting Force-Pumps, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a double-acting force-pump, and particularly to a structure whereby the bushing at the upper end of the pump-cylinder is held in position by a body of water.

The invention has for an object to provide a removable bushing disposed at the upper end of the pumping-cylinder in connection with a water column having sufficient pressure to retain the bushing in position during the pumping action.

A further object of the invention is to provide a piston upon the plunger-rod operating in a cylinder above the bushing to operate in connection with the water column for holding the bushing in position during the pumping action.

Other and further objects and advantages of the invention will be hereinafter set forth, and the novel features thereof defined by the appended claims.

In the drawings, Figure 1 is a vertical section, with parts in elevation, of the standard at the upper end of the pump. Fig. 2 is a vertical section, upon an enlarged scale, of the lower portion of the pump. Fig. 3 is a central vertical section through the upper plunger. Fig. 4 is a similar view of the bushing. Fig. 5 is a detail elevation of the bottom or pumping plunger, and Fig. 6 is a detail perspective of the plunger shown in Fig. 3.

Like letters of reference refer to like parts in the several figures of the drawings.

The letter A designates a standard or support of any desired configuration, preferably provided at its upper portion with an air-chamber A′, communicating with a discharge-spout A^2 and having at its upper end a pivoting-lug A^3 to receive the operating-handle A^4. This handle is pivotally connected at A^5 with a plunger-rod A^6 by means of a link A^7. The air-chamber A′ is connected with a delivery-pipe B by means of a pipe-section B′ and coupling B^2, which coupling is rendered accessible by means of an opening A^8 in the standard. At the base of the standard a suitable lug B^3 is provided, to which the supporting-rod B^4 is connected and extends downward to the bottom of the well.

The pumping-cylinder C, as shown in Fig. 2, is connected to the supporting-rod B^4 by means of a threaded lug C′ and at the opposite side to the delivery-pipe B by means of a neck C^2, by which the water is discharged from the cylinder. The lower portion of this cylinder is provided with a valve-seat C^3, having therein any desired form of valve—for instance, a ball C^4—while at the upper end of the pumping-cylinder a tandem cylinder C^5 is provided for maintaining the water column, to be hereinafter described. At the base of this cylinder a shoulder or seat C^6 is formed, upon which the annular bushing D is adapted to rest, and, if desired, may be provided at that point with a packing D′ for establishing a water-tight joint. This bushing is provided with a depending flange D^2, extending around a central aperture therein, and the walls of this aperture are also provided with a packing D^3, which may be seated in a suitable recess D^4, as shown in Fig. 4.

The piston or plunger-rod A^6 is provided at the cylinder C^5 with a piston-head E, provided upon its periphery with a packing disposed within a recess E′, while the under face is provided with a threaded recess E^2 to receive the upper end of the enlarged pipe-section E^3, forming the lower end of the rod, as shown in Fig. 2. This pipe is provided with a series of suitable apertures E^4, communicating with spaces within the cylinder C^5 beneath the piston E. At the lower end of this pipe-section a valve-cage F is mounted by means of a threaded socket F′ engaging the section E^3. The base F^2 of this socket is provided with a suitable seat to receive a check-valve F^3, while the cage is also provided with a seat F^4, cooperating with any suitable valve—for instance, a ball F^5. In order to maintain the necessary water column upon the removable bushing D, the plunger-rod A^6 is formed hollow and communicates with the pipe-section E^3, while its lower aperture is provided with an aperture A^9 to permit the discharge when the desired height of water column has been

secured through the water admitted by the check-valve at the lower end of the pipe-section.

With the parts in the position shown in Fig. 2 the pumping-piston is at its extreme lower end of its movement, while its cylinder is filled with water and also the water column in the plunger-rod is maintained. The upward movement of the rod discharges the water from the pump-cylinder and at the same time by suction refills the cylinder beneath the pumping-piston, so that in its return movement the pipe-section E^3, which is of sufficient area to displace a portion of the water column within the pumping-cylinder, causes a flow of water therefrom. The water column in the pipe-section and plunger-rod is sufficient to retain the valve at the lower end of the section closed in the downward movement of the pump-piston, and in the upward movement just described the piston in the upper cylinder moves away from the bushing at the top of the pumping-cylinder and permits the flow of water into the space thus formed of a portion of the water column carried by the plunger-rod. This space is variable in the movement of the piston, and in the downward movement thereof the water is to a large extent expelled from the space and enters the hollow plunger-rod. In starting the pump if this space within the pipe-section and plunger-rod is empty water will be taken through check-valve at the lower end of the pipe until the desired column is attained, when the pressure of the water will prevent any further opening of the valve. If it is desired to remove the bushing, which frequently becomes necessary in pumps where sand or other sharp material is raised, the entire plunger-rod is withdrawn, and as the pumping-piston rises upward the bushing is lifted from its seat and carried therewith to the upper portion of the well, where it may be replaced or repaired, as found necessary. This bushing may be again placed in position by simply lowering the pumping-plunger into its cylinder, as the upper piston will bear upon the bushing and force it downward upon its seat. By use of this water column the pressure is maintained upon the top of the check-valve at the lower end of the pipe-section greater than on the bottom, while the bushing is likewise maintained by the larger area of its upper face. Either of these parts may be opened by a sudden jar, and bursting of the pump is thus prevented. With a pressure of ten pounds to the square inch, or about twenty-four feet of water in the plunger-rod and pipe-section, the space between the bushing and its piston will be freely filled in the movement of the piston and acts as a cushion for the bushing. The height of this water column constantly varies during the stroke, being highest when the pump-piston is down and lowest when the pump-piston is at the top of its stroke. It will be seen from the foregoing that the water is discharged from the pumping-cylinder by the piston in the upward movement and by displacement by the pipe-section in the downward movement, thus producing a double-acting pump, while the use of the removable bushing in connection with the structure to provide a water column for retaining it in position present a very efficient structure by which the parts may be removed and replaced in the pumping-cylinder without the necessity of withdrawing more than the plunger-rod of the pump, thus saving much time and expense in the repairs which are frequently necessary to secure an efficient pumping service.

It will be obvious that changes may be made in the details of construction and configuration without departing from the spirit of the invention as defined by the appended claims.

Having described my invention and set forth its merits, what I claim, and desire to secure by Letters Patent, is—

1. In a force-pump, a pumping-cylinder, a valved piston therein, a hollow piston-rod for said piston having apertures at its upper portion, a removable bushing at the upper portion of said pumping-cylinder and below the apertures in the piston-rod, a cylinder extending above said bushing, and a piston carried by the piston-rod and operating in said bushing-cylinder.

2. In a force-pump, a pumping-cylinder, a valved piston therein, a hollow piston-rod for said piston having apertures at its upper portion, a removable bushing at the upper portion of said pumping-cylinder and below the apertures in the piston-rod, a cylinder extending above said bushing, a piston carried by the piston-rod and operating in said bushing-cylinder, and a check-valve disposed at the lower end of the hollow piston-rod.

3. In a force-pump, a pair of tandem cylinders disposed one above the other, a valved pumping-piston in the lower cylinder, a removable bushing resting upon a seat at the bottom of the upper cylinder, a water-chamber communicating with the upper cylinder above the bushing, and a piston in said upper cylinder.

4. In a force-pump, a pair of tandem cylinders disposed one above the other, a valved pumping-piston in the lower cylinder, a removable bushing resting upon a seat at the bottom of the upper cylinder, a water-chamber communicating with the upper cylinder above the bushing, a piston in said upper cylinder, and a pipe-section connecting said pistons and comprising a displacement-piston.

5. In a force-pump, a pair of tandem cylinders disposed one above the other, a valved pumping-piston in the lower cylinder, a removable bushing resting upon a seat at the bottom of the upper cylinder, a piston in said upper cylinder, a pipe-section connecting said pistons and having an apertured wall beneath the upper piston, and a hollow piston-rod communicating with said pipe-section.

6. In a force-pump, a pair of tandem cylin-

ders disposed one above the other, a valved pumping-piston in the lower cylinder, a removable bushing resting upon a seat at the bottom of the upper cylinder, a piston in said upper cylinder, a pipe-section connecting said pistons and having an apertured wall beneath the upper piston, a hollow piston-rod communicating with said pipe-section, and a check-valve at the lower portion of said pipe-section.

7. In a force-pump, the combination with tandem cylinders, of a seat at the lower portion of the upper cylinder, an annular bushing adapted to rest upon said seat and having a depending flange, a pumping-piston in the lower cylinder, and a piston-rod extending upward through said bushing and a water-chamber communicating with the upper cylinder above the bushing.

8. In a force-pump, the combination with tandem cylinders, of a seat at the lower portion of the upper cylinder, an annular bushing adapted to rest upon said seat and having a depending flange, a pumping-piston in the lower cylinder, a tubular piston-rod extending upward through said bushing and provided with apertures above the same, a piston in the upper cylinder above said bushing and having a threaded recess to receive said tubular piston-rod.

9. In a force-pump, a cylinder, a hollow piston-rod, a valved piston within said cylinder, a valved coupling to receive the lower end of said piston-rod and supported by arms from said valved piston, a water-chamber communicating with said piston-rod, and a bushing surrounding said rod below said chamber.

10. In a force-pump, a pair of tandem cylinders, a hollow piston-rod having apertures communicating with the upper cylinder, a pumping-piston at the lower end thereof, and a bushing at the upper end of the lower cylinder adapted to be removed in the withdrawal of the pumping-piston.

11. In a force-pump, a pair of tandem cylinders, a hollow piston-rod having apertures communicating with the upper cylinder, a pumping-piston at the lower end thereof, a bushing at the upper end of the lower cylinder adapted to be removed in the withdrawal of the pumping-piston, and means for maintaining a column of water in communication with the upper face of said bushing.

12. In a force-pump, a pair of tandem cylinders, a hollow piston-rod having apertures communicating with the upper cylinder, a pumping-piston at the lower end thereof, a bushing at the upper end of the lower cylinder adapted to be removed in the withdrawal of the pumping-piston, and means for maintaining a column of water in communication with the upper face of said bushing, a standard at the upper end of said pump having operating means for said piston-rod, a delivery-pipe extending from the pumping-cylinder, an air-chamber in said standard communicating with said delivery-pipe, and a discharge-pipe extending from said air-chamber.

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

WELLINGTON W. KUNTZ.

Witnesses:

JAMES J. GILLESPIE,

EDWIN REMMEL.