Karl G. Wagner
INVENTOR.

BY Clarence A. Brown and Harvey M. Jackson, Attorneys
This invention comprises novel and useful improvements in a sucker rod centralizer and more specifically pertains to an attachment for sucker rods which shall guide and center a sucker rod in the well tubing; will constitute means for securing and preventing the accumulation of paraffin and the like inside the tubing; and will facilitate the removal of broken sucker rods from the tubing assemblies of wells.

The primary object of this invention is to provide an attachment which may be readily applied to existing types of sucker rods and received within conventional tubings for reciprocation in the tubing with the sucker rod, and which is specifically intended to prevent the accumulation of paraffin in the tubing which would thus obstruct the flow of oil from a well; and will serve to guide the sucker rod and prevent wear of the same against the sides of the tubing.

A further object of the invention is to provide a combined sucker rod guide and tubing scraper attachment for sucker rods which may be conveniently and easily attached to existing sucker rods and will have a highly dependable permanent attachment thereto. The specific object of the invention is to provide an attachment for sucker rods in conformity with the foregoing object which shall compressively engage and be permanently secured to a sucker rod without danger of slippage on the same; which shall not materially impede the flow of oil through the tubing of a well; which will effectively prevent undue wearing of the sucker rod and tubing through rubbing of the same together; and which will render more effective the operation of the sucker rod and of the pumping operation of a well by guiding the sucker rod in the tubing throughout its length thereby minimizing vibrations and the like.

These, together with various ancillary features and objects of the invention, which will later become apparent as the following description proceeds, are attained by the present invention, preferred embodiments of which have been illustrated, by way of example, in the accompanying drawings, wherein:

Figure 1 is a vertical central longitudinal section view through a typical well assembly showing the well casing, a well tubing, a sucker rod therein and illustrating the manner of applying the sucker attachment to the sucker rod and within the tubing.

Figure 2 is a horizontal sectional view taken substantially upon the plane indicated by the section line 2—2 of Figure 1 and showing one manner in which a sucker attachment may be applied to a sucker rod in accordance with this invention.

Figure 3 is a vertical transverse sectional detail view, parts being in elevation, taken substantially upon the plane indicated by the section line 3—3 of Figure 2.

Figure 4 is a horizontal sectional view similar to Figure 2 and showing a modified form of sucker rod attachment in accordance with this invention, the attachment being shown applied to the rod and prior to its permanent engagement with the same.

Figure 5 is a view similar to Figure 4 but showing the manner in which the modified form of attachment is permanently locked compressively upon the sucker rod; and

Figure 6 is an end elevational view of the completely assembled form of the modification illustrated in Figure 4 on reference is made first to Figure 1 wherein it will be seen that there is disclosed a portion of a well excavation having the customary well casing 10 sunk into a well bore 12 in a formation, and in accordance with conventional practice there is received within the casing 10 a string of tubing 14 through which oil is pumped or withdrawn from the oil reservoir, usually by means of a pumping assembly including a sucker rod 16 which is reciprocable within the tubing 14 and operates a pump, not shown, at the bottom of the well bore.

It is commonly known to those skilled in operating oil wells of the sucker rod type, that the gradual accumulation of paraffin within the tubing 14 and about the sucker rod 16 will gradually throttle the cross sectional area of the tubing and materially restrict and sometimes completely prevent the necessary pumping operation. When this occurs, it is necessary to remove the sucker rod and/or the tubing 14 in order to cleanse the same, this being obviously a very expensive, laborious and time consuming operation.

It is further known that inasmuch as well bores are frequently not truly drilled in a straight line vertical shaft, that the long strings of sucker rods 16 and tubing 14 frequently have slight bends in the same which cause a rubbing action of the sucker rod against the side of the tubing with a consequent very great impairment of the life of the sucker rod and tubing assembly; excessive vibrations in these members which further impair the life of the same; and produce undue lost motion in the sucker rod assembly which may likewise detrimentally affect the pumping operation by virtue of the relative flexing of the sucker rod with respect to the tubing.

It is the primary intention of this invention to provide an attachment which may overcome all of the above mentioned disadvantages in a simple and satisfactory manner; and which attachment will further constitute a means facilitating the catching and withdrawing of broken sucker rods when the same drop to the bottom of the tubing or casing of the well.

For this purpose, the invention utilizes a disk-like body forming an attachment for a sucker rod, a plurality of these bodies being disposed upon a sucker rod in spaced relation and fixedly secured thereto in an improved manner. These disk-like bodies forming the attachment of the present invention are specifically adapted to function as guides for the reciprocating sucker rod; to operate as scrapers for removing or preventing paraffin deposits or incrustations on the inside of the tubing 14; facilitating the continuous flow of oil up the tubing 14 during the operation of the sucker rod; and constituting a means by which broken sucker rods may be removed from the tubing.

Referring now more specifically to the accompanying drawings, it will be seen that the attachment consists of a body indicated generally by reference numeral 18, and which is of substantially circular cross section, this body having an arcuate outer wall 20 which terminates in end portions 22 which are slightly spaced from each other as shown in Figure 2.

Disposed centrally with respect to the outer wall 20 and concentric therewith is an inner wall 24 which thus provides an accurate passage indicated at 26 between the inner and outer walls. The ends of the inner and outer walls are integrally joined by inwardly extending walls 28, and it will be seen that these walls 28 diverge outwardly from their juncture with the inner walls to thus constitute a wedge-shaped opening of a size to readily permit passage of the sucker rod 16 therebetween. A fastening member 30 in the form of a bolt or the like is received in a countersunk bore 32 in the outer wall 20 and extends through an aperture in the adjacent end wall 28 and through a screw threaded aperture in the other or opposite end wall.

The arrangement is such that the disk-like body is fixedly clamped upon the sucker rod 16, and the screw 30 then placed in the bore 32 and screwed into the two end walls 28 thus causing the inner wall 24 to compressively engage and firmly clamp the sucker rod 16, the body thereby forming a body is thus compressively clamped upon the sucker rod 16, the ends of the bolt 30 are welded or otherwise rigidly secured in a permanent fastening attachment to the end walls 28 thus permanently locking the attachment to the sucker rod.

The size of the attachment is such that the same may
be slidably received in the tubing 14 and may be inserted in the tubing as the sucker rod sections are installed. When so installed it will be apparent that the reciprocation of the sucker rod 16 will cause the attachments to reciprocate in the tubing and thus guide the sucker rod and scrape the walls of the tubing to prevent the formation of paraffin thereon; and the arcuate space 26 extending through the attachments will at all times permit easy passage of the oil up the tubing of the well and will also serve to receive a fishing tool when it is necessary to catch and remove broken sucker rod sections from the bottom of the well.

It should be here noted, as shown in Figure 1, that a plurality of these attachments are secured to the sucker rod 16, adjacent attachments being spaced from each other a distance which is less than the stroke of the sucker rod, as indicated by the line 34 in Figure 1. Thus, during a full stroke of the sucker rod in its reciprocations, each of the attachment disks will travel a distance greater than their spacing thus cleansing the tubing throughout its entire length.

It is evident that other means may be provided for compressibly clamping the attachment disks to the sucker rod. Thus, as shown in Figures 4-6, a modified construction of disk indicated generally by the numeral 36 may be provided, this disk having concentric outer and inner walls 38 and 40 respectively which thus provide an arcuate channel or space 42 therebetween for the passage of oil up the tubing 14.

An axially centered bore 44 is formed by the arcuate inner surface of the inner wall 40 and serves to receive the sucker rod 16 in the same manner as described in connection with the preceding embodiment. The disk 36 is provided with divergent side walls 46 forming a wedge-shaped opening by means of which the sucker rod 16 may be moved into the central aperture 44 of the disk. A closing member 50 is provided in this wedge-shaped opening as shown in Figure 4, this closure member having an arcuate outer surface 52 forming a continuation of the arcuate outer surface of the outer wall 38. With the disk in position upon the sucker rod 16, and the closure member 50 in place as shown in Figure 4, the disk 36 is compressed and caused to compressibly clamp upon the sucker rod 16 by any desired means, and while so compressibly engaged upon the sucker rod, the ends of the closure member 50 are welded to the surfaces 46 as shown at 54 in Figure 5. It will thus be seen that the compressive clamping action of the disk upon the sucker rod, previously mentioned is thus maintained.

From the foregoing, it will be apparent that the improved sucker rod attachment is compressibly clamped upon the sucker rod in an improved manner.

From the foregoing it is believed that the principles of this invention will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:
1. A scraper and guide attachment for centrally spacing sucker rods within well tubing and scraping the well tubing upon reciprocation of the sucker rods, said attachment including a body comprising concentrically spaced outer and inner split rings having circumferentially spaced free ends, means joining the outer and inner rings to one another at their circumferentially spaced free ends, said outer ring having an external diameter substantially equal to the inside diameter of the well tubing for slidably engaging the tubing, said inner ring having an internal diameter substantially equal to the diameter of a sucker rod for mounting the body on a sucker rod, and means interconnecting said joining means and reducing the spacing between said joining means for fixedly clamping the body on a sucker rod.

2. The combination of claim 1, wherein said joining means are spaced apart from one another a circumferential distance less than 180°.

3. A scraper and guide attachment for centrally spacing sucker rods within well tubing and scraping the well tubing upon reciprocation of the sucker rods, said attachment including a body comprising concentrically spaced arcuate outer and inner walls, said outer and inner walls terminating in sets of circumferentially spaced ends providing an opening into the space enclosed by the inner wall and providing an opening into the space enclosed by the inner wall, said opening defining an arc of less than 180°, spacing means rigidly connecting the ends of each set to one another, the outer diameter of said outer wall being substantially equal to the inner diameter of a well tubing string for slidably engaging the inside of the tubing, the inner diameter of the inner wall being substantially equal to the external diameter of a sucker rod for fitting around the sucker rod, and means for retaining said inner wall in compressive clamping engagement with a sucker rod over which the body is fitted.

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