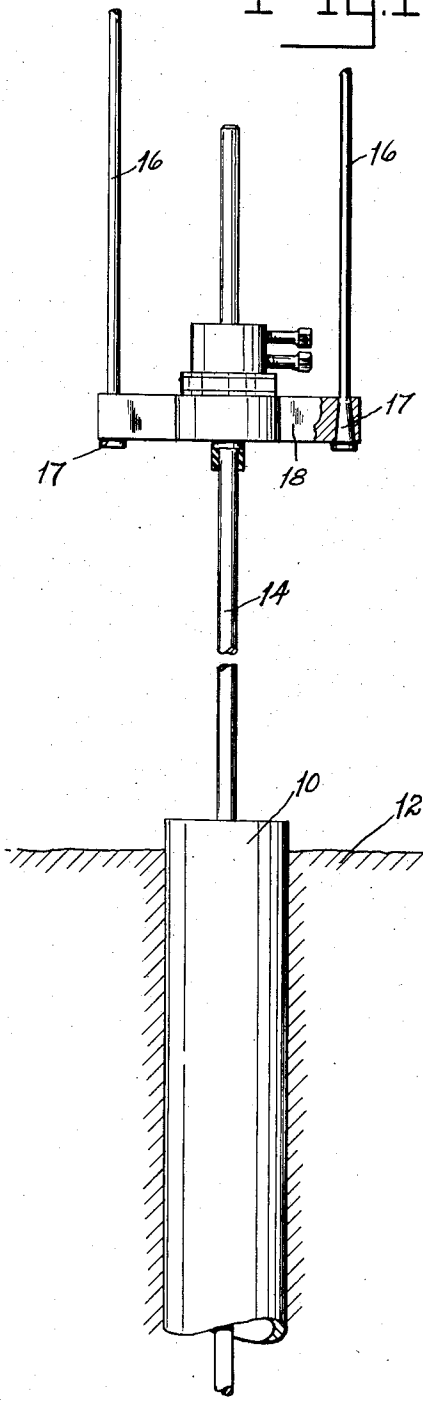
Nov. 13, 1951 W. H. EDWARDS 2,574,550

POLISHED ROD INSULATION

Filed Nov. 10, 1949

Fig. 1.



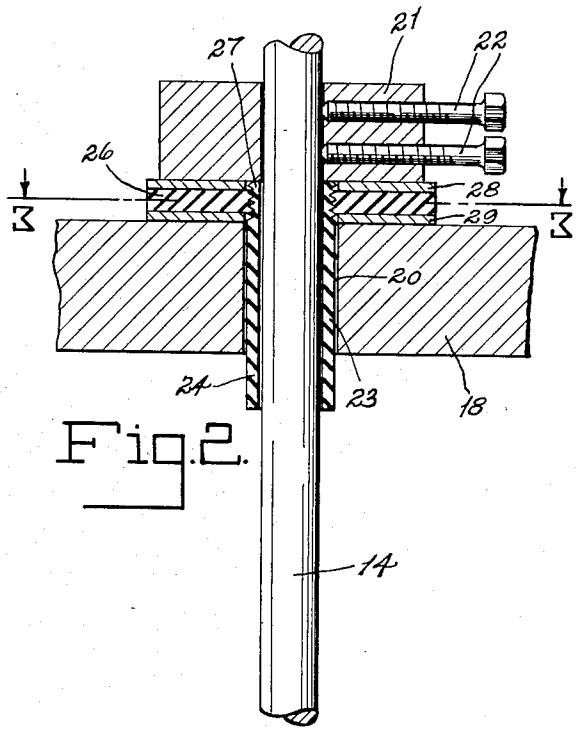


Fig. 2.

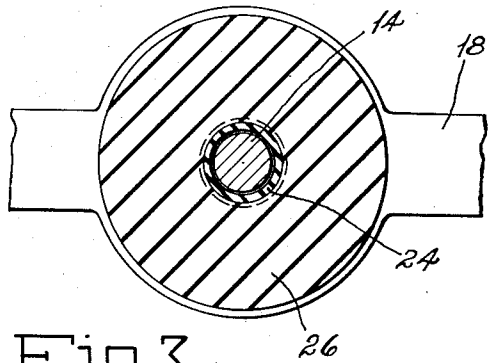


Fig. 3.

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POLISHED ROD INSULATION

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5 Claims. (Cl. 103—205)

1

The present invention relates to the pumping of wells, and more specifically is concerned with overcoming the electrolytic corrosion of subsurface equipment used in a pumping well, for the production of petroleum, which results from the flow of electrical surface energy through the sucker or polished rod.

The invention particularly contemplates the disposition of compact electrical insulating means between the polished rod and its source of actuation at the polished rod cross. More specifically, an insulating sleeve or bushing is disposed between the polished rod of the pumping assembly and the hanger or polished rod cross, and an insulating collar or washer is caused to separate the upper surface of the hanger from the polished rod clamp. As a result, a compact and relatively permanent mechanical connection joins the polished rod to its driving instrumentalities, and simultaneously prevents the flow of electricity down the polished rod.

A particular feature of this arrangement resides in the elimination of cumbersome insulating couplings by electrical insulating members which remain essentially a fixed relationship with respect to the parts which they electrically separate. As a result of the absence of relative movement, frictional wear as well as tensile stressing of the insulating members is essentially eliminated. Therefore, continuous and permanent insulation of the polished or sucker rod is continuously realized without the deterioration which would be expected under the high mechanical stresses and loads usually encountered in pumping assemblies of this character.

Obviously, there is a complete suppression of electrolytic corrosion, due to electrical surface currents passing through the sucker rod, currents which otherwise reach substantial magnitude and are highly destructive of the sucker rods, pump, casing, tubing and the like.

In order to describe the invention in greater detail, reference is had to the attached drawing wherein:

Figure 1 is a vertical elevation, partially in section, showing one embodiment thereof as applied to a pumping petroleum well;

Figure 2 is a sectional detail view taken vertically and centrally through the embodiment of Figure 1 in the region where the sucker rod passes through the hanger; and

Figure 3 is a sectional detail view taken on the lines 3—3 of Figure 2.

In Figure 1, the numeral 10 represents a well casing leading to a petroleum producing reservoir, not shown, at a point below the surface of the ground, which is represented by the reference numeral 12.

2

A polished or sucker rod 14 extends vertically axially down the well casing 10 connecting at its lower extremity with the piston of well pump, not shown, which is disposed within the petroleum reservoir.

The sucker rod 14 is continually reciprocated in an axial direction by any driving and transmission mechanism, as for example, a pumping jack not shown comprising a pivoted lever or walking beam oscillated by a driving motor about its fulcrum or pivot point in a vertical plane and suspending from its extremity, a pair of driving cables or rods 16. Both cables 16, as shown in Figure 1, are connected as at 17 with a polished rod cross, yoke or hanger 18, which accordingly is continually lifted and lowered through the desired reciprocating path.

Mechanical connection between the polished rod 14 and the polished rod cross 18 is effected by passing the extremity of the polished rod centrally through an aperture or cylindrical passageway in the rod cross or hanger 18, and attaching a hanger clamp 21 thereabove. The hanger clamp 21 shown in the drawing is provided with set screws 22 for rigid attachment to the rod 14 although any other equivalent fastening or locking means for interconnecting the clamp and the rod 14 against relative movement are obviously contemplated.

In accordance with the present invention, it is to be particularly noted that the cylindrical passageway 20 is of substantially greater diameter than the rod 14 in order to accommodate an interposed electrical insulating sleeve, tube or collar 23 which therefore embraces the rod 14 and lines the bore or aperture 20. The sleeve 23 extends completely through the aperture and preferably a short distance therebeyond, as at 24, to positively prevent electrical contact between the rod and the hanger 18.

As is particularly shown in Figure 2, an insulating disc, collar, or washer 26 extends radially outwardly from the upper portion of the sleeve 23, occupying the space between the lower surface of the clamping collar 21 and the upper surface of the polished rod cross 18. In the embodiment shown, the sleeve 23 and washer 26 are threadedly interengaged as at 27.

Preferably, the insulating washer 26 extends radially outwardly beyond the margins of the collar to positively assure interruption of all electrical current flow between the parts but also to

provide a substantial and adequate contact surface for transmitting the mechanical stresses encountered in actuation of the sucker rod 14.

Preferably, also, additional washers 28 and 29, formed of some material of good structural properties such as steel, iron or the like, are disposed respectively above and below the insulating washer to distribute these stresses uniformly through the insulating washer.

As above intimated, the interconnection between the tubular sleeve 23 and the insulating washer 26 may take any conventional form. For example, these parts may be joined by any desired fastenings or may be molded as an integral unit as a sleeve having a radial flange projecting from its upper extremity.

On the other hand, direct mechanical connection of these parts is not necessary where other provision is made to permanently hold the sleeve 23 in the position shown between the polished rod 14 and the hanger 18. For example, the sleeve may be held in position by clamps, setscrews or the like joining it to either the hanger or the rod, or may be fastened by any suitable means to either or both of the washers 28 and 29.

As a result, however, of the arrangement of the tubular insulating member 23 in cooperation with the insulating flange 26, it is obvious that the polished rod remains electrically separate from its driving means so that the usual current flow along the rod is thereby positively interrupted.

In accordance with the broadest aspect of the invention, the members 23 and 26 may be formed of relatively strong, solid, electrical insulating material. However, it will be apparent from what has been said before that the substantial stresses normally encountered in pumping petroleum wells dictate the use of materials having substantial resistance to compressive stress and impact. To this end, therefore, it is preferred to employ some relatively rigid insualting material of high compressive strength, such as, for example, the following: polystyrene resins; vinyl acetate; pressed fiber; rubber; and the phenol-formaldehyde resins, for instance, "Bakelite," or the linen base molded product "Micarta." In general, plastics of substantial compressive strength and electrical insulating properties are suitable.

It is important to note that this structure adds subsantially nothing to the bulk of the assembly by way of eliminating the electrolytic destruction of subsurface equipment attributable to sucker rod conductors. In other words, this result is realized in a simple manner which obviates the use of undesired, cumbersome insulating couplings which would impair the vital strength and permanence of the assembly.

Obviously, many other modifications and variations of the invention as hereinbefore set forth may be made without departing from the spirit and scope thereof, and only such limitations should be imposed as are indicated in the appended claims.

I claim:

1. In a well pumping apparatus in which a well pump is actuated by a string of polished rods suspended in the well from a vertically reciprocating driving mechanism at the surface, said mechanism including a cross member and means for suspending the cross member from said mechanism, the polished rod extending vertically through an aperture in said cross member and having a clamp affixed to the rod above the cross member, the improvement which comprises means for electrically insulating said polished rod from said cross member comprising a sleeve embracing the polished rod and disposed within the said aperture of the cross member, and a projecting collar extended radially outwardly from the upper extremity of the sleeve and separating the upper surface of said cross member from said polished rod, said sleeve and collar being formed of electrically insulating material.

2. The combination called for in claim 1 wherein said insulating sleeve is attached to said insulating collar, thereby continuously locating the sleeve within the aperture in said polished rod cross member.

3. Means for electrically insulating the polished rod from a positively reciprocated polished rod cross member of a petroleum pumping well, wherein said polished rod extends vertically and axially of a petroleum well casing from a subsurface reservoir to the surface of said well, said polished rod passing through an opening in said polished rod cross member in the vicinity of its upper extremity and being provided above said aperture with a rigidly attached polished rod clamp projecting over the upper surface of the cross member to thereby suspend the polished rod, said insulating means comprising a cylindrical sleeve having an internal and an external diameter permitting said sleeve to fit coaxially about the polished rod and within the said aperture in said polished rod cross member, and an annular collar interengageable with the upper extremity of said sleeve and extending radially outwardly therefrom a substantial distance to lie between said polished rod clamp and the upper surface of said cross member, said sleeve and collar being formed of electrically insulating material.

4. The apparatus according to claim 3 wherein the upper extremity of said sleeve is provided with a screw thread on its outer surface and wherein said collar is provided with a mating thread, permitting the sleeve and collar to be threadedly interengaged against relative axial movement.

5. The apparatus according to claim 3, having in combination therewith a pair of rigid metallic washers having annular faces substantially coextensive with the annular surfaces of said collar and adapted to oppositely engage said faces to distribute compressive stress through the collar.

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