

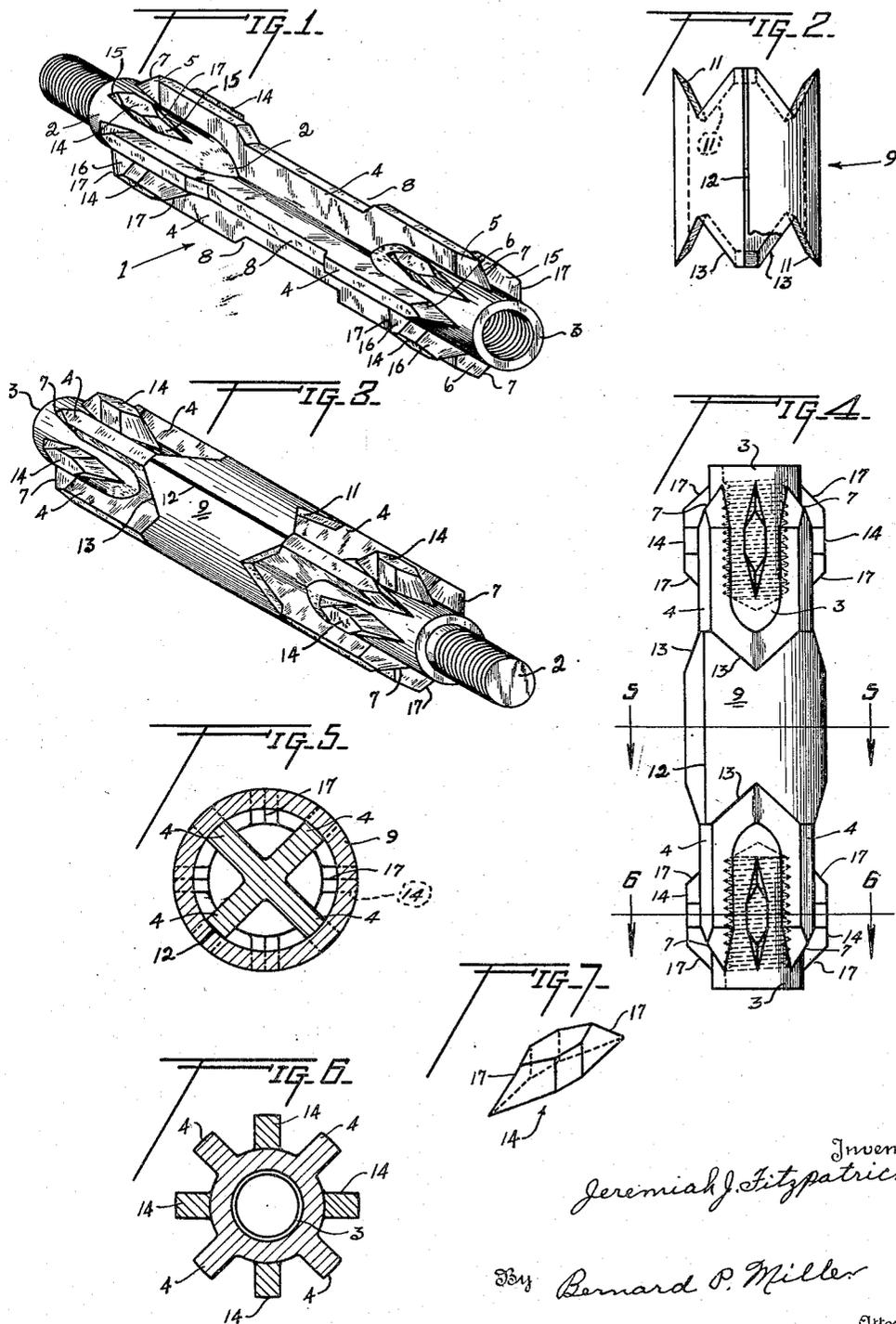
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SUCKER ROD COUPLING

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SUCKER ROD COUPLING

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6 Claims. (Cl. 255—28)

My invention relates to couplings for pump rod sections, and is designed for use particularly with sucker rod strings in deep wells, such as oil wells.

The prime object of the invention is the provision of a rod coupling which not only connects adjacent ends of rod sections, but also acts to cut accumulated paraffin from the walls of a string of production tubing.

Another object is to provide a combination rod coupling and paraffin scraper so designed that a minimum amount of fatigue, usually due to wall friction, is exerted upon the coupling portion of the device, and the greater amount of the fatigue is borne by the paraffin scraping element, the tendency of the coupling proper to become crystallized and to part under strain, thus being reduced to a minimum.

A further object of the device is the provision of a combination coupling and paraffin scraper in which the scraping element, which receives the major portion of wear, is separate from the rod coupling element, and may therefore be formed of a metal particularly treated to stand the wear, while the coupling element proper may be of a different metal of a nature which will withstand the shock exerted thereon by the motion of the rod string being reversed while under load.

A still further object of the invention is the provision of a device of the class described which is designed to permit a free flow of production fluid therethrough, and at the same time contains sufficient mass to withstand the enormous strain under which it must function.

Yet another object of the invention is the provision of a combination rod coupling and paraffin scraper in which the scraping element is replaceable when worn.

A further object is the provision of a combination rod coupling and paraffin scraper which also functions as a rod guide.

Other objects of the invention will be apparent by reference to the accompanying one-sheet drawing wherein like characters of reference designate like parts in all of the figures.

In the drawing:

Figure 1 is a perspective view of the rod coupling element of the device per se, the scraping element having been removed;

Figure 2 is an elevational view of the scraping element;

Figure 3 is a view similar to Figure 1 with the scraping element installed upon the coupling element.

Figure 4 is an elevational view of a box and box embodiment of the complete device;

Figures 5 and 6 are transverse sectional views taken substantially along the lines 5—5 and 6—6 respectively of Figure 4; and,

Figure 7 is a detail of one of a plurality of outstanding lugs which are carried by the coupling element.

One practical embodiment of the invention is illustrated in the drawing wherein the reference numeral 1 indicates as a whole a rod connecting element consisting substantially of two aligned cylindrical rod receiving members 2 and 3 both threaded to receive adjacent ends of sucker rod sections, not shown. The members 2 and 3 may be constructed of the pin and box type as shown in Figures 1 and 3, or the device may be constructed in the box and box type and have two of the boxes 3 as illustrated in Figure 4. The members 2 and 3, or 3 and 3 as the case may be, are rigidly connected to each other by a plurality of integral vanes or ribs 4 which extend radially outward from a common center, which center is in alinement with the longitudinal axes of the members 2 and 3, or 3 and 3. The outer edges of the vanes 4 project outwardly beyond the exterior surface of the members 2 and 3 or 3 and 3, and their ends are each bevelled both laterally and longitudinally to form converging faces 5 and 6 separated by a knife-like paraffin cutting edge 7. The faces 5—6 and the edge 7 meet at the exterior surface of the members. Intermediate their ends, each of the ribs 4 are provided with elongated notches 8 which are in radial alinement with each other for receiving a tubular paraffin scraping element 9, best seen in Figure 2. Both end walls 10 of each notch 8 are bevelled, and both ends of the scraping element are similarly bevelled as indicated at 11 to fit the bevelled ends of the notches 8.

The scraping element 9 is generally tubular in form and has a longitudinal line of severance 12 along which it has been cut. The longitudinal cut 12 allows the element to be sprung open sufficiently to permit its being passed over the outer edges of the ribs 4 and into the notches 8 of the element 1. In installing the scraping element upon the coupling element, the cut 12 is placed along one of the ribs 4, and the cut is then closed by welding and when so installed, the periphery of the element 9 lies flush with the outer edges of the ribs 4. Each end of the element 9 is provided with notches 13 which occur between the ribs 4, when the element is properly positioned, and the bevelled portions 11 follow the entire contour of

both ends of the element. The notches may be V-shaped as shown, or may be made more of a U-shape, if desired.

Integral with or welded to the outer surface of each member 2 and each member 3, are a plurality of radially spaced outwardly projecting lugs 14 having their outer edges in circumferential alignment with the outer edges of the ribs 4, and which are located one each between adjacent ribs 4. Both ends of the lugs 14 are shaped similarly to that of the ends of the ribs 4, as above described, having bevelled side faces 15-16, and an intermediate knife-edge 17.

Operation

The couplings are installed at desired intervals throughout the sucker rod string, and therefore function with each stroke of the pump to keep the production tubing free of paraffin at the points of installation, for a distance equal to the length of the rod stroke. The paraffin along other portions of the tubing may be removed by raising the rod string a distance equal substantially to the interval between the installations.

It may readily be seen that the notches 13 prevent any possibility of the sleeve portion of the device fowling with the spaces between sections of production tubing, since no laterally extending surface is presented to the ends of the tubing sections. The ends of the ribs 4 and lugs 14 being bevelled act to prevent their hanging between the tubing sections.

Operative tests have shown that a much better result is obtained by forming the device so that the leading ends of the ribs and lugs, or actually the cutting edges 7 and 17, precede the cutting edges of the sleeve 9 in contacting the paraffin, than could be obtained by utilizing only the cutting edge of the sleeve for removing the paraffin. The cutting edges 7 and 17 act as plows for loosening the paraffin, and the following cutting edges of the sleeve can then better remove the loosened paraffin.

The lugs 14 perform a further function in helping to protect the sleeve against collapse due to side thrust occasioned by the well being crooked and the tool therefore being dragged violently against a side wall of the tubing. This feature might at first glance seem trivial, but tests have shown that loads of 18,500 pounds are common in deep pumping wells, and that at the time the rods are reversed in motion during the pumping stroke, a 5000 pound blow is usually delivered. This blow together with the load present upon the rods could well collapse a sleeve type paraffin scraper unless the blow against the tubing wall is distributed in the coupling over a considerable length of span. The end portions of the ribs 4 and the lugs 14 together act to receive a portion of this shock, and thereby make it possible to provide a sleeve type scraper with adequate fluid passage through the sleeve and between the ribs. The lugs 14 prevent the sleeve from being flattened between the ribs 4, when the blow is delivered.

Should the sleeve 9 become worn or damaged, it may easily be cut loose from the element or body 1 and a new one welded in place.

It is pointed out that not only does the present device act to couple rod sections and remove paraffin, but it also functions as a rod guide for preventing wear between the production tubing and the sucker rod string. The construction of the coupling element 1 and the scraping element of two different metals permits the sleeve to be

made of a metal which will glaze under friction with the tubing and will not become rough or gaud. The distance from end to end of the ribs is such that considerable bearing surface is presented against the tubing.

I claim:

1. A sucker rod coupling, including: upper and lower rod connecting members having their axes aligned; longitudinally extending vanes, their ends connecting the members and their adjacent edge portions integrally connecting each other in substantial alignment with the axes of said rod connecting members, said vanes extending radially outward from their point of interconnection past the peripheries of the rod connecting members, both ends of each vane being bevelled inwardly to the periphery of one of said rod connecting members and also being bevelled laterally to form sharp outwardly presented paraffin cutting edges, each vane having a longitudinally extending indenture in its outer edge; and, a tubular sleeve seated around the vanes within said indentures, its periphery lying flush with the outer edges of the vanes, said sleeve having notches in its ends which are located between the vanes and which act to prevent lodgement of the device in interstices of tubing joints, said sleeve ends being bevelled inwardly to form continuous paraffin cutting edges.

2. A sucker rod coupling, including: upper and lower rod connecting members having their axes aligned; longitudinally extending vanes, their ends connecting the members and their adjacent edge portions integrally connecting each other in substantial alignment with the axes of said rod connecting members, said vanes extending radially outward from their point of interconnection past the peripheries of the rod connecting members, both ends of each vane being bevelled inwardly to the periphery of one of said rod connecting members and also being bevelled laterally to form sharp outwardly presented paraffin cutting edges, each vane having a longitudinally extending indenture in its outer edge; and, a removable tubular sleeve seated around the vanes within said indentures, its periphery lying flush with the outer edges of the vanes, said sleeve having notches in its ends which are located between the vanes and which act to prevent lodgement of the device in interstices of tubing joints, said sleeve ends being bevelled inwardly to form continuous paraffin cutting edges.

3. A sucker rod coupling, including: upper and lower rod connecting members having their axes aligned; longitudinally extending vanes, their ends connecting the members and their adjacent edge portions integrally connecting each other in substantial alignment with the axes of said rod connecting members, said vanes extending radially outward from their point of interconnection past the peripheries of the rod connecting members, both ends of each vane being bevelled inwardly to the periphery of one of said rod connecting members and also being bevelled laterally to form sharp outwardly presented paraffin cutting edges, each vane having a longitudinally extending indenture in its outer edge; a tubular sleeve seated around the vanes within said indentures, its periphery lying flush with the outer edges of the vanes, said sleeve having notches in its ends which are located between the vanes and which act to prevent lodgement of the device in interstices of tubing joints, said sleeve ends being bevelled inwardly to form continuous paraffin cutting edges; and, radially

spaced outwardly projecting lugs carried by the rod connecting members for contacting the inner wall of a tubing string, both ends of each lug being bevelled inwardly to the periphery of its supporting rod connecting member and also being bevelled laterally to form sharp outwardly presented paraffin cutting edges.

4. A sucker rod coupling, including: upper and lower rod connecting members having their axes aligned; longitudinally extending vanes, their ends connecting the members and their adjacent edge portions integrally connecting each other in substantial alignment with the axes of said rod connecting members, said vanes extending radially outward from their point of interconnection past the peripheries of the rod connecting members, both ends of each vane being bevelled inwardly to the periphery of one of said rod connecting members and also being bevelled laterally to form sharp outwardly presented paraffin cutting edges, each vane having a longitudinally extending indenture in its outer edge; a removable tubular sleeve seated around the vanes within said indentures, its periphery lying flush with the outer edges of the vanes, said sleeve having

5 notches in its ends which are located between the vanes and which act to prevent lodgement of the device in interstices of tubing joints, said sleeve ends being bevelled inwardly to form continuous paraffin cutting edges; and, radially spaced outwardly projecting lugs carried by the rod connecting members for contacting the inner wall of a tubing string, both ends of each lug being bevelled inwardly to the periphery of its supporting rod connecting member and also being bevelled laterally to form sharp outwardly presented paraffin cutting edges.

15 5. Organization as described in claim 2 in which the sleeve is severed along a single longitudinal line of cleavage so that it may be expanded to pass over the ends of the vanes in reaching its position in the notches therein.

20 6. Organization as described in claim 2 in which the sleeve is severed along a single longitudinal line of cleavage so that it may be expanded to pass over the ends of the vanes in reaching its position in the notches therein, and means for connecting the edges of said sleeve along the line of cleavage.

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