

[54] POLISHED ROD LINER EXTENSION

[72] Inventors: Robert H. Gault, Midland, Tex.; Robert F. Joy, Bethlehem, Pa.

[73] Assignee: Bethlehem Steel Corporation

[22] Filed: July 2, 1970

[21] Appl. No.: 51,874

[52] U.S. Cl. ....166/84

[51] Int. Cl. ....E21b 33/04

[58] Field of Search .....166/84; 74/108

[56]

References Cited

UNITED STATES PATENTS

3,353,606 11/1967 Dyer .....166/84

Primary Examiner—William E. Wayner

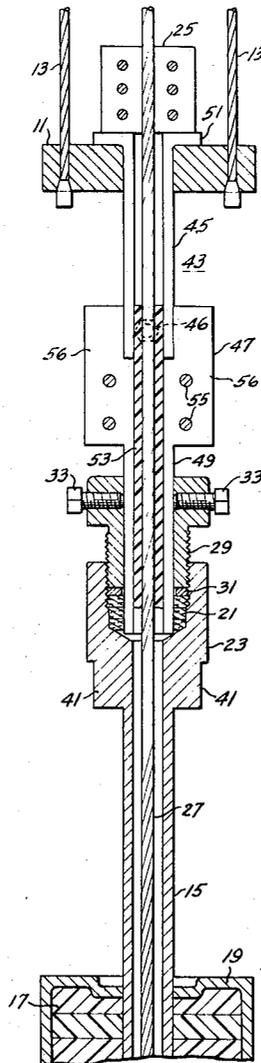
Attorney—Joseph J. O'Keefe

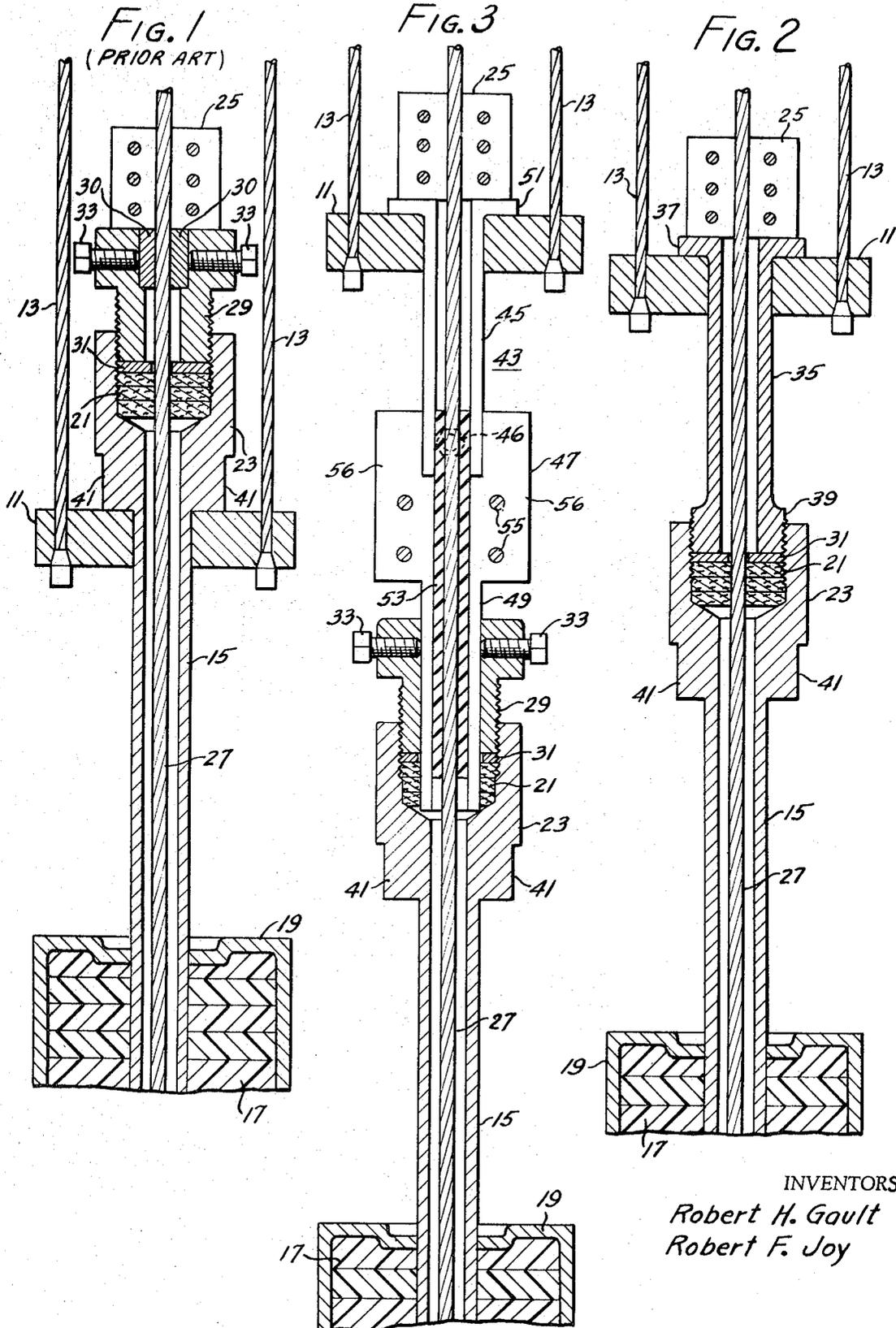
[57]

ABSTRACT

A tubular extension is secured to the upper portion of a polish rod liner and suspends it from a carrier bar. Improved sealing is provided by a resilient lining within a portion of the extension.

14 Claims, 3 Drawing Figures





INVENTORS  
Robert H. Gault  
Robert F. Joy

## POLISHED ROD LINER EXTENSION

## BACKGROUND OF THE INVENTION

The present invention relates to oil well pumping apparatus and particularly to means for connecting polish rod liners to carrier bars supported from conventional horseheads or equivalent apparatus and also to means for securing improved sealing of the polish rod liner with the pumping string.

Polish rod liners, which are essentially hollow polish rods, are often used to surround polish rods passing through packing in the stuffing box of a well head in place of the standard solid polish rod. Polish rod liners are particularly useful and necessary where a so-called flexible pumping strand, which consists of a wire rope or strand with or without an outer plastic or other corrosion resistant coating, is used in place of the conventional sucker rod string.

Sucker rods and flexible pumping strand both customarily make use of a carrier bar clamp to support the weight of the fluid column in the well plus the weight of the sucker rod string or flexible pumping strand extending down a well from a carrier bar. A packing is conventionally positioned at the top of the polish rod liner to seal the polish rod liner to the sucker rod string or flexible pumping strand extending up through the polish rod liner. This packing often requires frequent readjustment by tightening its packing gland to maintain an oil tight seal. The carrier bar clamp, however, has customarily rested on top of the packing gland clamp so that the packing gland clamp could not readily either be turned to tighten the packing or removed to replace the packing. This customary arrangement necessitated jacking up the carrier bar clamp to remove the weight from the packing clamp every time the packing was to be adjusted or replaced. In addition, the customary arrangement made it difficult to obtain a satisfactory seal between the packing and the surface of flexible pumping strand because of the uneven or somewhat ridged or spirally corrugated surface of conventional pumping strand.

## SUMMARY OF THE INVENTION

The present invention obviates the difficulties of the prior art by providing an extension for the polish rod liner. This extension fits into the carrier bar slot under the carrier bar clamp and extends downwardly from the carrier bar to connect to the polish rod liner and contact the polish rod liner packing. Within the extension there is a lining, preferably resilient, which effects a seal between the inside of the extension and the pumping string extending therethrough. Where such resilient lining is provided the extension will preferably be provided with a smooth outer surface and will extend through the packing of the polish rod liner to facilitate sealing by presenting a smooth surface against which the packing of the polish rod liner packing may make a tight seal.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a typical polish rod liner arrangement of the prior art partially cut away.

FIG. 2 shows one embodiment of the present invention, partially cut away.

FIG. 3 shows another embodiment of the present invention, partially cut away.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates the customary construction of a polish rod liner arrangement of the prior art. In this FIGURE and in the other FIGURES there is shown a cross section of a carrier bar 11 which is supported by two brides 13 from a conventional horsehead, not shown. A polish rod liner 15 extends through packing 17 in well head 19. Other packing 21 is positioned in packing body 23 formed as an integral part of polish rod liner 15.

A carrier bar clamp 25, one half of which is shown in the FIGURES of the drawing, is clamped onto a flexible pumping strand 27, which is preferably plastic coated, extending

through the carrier bar clamp 25 upwardly to a reel or the like, not shown, supported upon or adjacent to the horsehead. The flexible pumping strand 27 extends downwardly from the carrier bar clamp 25 through the polish rod liner 15 and the well head 19 and thence down the well, not shown. Carrier bar clamp 25 supports the entire weight of the flexible pumping strand 27 upon carrier bar 11 through the structure of the packing body 23 and packing clamp 29. Said clamp 29 is screwed into packing body 23 and compresses packing 21 against the surface of the flexible pumping strand 27. A packing gland 31 may be conventionally interposed to provide a bearing surface between the packing clamp 29 and the packing 21.

A plurality of heavy duty set screws 33 serve to clamp the packing clamp 29, and through it the polish rod liner 15, to the flexible pumping strand 27 through the action of clamping jaws 30 which contact the flexible pumping strand 27.

Since the pumping strand may extend several thousand feet or more down the well, it will be understood that in the arrangement shown in FIG. 1 a very considerable weight will be supported by the carrier bar clamp 25 bearing upon the packing clamp 29. The great weight upon packing clamp 29 tends to jam it within packing body 23 so that it is difficult to move the packing clamp 29 relative to the packing body 23. Since it is frequently necessary to either replace the packing 21 or to compress the packing 21 against flexible pumping strand 27 to prevent oil from leaking past the seal, it is necessary to periodically jack up the carrier bar clamp 25 to remove the weight of the flexible pumping strand from the packing clamp 29 so that it may be removed or rotated. Such jacking requires additional equipment, is time consuming and interferes with production.

FIG. 2 shows one embodiment of polish rod liner extension of this invention which represents a simple but effective solution to the problem of replacing or compressing the packing 21 about the flexible pumping strand 27 without jacking up the carrier bar clamp 25 or otherwise removing the weight of the flexible pumping strand 27 from the carrier bar 11. A polish rod liner extension 35, having an upper flange 37 and a lower threaded portion 39 is positioned between the carrier bar 11 and the packing body 23 of the polish rod liner 15. The upper flange 37 of the polish rod liner extension 35 is positioned under the carrier bar clamp 25 against the top surface of the carrier bar 11. The lower threaded portion 39 is threaded into the packing body 23 of the polish rod liner 15 in place of the packing clamp 29 shown in FIG. 1 to compress the packing 21 by downward movement of the packing gland 31. Since the packing body 23 is located below the carrier bar 11 it may be easily turned relative to the lower threaded portion 39 of the polish rod liner extension 35 by means of conventional wrench flats 41 provided on the packing body 23. The packing 21 may thus be replaced or compressed against the flexible pumping strand 27 by merely rotating the packing body 23 with respect to extension 35. This obviates the necessity of the time consuming job of removing the weight of the flexible pumping strand and carrier bar clamp from the flange 37.

In FIG. 3 there is shown an improved embodiment of the polish rod liner extension of FIG. 2. The polish rod liner extension 43 of FIG. 3 is constructed in three sections: an extension section 45, a strand packing section 47 and a polish rod section 49. The extension section 45 has an upper flange 51 which corresponds to the upper flange 37 of the polish rod liner embodiment shown in FIG. 2. This flange 51 is positioned under carrier bar clamp 25. The lower end of extension section 45 is clamped within or otherwise secured to the packing section 47 which is lined with a resilient packing material 53, such as stiff foam rubber or soft rubber or neoprene. One or more heavy set screws 46 as shown in dotted outline can serve as means for clamping extension 45 to packing section 47. The packing section 47 is made in two halves which are secured together by suitable fastening means such as bolts 55 passing through the flanges 56 of each half.

The two piece construction facilitates placement over the flexible pumping strand 27. When the two halves of packing section 47 are placed over the strand 27 and clamped tightly together by bolts 55 the relatively soft packing material 53 effects a seal between the inside of the packing section 47 and the surface of the strand 27.

It is highly desirable for the strand 27 to be plastic coated in order to prevent the entrance of corrosive fluids into the strand. When the strand 27 has an outer plastic covering, this outer covering often has a ridged or spirally corrugated surface corresponding to the underlying outer surface of the strand 27 which in turn is comprised of the surface contours of the component wires of the strand. Such a ridged surface is extremely difficult to effect a seal with by means of the usual hollow polish rod packing. The relatively soft packing material 53, however, makes a very effective seal with such an uneven strand surface.

The polish rod section 49 of the hollow polish rod extension is shown in FIG. 3 with a lining of packing material 53. The packing need not extend into this section, however, if there are no seams or openings in section 49 to allow the oil from the well to escape. The outer surface of polish rod section 49 is smooth and the section is dimensioned to fit down into the packing 21 of the packing body 23. The smooth outer surface of polish rod section 49 provides an ideal surface with which the packing 21 can form an effective oil tight seal. Polish rod section 49 is clamped within packing body 23 and packing 21 by means of the heavy-duty set screws 33 of packing clamp 29 which engage the outer surface of polish rod section 49.

It will be seen in FIG. 3 that oil is prevented from escape from the well along the outside surface of the polish rod liner 15 by the well head packing 17, from escape along the outside surface of the polish rod section 49 of the polish rod liner extension 43 by the packing 21, and from escape through the inside of the polish rod liner extension 43 by the packing 53. The packing 53 can be compressed by tightening bolts 55 on strand packing section 47. The packing 21 can be compressed or replaced without removing the weight of the flexible pumping strand 27 from carrier bar 11 by either releasing set-screws 33 and rotating packing clamp 29 in packing body 23, or, alternatively, by rotating packing body 23 and polish rod liner 15 by the use of wrench flats 41 on the surface of packing body 23.

It will be desirable if not only the strand packing clamp section 47 of polish rod liner extension 43 but also the extension section 45 and the polish rod section 49 are each comprised of two opposing half or other sections to facilitate placement about the flexible pumping strand 27 or other type of sucker rod string. In some cases it may be beneficial if the abutting edges of these half sections interlock with each other in some suitable tongue and groove arrangement to provide an oil tight seal along the edges of the sections.

We claim:

- 1. An operative assemblage of oil well pumping apparatus comprising:
  - a. a pump actuating string extending into an oil well through

- b. reciprocating actuating means for said pump actuating string,
- c. a polish rod liner assembly surrounding said actuating string as it passes through the said packing in the well head,
- d. packing means associated with said polish rod liner assembly to prevent oil from passing up between the actuating string and the polish rod liner, and
- e. extension means removably secured to the polish rod liner at one end and operatively secured to said reciprocating actuating means at the opposite end so as to support said polish rod liner assembly.

2. The apparatus of claim 1 wherein said extension means of (e) surrounds said pump actuating string.

3. The apparatus of claim 2 wherein said extension means is operatively secured to said actuating means by a flange means disposed at the top of said extension means adapted for clamping between a carrier bar and carrier bar clamp associated with said actuating means.

4. The apparatus of claim 3 wherein said extension means is of generally tubular form.

5. The apparatus of claim 2 wherein said pump actuating string is comprised of a flexible pumping strand.

6. The apparatus of claim 2 additionally comprising:

- f. packing means disposed in said extension means of (e) to prevent oil from passing up between the extension means and the pump actuating string.

7. The apparatus of claim 6 wherein the lower portion of said extensions means is generally cylindrical and is adapted to extend at least partially through the hollow polish rod packing means of (d) while surrounding said pumping string.

8. The apparatus of claim 7 wherein said cylindrical lower portion of said extension means has a smooth surface to facilitate sealing with said packing of (d).

9. The apparatus of claim 8 wherein said pump actuating string is comprised of a flexible pumping strand.

10. The apparatus of claim 9 wherein said flexible pumping strand is coated with a layer of plastic material.

11. The apparatus of claim 10 wherein said packing means of (f) disposed in said extension means is comprised of a somewhat resilient packing material.

12. The apparatus of claim 11 wherein the portion of the extension means containing the said resilient packing material is formed in two parts with means to clamp said parts together to effect sealing between said flexible pumping strand and said resilient packing material.

13. The apparatus of claim 12 wherein said entire extension member is formed in two portions to facilitate placement about said flexible pumping strand without threading said strand through said extension.

14. The apparatus of claim 13 wherein said extension means is operatively secured to said actuating means by a flange means disposed at the top of said extension means adapted for clamping between a carrier bar and carrier bar clamp associated with said actuating means.

\* \* \* \* \*

60

65

70

75