

No. 741,926.

PATENTED OCT. 20, 1903.

C. L. PARKER.
PUMP.

APPLICATION FILED MAY 14, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

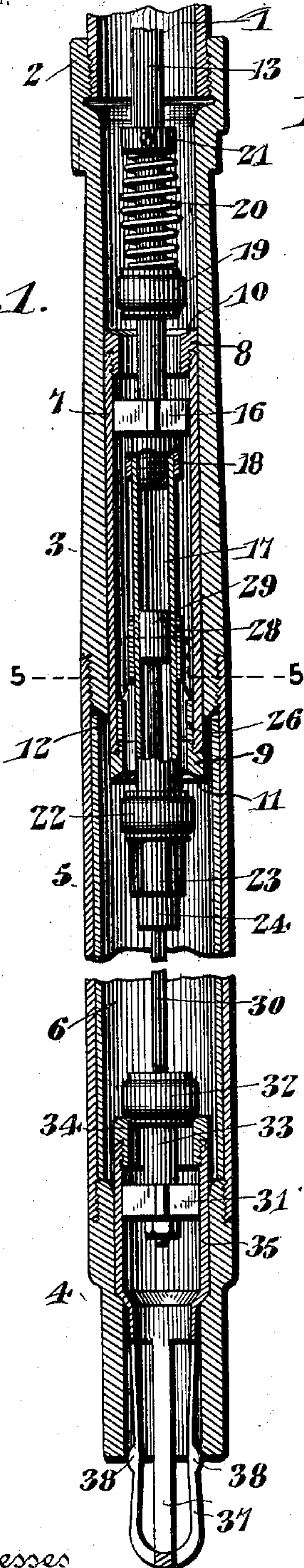


Fig. 2.

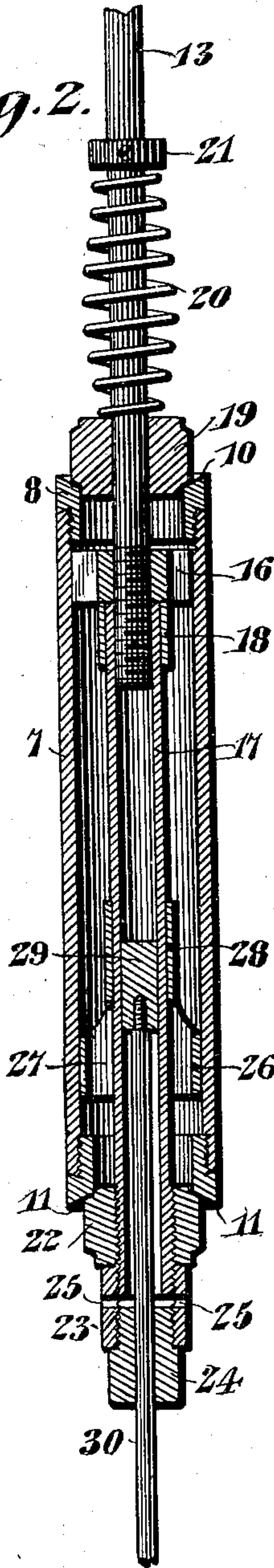
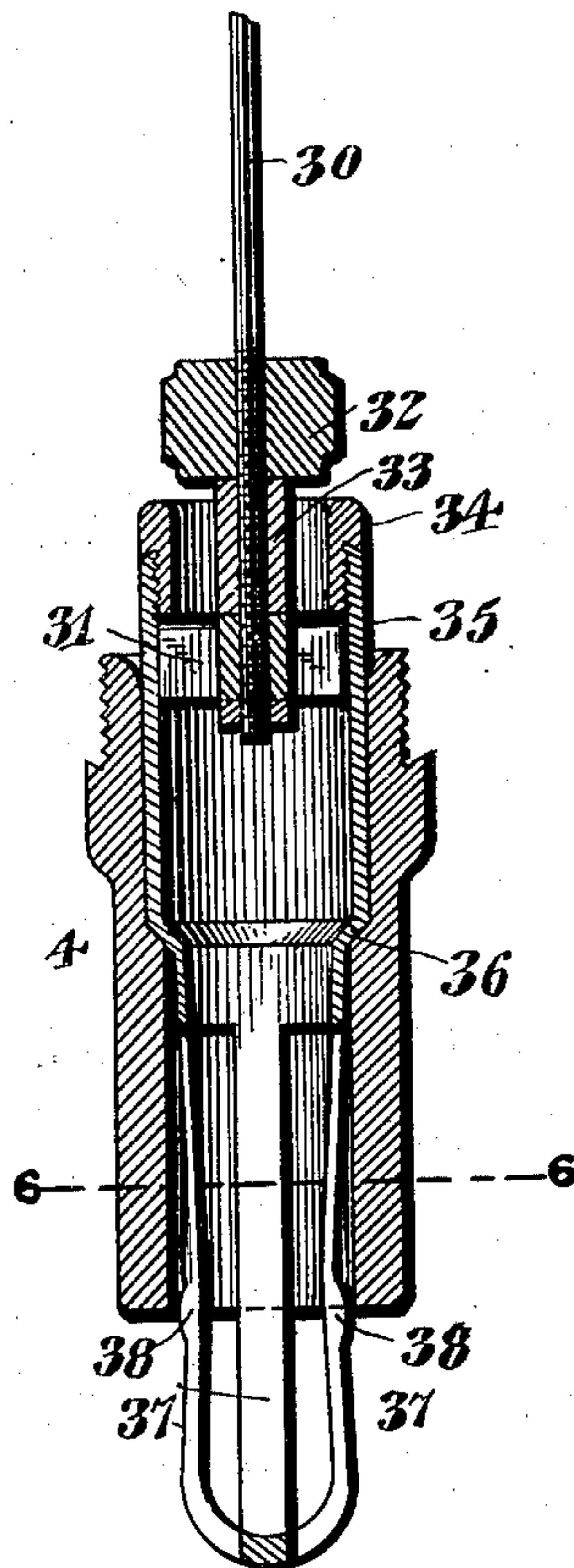


Fig. 3.



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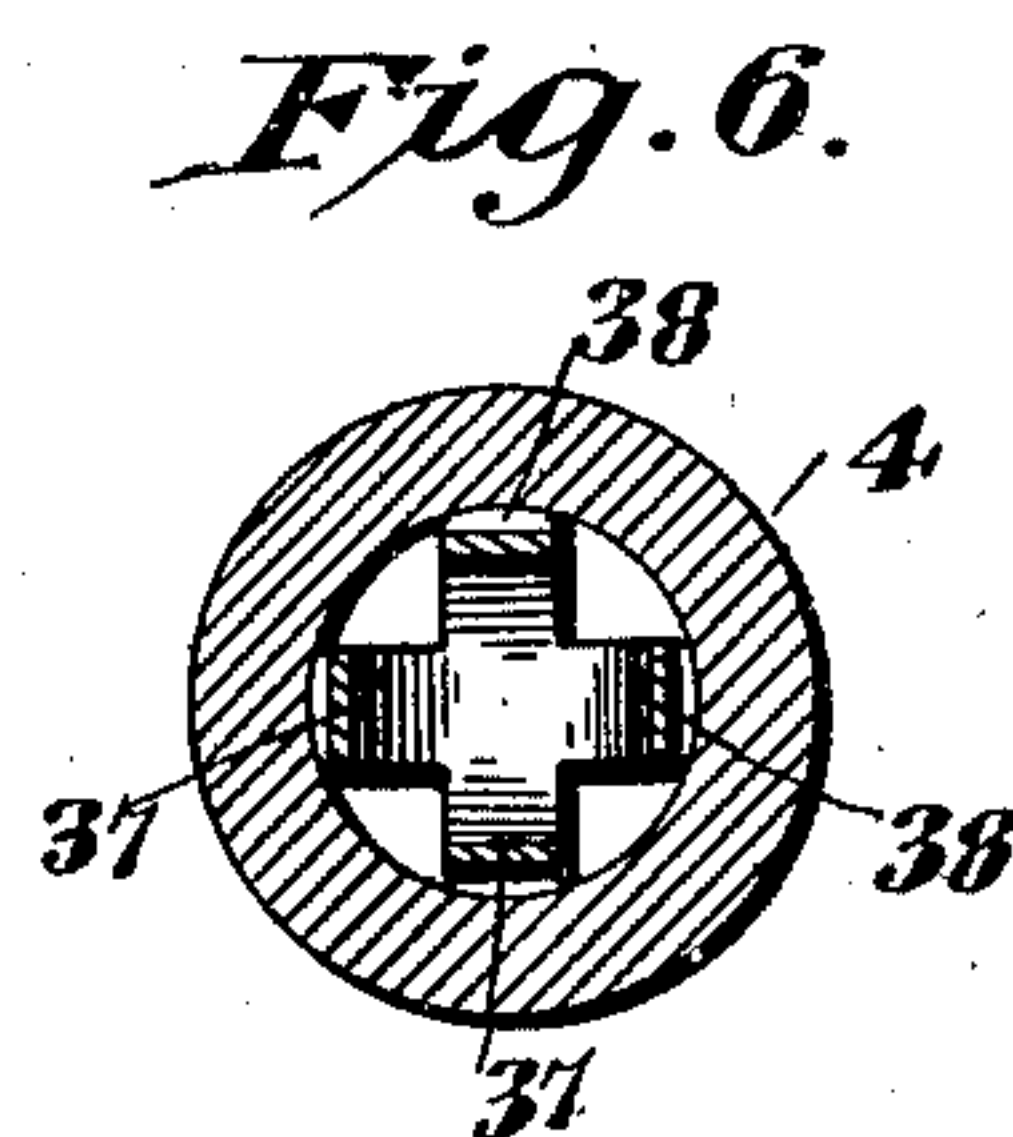
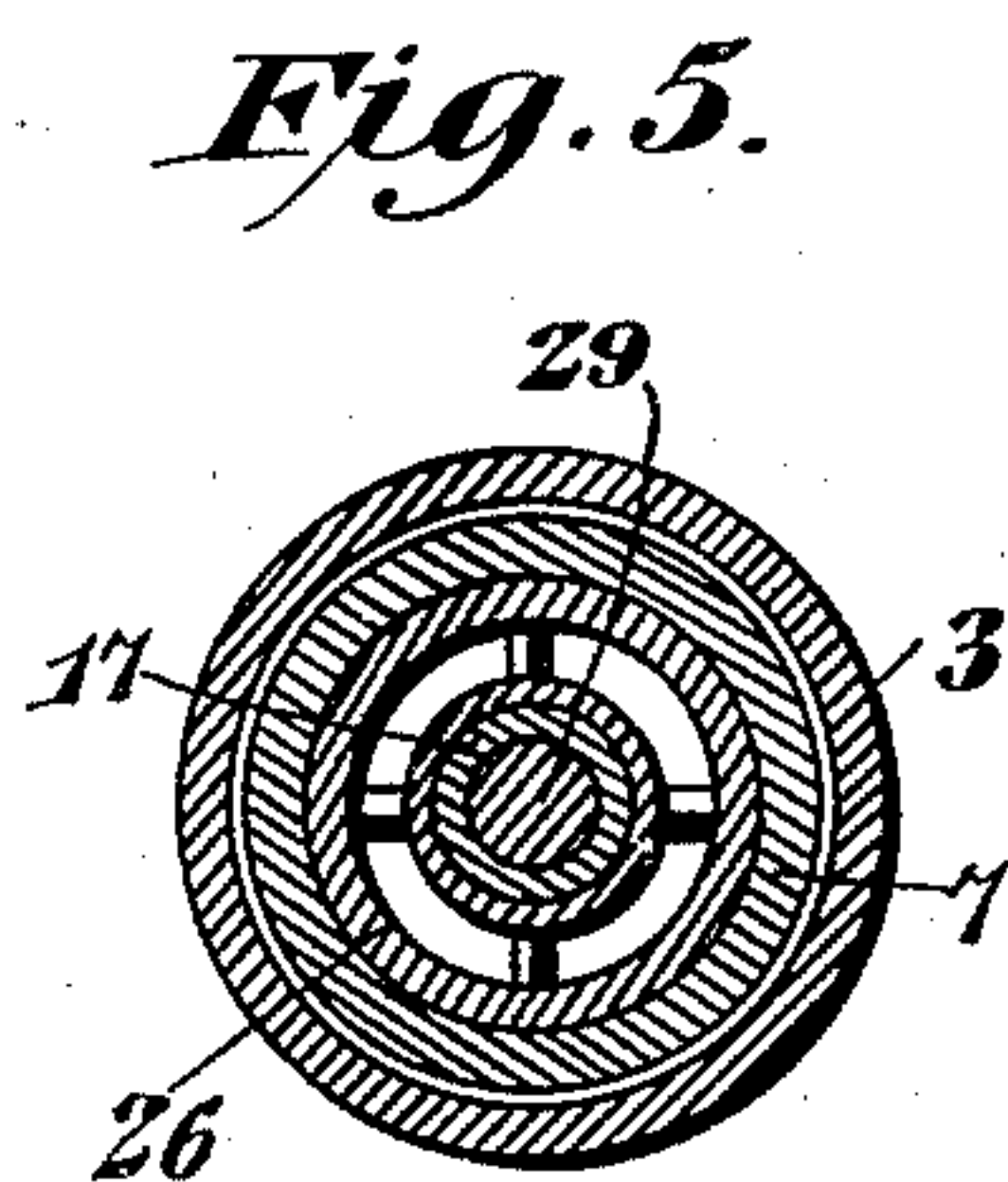
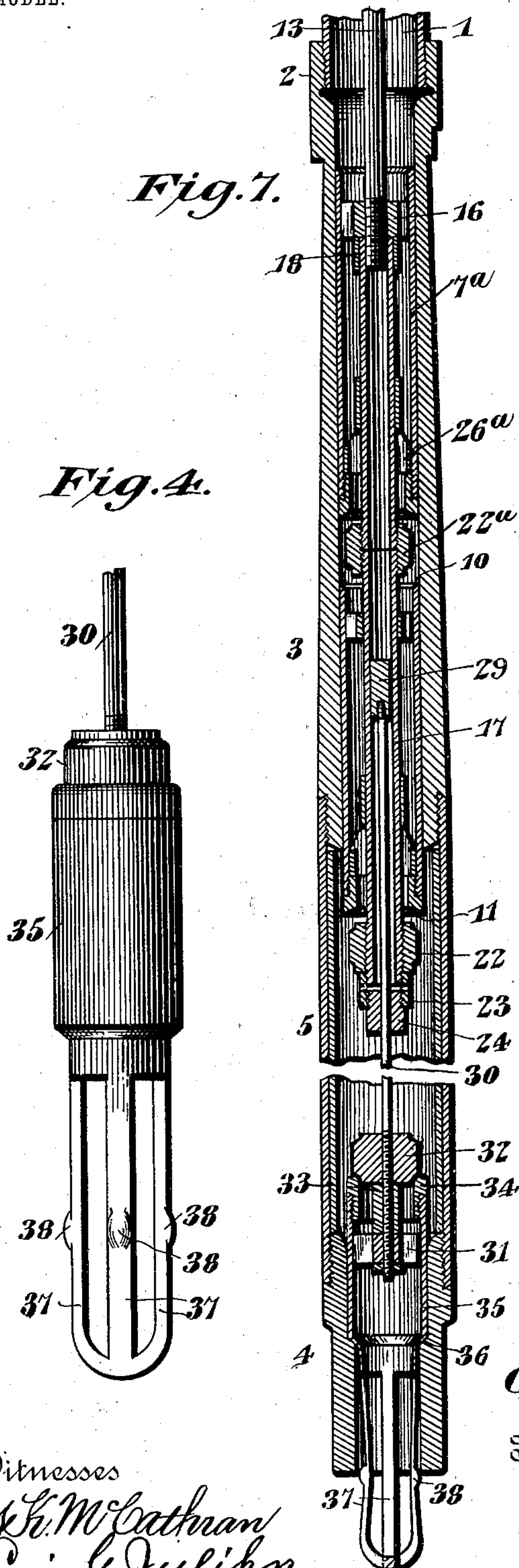
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NO MODEL.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

CLARENCE L. PARKER, OF LOS ANGELES, CALIFORNIA.

PUMP.

SPECIFICATION forming part of Letters Patent No. 741,926, dated October 20, 1903.

Application filed May 14, 1902. Serial No. 107,352. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE L. PARKER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Pump, of which the following is a specification.

My present invention relates to a novel positively-operating pump for deep-well service, the object being to produce a pump in which the working and standing valves will be positively operated or moved to their proper positions by the operation of the sucker-rod immediately prior to the movement of the plunger.

A further object of the invention is to render the plunger and barrel self-cleaning, so that the friction incident to the movement of the plunger will be reduced to a minimum and the latter prevented from sticking or choking, and thereby necessitating the replacement of the pump-barrel and plunger by new parts.

Still further objects of the invention are to provide a novel cage or strainer serving to retain the seat of the standing or foot valve in proper position at the lower end of the barrel and to so connect the various interior parts of the pump that the plunger, together with the several valves and valve-seats, and the cage may all be withdrawn from the barrel by the elevation of the sucker-rod.

Other objects subordinate to those enumerated and various novel features of construction will appear more fully during the course of the succeeding description of the illustrated embodiments of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of the pump complete, the tubing or well-casing being broken away and interior parts being shown in the positions assumed by them during the descent of the plunger. Fig. 2 is a sectional view through the plunger, plunger-rod, and associated parts with the sucker and lifting-rods in elevation and the various parts in the positions assumed during the ascent of the plunger. Fig. 3 is a sectional view through the cage and the lower end of the barrel, the standing or foot valve being in the open position to correspond with the positions of the valves shown in Fig. 2. Fig. 4 is a detail elevation of the

cage and certain connected parts. Fig. 5 is a transverse sectional view on the line 5 5 of Fig. 1. Fig. 6 is a similar view on the line 6 6 of Fig. 3, and Fig. 7 is a longitudinal sectional view showing a modification of the construction shown in Fig. 1, the variation consisting in the employment of a plurality of plungers and working valves.

Like numerals of reference are employed to designate corresponding parts throughout the views.

As is usual in this class of pumps, the tubing 1 is screwed at its lower end to the upper end of the pump-barrel 2. In the present instance the barrel is made up of an upper section 3, a lower section or shoe 4, and an intermediate barrel-section 5, the several sections having threaded connection and the intermediate section 5, which is generally a comparatively thin shell, being preferably, though not necessarily, provided with a lining 6, designed merely to reduce the internal area of the barrel. Within the upper section 3 of the barrel is fitted a hollow cylindrical plunger 7, into the opposite ends of which are screwed valve-seats 8 and 9, the transversely-inclined end faces of which define scraper edges 10 and 11, which serve to clear the barrel of sand or grit as the plunger reciprocates. The lower end face of the barrel-section 3 is also inclined to form an annular scraper edge 12, which in a similar manner serves to clear the plunger. The opposed faces of the plunger and barrel are by means of these scraper edges kept free from any accumulation which could possibly interfere with the proper working of the parts.

The pump or sucker rod 13, having connection at its upper end with suitable operating mechanism, is passed down through the casing and barrel and into the upper edge of the plunger, where it is provided with a centering-spider 16, and is screwed into the upper end of a hollow plunger-rod 17, the threaded connection between the plunger and pump or sucker rods being preferably reinforced by a band 18, as shown. The top valve 19 (which, like all of the valves employed in the pump, is suitably formed to permit of its reversal) is slidably mounted upon the sucker-rod at a point above the plunger and is yieldingly urged down upon the seat 8 by a helical spring

20, bearing at its opposite end against a thrust-collar 21, adjustably retained upon the sucker-rod by a set-screw, as shown.

The working valve 22 is screwed upon the plunger-rod 17 at a point below the plunger and is retained in place by a jam-nut 23, into which is screwed a bushing 24, the nut being provided above the bushing with one or more ports 25, through which the plunger-rod may be drained. It should be particularly noted at this point that the plunger has no direct connection with either the pump or sucker rod 13 or the plunger-rod 17, while, on the contrary, the working valve 22 is fixed upon the plunger-rod and will necessarily move in one direction or the other whenever the sucker-rod is operated. It is this relation of the parts which effects the positive movement of the working valve as distinguished from ordinary constructions, in which the plunger is fixed to the rod and is equipped with loose check-valves, which may or may not move to their proper positions at the proper time.

As will be more fully explained, the elevation of the plunger is effected through the medium of the working valve 22, which by the elevation of the sucker-rod is drawn up against the valve-seat 9 at the lower end of the plunger. The depression of the plunger is effected by means of what may be termed a "depressor" 26 in the form of an annular band fitted within the plunger and connected by radial webs 27 with a sleeve 28 of smaller diameter than the band and shrunk or otherwise secured upon the sucker-rod 17 at a point above the band. This open form of the depressor will permit the unrestricted flow of fluid; but as the rod is forced down the working valve will be moved to its open position, and the depressor will be brought into contact with the upper end of the valve-seat to force down the plunger and permit the fluid to pass through the same to the upper end of the barrel. Obviously the relative positions of the working valve and depressor will determine the degree of independent movement of the valve, and these parts are therefore separated just sufficiently to permit the working valve to move to its open position by the time the depressor is brought into engagement with the plunger by the depression of the sucker-rod.

The plunger-rod 17 is made hollow for the reception of a cylindrical head 29, screwed or otherwise secured to the upper end of a lifting-rod 30, passed downwardly through the bushing 24, the bore of which is of smaller diameter than the head 29. At its lower end the lifting-rod is provided with a centering-spider 31 and with a standing or foot valve 32, spaced from the spider by a spacing-collar 33, as clearly shown in Fig. 3.

The standing valve 32 is disposed adjacent to its valve-seat 34, screwed into the upper end of what may be termed a "cage" 35. This cage, which constitutes one of the novel features of the invention, is of cylindrical form,

is snugly fitted into the upper end of the lower barrel-section or shoe 4, and is provided with an annular shoulder 36, seated against an internal annular shoulder formed in the shoe 4 by reducing the internal diameter of the lower end thereof. Below the shoulder the diameter of the cage is reduced, and said cage is cut away to define a series of separated spring members 37, connected at a point below the shoe to form a strainer and designed to frictionally engage the shoe for the purpose of retaining the cage in place. The retaining action of the members 37 is augmented by projections 38, having rounded outer faces and designed when forced into the shoe to flex the members 37, and thereby increase the frictional engagement of the parts.

Before proceeding to describe the operation of the pump attention may be directed to Fig. 7 of the drawings, wherein I have shown a modification of the construction shown in Fig. 1. The variation consists in the employment of a plurality of plungers and working valves. In the illustrated form a second plunger 7^a is located in the barrel at a point above the plunger 7 and the hollow plunger-rod is equipped with an additional depressor 26^a, engaging the plunger. In this form of the invention the two plungers are so related that an additional working valve 22^a may be disposed between them and in coöperative relation with the valve-seat at the lower end of the extra or upper plunger, and said valve 22^a serves to unite the sections comprising the pump-rod in this instance. When the plunger and working valve are duplicated, the employment of the top valve is unnecessary, and for this reason the upper ends of the plungers are not equipped with valve-seats, as in the preferred form of the invention.

Referring more particularly to the first six figures of the drawings, the operation of the pump is as follows: Assuming the parts to be in the positions shown in Fig. 1 of the drawings, the elevation of the sucker-rod 13 by suitable operating mechanism located above-ground will effect the upward movement of the hollow plunger-rod 17, the relative movement of which with respect to the plunger will raise the depressor 26 away from the valve-seat 9 and draw the working valve 22 snugly against its seat to close the lower end of the plunger. This initial independent movement of the plunger-rod 17 will also effect the positive opening or unseating of the standing or foot valve 32 at the lower end of the barrel, because the head 29 of the lifting-rod 30 is so snugly fitted within the plunger-rod that the force of the vacuum formed in the hollow rod above the head and the frictional engagement between the head and the rod will effect the upward movement of the rod 30 as the plunger-rod is elevated. The initial movement of these parts independently of the plunger will therefore simultaneously effect the positive closing of the working valve 22, the opening of the standing valve 32, and the engagement

of the plunger with the plunger-rod through the medium of the working valve. Continued upward movement of the sucker-rod will elevate the plunger 7, the weight of the column of fluid above the plunger serving, assisted by the spring 20, to close the top valve 19. The column of fluid will now be lifted in an obvious manner.

It will of course be understood that the frictional engagement of the head 29 with the interior of the plunger-rod 17 is not of such character as will prevent relative movement between the head and rod after the standing valve has been opened and during the continued upward movement of the plunger. On the contrary, these parts are so related that while the resistance opposed to relative movement between the head and plunger is sufficient to open and close the standing valve 32 no material resistance is opposed to the subsequent independent movement of the rod which is necessary to the proper operation of the plunger.

We have thus seen in what manner the parts are moved from the positions shown in Fig. 1 to those illustrated in Figs. 2 and 3 by the elevation of the sucker-rod 13. It now remains to be seen how the parts are restored to their original positions by the downward movement of the sucker-rod to complete the reciprocation of the pump. Assuming the parts to be in the positions shown in Figs. 2 and 3, the downward movement of the sucker-rod will move the working valve 22 away from the lower end of the plunger and will simultaneously force the standing valve 32 upon its seat, thus closing the lower end of the barrel and opening a passage through the plunger. Just as the valves 32 and 22 reach their closed and open positions, respectively, the plunger-depressor 26 will be brought into engagement with the valve-seat 9, and continued downward movement of the rod will force down the plunger, permitting the fluid to pass through the plunger, the valve 19 being forced open by the fluid-pressure from below against the resistance of the spring 20. When the plunger has reached the limit of its downward movement, the elevation of the sucker-rod will effect the opening of the standing valve 32, the closing of the working valve 22, and the elevation of the plunger in the manner already described, the plunger always remaining in the barrel except when withdrawn for cleaning or repair. If now it is desired to remove the working parts of the pump from the barrel, it is simply necessary to sufficiently elevate the sucker-rod 13. This rod is rigidly connected, as stated, to the plunger-rod 17. The plunger-rod will lift the plunger through the medium of the valve 22, the head 29 will be engaged by the bushing 24, and the lifting-rod thus drawn up will bring the spider 31 against the lower end of the valve-seat 34. If now sufficient force is exerted, the holding power of the retaining members 37 will be overcome and

the cage, together with the various other interior parts, will be lifted out of the barrel.

The operation of the compound form of pump shown in Fig. 7 will be clearly understood from the above description and does not appear to require particular notice.

For the purpose of facilitating the description of the specific construction of the pump I have called the rod 13 a "sucker-rod," the hollow tube 17 a "plunger-rod," and the rod or stem 30 a "lifting-rod." It should be understood, however, that the parts 13, 17, and 30 constitute sections of the pump-rod in the generic sense of that term and that the term "plunger-rod" as employed in the claims is sufficiently comprehensive to embrace any rod, whether sectional or otherwise, capable of effecting the operation of the plunger.

It is thought that from the foregoing the construction and operation of my pump and the advantages accruing therefrom will be readily comprehended; but while the present embodiments of the invention are deemed at this time to be preferable I do not wish to limit myself to the structural details defined, as, on the contrary, I reserve the right to effect such changes, modifications, and variations as may be properly comprehended within the scope of the protection prayed.

What I claim is—

1. In a pump, the combination with a barrel, and a standing valve and plunger therein, of a working valve, a hollow plunger-rod for operating the plunger, and a lifting-rod connected to the standing valve and having frictional engagement with the plunger-rod to receive initial movement therefrom, and means for connecting the plunger-rod to the lifting-rod to permit their simultaneous withdrawal from the well.

2. In a pump, the combination with a barrel, and a standing valve and plunger therein, of a working valve, a plunger-rod having a chamber closed at its upper end, and a lifting-rod connected to the standing valve and having a head fitted within said chamber to cause the opening of the standing valve as the plunger-rod ascends.

3. In a pump, the combination with a barrel, and a standing valve and plunger therein, of a working valve, a plunger-rod for operating the plunger, a lifting-rod connected to the standing valve and having a head fitted within the plunger-rod to cause the opening of the standing valve as the plunger-rod ascends, and means for preventing the withdrawal of said head from the plunger-rod.

4. In a pump, the combination with a barrel, and a standing valve, of a hollow plunger in the barrel, a pump-rod having limited movement independently of the plunger, a working valve carried by the rod to close the lower end of the plunger, and a depressor located within the plunger and operated by the rod to depress the plunger subsequent to the opening of the working valve.

5. In a pump, the combination with a bar-

rel, and a standing valve, of a hollow plunger within the barrel, an annular valve-seat secured in the lower end of the plunger, a pump-rod, and a working valve and depressor carried, respectively, by the pump-rod and arranged for alternate engagement with the valve-seat to effect the elevation and depression of the plunger.

6. In a pump, the combination with a barrel and standing valve, of a hollow plunger within the barrel, a hollow plunger-rod, a working valve and a depressor operated by the plunger-rod to elevate and depress the plunger, the depressor being located within said plunger, and a lifting-rod connected to the standing valve and extended into the plunger-rod for frictional engagement therewith.

7. In a pump, the combination with a barrel and standing valve, of a hollow plunger, a hollow plunger-rod, a working valve and a depressor carried by the plunger-rod adjacent to the lower end of the plunger and disposed to elevate and depress said plunger, and a lifting-rod connected to the standing valve and provided with a head fitting frictionally within the plunger-rod to cause the positive actuation of the standing valve by said rod.

8. In a pump, the combination with a barrel and standing valve, of a hollow plunger having a valve-seat secured in the lower end thereof, a hollow plunger-rod, a working valve and a depressor carried by said rod and arranged to engage the opposite sides of the valve-seat to effect the elevation and depression of the plunger, a lifting-rod connected to the standing valve, and a head carried by the lifting-rod and fitted frictionally within the plunger-rod.

9. In a pump, the combination with a barrel and standing valve, of a hollow plunger within the barrel, a hollow plunger-rod, a working valve and a depressor carried by the plunger-rod and disposed to elevate and depress the plunger, a lifting-rod connected to the standing valve and provided with a head fitted frictionally within the plunger-rod, a sucker-rod connected to the hollow plunger-rod, and a spring-pressed top valve mounted on the sucker-rod at the upper end of the plunger.

10. In a pump, the combination with a barrel and standing valve, of a hollow plunger within the barrel, valve-seats secured in the opposite ends of the plunger, a hollow plunger-rod, a working valve and a depressor carried by the plunger-rod and disposed for alternate engagement with the valve-seat at the lower end of the plunger, a lifting-rod connected to the standing valve, a head secured to the lifting-rod and fitted frictionally within the plunger-rod, a bushing resisting the withdrawal of the head from the rod, a sucker-rod connected to the upper end of the plunger-rod, a spider centering the sucker-rod within the plunger, a top valve slidably mounted upon the sucker-rod at the upper end of the plunger, an adjustable collar on

the sucker-rod, and a spring interposed between said collar and the top valve.

11. In a pump, the combination with a barrel, of a working valve, standing valve, plunger and pump rod therein, a cage retained in the lower end of the barrel and provided with a valve-seat for the standing valve, a lifting-rod connected to the standing valve to operate the same, means for connecting the lifting-rod with the cage after predetermined movement of the standing valve, a head carried by the lifting-rod and frictionally fitted within the pump-rod, and means for preventing the withdrawal of said head from the rod, whereby all of the interior parts of the pump may be removed through the medium of the pump-rod.

12. In a pump, the combination with a barrel, of a cage retained at the lower end of the barrel, a standing valve seated at the upper end of the cage, a hollow plunger within the barrel, a hollow plunger-rod, a working valve and a depressor carried by the plunger-rod to elevate and depress the plunger, a lifting-rod connected to the standing valve and having a head fitting within the plunger-rod, a bushing at the lower end of the plunger-rod to prevent the complete withdrawal of the head, and means for connecting the lifting-rod to the cage after predetermined movement of the standing valve, whereby the cage, the plunger, the valves and connected parts may be removed from the pump by the elevation of the plunger-rod.

13. In a pump, the combination with a barrel, of a cage fitted into one end thereof, said cage being formed with integral resilient engaging members disposed to engage the barrel to retain the cage in place and extended below the barrel to form a strainer.

14. In a pump, the combination with a barrel and cage formed with cooperating shoulders, of frictional retaining members carried by the cage and disposed to engage the barrel, said members being extended below the barrel and connected at their lower ends to form a strainer.

15. In a pump, the combination with a barrel, of a cage fitted therein, provided with a reduced end extended below the barrel and having a series of connected spring-retaining members constituting a strainer, said members being provided with projections arranged to engage the interior face of the barrel.

16. In a pump, the combination with a barrel, of a plunger movable therein and having a valve-seat, a pump-rod movable in the plunger and barrel, a depressor on the pump-rod adapted to engage the top of said valve-seat to move the plunger, a valve-seat in the barrel, and valves on the pump-rod adapted to fit the respective valve-seats.

17. In a pump, the combination with a barrel, and a standing valve and plunger therein, of a working valve, a plunger-rod for operating the plunger, a lifting-rod connected to

the standing valve and fitted within the plunger-rod to cause the opening of the standing valve as the plunger-rod ascends, and means for preventing the complete withdrawal of said lifting-rod from the plunger-rod.

18. In a pump, the combination with a barrel, and a standing valve and plunger therein, of a working valve, a hollow rod for operating the plunger, and an operative connection between the standing valve and said rod, said connection including means frictionally engaging the interior of the rod and means preventing the complete disengagement of the rod and standing valve.

19. In a pump, the combination with a barrel, and a standing valve and plunger therein, of a working valve, a plunger-rod for operating the plunger, and a lifting-rod having connection with the standing valve and fitted within the plunger-rod to cause the opening of the standing valve as the plunger-rod ascends and means for preventing the complete withdrawal of the lifting-rod from the plunger-rod.

20. In a pump, the combination with a bar-

rel, and a plunger, working valve and standing valve therein, of means for operating the standing valve, said means comprising relatively movable interfitted elements defining an intermediate closed chamber enlarged and contracted by the relative movement of said elements, whereby the movement of one element, and of the standing valve will be assisted by the rarefaction and compression of the air within the chamber.

21. In a pump, the combination with a barrel, a plunger, working valve and standing valve therein, of a plunger-rod operatively related to the plunger and formed with a chamber closed at one end, and a lifting-rod connected to the standing valve and movably fitted within the chamber of the pump-rod.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CLARENCE L. PARKER.

Witnesses:

A. C. DILLON,
F. J. McCLARY.