ABSTRACT OF THE DISCLOSURE

A polyurethane sucker rod guide and centralizer for use on sucker rods extending longitudinally through production tubing such as is used in pumping fluids to the surface in oil wells wherein the rod guide and centralizer surround the rod to position it generally axially of the tubing to prevent engagement of the rods with the tubing when such rods are reciprocated therein for actuating as well pump connected to the sucker rods.

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention pertains to a polyurethane sucker rod guide and centralizer for use in production tubing and particularly plastic-lined tubing to permit low friction engagement between the sucker rod guides and the tubing at those points along the string of sucker rods where engagement between such rods and tubing occur to provide a minimum of wear and damage to the plastic coated inner surface of the tubing.

(2) Description of the prior art

In mechanical oil well pumping apparatus, lengths of solid rods, known as sucker rods, are coupled together so as to extend down into a string of production tubing for connecting mechanical pumping or pumping equipment at the surface to a well pump disposed in the well. As the sucker rod string is reciprocated in the tubing to actuate the pump for pumping well fluids upwards through the production tubing to the surface, such string of sucker rods normally engages the inner surface of the tubing at various spaced points because, more often than not, the string of tubing and the well bore are crooked rather than straight. The engagement by the reciprocating sucker rods with the inner surface of the tubing at various points causes wear on the rods and the tubing when the rods are reciprocated therein. Various rod guides have been suggested to position the sucker rod string so as to minimize engagement between the sucker rods and the tubing; however, the rod guides frequently cause wear and are particularly troublesome when employed in a tubing string that is internally coated or lined with a plastic film which is provided to inhibit corrosion of the tubing.

SUMMARY

The present invention pertains to a polyurethane rod guide and centralizer which is secured to a sucker rod and which comprises a longitudinally extending cylindrical body having annular surfaces at its opposite ends tapered inwardly toward the rod on which a rod guide is carried and which includes a plurality of circumferentially spaced longitudinally extending flutes or channels which are provided in the outer surface of the cylindrical body and which are disposed at an angle to the longitudinal axis of the sucker rod and which channels normally include a base surface with a pair of circumferentially spaced sides which are disposed at substantially a right angle to such base surface.

It is an object of the present invention to provide a new and improved polyurethane sucker rod guide and centralizer which reduces rod, coupling and tubing wear in sucker rod pumped wells and facilitates the use of internally coated tubing having a plastic lining in such wells.

Another object of the present invention is to provide a new and improved sucker rod guide and centralizer wherein the guide comprises a longitudinally extending polyurethane body having an outer cylindrical surface and having annular surfaces at its opposite ends tapered inwardly toward the longitudinal axis of such cylindrical body. A plurality of circumferentially spaced longitudinally extending flutes or channels are disposed at an angle to the longitudinal axis of the sucker rod guide or body and extend longitudinally of the body from one of the annular tapered end surfaces to the other to provide relatively sharp edges for cutting or scraping paraffin off of the inner surface of the production tubing when such rod guides engage or rub against such tubing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal view partly in section and partly in elevation showing the sucker rod guide and centralizer of the present invention positioned on a sucker rod disposed in a plastic-lined joint of tubing;

FIG. 2 is a sectional view taken on line 2--2 of FIG. 1 showing details of construction of the sucker rod guide and centralizer apparatus of the present invention; and

FIG. 3 is a sectional view taken on line 3--3 of FIG. 1 showing additional details of construction of the sucker rod guide apparatus of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Briefly, as shown in FIG. 1 of the drawings, the sucker rod guide and centralizer apparatus of the present invention is designated generally G and is shown mounted on a solid sucker rod 4 that extends generally axially of the length of tubing 6 which, as shown, is internally coated or lined with a plastic film 7. The sucker rod guide G is formed of polyurethane and comprises a generally cylindrical body 11 having annular tapered end portions 12 and 13 which are inclined inwardly toward the longitudinal axis of such cylindrical body. Laterally extending surfaces 19 and 20 which are transverse of the longitudinal axis of the body 11 are provided adjacent each end of the tapered surfaces 12 and 13. The body 11 is split longitudinally at 21 to enable the body to be installed on the rod 4 by spreading the split portion and inserting the rod 4 laterally into the central longitudinally extending opening or passage at 23 which extends axially through the body 11. An epoxy resin 29 or other suitable bonding agent is employed to glue or bond the facing edges of the split portion 21 together and for also securing the body 11 to the rod 4.

Circumferentially spaced flutes or channels 24 are provided on the exterior of the body 11 and extend longitudinally thereof to facilitate the flow of well fluids around the guide G through the tubing 6. As shown, such flutes or channels 24 extend from one tapered end portion 12 to the tapered end portion 13 at the opposite end of the body 11.

The flutes or channels 24 are preferably formed with a bottom surface 26 and with side surfaces 27 and 28 being disposed at substantially right angles to such surface 26.

It will be noted that the flutes 24 are disposed at an angle to the longitudinal axis of the body 11 so that the edges 29, formed at each end of the channels where the sides 27 and 28 intersect the tapered ends 12 and 13, present a sharp cutting edge which tends to cut or scrape paraffin off of the inner surface of the tubing 6 when the guide body 11 bumps or rubs against such tubing.

In using the polyurethane sucker rod guide and centralizer of the present invention, it will be appreciated that
3,560,060

the body 11 may be affixed to the sucker rod 6 or to the sucker rod box couplings at the ends of the rods (not shown) at desired intervals either by molding the body 11 onto the rod 6 or by securing the body 11 thereon with a suitable bonding agent such as epoxy resin. With the bodies 11 thus positioned on the sucker rod at longitudinally spaced intervals, the sucker rod string may be reciprocated in the tubing 6 with a minimum of rubbing or abrasion between the inner surface of the tubing 6 and the rod string 4. Also, it will be appreciated that the polyurethane sucker rod guides G are chemically resistant to well fluids and gases encountered in oil and gas wells as well as to chemicals normally used in treating oil wells and that such polyurethane guide G does not produce a paraffin build up as paraffin does not readily adhere well to such polyurethane guides.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made within the scope of the appended claim without departing from the spirit of the invention.

What is claimed is:

1. A sucker rod guide and rod centralizer for use in plastic coated tubing comprising:
   (a) a body having a cylindrical outer surface extending longitudinally thereof;
   (b) an annular end surface at each end of such cylindrical outer surface tapered inwardly toward the longitudinal axis of such cylindrical body;
   (c) a plurality of circumferentially spaced longitudinally extending flutes formed in said body, said flutes being disposed at an angle to the longitudinal axis of said body and communicating the tapered annular end surfaces at the opposite ends of said body;
   (d) said flutes including a flat bottom surface and a pair of circumferentially spaced side surfaces disposed at substantially right angles to said bottom surface and intersecting the outer cylindrical surface of said body;
   (e) said body being split longitudinally along the bottom surface of one of said flutes; and
   (f) a suitable bonding agent bonding the faces of the split together and securing the body on the rod.

References Cited

UNITED STATES PATENTS

2,690,934 10/1954 Holcombe ----------- 308—4
3,049,382 8/1962 Eli ------------------ 308—4
3,360,846 1/1968 Schelliste et al. ------ 166—241X
3,414,337 12/1968 Sable ---------------- 308—4

MANUEL A. ANTONAKAS, Primary Examiner

U.S. Cl. X.R.

166—241