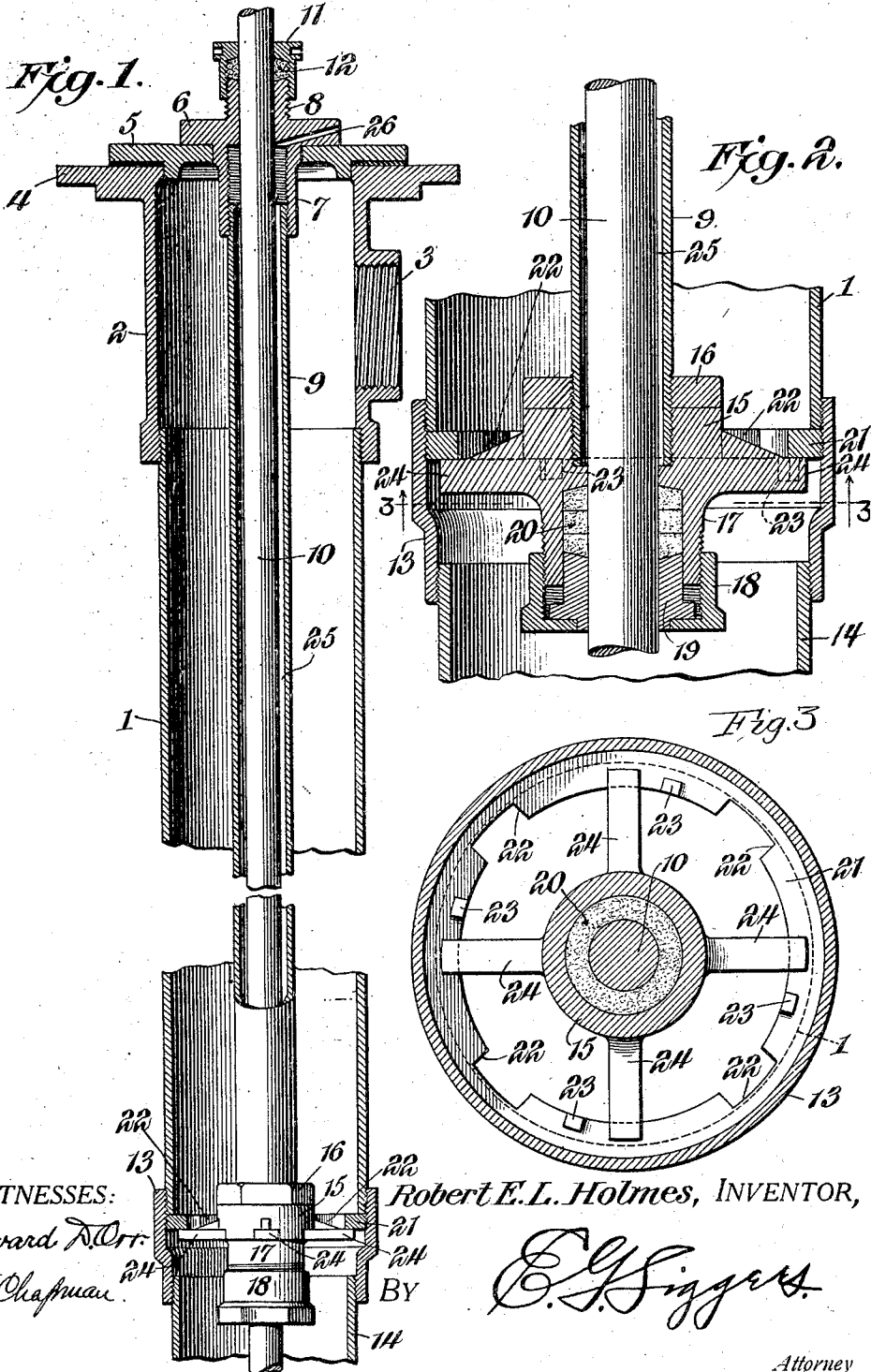


R. E. L. HOLMES.
PUMP STRUCTURE.
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Patented Nov. 28, 1916.



WITNESSES:

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ROBERT E. L. HOLMES, OF BEAVER FALLS, PENNSYLVANIA.

PUMP STRUCTURE.

1,206,706.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT E. L. HOLMES, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Pump Structure, of which the following is a specification.

This invention has reference to pump structures, and especially deep well pump structures, and its object is to provide means for preventing the buckling of pump rods, which buckling is particularly liable to occur in double acting pumps where there is a thrust upon the rod in its descending movement.

In accordance with the present invention the pump rod works either in a column pipe, or, in case the latter is not used, in the well casing, and sometimes the pump rod may be applied to a working barrel fastened down in a well or mine shaft. In any event, the pump rod works through a pipe secured at the upper end at or near the point of discharge of the pump and at the lower end closely adjacent to the pump barrel, so that the pipe in which the pump rod is located serves to guide the rod and hold it against buckling on the down stroke, while the pipe further serves as a container for lubricant whereby wear of the pump rod is minimized.

Where the column or discharge pipe connects to the pump barrel the two are joined by a coupling in which is lodged a locking ring and the lower end of the pump rod guide pipe carries a locking member coacting with the locking ring to hold the guide pipe or tubing firmly in place at its lower end, but in such manner that the guide pipe or tube may be disconnected from the fixed locking member at its lower end and raised from the well. By making the fixed locking ring of sufficient internal diameter it will not interfere with the removal of the pump plunger or plungers, foot valves, etc., through the column pipe, thus avoiding the necessity of withdrawing the column pipe from the well.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming part of this specification, with the further understanding that while the drawings show a practical form of the invention, the latter

is not confined to any strict conformity with the showing of the drawings, but may be changed and modified so long as such changes and modifications come within the scope of the appended claims.

In the drawings:—Figure 1 is a longitudinal section of a column pipe with a pump barrel carried by the lower end, and showing the invention applied. Fig. 2 is a similar section on a larger scale of the column pipe where joining the pump barrel, and also showing the locking means for the lower end of the guide tube. Fig. 3 is a section on the line 3—3 of Fig. 2.

Referring to the drawings there is shown a column pipe 1 which may be taken as indicative of either a column pipe or a well casing, or any other arrangement customary in well structures. In the particular showing of the drawings the top of the column pipe is screwed into a T coupling 2 having an outlet neck 3 at one side and an outstanding flange 4 at the end remote from the column pipe 1, whereby the coupling and pipe carried thereby may be appropriately supported. That end of the coupling 2 remote from the pipe 1 is closed by a cap plate 5 on which there rests a flange 6 having a hollow internally threaded hub 7 on one face and an externally threaded neck 8 on the other face, the hub and neck being in alinement. Screwed into the hub 7 is the upper end of a tube 9 constituting a guide tube for a pump rod 10, the latter extending through the flange 6 and neck 8 in suitably close relation thereto, and also through a packing nut 11 applied to the neck 8 and holding packing 12 about the rod 10.

The lower end of the column pipe 1 has a reducing coupling 13 screwed thereto and this reducing coupling carries a pump barrel 14 of which only the upper end is shown, since any suitable pump may be employed and the present invention has nothing to do with the structure of the pump itself.

The lower end of the tube 9 is screwed into a sleeve 15 and is held thereto by a lock nut 16. The sleeve 15 is provided with an axially extended neck 17 in alinement with the sleeve, and this neck has applied to it a packing nut 18 carrying a gland 19 confining packing 20 within the neck 17. The pump rod 10 is extended through the sleeve 15 and packing 20 and is continued into the

pump barrel 14 and is assumed to be connected to a pump piston in the usual manner. In the case of double plunger pumps there may be two rods, one of which is solid and the other hollow, or any arrangement of pump rods which it is customary to employ in deep well pumps may be provided. The rod 10 is to be taken as indicative of any of the customary arrangements.

Lodged in the coupling 13 and held therein by the lower end of the column pipe 1 is a ring 21 having notches 22 in its inner circumference, which notches are located at appropriate intervals for a purpose which will presently appear. Suitably spaced from each notch 22 and formed on the under face of the ring 21 are lugs 23 serving a purpose which will presently appear.

Extending outwardly from the sleeve 15 are arms 24, the notches 22, lugs 23 and arms 24 being the same in number. In the particular showing of the drawings four circumferentially equi-distant arms 24 are provided and the ring 21 has four equi-spaced notches 22 and four equi-spaced lugs 23.

When the parts are assembled the sleeve 15 is screwed upon the lower end of the tube 9 and locked thereto by the nut 16, so that in subsequent operations the parts do not become accidentally disconnected. The upper end of the tube 9 has the guiding and coupling member 6 applied thereto and the pump rod 10 is extended through the packing glands 11 and 18 and is suitably connected to the pump piston or pistons.

When the parts are lowered into the well through the column pipe 1 the arms 24 finally reach the ring 21, whereupon by turning the tube 9 about its longitudinal axis the ends of the arms 24 are ultimately brought into coincidence with the notches 22, the outer ends of the said arms being radially more distant from the axis of the rod 10 than the inner edge of the ring 21. Now, the tube 9 with the sleeve 15 thereon is turned about the longitudinal axis of the tube sufficiently to carry the outer ends of the arms 24 beneath the ring 21 and away from the notches 22, the extent of such movement being limited by the engagement of the arms 24 with the lugs 23.

With the parts assembled as indicated, the tube 9 is locked at the lower end against the fixed locking ring 21, while the upper end of this tube is held securely in the hub 7 and by the parts carrying the hub.

The tube 9 quite closely surrounds the rod 10 leaving, however, a small annular space 25 into which lubricant may be introduced by way of a passage 26 extending through the flange 6 from the exterior thereof to the interior of the hub 7. The lubricant serves to lubricate the rod where it might touch the inner wall of the tube 9

and also where the rod passes through packing, while the packing at the lower end of the tube 9 prevents escape of lubricant at such point or the entrance into the tube 9 of the liquid being pumped.

The tube 9 being firmly held at both the upper and lower ends and the rod 10 being positively guided at the upper and lower ends of the tube cannot buckle to any material extent on the down stroke when force is applied at the upper end of the rod to move it on the down stroke. In double acting pumps such force is quite liable to buckle the pump rod.

It is material that the guide tube containing the pump rod be positively fastened at both ends, while the lower fastening should be at or near the pump barrel, for otherwise buckling is quite liable to occur. In the case of single acting pumps the guide tube securely fastened top and bottom where closely surrounding the rod, avoids rubbing of the rod other than at the stuffing boxes, while in double acting pumps all buckling of the rod under the applied forces is avoided. At the same time the guide rod is readily disengaged from its lower locking connections by the simple expedient of turning the guide tube and parts carrying it and carried by it in a direction to move the arms 24 away from the lugs 23 until coinciding with the notches 22, whereupon the whole structure may be lifted from the well and, assuming that the fixed locking ring 21 is of sufficient internal diameter, the working parts of the pump may be readily removed with the pump rod 10.

While an efficient locking means for the lower end of the guide tube of the pump rod has been shown in the drawings, it will be understood that the invention is not limited to such particular means, but other means may be employed, which means are suitably constructed to positively lock the guide tube at its lower end at a point sufficiently close to the upper end of the working barrel of the pump.

What is claimed is:—

1. In well pump structures, the combination with a reciprocable pump rod, of a guide tube therefor having means for positively locking it at both the upper and lower ends with the locking means for the lower end of the guide tube located adjacent to the upper end of the pump barrel.

2. In pump structures for deep wells and the like, a guide tube for a reciprocable pump rod having means at the upper end for positively suspending it in surrounding relation to the pump rod and at the lower end having means for positively holding it in fixed relation to the pump rod and against either lateral or longitudinal movements, the holding means on the lower end of the tube being of a size to permit withdrawal of the

pump structures carried by the lower end of the pump rod with the guide tube when the latter is withdrawn from the well.

3. In pump structures for deep wells and the like, an interiorly notched locking ring adapted to be located in the well adjacent to the upper end of the pump barrel, and a guide tube for the pump rod having means for positively holding it at the upper end and at the lower end provided with outstanding arms adapted to the notches in the locking ring and movable into underriding relation to said locking ring by a turning movement of the tube about its longitudinal axis.

4. In pump structures for deep wells and the like, an interiorly notched locking ring adapted to be located in the well adjacent to the upper end of the pump barrel, and a guide tube for the pump rod having means for positively holding it at the upper end and at the lower end provided with outstanding arms adapted to the notches in the locking ring and movable into underriding relation to said locking ring by a turning movement of the tube about its longitudinal axis; said locking ring having stops on its under face for limiting the turning movement of the arms in a direction away from the notches.

5. In pump structures for deep wells and the like, a guiding tube for the pump rod provided with means at the upper end for introducing lubricant thereinto and at the lower end having a locking member applied thereto with packing means for the pump rod, and another locking member coacting with the first-named locking member and adapted to be fixedly lodged adjacent to the upper end of the pump barrel.

6. In a pump structure for deep wells and the like and including a working barrel and coupling for connecting the working barrel to the column pipe or pump casing, a holding device at the coupling, a pump rod, a guide tube for the pump rod, and locking means carried by the guide tube in coactive relation to the holding device at the cou-

pling for rigidly and removably securing the lower end of the guide tube adjacent to the pump barrel.

7. In pump structures for deep wells and the like, a guide tube for a pump rod having means at the upper end for positively suspending it in surrounding relation to the pump rod, and locking means for the lower end of the guide tube comprising coacting locking devices, with one of the locking devices carried by the lower end of the guide tube and the other locking device secured to the pump structure adjacent to the pump barrel.

8. In pump structures for deep wells and the like, a guide tube for a pump rod having means at the upper end for positively suspending it in surrounding relation to the pump rod, and locking means for the lower end of the guide tube comprising coacting locking devices with one of the locking devices carried by the lower end of the guide tube and the other locking device secured to the pump structure adjacent to the pump barrel, the coacting parts of the lock structure being constructed and arranged for locking the lower end of the guide tube to the pump structure or unlocking it therefrom by a fractional turn of the guide tube and the part of the locking structure carried thereby.

9. In pump structures for deep wells and the like, a guide tube for a pump rod and a fastening device for the lower end of the guide tube having coacting fastening means formed separate from either the tube or the pump structure with one part fast to the guide tube and the other to the pump structure for readily detachable locking engagement.

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

ROBERT E. L. HOLMES.

Witnesses:

J. WALKER WILSON,
CHARLES THEO. SMITH.