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W. F. WARD

3,277,966

GUIDE WITH SACRIFICIAL INSERTS

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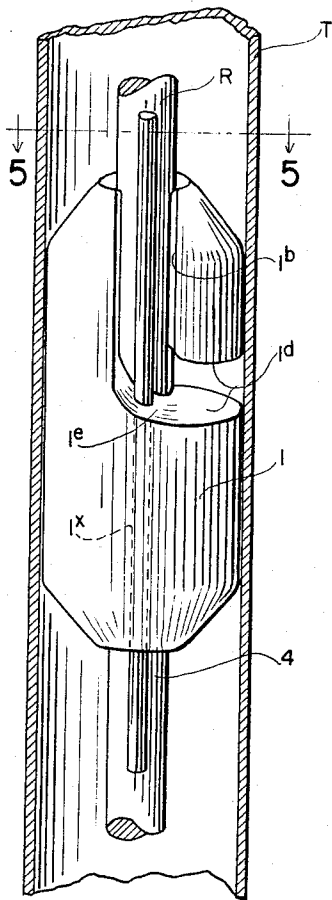


Fig. 1

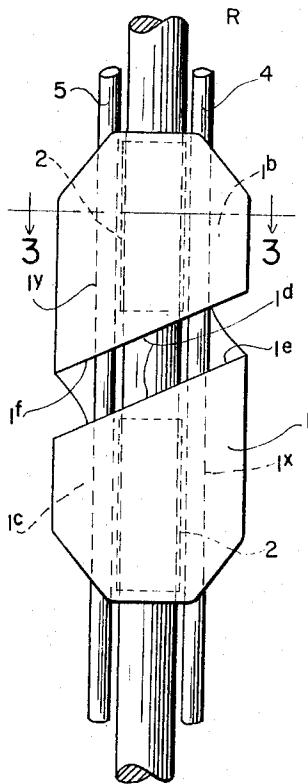


Fig. 2

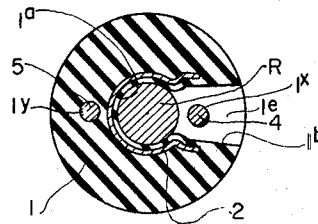


Fig. 3

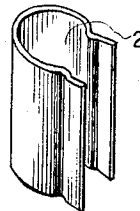


Fig. 4

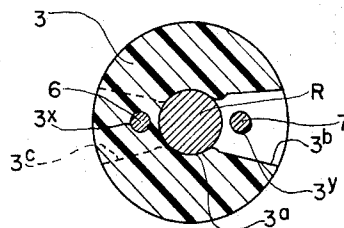


Fig. 6

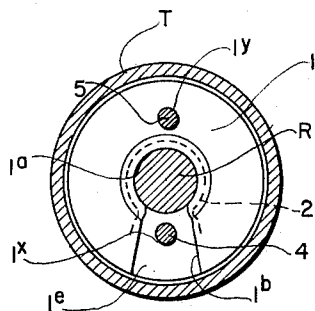


Fig.5

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3,277,966

GUIDE WITH SACRIFICIAL INSERTS

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6 Claims. (Cl. 166—176)

This invention relates to improvements in sucker rod guides, and more particularly relates to novel combinations of bars of sacrificial well-treating materials with sucker rod guides particularly adapted for supporting the sacrificial bars in optimum positions with respect to the sucker rods and the web tubing or casing within which the sucker rods are operating.

Such undesirable effects as electrolytic corrosion, the build-up of paraffin, and perhaps other phenomena can be controlled by introducing certain materials into the well zone to be protected, as is well-known in the prior art in general. For instance, zinc, magnesium, aluminum, etc. can be introduced into a well to protect the steel members within the well from electrolytic action. Experience has shown that where a clip-on sucker rod guide is used, for example of the general type shown in my Patents 2,604,364 or 2,793,917, there is a definite tendency for corrosion to occur to a concentrated extent on the portions of the sucker rod which are exposed within the slot of the guide. The exact reason for this concentration is not known, but it has generally been assumed that the corrosion is augmented and concentrated in the slot due to the relatively higher velocity of sour crude well fluid through the slot and the accompanying tendency to cause erosion.

It is a principal object of this invention to provide a rod guide particularly well adapted for holding bars of sacrificial material in positions parallel with the sucker rod and within the slot but spaced from the sucker rod so that the sacrificial bars are out of contact therewith. More particularly, I have discovered that a rod guide of the opposed-slot configuration, first suggested in the patent to Gillespie No. 2,436,994, is especially well adapted for holding two sacrificial bars each supported in an offset bore provided through the diametrically opposite side of the guide from one of its longitudinal slots, and extending parallel to and in alignment with the other longitudinal slot in the guide. In this way, a sacrificial bar can be conveniently located and firmly supported in the zone of maximum tendency toward corrosion. In an ordinary rod guide, a sacrificial bar of $\frac{3}{8}$ " diameter in circular cross-section has been found to provide satisfactory protection and adequate longevity without unduly restricting the flow of well fluids through the slots of the guide.

As stated above, other sacrificial inserts have been suggested by prior inventors, for instance as shown in Patents 2,392,033 and 1,608,709. At the present time, such protection is often obtained by using pony rods having magnesium sleeves cast thereon, which rods are commercially available. When such pony rods are inserted periodically in a rod string, they serve to provide cathodic protection until the magnesium is eaten away, at which time the pony rods must be removed from the string and sent back to factories for a new coating of magnesium. However, the effectiveness of such pony rods is somewhat limited by the fact that they can only be located at couplings between standard 25 or 30 foot sucker rods and therefore cannot be placed precisely at points of maximum corrosion, such as at the slots in rod guides.

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It is another important object of this invention to provide a very efficient and inexpensive improvement in the structure of rod guides which readily cooperates with the shape of the sacrificial bars and supports them parallel with the sucker rod, electrically out of contact therewith, and at any location between the ends of the sucker rod which may be found desirable.

Still another object of the invention is to provide means for holding sacrificial bars which permits easy changing of the bars when they are eaten away to such an extent as to require replacement.

One of the latest ways of combating paraffin in tubing and on sucker rods in a well is to use chemical inhibitors, which are often introduced into the well fluid as pellets which dissolved gradually in the well and for a time effectively control the buildup of paraffin. The chemical name for one such inhibitor is, for example, Naptha.

The present invention has for another of its objects the providing in combination of bars of such chemical inhibitor materials inserted in the bores of the rod guides according to the present invention, either in place of, or supplementing the cathodic protection bars. These chemical inhibitor bars slowly dissolve in the well fluids in the same manner as the commercially available pellets which inhibit the buildup of paraffin until the chemical inhibitors are exhausted.

In the case of the novel rod guides according to the present invention, wherein each sacrificial bar is supported in an offset bore extending parallel with the sucker-rod-receiving bore of the guide, the guide is made more flexible by the presence of the hollow bar-receiving bore which therefore makes it easier to install the guide on the sucker rod by flexing the material of the guide opposite the slot so as to permit widening of the mouth of the slot to receive the sucker rod. However, once the guide is snapped on to the sucker rod in the manner explained, for instance in Tripplehorn Patent 2,928,472, the guide can be stiffened and inhibited from further flexing by inserting the sacrificial bars into the offset bores of the guide. Thus, there is a definite cooperation between the structure of the rod guides and the presence or absence of the sacrificial bars in the bores of the guide whereby the guide is made more limber and therefore is more easily applied to the sucker rod when the bars are absent from the bores, and whereby the rod guides are stiffened and caused to grip the sucker rods more unyieldingly when the sacrificial bars are inserted into their operative positions within the offset bores.

Other objects and advantages of my invention will become apparent during the following discussion of the drawing, wherein:

FIG. 1 is a perspective view of one of the present rod guides mounted on a sucker rod and located within a length of pump tubing which has been cut away to show the manner in which the sacrificial bars are supported by the guide in an optimum position with respect to the sucker rod and the tubing.

FIG. 2 is an elevation view of the guide and sacrificial bar supported on the sucker rod;

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2;

FIG. 4 is a perspective view of a spring steel clip of the type embedded within the guide shown in FIGS. 1, 2, and 3;

FIG. 5 is an end view taken along line 5—5 of FIG. 1; and

FIG. 6 is a cross sectional view corresponding with FIG. 3 but showing a modified form of guide.

Referring now to the drawing, FIG. 1 shows a sucker rod R disposed within a length of tubing T, the latter being shown broken away so as to illustrate a combination rod guide and sacrificial bar operatively associated according to the present invention.

The rod guide illustrated in the figures of the drawing includes a substantially cylindrical body 1 having a bore 1a therethrough. In the vicinity of one end of the bore there is a slot 1b extending through the side wall of the body 1 and joining the bore 1a in such a way as to permit the pressing of the sucker rod R through the slot and into the bore. The other end of the guide includes a slot 1c which is similar to the slot 1b and extends through the body 1 and into the bore 1a. The two slots 1b and 1c respectively open radially outwardly from the bore 1a in opposite directions with respect to the longitudinal axis of the guide. These opposed slots 1b and 1c are mutually joined together on one side of the guide by a transverse slot 1d which extends approximately normal with respect to the axis of the guide and joins the slot 1b with the slot 1c for the purpose of providing a continuous oil passage through the body 1, and for the purpose of making it possible to apply the rod guide to a sucker rod in the manner taught in the Gillespie and Triplehorn patents, supra.

In one form of the present invention, the body 1 of the rod guide is preferably made of neoprene rubber having a spring-steel clip 2 embedded near each end of the body, surrounding the bore and registering with the opening of the radial slot located near that end of the guide. The spring steel clip serves the same purpose which it serves in my rod guide Patent 2,604,364, namely tight clamping of the resilient guide body to the sucker rod so as to prevent accidental and undesired displacement of the rod guide longitudinally of the sucker rod, and in addition in the present structure the clip tends to increase the strength of the guide in the vicinity of the offset bore and prevent it from breaking in half in that vicinity when flexed open.

Alternatively, the guide body can be made of a spring-like plastic such as nylon, as taught in my Patent 2,793,917. This structure is shown in FIG. 6 wherein the body 3 is made of nylon and has an axial bore opening at each end into oppositely disposed radial slots 3b and 3c. The plastic guide body may or may not also employ a C-shaped clip to add to its strength.

In either event, and regardless of the particular materials of which the rod guide is made, the transverse slot 1d provides opposed shoulders each aligned with one of the slots and facing longitudinally down the slot. For instance, there is a shoulder 1e facing along the slot 1b, and a shoulder 1f facing longitudinally of the slot 1c, and each of these shoulders is provided with a bore 1x and 1y. These bores 1x and 1y receive and support elongated sacrificial bars 4 and 5, respectively, which bars extend from the bores in the shoulders 1e and 1f at least the full lengths of the slots 1b and 1c, respectively, and provide protection especially concentrated within the slots of the guide.

As stated above, the rod guide is applied to the sucker rod without the sacrificial bars inserted in the bores 1x and 1y, and after the rod guide is installed, the bars are inserted in the bores 1x and 1y thereby stiffening the grip of the guide on the rod. The sacrificial bars are thus supported in the very positions in which they will do the most good. The structure of the modification shown in FIG. 6 is functionally similar to the structures shown in FIGS. 1, 2, and 3 and includes bar-holding bores 3x and 3y for receiving the sacrificial bars 6 and 7.

I do not limit my invention to the exact forms shown in the drawing, for obviously changes may be made therein within the scope of the following claims.

I claim:

1. In oil well equipment, a guide to be attached to a sucker rod, comprising:

- (a) a substantially cylindrical deformable body having a rod-receiving longitudinal first bore therethrough and having a longitudinal slot extending through the body when attached to a rod and communicating with the bore, the slot being wide enough to admit the rod into the bore when the body is flexed open at the slot and normally leaving exposed a portion of the rod within the slot;
- (b) the body having a shoulder facing generally in the direction of the slot and having a second bore radially offset from the center of the body and extending through said shoulder toward the slot and substantially parallel with the first bore; and
- (c) sacrificial bar means made of a well-treating material and inserted in said offset bore and extending toward and into said slot.

2. For use on a sucker rod within a well, in combination:

- (a) a rod guide having a body with an axial bore therethrough for receiving the sucker rod and having radially oppositely opening slots through its side wall and extending toward opposite ends of the body from its center, and the body having a substantially transversely disposed slot joining said rod receiving slots on one side of the body and providing transversely disposed shoulder portions of the body each facing longitudinally down a slot, and the body having bores offset from its axis and each extending through one of its shoulders and facing along the length of the opposite slot; and
- (b) sacrificial bars sized slightly larger cross-sectionally than said offset bores and made of well-treating material, and each of length approximating the length of the rod guide, and each of the bars being inserted in an offset bore and supported by the body with an exposed portion of each bar extending at least the full length of the slot aligned therewith.

3. In oil well equipment a combined sucker rod guide and well treatment device comprising:

- (a) a rod guide comprising a deformable body with a longitudinal bore therethrough to receive the rod, the diameter of the bore being slightly less than the diameter of the rod, and said body having two longitudinal slots therethrough communicating with the bore and each extending from substantially the longitudinal center of the body to an opposite end thereof the slots opening from the bore in the mutually opposite radial directions and being joined near said center by a substantially transverse slot in one side of the body, the transverse slot providing two opposite shoulders respectively facing down the length of opposite longitudinal slots, and the body having two bores offset from said longitudinal bore and parallel therewith, said two bores passing through the two shoulders and each being aligned with a longitudinal slot; and
- (b) a well-treating material formed in the shape of bars and inserted and supported in said offset bores parallel with said longitudinal bore.

4. In a device as set forth in claim 3, each offset bore being located in an end portion of the body diametrically opposite to the longitudinal slot located in the same end portion, whereby the body is more free to flex open at a slot when the bar is removed from the offset bore which is longitudinally coextensive with that slot.

5. In a device as set forth in claim 3, said bar comprising a sacrificial cathodic-protection metal.

6. In a device as set forth in claim 3, said bar comprising a chemical inhibiting the depositing of paraffin in the well.

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