

April 19, 1938.

J. ANTHONY

2,114,988

SLIP SOCKET

Filed April 26, 1935

Fig. 1.

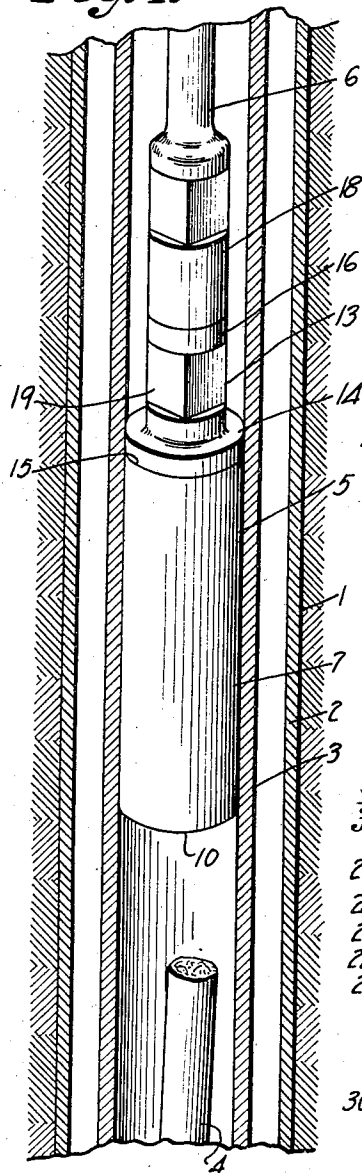


Fig. 2.

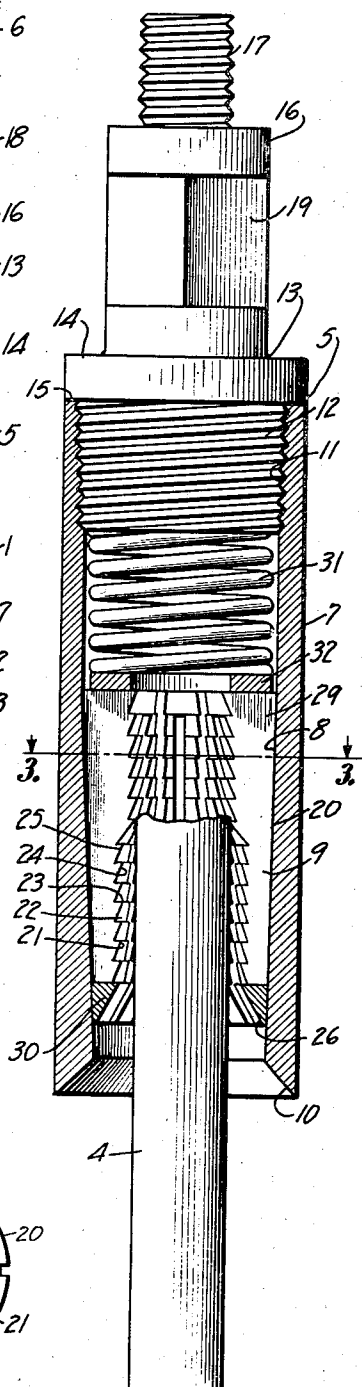


Fig. 3.

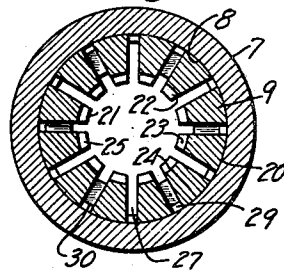


Fig. 4.

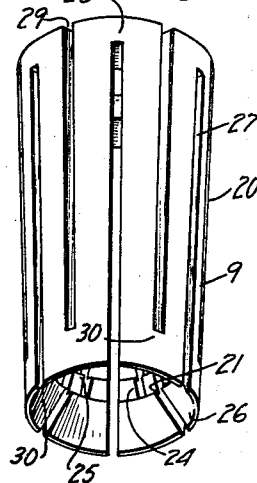


Fig. 6.

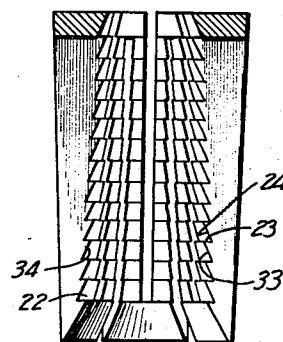
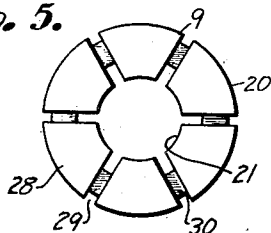


Fig. 5.



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SLIP SOCKET

Jack Anthony, Tulsa, Okla., assignor, by mesne assignments, of sixty percent to Frank P. Collins and forty percent to George Krell, both of Sapulpa, Okla.

Application April 26, 1935, Serial No. 18,333

6 Claims. (Cl. 294—102)

This invention relates to slip sockets, particularly to those of the character employed in the recovery of broken or disconnected sucker rods from wells and has for its principal object to provide a slip socket having a single slip capable of sufficient flexibility to grip any portion of a broken or disconnected rod that may be left in a well.

It is also an important object of the invention to provide a slip of unitary construction and having substantially the same degree of expansibility throughout the length thereof whereby the slip has more extended bearing surface in engagement with the socket.

In accomplishing these and other objects of the invention, as hereinafter pointed out, I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawing, wherein:

Fig. 1 is a vertical section through a portion of a well and its tubing containing a broken sucker rod and showing my improved socket in suspended position to engage over the broken end of the rod.

Fig. 2 is an enlarged vertical section through the slip socket showing the slip element engaged with the rod.

Fig. 3 is a horizontal section on the line 3—3, Fig. 2.

Fig. 4 is a detail perspective view of the slip.

Fig. 5 is an end view of the slip.

Fig. 6 is a vertical section through a modified form of slip.

Referring more in detail to the drawing:

1 designates the bore hole of a well having a casing 2 in which is suspended a string of well tubing 3 wherein a string of sucker rods has been broken to leave a portion of the string within the tubing as indicated by the numeral 4.

As above pointed out, the present invention contemplates a slip socket 5 that is lowered through the tubing 3 by means of a connected string of sucker rods 6 to grip the broken end of the rod 4 and effect its withdrawal from the well.

In the present invention the slip socket includes a cylindrical barrel portion 7 having a downwardly tapering inner bore 8 in which is slidably mounted a slip 9 embodying the features of the invention as hereinafter described.

The lower end of the barrel 7 has a bevelled edge sloping upwardly and inwardly in the direction of the bore 8 to form a guide lip 10 for directing the barrel over the broken end of the rod when the slip socket is lowered into the tub-

ing. The opposite end of the barrel is internally threaded as at 11 and engaged therein is the threaded end 12 of a head 13.

The head 13 includes an annular flange portion 14 that seats squarely against the upper end 15 of the barrel and projecting upwardly therefrom is a reduced cylindrical portion 16 which terminates in a threaded pin 17 adapted to be engaged by the box end 18 carried on the lower end of the sucker rods 6 wherewith the slip socket is lowered into a well. The cylindrical portion 16 of the head has the sides thereof flattened as at 19 to facilitate application of a wrench wherewith the slip socket is connected and disconnected from the sucker rods.

The slip 9 is preferably formed of spring material and comprises a substantially sleeve like body having its outer circumferential face 20 tapered to conform to the taper of the socket bore 8 and is of sufficient length to provide an ample gripping surface to assure positive grip on the loose end of the sucker rod.

The inner circumferential face 21 of the slip is provided with a series of circularly arranged V-shaped grooves 22 having horizontal faces 23 and having inclined circumferential faces 24 converging inwardly toward the upper end of the slip to connect the outer periphery of a lower face 23 with the inner periphery of a next adjacent upper face and form a series of gripping teeth 25 adapted to engage and bite into the sucker rod as later described.

The inner diameters of the teeth 25 at the lower end of the slip are preferably of larger diameter than the upper end of the slip as best shown in Fig. 2 so as to insure engagement of at least one set of teeth with the portion of the rod to be removed from the well.

For example, if the rod is of small diameter, and will pass the set of teeth in the lower end of the slip they will be engaged with the teeth at the upper end of the slip; however, if the rod is of large diameter, it will be engaged by the teeth in the lower end of the slip. The lower or entrance end 26 of the slip is bevelled downwardly and outwardly toward the circumferential wall of the socket so as to cooperate with the correspondingly bevelled edge 10 to assist in guiding the socket over the broken end of the rod.

In order to provide flexibility of the slip, it is provided with a series of circumferentially spaced slits 27 extending from the lower end thereof to a point adjacent the upper end to leave connecting portions 28 while the opposite end of the slip has slits 29 extending downwardly at points

intermediate to and substantially coextensive with the slits 27 but they terminate short enough from the lower end to provide connecting portions 30.

5 It is thus obvious that the slip is divided into a plurality of gripping sections secured together at alternate ends by the connecting portions 28 and 30 respectively so that the slip constitutes a single unit adapted to diametrically expand and
10 contract uniformly throughout its entire length to maintain substantially the entire outer circumference in bearing contact with the tapered portion of the socket.

The slip thus constructed is normally retained
15 in the lower constricted end of the bore by means of a coil spring 31 having one end engaging against the head 13 and its opposite end engaging against a washer 32 seated against the upper end of the slip as clearly shown in Fig. 2.

20 In the form of slip shown in Fig. 6, the inner circumferential face 33 thereof is provided with a plurality of teeth 34 gradually tapering in diameter from the lower end of the slip to the upper end thereof. Otherwise, the construction of the
25 slip is similar to that of the preferred form of invention.

In using a slip socket equipped with a slip constructed as described, the slip socket is coupled onto the sucker rod 6 and lowered through the tubing as shown in Fig. 1 until the bevelled end 10 of
30 the socket engages against the broken end of the sucker rod. Continued downward movement of the socket causes the bevelled end 10 to guide the broken end of the sucker rod into the slip
35 until stopped by engagement of the teeth, whereupon further downward movement of the socket will effect compression of the spring 31 and movement of the slip toward the upper end of the socket, thereby allowing the slip to expand and
40 permit further entrance of the broken rod thereinto.

The slip socket is then raised so that the power of the spring urges the slip into gripping engagement with the rod. Continued upward lift of the
45 socket then causes the slip to be wedgingly engaged with the tapered bore of the socket which causes diametrical contraction and thereby enhances gripping engagement of the teeth.

50 After the rod has thus been firmly engaged by the teeth of the slip, the slip is removed carrying the broken end of the rod therewith.

From the foregoing it is apparent that I have provided a slip and slip socket construction which firmly and positively grips the rod and is readily adaptable to various diameter rods or to the pin of a rod in case a section of the rod has become
5 accidentally disconnected at one of the joints.

What I claim and desire to secure by Letters Patent is:

1. In an apparatus of the character described including a slip socket, a slip in the socket comprising a substantially cylindrical body provided
10 with toothed gripping portions and having slits alternately extending from the respective ends thereof and through the toothed gripping portions.

2. In an apparatus of the character described including a slip socket, a slip in the socket comprising a substantially cylindrical body provided with sets of toothed gripping portions respectively located at the ends of the slip and having
20 slits alternately extending from the respective ends thereof and through the sets of toothed gripping portions.

3. In a device of the character described, a slip socket, and a slip in the socket having a plurality of sections with the sections connected at alternate ends of the slip whereby the slip is capable of diametric variation throughout the entire length of the slip when the slip is moved in said
25 socket.

4. A slip comprising a substantially cylindrical sleeve-like body provided with gripping portions and having slits extending from the respective ends thereof and through the gripping portions in alternately staggered relation whereby the slip is contractible throughout the entire length thereof.
35

5. A slip comprising a substantially tapered sleeve-like body having slits extending from one end thereof and intermediately arranged slits extending from the other end in substantially co-extensive relation with the first named slits to provide a plurality of interconnected gripping sections.
40

6. A slip comprising a tapered sleeve-like body formed of spring material having slits alternately extending from the respective ends thereof and in substantially coextensive relation to form a plurality of interconnected flexible gripping sections whereby the slip is contractible throughout its entire length.
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