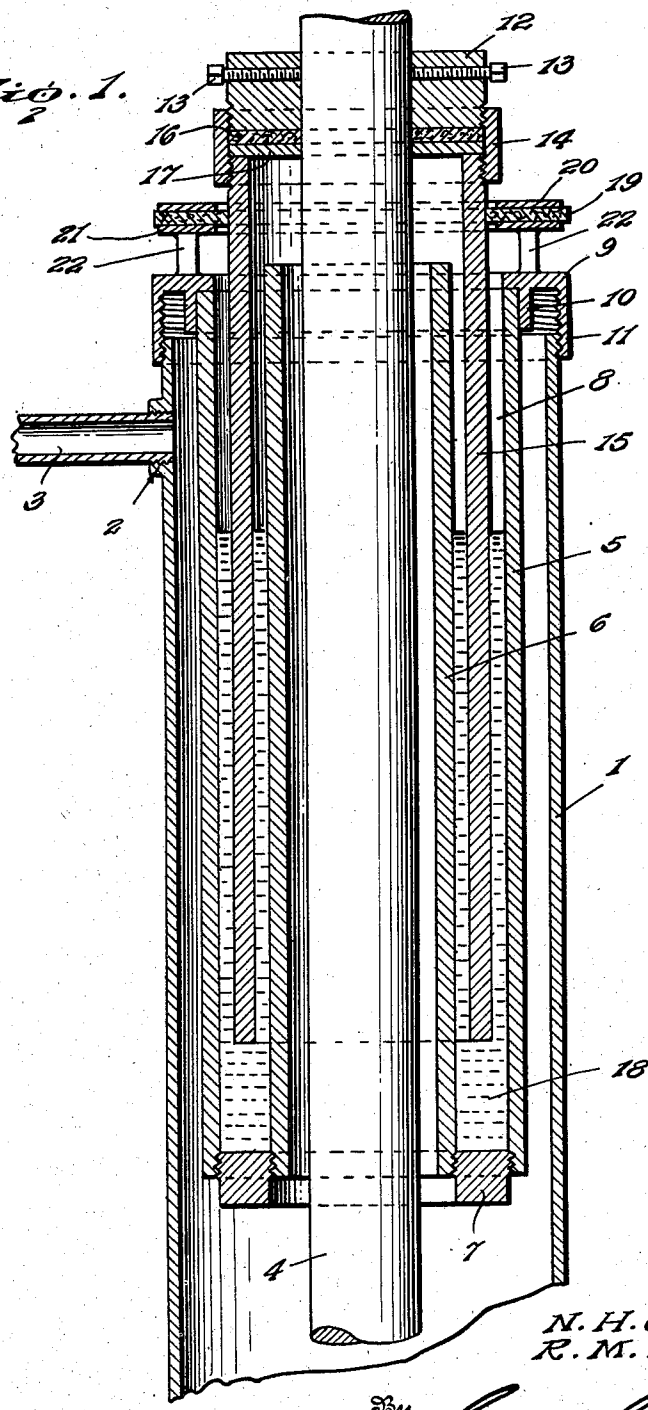
Oct. 22, 1940. N. H. ARMSTRONG ET AL 2,218,839

STUFFING BOX

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Fig. 1.



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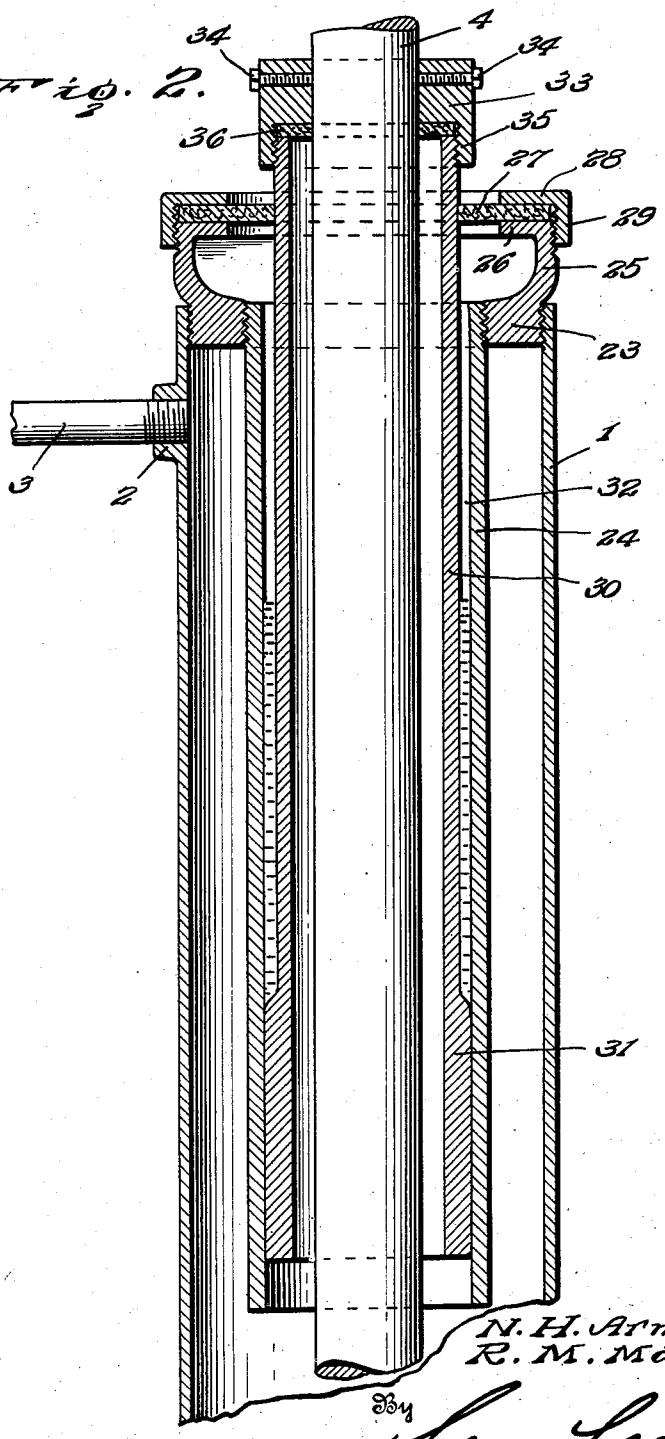
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Fig. 2.



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2,218,839

STUFFING BOX

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4 Claims. (Cl. 286—26)

This invention relates to a stuffing box which is particularly adapted for use in connection with the pump rod or polish rod of a well pump.

One object of the invention is to provide a stuffing box consisting of companion members carried by the well casing and the pump rod and cooperating with each other to form a liquid seal serving very effectively to prevent escape of fluid pumped out of the well while at the same time eliminating substantially all friction when the pump is in operation.

Another object of the invention is to provide a stuffing box wherein a cylindrical pocket is carried by the well casing in position to receive a tubular sleeve carried by the pump rod, the sleeve being curved at its upper or outer end and firmly secured to the pump rod so that it will reciprocate in the pocket without moving out of oil or other liquid in the pocket during upward movement of the pump rod. It will thus be seen that a liquid seal will be at all times established and leakage of fluid from the well casing prevented.

Another object of the invention is to provide improved means for wiping the outer surface of the sleeve during reciprocation of the pump rod and the sleeve and thus remove from the sleeve oil which adheres to it when it is immersed in the liquid.

Another object of the invention is to provide a stuffing box for a pump rod which is very simple in construction and capable of being very easily applied to a pump rod and a well casing in which the pump rod operates.

The invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a view taken vertically through the upper portion of a well casing and a portion of a pump rod together with the improved stuffing box, the pump rod being shown in elevation and the well casing and stuffing box in vertical section, and

Figure 2 is a similar view showing a modified construction.

The well casing, which is indicated by the numeral 1, may be of any desired diameter and adjacent its upper end is formed with a side port 2 into which is screwed the pipe 3 through which fluid is pumped from the well casing when the pump rod 4 is reciprocated vertically in the well casing. This pump rod may be of any desired length and have its lower end connected with pumping means for forcing the fluid upwardly through the well casing and out through the discharge pipe 3 when the pump is in operation. The stuffing box constituting the subject-matter of this invention is employed to provide a liquid seal about the pump rod within the upper portion of the well casing and is of the following construction.

Referring to Figure 1, it will be seen that within the upper portion of the well casing is mounted an annular pocket having an outer annular wall 5 and an inner annular wall 6. These walls are formed of metal tubing which may be sections cut from pipe of the proper diameter and the lower end portions of these tubes or annular walls are threaded to receive a metal ring 7 which is screwed tightly into place and provides a solid bottom for the pocket 8. A collar or ring 9 is disposed about the upper end portion of the outer annular wall or tube 5 where it is firmly secured in covering relation to the upper edge of the tube by a depending annular flange 10 firmly engaged with the tube. There has also been provided a depending annular flange 11 about the outer peripheral edge of the collar 9, and this flange is internally threaded and screwed into engagement with the upper end of the well casing. It will thus be seen that the outer annular wall will be supported from the well casing concentric thereto and since the inner annular wall is engaged with the ring 7 screwed into the lower end of the outer wall the entire pocket will be suspended within the well casing. An annular block or mounting ring 12 fits snugly about the pump rod 4 and is firmly secured in a set position thereon by a suitable number of set screws 13. This block or ring 12 has its lower portion externally threaded to receive the sleeve 14 which extends downwardly from the block and has its lower end portion internally threaded to receive the externally threaded upper end portion of a tube 15. The tube 15 is of such diameter that, when it is in place and extends downwardly into the pocket 8, it will be spaced from the walls 5 and 6 and may be reciprocated vertically in the pocket without having engagement with either of the annular walls of the pocket. Therefore, friction between the tube 5 and the walls of the pocket will be entirely eliminated. A packing disk 16 is placed against the under face of the block 12 about the pump rod 4 and under this packing disk is disposed a metal ring 17 against which engages the upper end of the tube 15. Therefore, when the tube is screwed into the sleeve or collar 14 and the rings 16 and 17 are forced upwardly, the ring 16 will be compressed and expanded between the block 12 and the ring 17 to form a tight joint and prevent leakage through the upper end of the tube 15. As the tube 15 is continuously immersed

in the oil or other liquid 18 with which the pocket 8 is partially filled, fluid in the casing 1 will be prevented from escaping about the tube, and when the pump is in operation, all of the fluid will be forced from the well casing through the discharge pipe 3. During reciprocation of the pump rod, the tube 15 moves upwardly through the open upper end of the pocket and then back down into the pocket. It will thus be seen that portions of the tube 15 which have been immersed in the oil 18 will be moved upwardly through the upper end of the pocket and if wind is blowing this oil is liable to be blown off the tube and not only become wasted but also cause attendants to be spattered with oil. In order to prevent this, the film of oil must be wiped from the tube as it moves upwardly out of the pocket. Therefore, there has been provided a wiper mounted above the collar 9. This wiper consists of a flat ring 19 formed of felt or other suitable material and is of such internal diameter that it fits snugly about the pump rod. The wiping ring is disposed between clamping rings 20 and 21 which are held in gripping engagement with upper and lower faces of the wiping ring by suitable fasteners, such as screws or bolts, and attention is called to the fact that the rings 20 and 21 are of less width than the wiping ring so that this wiping ring projects from the inner peripheries of the clamping rings. This permits the inner peripheral portion of the wiping ring to be flexed somewhat during movement of the pump rod and also permits it to maintain its close contacting engagement with the pump rod and very effectively wipe oil from the tube during reciprocating movement of the tube and pump rod. The lower clamping ring 21 is spaced upwardly from the collar 9 and supported in this elevated position by a suitable number of struts 22 spaced from each other circumferentially of the ring and the collar. By removing the upper clamping ring a new wiping ring may be easily applied and by tightening the bolts or screws which hold the upper ring in place the wiping ring may be additionally compressed when its inner peripheral edge becomes worn and it does not properly engage about the tube 15. This wiper serves very effectively to remove the film of oil as the pump rod and tube move upwardly and this oil will flow downwardly along the tube into the pocket. It will thus be seen that the sleeve will be substantially freed from oil as it moves upwardly and the oil will not be blocked from the sleeve or tube. We have, therefore, provided a stuffing box which will very effectively prevent leakage of fluid pumped upwardly during operation of the pump and all friction will be eliminated except the slight friction between the wiper and the outer surface of the tube 15.

In the embodiment of the invention illustrated in Figure 2, the upper end of the well casing 1 is closed by a ring or annular plug 23 which is screwed into the well casing and is also internally threaded to receive the threaded upper end portion of the tube 24 which takes the place of the tube 5. This ring or annular plug 23 is extended upwardly above the well casing to form a cup 25 which has its upper end portion externally threaded and formed with an inwardly extending flange 26 upon which a wiper 27 taking the place of the wiper 19 is secured by a clamping ring 28 having a depending annular flange 29 which is internally threaded and screwed into engagement with the threaded upper portion of the cup 25. A tube 30, corresponding to the tube 15, is disposed about the pump rod 4 within the tube 24, and this tube 30 has its lower end portion 31 externally thickened to provide a head 31 which fits snugly within the sleeve 24 and constitutes a closure for the space or pocket 32 between the tube 30 and the tube 24. This space or pocket is partially filled with oil and forms a liquid seal about the tube 30. In view of the fact that the wiper 27 fits snugly about the sleeve 30, oil carried upwardly upon the tube 30 during upward movement thereof will be wiped from the same and caused to flow back into the pocket 32. Therefore, the proper supply of oil will be maintained in this pocket and leakage prevented. In case a great deal of oil should be carried upwardly by the tube or sleeve 30, this oil will, as it is wiped from the reciprocating tube or sleeve, accumulate in the cup 25 and then flow back into the pocket 32. A collar 33 which fits snugly about the pump rod 4 is secured thereto by set screws 34 and this collar has its lower end portion recessed and internally threaded, as shown at 35, to receive the threaded upper end of the tube 30, a gasket 36 being provided between the upper end of the tube 30 and the collar to form a tight joint.

Having thus described the invention, what is claimed as new is:

1. In a structure of the character described, a well casing, a reciprocating pump rod operating in said casing, a tubular sleeve in said casing about said pump rod, a ring mounted in upper end portions of said casing and engaging the upper end of said sleeve to support the sleeve in the casing and close the space between the upper ends of the sleeve and casing, said ring having a portion extending upwardly and forming an annular cup, a tube surrounding said pump rod, a collar carried by said pump rod and engaged with the upper end of said tube, said tube extending longitudinally in said sleeve and having its lower portion formed with a head in close contacting engagement with walls of the sleeve, the space between the sleeve and the tube above the head thereof being partially filled with liquid to form a liquid seal, and a wiping ring carried by said cup and engaging said tube to wipe liquid from the tube as the tube and the pump rod move upwardly.

2. In a structure of the character described, a well casing, a pump rod reciprocating in said casing, a sleeve in said casing about said pump rod, means for closing the upper end portion of space between the sleeve and the casing, and a tube about said pump rod within the sleeve having its upper end connected with the pump rod and its lower end externally thickened to form a head having close contacting engagement with walls of the sleeve, the space between the sleeve and tube above the head being partially filled with liquid to form a liquid seal.

3. In a stuffing box, a well casing, a pump rod mounted to reciprocate in the casing, a sleeve mounted in the casing about the pump rod, a tubular member about the pump rod within the sleeve, said tubular member moving with the pump rod and cooperating with the sleeve to form a liquid seal, a ring connecting the sleeve with the casing, and a wiper carried by the ring and engageable with the tubular member for wiping liquid therefrom as said member and rod reciprocate.

4. In a stuffing box as recited in claim 3, wherein the wiper comprises a disk of relatively soft material, and means for removably clamping the wiper in operative position.

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