Nov. 13, 1923. 1,473,968

F. I. NEVILL

ADJUSTER FOR WELL PUMPING APPARATUS

Filed May 13, 1922

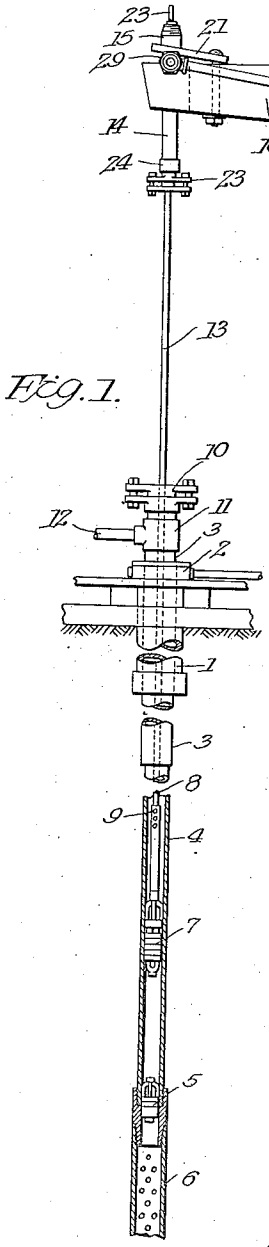


Fig. 1.

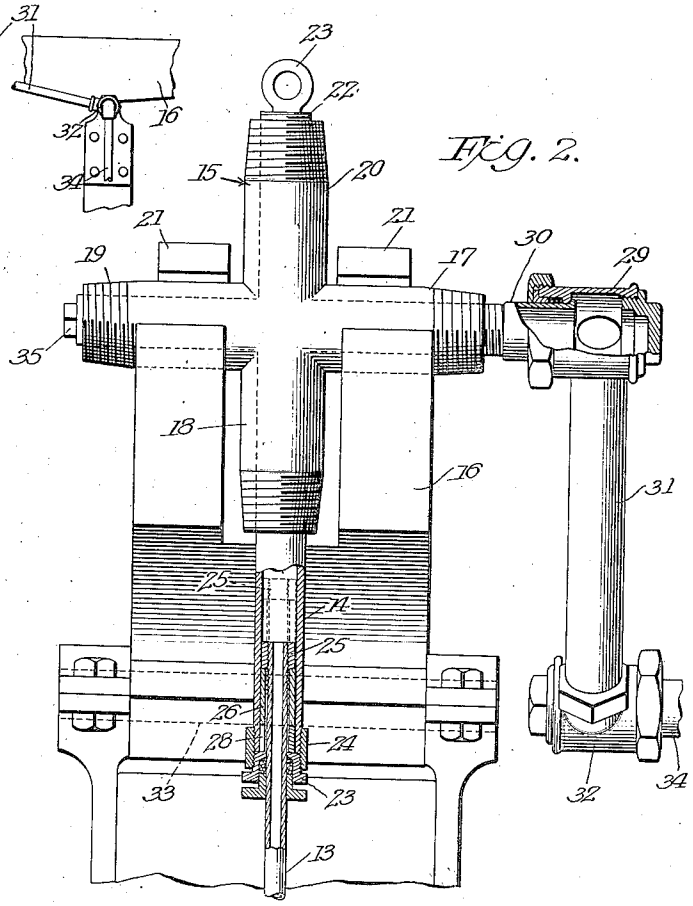


Fig. 2.

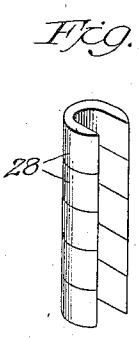


Fig. 4.

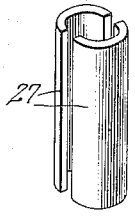


Fig. 3.

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UNITED STATES PATENT OFFICE.

FRANK I. NEVILL, OF HOUSTON, TEXAS.

ADJUSTER FOR WELL-PUMPING APPARATUS.

Application filed May 13, 1922. Serial No. 560,551.

To all whom it may concern:

Be it known that I, FRANK I. NEVILL, of Houston, county of Harris, and State of Texas, have invented an Improvement in Adjusters for Well-Pumping Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention aims to improve pump adjusters to adapt them for use with hollow polished rods to which an expansible fluid is supplied to aid in pumping.

Further aims are to provide suitable apparatus for operating deep well pumps which shall be strong, simple in construction, and easily and quickly adjusted to working conditions.

Other aims and advantages of my invention will appear in the body of this specification in connection with the description of the illustrative embodiment shown in the accompanying drawings, wherein:

Figure 1 is a side elevation of part of a deep well pumping apparatus showing parts in section and other parts broken;

Fig. 2 is an enlarged fragmentary end elevation of a portion of Fig. 1 showing the adjuster partly in section, other parts being broken away;

Fig. 3 is an enlarged perspective view of a spacer member; and

Fig. 4 is an enlarged perspective view of another form of spacer members.

Referring to Fig. 1 of the drawings, wherein the invention is shown applied to an oil well pumping rig of common type, preferably I provide an outer well casing 1 having a casing head 2 of usual construction and a well tube 3 is concentrically arranged in the casing and preferably extends to near the bottom of the well. The well tube 3 has a slightly reduced working barrel 4 at its lower end which is closed by a standing valve 5 and provided with a perforated suction pipe 6.

A piston or working valve 7 is arranged to reciprocate in the working barrel 4 and is operated by a fluid conducting tubular sucker or piston rod 8 having perforations 9 preferably communicating with the working barrel or well tubing above the working valve. The sucker rod extends upwardly through the usual stuffing box 10 arranged on the upper end of the well tubing above the tee 11 to which the usual discharge outlet 12 is connected. The polished upper portion 13 of the sucker rod, which projects through and reciprocates in the stuffing box, is adjustably secured by means of an adjuster pipe 14 or other suitable connection, which is preferably threaded to an adjuster 15 (see Fig. 2). The adjuster is pivotally mounted on the walking beam 16 of a standard pumping rig in the embodiment shown; but it is to be understood that the adjuster may be employed in other types of rigs.

The adjuster 15 preferably comprises a four way extra heavy tubular member having branches 17, 18, 19 and 20 (Fig. 2), opposite pairs of which are adapted to form trunnions by journaling them in appropriate bearings in the end of the walking beam. They may be held against displacement by an adjuster board 21 suitably secured to the walking beam. The upper vertical branch 20 of the adjuster is internally threaded to receive a plug 22 which has a hook receiving ring 23 on its upper end for lifting purposes. All of the branches of my improved four way adjuster are preferably the same size and length and are provided with both internal and external threads so the adjuster may be reversed in position if necessary.

The adjustable connection between the tubular polished rod 13 and the adjuster pipe 14, or other means for connecting it to the adjuster, preferably comprises an inverted stuffing box 23, through which the polished rod passes, and which is detachably connected to the adjuster pipe 14 by means of a threaded sleeve 24. The upper end of the polished rod 13 may have a shoulder or annular collar 25 (Fig. 2) preferably detachably and adjustably secured thereto as by screw threads. The collar 25 is adapted to telescope within the adjuster pipe 14. A removable spacer, such as a section of pipe 26, or a plurality of spacers or pipes of appropriate length, is adapted to rest upon the top of the stuffing box and maintain the shoulder or collar 25 at the proper elevation.

In practice a series of short sections of pipe 26 of different lengths are provided in order that an appropriate one may be inserted between the collar 25 and stuffing box 23 to properly space the working valve 7 from the standing valve 5 when necessary. (See the dotted position of the polished rod in Fig. 2.)

Instead of employing sections of pipe as shown in Fig. 2 a series of semi-cylindrical

spacer members 27 (Fig. 3) or a series of U shaped spacers 28 (Fig. 4) may be inserted. One of the small U shaped spacers 28 may be used for making small adjustments and may be inserted either above or below the pipe section 26. See the spacer 28 in Fig. 2. In case either of these types of spacers are used it is not necessary to remove the collar 25 on the polished rod 13 in order to make any desired adjustment in the elevation of the sucker rod. It will be noted that one or more of the U shaped spacers may be inserted above and between the upper end of a pipe section 26 or the semi-cylindrical sections 27 and the collar 25 to effect the necessary adjustment of the working valve 7.

If only a small adjustment is necessary, the collar 25 may be screwed up or down the desired distance on the polished rod thus effecting a very simple and accurate adjustment.

The fluid connection to the adjuster 15 preferably comprises a swinging joint 29 having a nipple 30 threaded into one branch 17 thereof (Fig. 2) and a pipe section 31 is connected to the swivel joint 29 and extends along the walking beam 16 terminating in another swinging or swivel joint 32 which is held in axial alinement with the saddle pin 33 of the walking beam, so that the pipe section 31 may oscillate with the walking beam. A gas or air pipe line 34, leading from a suitable source of gas under pressure, is connected to the swivel 32.

The branch 19 of the adjuster is closed by a plug 35 so that gas under pressure entering the adjuster passes downwardly through the upper end of the polished rod and through the sucker rod into the well as hereinbefore described. Thus gas is discharged continuously into the discharge column from the pump to aid in lifting the liquid to the surface.

An advantage of the construction illustrated is that if the threads in the lower branch of the adjuster should be sheared due to the enormous tension thereon (which when operating in a 3000 foot well, for example, exceeds 14000 pounds) or in case the internal threads in any one of the branches should be sheared out or stripped, the connection may be made by means of the external threads by using an ordinary sleeve coupling reducer (not shown).

It will be observed that any one of the branches of the adjuster is adapted to receive the adjuster pipe 14, and likewise the two vertical branches 18 and 20 may be used as trunnion members instead of the branches 17 and 19. Thus the interchangeability of the branches renders the device capable of withstanding long wear and the tremendous strains to which it is subjected.

In operating the apparatus the necessary adjustment of height or length of the pump rod may be accomplished in either of two ways. First, the polished rod 13 may be clamped immediately above the stuffing box 10 in the usual manner when the walking beam is in its lowest position. Then the stuffing box 23 may be removed from the sleeve 24 and the walking beam moved upwardly away from the top end of the polished rod, until the adjuster pipe is lifted above the end of the polished rod. Then the collar 25 may be screwed further down on the polished rod or, if necessary, a pipe section of different length may be readily substituted for the section 26 by removing the annular collar 25 and inserting a new section. Also the effective length of the spacer member may be increased by simply inserting one or more of the U shaped spacers 28 either above or below the spacer section, thus avoiding the necessity for removing the collar 25, and effecting a quick adjustment. Another method of making an adjustment may be accomplished by removing the plug 22, clamping the polished rod 13 in its extreme upper position, then lowering the walking beam to expose the upper end of the polished rod through the branch 20 of the adjuster and inserting the spacer members as hereinabove described. The walking beam is then raised and the plug 22 reinserted. Thus the adjustment may be easily and quickly made.

Another important feature of my adjuster is that in case the height of the rig or walking beam is not sufficient to afford a clearance between the stuffing boxes 10 and 23 on the down stroke, the adjuster pipe 14 may be removed from the branch 18 and inserted in the upper branch 20 in which case the stuffing box 23 will be threaded directly into the lower branch 18.

Having thus fully described my invention and one form thereof selected for illustrative purposes, it is to be understood that the invention is not restricted to the embodiments and means of operation shown but it is susceptible of various modifications and changes involving omission of parts, alteration, substitution, addition and rearrangement of parts.

I claim:—

1. An adjuster member for combined reciprocating and air lift pumps having a fluid conducting channel therein adapted for fluid connection with the sucker rod of the pump.

2. In a pumping rig for deep well reciprocating pumps, an adjuster member having a plurality of branches and a fluid conducting passage therein connected to supply a compressed fluid to the well whereby to assist in pumping.

3. An adjuster for oil well pumps and the

like comprising a pair of tubular trunnion members, a tubular branch connected thereto, means for connecting a hollow sucker rod to said branch and fluid conducting connections to one of said trunnions for conducting an expansible fluid into the well.

4. A fluid conducting adjuster for reciprocating pumps having lateral and vertical tubular branches and fluid conducting means connected to some of said branches.

5. An adjuster for deep well reciprocating pumps having a plurality of tubular branches some of said branches being closed and fluid conducting means connected to the remaining branches.

6. An adjuster for deep well reciprocating pumps comprising a pair of trunnion members and a perpendicular branch connected thereto, one of said trunnions and said branch being hollow and communicating with each other, and fluid conducting means connected to both of said hollow members for conducting an expansible fluid into the well.

7. An adjuster for reciprocating pumps comprising a pair of horizontal tubular trunnion members and a pair of vertical tubular branches integral therewith, means for closing some of said tubular branches and fluid connections to other of said branches for conducting an expansible fluid to assist in pumping.

8. In an adjuster for deep well reciprocating pumps a pair of trunnion members and oppositely disposed tubular branches perpendicular thereto and connected therewith one of said trunnions being tubular and communicating with said branches, fluid conducting means connected to two of said tubular portions and a closure for the other tubular member.

9. In an adjuster for deep well reciprocating pumps comprising a four way fluid conducting member, a closure for one of said members, a plug for closing another of said members having hook receiving means and fluid conducting means connected to the remaining members.

10. An adjuster for deep well pumps comprising a plurality of tubular branches of substantially the same length and diameter, said branches being provided with means for receiving a fluid conducting means.

11. An adjuster for reciprocating pumps and the like comprising four similar branches, each of said branches being adapted for connection with the sucker rod of said pump and opposite ones of said branches adapted to form trunnion members.

12. In an oil well pumping rig, a fluid conducting adjuster and a tubular polished rod connected for communication therewith.

13. In a deep well pumping rig, a fluid conducting adjuster and a tubular polished rod adjustably connected thereto and in communication therewith.

14. In deep well pumping apparatus, a substantially T shaped fluid conducting adjuster, an adjuster pipe connected to said adjuster, a tubular polished rod and means for adjustably connecting said polished rod to said adjuster pipe.

15. In a deep well pumping apparatus, a fluid conducting adjuster, an adjuster pipe detachably connected thereto and a tubular polished rod adapted for adjustable and telescopic connection with said adjuster pipe.

16. In a pumping rig for oil wells and the like, a fluid conducting adjuster, a tubular polished rod telescopically connected to said adjuster, means for maintaining a fluid tight connection between said polished rod and adjuster and means for preventing relative movement of said polished rod and adjuster.

17. In a pumping rig, a tubular adjuster, an adjuster pipe connected to said adjuster, a tubular polished rod adapted to telescope within said adjuster pipe, stop means on the end of the polished rod, a stuffing box for the polished rod connected to one end of the adjuster pipe and spacer means arranged between said stuffing box and said stop means to maintain the polished rod in its adjusted position.

18. In a deep well pumping ring, a tubular adjuster, an adjuster pipe detachably connected thereto, a polished rod telescopically engaging the interior of said adjuster and having a stop shoulder thereon, means connected to one end of said adjuster pipe through which the polished rod is adapted to slide and spacer means telescopically mounted in said adjuster pipe and positioned between said stop shoulder and said first mentioned means for maintaining the polished rod in a fixed adjusted position.

19. In a pumping rig, a tubular fluid conducting adjuster, an adjuster pipe connected thereto, a tubular polished rod adapted to telescope within said adjuster pipe, an annular shoulder detachably connected to the end of said polished rod, means connected to one end of said adjuster pipe in fluid tight sliding engagement with the polished rod and a plurality of spacer members adapted to embrace the polished rod between said means and said annular shoulder.

20. In a deep well pumping rig, a fluid conducting adjuster having a pair of vertical tubular branches in axial alinement, an adjuster pipe connected to one of said branches, a stuffing box on the free end of said adjuster pipe, a polished rod passing through said stuffing box and having a removable shoulder

on the upper end thereof, spacer means arranged between said stuffing box and shoulder, and a removable closure in the upper vertical branch of said adjuster adapted to permit the end of said polished rod to project through said branch for inserting additional spacer members.

21. In a deep well pumping rig, a walking beam, fluid conducting adjuster pivotally mounted on the walking beam, a tubular pump rod connected to said adjuster and fluid conducting means connected to said adjuster and adapted to oscillate with said walking beam about a common axis.

22. In a pumping rig, a fluid conducting adjuster, an adjuster pipe connected to said adjuster, a polished rod telescopically mounted in said adjuster pipe, stop means adjustably secured to the telescoping end of the polished rod, a fluid tight connection between the adjuster pipe and polished rod and spacer means between said fluid tight connection and said polished rod stop means.

23. An adjustable connection for pipes under tension comprising a pipe, a tubular rod telescopically mounted in said pipe, a shoulder on the telescoping end of the rod, packing means on the rod and connected to said pipe and a spacer member between said packing means and said shoulder.

24. In an adjuster for pump rigs, an adjuster pipe, a tubular polished rod telescopically mounted therein, stop means on the upper end of the polished rod, a stuffing box on the adjuster pipe around the polished rod and a substantially U-shaped spacer member on the polished rod between said stop means and the stuffing box.

In testimony whereof, I have signed my name to this specification.

FRANK I. NEVILL.