

1,299,083.

Patented Apr. 1, 1919.  
2 SHEETS—SHEET 1.

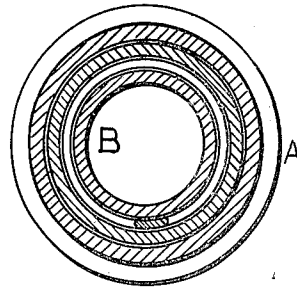
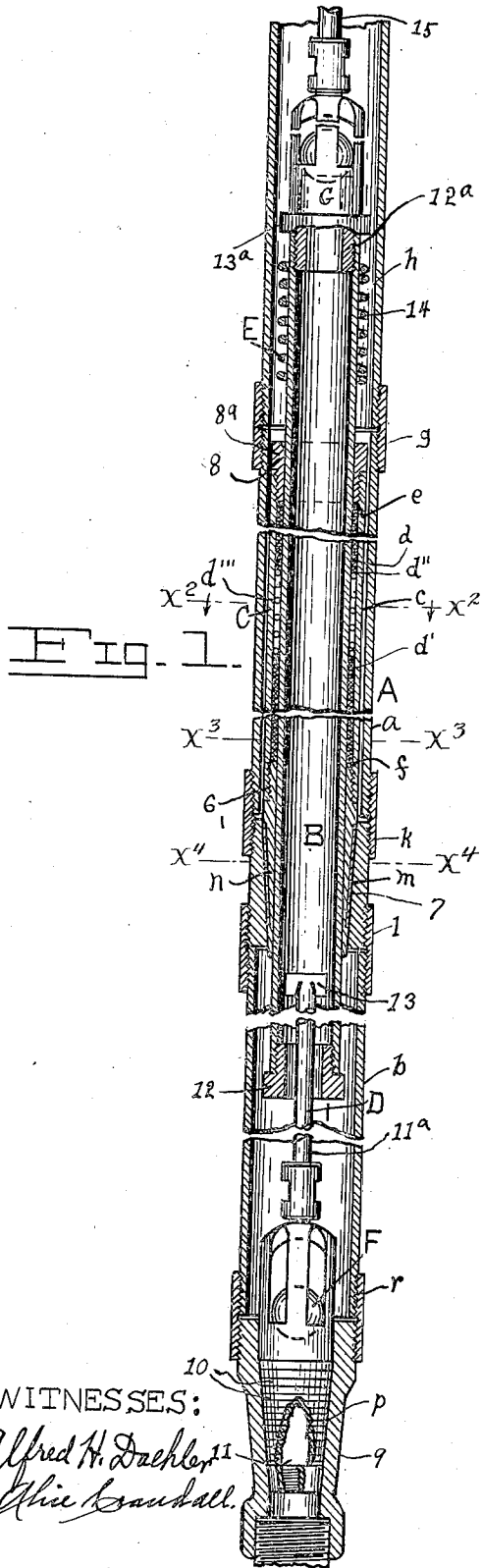


Fig. 2.

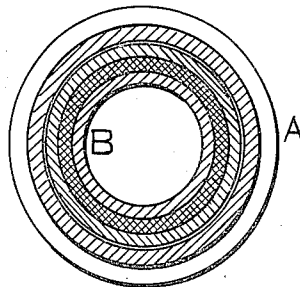


Fig. 3.

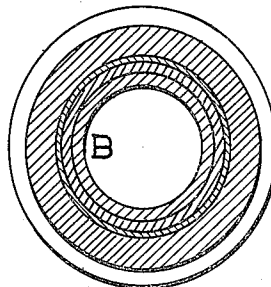


Fig. 4.

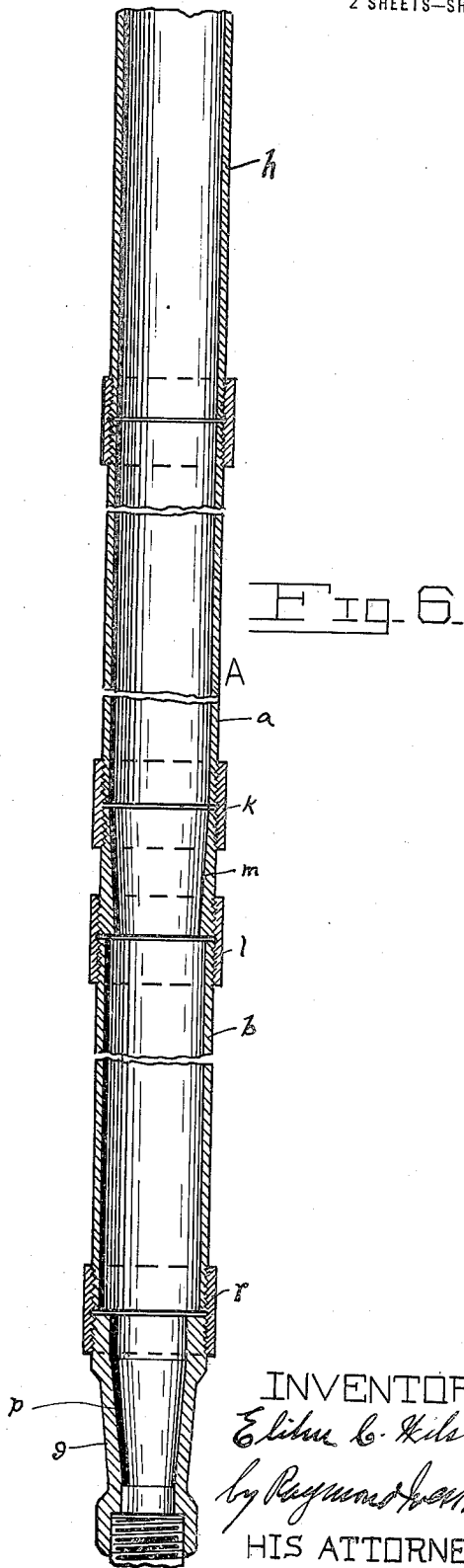
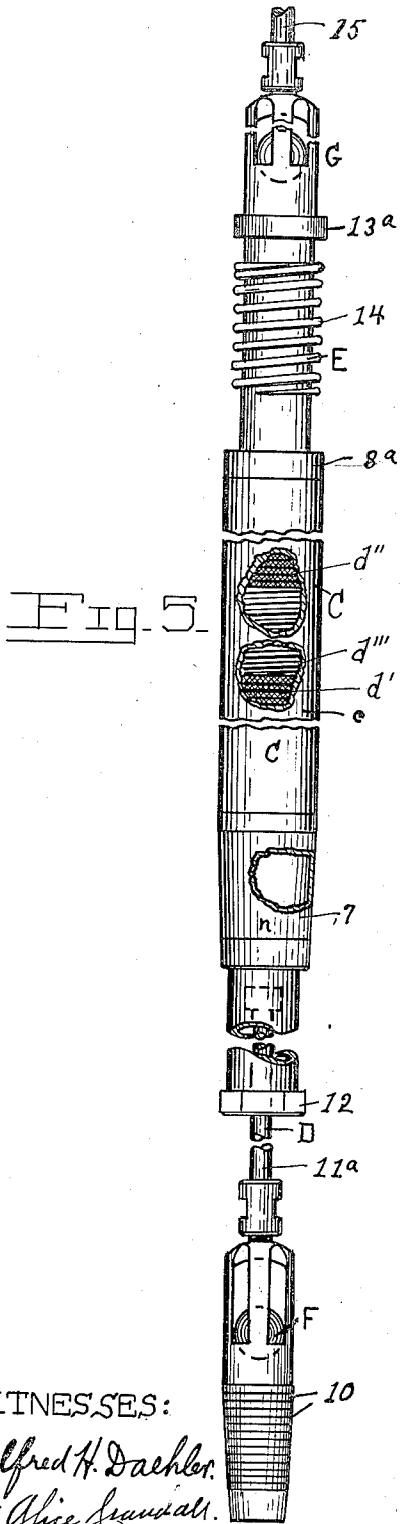
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1,299,083.

Patented Apr. 1, 1919.  
 2 SHEETS—SHEET 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

ELIHU CLEMENT WILSON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO WILLIAM W. WILSON, OF LOS ANGELES, CALIFORNIA.

## PUMP.

1,299,083.

Specification of Letters Patent.

Patented Apr. 1, 1919.

Application filed February 16, 1916. Serial No. 78,625.

*To all whom it may concern:*

Be it known that I, ELIHU C. WILSON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to pumps, and more particularly to deep well pumps for use in oil or other deep wells. On account of erosion due to sand or other foreign materials suspended or contained in the oil or other fluid being pumped, the working barrels and plungers of such pumps, as ordinarily constructed, require frequent repair, regrinding and replacement, necessitating the breaking up of the pump tubings as well as the rods or reciprocating parts in order to bring such barrels and plungers to the surface and remove them from the well hole. After repairing a pump of standard construction, the tubing and rod sections must be again connected as working barrel and plunger are re-lowered to or below the liquid level in the well hole. With a certain type of pump in which the plunger has a ground fit in the working barrel, it is possible to replace or install the same in the well hole by first lowering the working barrel, adding length after length of tubing, and then lowering the plunger into the working barrel by adding plunger rod lengths as the plunger descends; but in case a packed fit is desired, as between plunger and barrel, to prevent the rapid destruction, by foreign matter, of plunger and barrel, incident to the use of ground fits or metal to metal wearing surfaces, the barrel and plunger must be simultaneously lowered, as it is not practicable to assemble the barrel and plunger by the endwise introduction of the plunger into the barrel, as the packing would be thereby injured; particularly is this so if the plunger and barrel are at the ends of connections of great length.

In accordance with the present invention, I provide a packing means assembled with a removable plunger, which packing means and other pump features may be withdrawn from and returned to a working barrel with the plunger, leaving the working barrel in its normal position in the well. I further provide means whereby the packing means

and other pump features are properly re-seated in the working barrel upon return of the same thereto. A pump so organized has all the advantages of a packed pump, the repair and replacement of which requires the maximum amount of time and labor, though it is apparent that its repair is attended with but a fraction of the trouble necessary to repair inferior types.

The invention has for its object to provide a pump of the general character stated, which will be generally superior in point of relative simplicity and inexpensiveness of construction combined with positiveness and efficiency of operation, compactness in form, economy in power and freedom from frictional losses and wear and tear, and facility in repair, and which will be generally superior in efficiency and serviceability.

With the above and other objects in view, the invention consists in the novel and useful provision, construction, formation, combination, association and interrelation of parts, members and features, all as hereinafter described, shown in the drawings, and finally pointed out in claims.

In the drawings:

Figure 1 is a central vertical sectional view of a pump constructed and organized in accordance with the invention; parts being shown in elevation and parts being broken away and sectioned for clearness of illustration;

Fig. 2 is a horizontal sectional view taken on the line  $x^2-x^2$ , Fig. 1, and looking in the direction of the appended arrows;

Fig. 3 is a horizontal sectional view taken on the line  $x^3-x^3$ , Fig. 1;

Fig. 4 is a horizontal sectional view taken on the line  $x^4-x^4$ , Fig. 1;

Fig. 5 is a side elevation of features of the pump shown in Fig. 1 and illustrated as withdrawn from the working barrel and tubing; and,

Fig. 6 is a central vertical sectional view of the working barrel and other features shown in Fig. 1, with the features shown in Fig. 5 withdrawn.

Corresponding parts in all the figures are designated by the same reference characters.

Referring with particularity to the drawings, in the embodiment of the invention therein shown A designates the working bar-

rel of a pump, B designates the plunger thereof, C designates packing means, D designates means whereby the foot valve of the pump may be withdrawn with the plunger and the foot valve re-seated, withdrawing the packing means C, when the foot valve is withdrawn, E designates means for re-seating the packing means C, F designates the foot valve of the pump, and G designates the plunger valve. E also cooperates with the plunger valve G to re-seat the foot valve.

The packing means C are withdrawn from the working barrel together with the plunger B and the foot valve F and plunger valve G and connected parts, leaving the working barrel A in the well hole, and obviating the necessity of breaking up or dis-jointing the tubing extending in the hole down to the working barrel. The packing means C comprises a sheath or tubular box *c* within which is contained the packing *d*, in contact with which the plunger B operates in performing the working strokes of the pump, such packing *d* being shown as comprising two packing members *d'* and *d''* separated by a compression member *d'''* which serves to force the respective members of the packing upwardly and downwardly against an upper seat *e* and a lower seat *f* respectively. The working barrel A at its upper end is provided with a coupling or collar *g* through the agency of which joints or lengths, such as *h*, of well casing may be connected with the working barrel, and the lower end of the working barrel is interrupted to include two couplings or collars *k* and *l* which respectively connect the upper portion of the working barrel *a* and the lower portion of the working barrel *b* with a downwardly tapered tubular seat *m* for a downwardly tapered tubular foot *n* threaded, as at 6 to and within the sheath or box *c* of the packing means C. An annular interspace is provided between such foot *n* and seat *m* within which and upon the foot *n* is disposed a jacket 7 of Babbitt metal or leather washers which produces a tight fit between such foot and such seat. The upper end of the foot *n* constitutes the seat *f* for the lower end of the packing *d* or member *d'* thereof; and the upper seat *e* for the packing consists of the lower end of a nut 8 threaded into the upper end of the sheath or box *c* of the packing means C and which nut has an enlarged head 8<sup>a</sup> bearing against the upper end of such sheath or box. The seat *p* for the foot valve F is provided in a downwardly tapering tubular end piece 9 connected onto the lower working barrel member *b* by a coupling or collar *r*. The foot valve F may be of the usual ball-and-cage type or any other preferred type, and the cage member is provided with a plurality of packing rings or plurality of leather wash-

ers 10, all commonly mounted upon a sleeve or stem 11 projecting from the lower end of the cage member, and of diminishing diameters downwardly so as to form a conical packing which fits the seat *p*.

The means D are shown as of the standard Garbutt rod type, connecting the foot valve with the lower end of the plunger B, and essentially comprises a rod 11<sup>a</sup> fixed to the upper end of the foot valve cage and projecting through a nut 12 screwed into the lower end of the plunger, such rod being provided with a T-head or like enlargement 13 above such nut 12, and permitting the plunger to reciprocate within the limits of pump stroke, without unseating the packing of the foot valve from the seat *p* thereof. The plunger B is, of course, tubular so that the oil or other fluid may be elevated through the foot valve, through the nut 12, and thence on upwardly through the plunger and through the plunger valve or working valve G which may be of the same type as the foot valve F, or any other preferred type, the cage member of such working valve being connected with the upper end of the plunger by means of an externally threaded bushing or thimble 12<sup>a</sup> provided with a protruding flange 13<sup>a</sup> disposed above the means E for re-seating the packing means C; such means E comprising a compression spring 14 coiled around the upper end of the plunger B and engaging the flange 13<sup>a</sup> at its upper end and the head 8<sup>a</sup> of the nut 8 at its lower end. The sucker rod 15 is connected onto the cage of the working valve G and, as will be understood, is utilized to reciprocate the plunger B with the working valve G in the operation of the pump.

The operation, method of use and advantages of the improvements in pumps will be readily understood from the foregoing disclosure, taken in connection with the accompanying drawings and the following statement:

In operation the plunger B is reciprocated in the usual manner by the sucker rod 15, within the working barrel A and the packing means C held therein by the sheath or box *c* with its foot *n* which takes into the seat *m*, in conical fit, the Babbitt metal sleeve 7 insuring a tight fit of the latter parts. The weight of the column of liquid in the tubing or casing *h* above the working barrel, which is imposed upon the packing means serves to hold the same tightly in place, holding the foot *n* tightly in its seat *m*. The packing rings 10 beneath the foot valve F are wedged tightly in place within the seat *p* in the end piece 9 at the lower end of the working barrel member *b*, with which end piece is connected the suction pipe, a fragment of which is shown, through which the liquid is drawn to the foot valve F. The packing means C insures a close working fit 13

as between the plunger and the working barrel, maintaining the full efficiency of each pump stroke against liquid losses as between the barrel and the plunger. This tight working fit prevents the invasion as between the plunger and the working barrel of sand, grit or any other foreign substances tending to abrade or cut or pit or channel the plunger or its cooperating packing means. The pump is operated in the usual manner, the liquid drawn into the space above the foot valve upon the up-stroke of the plunger rising above the working valve upon the next down-stroke of the plunger and thereafter being elevated with the column of liquid above it to produce flow at the mouth of the well.

When it is desired to renew the packing means C, or repair the same, it is not necessary to withdraw the working barrel together with the plunger and valves and operating rods, as is the case in other deep well pumps which do not permit of the withdrawal of the plunger and the working parts connected therewith from the working barrel and the inner surface of the same which is engaged with the plunger in the working stroke. Thus is obviated the necessity of breaking up the string of tubing *h* above the pump barrel in order that section by section of such tubing may be removed from the well and the pump barrel eventually brought to the surface. In accordance with the present invention it is only necessary to elevate the sucker rod and disjoint it as may be necessary, thus elevating the plunger with the foot and working valves, the packing means C being engaged at the lower end of its foot N by the nut 12 at the lower end of the plunger and thus freed from its seat *m*, and the T-head or other terminal portion of the Garbutt rod 11<sup>a</sup> engaging with the nut 12 and elevating the foot valve cage with its packing rings 10 to remove the latter from the seat *p*. Thereupon continued elevation of the plunger will eventually withdraw the working and foot valves and packing means from the working barrel and the tubing or casing positioning the same, and then the packing means may be disassembled upon the plunger, either by disconnecting the foot *n* from the sheath or box *c* to free the packing members *d* and *d'* from the interspace between the plunger and the sheath, or by removing the nut 8 from the said sheath, similarly permitting the packing members to be removed from such interspace. Subsequently fresh packing elements, together with the spring *d'''* may be restored to working position in such interspace, and the foot *n* or nut 8 or both restored to working position. Thereupon the plunger and connected parts previously withdrawn from the hole, together with the repaired or replaced packing means, may be again lowered into the

hole and brought down into the working barrel. In order to effectively secure the packing rings 10 in their seat *p* the weight of the plunger and connected parts and the sucker rod tubing 15 is allowed to be brought down onto the foot valve, through the agency of the nut 12, and, furthermore, during which performance the spring 14 of the means E will be put under compression as between the flange 13<sup>a</sup> and the nut 8, exerting pressure upon the packing means to force the foot *n* of the same into its seat *m*. Thus, pressure is exerted to seat the packing means during the lowering of the plunger onto the foot valve, and when the nut 12 has engaged the foot valve, its packing 10 is finally forced home through a final further compression of the spring 14 which likewise finally forces the foot *n* of the packing means home. This action is permitted, it will be understood, by the Garbutt rod 11<sup>a</sup> and the relative play thereby permitted as between the plunger and the foot valve F.

It will be understood that the packing means embraces only a portion of the plunger, and is of sufficient extent to thoroughly prevent leakage as between the working barrel and the plunger during the full working stroke. The packing means also takes the place of the ordinary pump liner, guiding and accommodating the plunger in its working strokes.

It is manifest that the invention will produce a great saving in time incident to repair and replacement of worn packing features, will enhance length of life of the working pump parts, and will effectively prevent leakage as between the working barrel and the plunger. The various features incident to practice of the invention are simple and inexpensive in construction and not liable to disarrangement or to require frequent or troublesome replacement.

It will be understood that many changes may be made in construction, interrelation, formation and association of parts, members and features in the practice of the invention, and in the adaptation of the same to varying conditions of use and service, without departing from the true spirit of the invention.

Having thus disclosed my invention, I claim and desire to secure by Letters Patent:

1. In a pump, a working barrel provided with a seat, a tubular plunger mounted to reciprocate within the barrel, packing means surrounding the plunger and resting upon the seat of the barrel, and means for utilizing a portion of the force incident to each stroke of the pump to hold the packing means in position upon the seat.

2. In a pump, a working barrel, a plunger, packing means between the barrel and the plunger, the barrel being provided with a seat for the said packing means, and yield-

ing means for transmitting a portion of the force incident to the descent of the plunger to the packing means to force the said packing means into position upon the said seat on the working barrel upon the lowering of the plunger.

3. In a pump, a working barrel, a plunger, packing means between the barrel and the plunger, the barrel being provided with a seat for the said packing means, and yielding means for transmitting a portion of the force incident to the descent of the plunger to the packing means to force the said packing means into position upon the said seat on the working barrel, one end of said yielding means bearing upon the said packing means, while the other end of said yielding means is adapted to be engaged by the plunger upon the lowering thereof.

4. In a pump, a working barrel, a plunger having an outwardly extending shoulder thereon, packing means between the barrel and the plunger, the barrel being provided with a seat for the said packing means, and a spring surrounding the plunger, one end of which engages the said packing means, while the other end thereof is adapted to be engaged by the shoulder on the plunger upon the lowering of said plunger, the said spring serving to transmit a portion of the force incident to the descent of the plunger to the packing means to force the said packing means into position upon the said seat on the working barrel.

5. In a pump, a working barrel, a plunger, packing means between the barrel and the plunger, the barrel being provided with a seat for the said packing means, means for transmitting a portion of the force incident to the descent of the plunger to the packing means to force the said packing means into position upon the said seat on the working barrel upon the lowering of the plunger, said plunger being also provided with a foot valve provided with packing, and said barrel being provided with a seat for said packing of said foot valve, and means for transmitting a portion of the force incident to the descent of the plunger to said foot valve to force the packing of the same to its seat co-incidentally with the before mentioned means for transmitting a portion of the force incident to the descent of the plunger to the plunger packing means.

6. In a pump, a working barrel formed with an annular tapered seat, a tubular plunger mounted to reciprocate within the barrel, annular packing means surrounding the plunger and provided at its lower end with a tapered foot adapted to rest upon and engage the tapered seat of the barrel, and means for transmitting a portion of the force incident to each operation of the plunger to the packing means to hold the

packing means firmly in position upon the seat.

7. In a pump, a working barrel formed with an annular tapered seat, a tubular plunger mounted to be reciprocated within the barrel, annular packing means surrounding the plunger and provided at one end with a tapered foot adapted to engage the seat of the barrel, and yielding means for transmitting a portion of the force incident to each operation of the plunger to the packing means to hold the latter firmly in position.

8. In a pump, a working barrel formed with a detachable annular section which is provided with a tapered seat, a tubular plunger mounted to reciprocate within the barrel, annular packing means surrounding the plunger and provided at one end with a tapered foot adapted to engage said seat, and means for transmitting a portion of the force incident to each operation of the plunger to the packing means to hold the latter in position.

9. In a pump, a working barrel, a plunger, packing means between the barrel and the plunger, the barrel being provided with a seat for the packing means, yielding means bearing upon the packing means, and means upon the plunger for acting through said yielding means to force said packing means into position upon said seat upon the lowering of said plunger; said plunger being likewise provided with a foot valve provided with packing, and said barrel being provided with a seat for said packing of said foot valve; there being means of connection between said foot valve and said plunger whereby said plunger may be reciprocated independently of said foot valve or may be lowered onto said foot valve to force the packing of the same to its seat during the action of said yielding means.

10. In a pump, a working barrel formed in end sections and a removable intermediate section, the intermediate section being provided with an annular seat, coupling means between the sections, a tubular plunger slidable within the pump barrel, packing means surrounding the plunger and engaging the before mentioned seat, and means for transmitting a portion of the force incident to each operation of the plunger to the packing means to hold the said packing means in position upon the seat.

11. In a pump, a working barrel formed with an annular seat, a tubular plunger mounted to reciprocate within the barrel, a tubular sheath loosely surrounding the plunger and provided at its lower end with a foot adapted to engage the seat, packing arranged within the tubular sheath and engaging the plunger, and yielding means for transmitting a portion of the force incident

to each operation of the plunger to the sheath to hold the foot thereof in engagement with the seat of the barrel.

5 12. In a pump, a working barrel formed with an annular tapered seat, a tubular plunger mounted to reciprocate within the barrel, a tubular sheath loosely surrounding the plunger and provided at its lower end with a tapered foot adapted to engage the tapered  
10 seat of the barrel, packing arranged within the sheath and engaging the plunger, and yielding means for transmitting a portion of the force incident to each operation of the plunger to the sheath to hold the foot thereof  
15 in engagement with the seat.

13. In a pump, a working barrel provided with an annular seat, a tubular plunger mounted to reciprocate within the barrel, a tubular sheath loosely surrounding the plunger and provided at its end with a foot  
20 adapted to engage the seat of the barrel, interior shoulders being provided at opposite ends of the sheath, packing arranged within the sheath at opposite ends thereof, a spring  
25 engaging the packing and cooperating with the shoulders to expand the same into a tight engagement with the plunger, and yielding means for transmitting a portion of the

force incident to the descent of the plunger to the sheath to hold the foot thereof in engagement with the seat.

30 14. In a pump, a working barrel provided with an annular tapered seat, a tubular plunger mounted to be reciprocated in the barrel and provided with a shoulder, a tubular sheath loosely surrounding the plunger and  
35 provided at its end with a tapered foot adapted to engage the seat of the barrel, interior shoulders being provided at opposite ends of the sheath, packing arranged within opposite ends of the sheath, yielding means  
40 engaging the packing and cooperating with the shoulders to expand it into a tight engagement with the plunger, and a spring interposed between the sheath and the shoulder of the plunger for transmitting a  
45 portion of the force incident to each operation of the plunger to the sheath to hold the foot thereof upon the seat.

In testimony whereof, I have signed my name to this specification in the presence of 50 two subscribing witnesses.

ELIHU CLEMENT WILSON.

Witnesses:

RAYMOND IVES BLAKESLEE,  
L. S. ARNOLD.