E. E. OSBORNE.

COMBINATION SUCKER ROD SOCKET.

APPLICATION FILED JAN. 14, 1914.

1,153,818.

Patented Sept. 14, 1915.

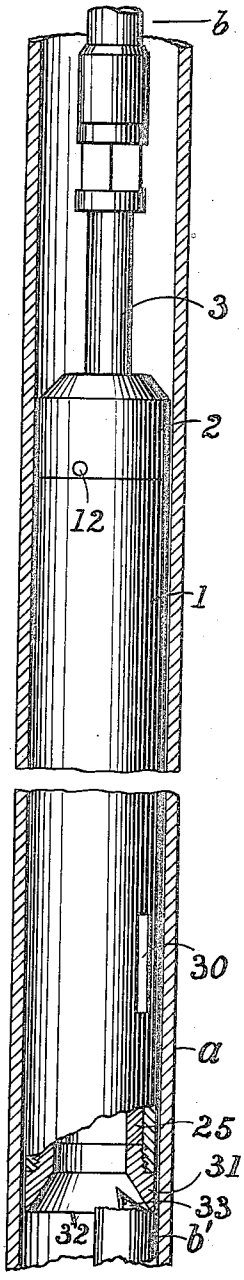


FIG. 1.

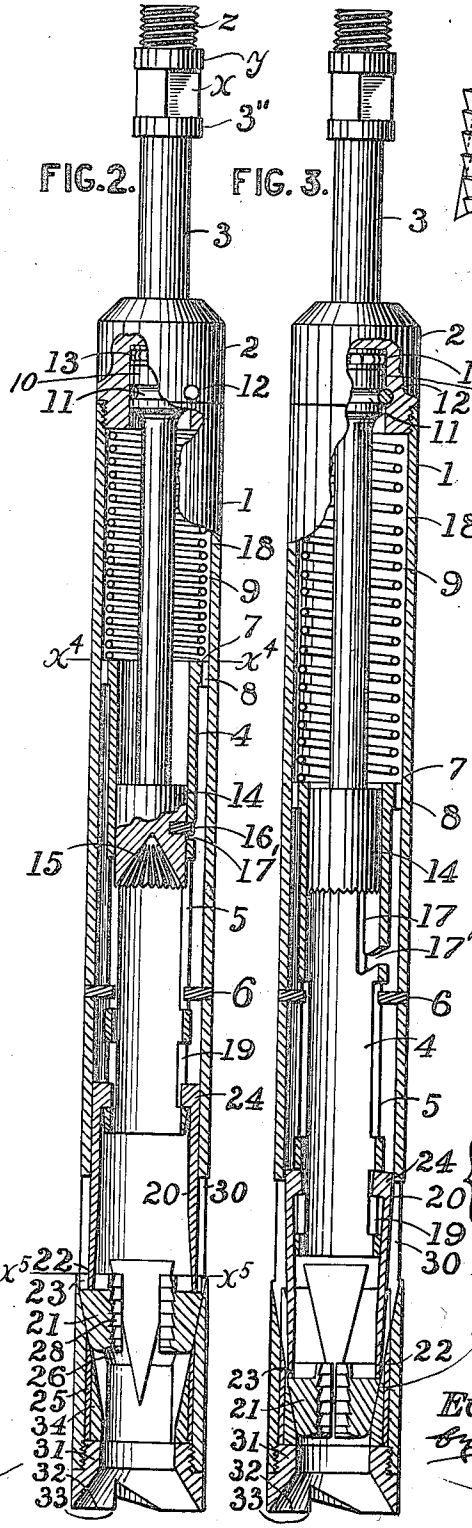


FIG. 2.

FIG. 3.

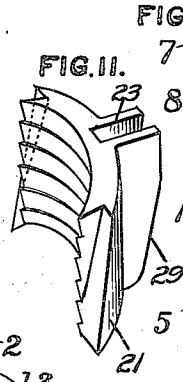


FIG. 11.

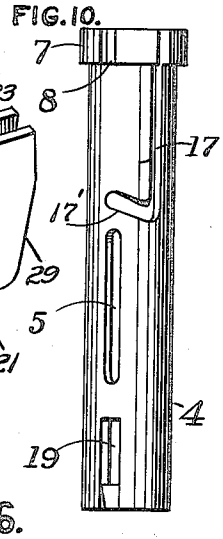


FIG. 10.

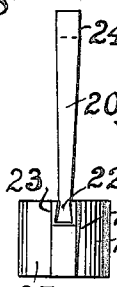


FIG. 6.

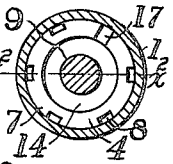


FIG. 4.

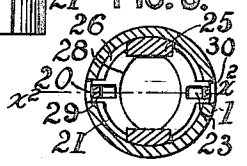


FIG. 5.



FIG. 7.

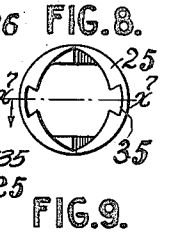


FIG. 8.

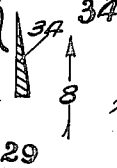
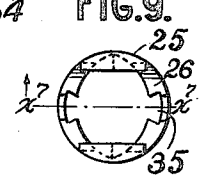


FIG. 9.



Witnesses:

F. M. Kearney.

L. Belle Weaver

Inventor:

Evan E. Osborne.

by James R. Townsend

his atty.

UNITED STATES PATENT OFFICE.

EVAN E. OSBORNE, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO WALTER A. BABB, OF SANTA MONICA, CALIFORNIA.

COMBINATION SUCKER-ROD SOCKET.

1,153,818. Specification of Letters Patent. Patented Sept. 14, 1915.

Application filed January 14, 1914. Serial No. 812,164.

To all whom it may concern:

Be it known that I, EVAN E. OSBORNE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Combination Sucker-Rod Socket, of which the following is a specification.

This invention relates to fishing or grappling tools for recovering sucker-rods or other objects which may have become broken, unscrewed or otherwise lost in pumps of deep wells, and especially in oil well pumps.

The accompanying drawings illustrate the invention.

Figure 1 is a broken sectional elevation of the tool within a pump tubing, the lower end of the tool being broken to show the upper end of a broken sucker rod in position from which the tool must shift it before it can be caught. Fig. 2 is an elevation of the tool in the set position and broken and partly in axial section. Fig. 3 is a view analogous to Fig. 2 showing the tool in the sprung position. Line x^2, Figs. 4 and 5 indicate the plane in which Figs. 2 and 3 are sectioned, except that in Fig. 3 the sleeve retaining element or mandrel is relatively turned so that its lug has released the sleeve. Fig. 4 is a cross section on line x^4, Fig. 2. Fig. 5 is a cross section on line x^5, Fig. 2. Fig. 6 is a detail of a gripping element and a connecting link. Fig. 7 is a sectional detail of the guide bushing on line x^7, Figs. 8 and 9; one wedge being detached. Fig. 8 is a bottom view of the guide bushing. Fig. 9 is a top view of the guide bushing. Fig. 10 is a detail of the sleeve which actuates the gripping elements. Fig. 11 is a perspective of a slip detached.

Referring more particularly to the drawings in the several views in which, like reference characters apply to like parts of the invention, an outer case 1, cylindrical in form for sliding within a pump tubing *a*, is provided with a head 2, a shank 3, a collar 3″, a wrench seat *x*; a collar *y*, and a pin *z* adapted to be secured to a sucker-rod *b*.

Within case 1 there is mounted a sleeve 4 having slots 5, longitudinally arranged in the walls thereof, and case 1 is provided with lugs 6 which project into said slots, sleeve 4 therefore having a longitudinal sliding movement relative to, but being non-rotatable in, the outer case. A flange 7 keeps sleeve 4 concentric with the outer case and is provided with notches 8 in the periphery thereof to permit the interior of case 1 to be readily drained of oil or other substances which might tend to clog the tool if allowed to remain therein. An inner sleeve retaining element or mandrel 9 co-axial with case 1 and sleeve 4 is mounted with its upper end 10 projecting into said head 2. Said upper end 10 is provided with a groove 11 circumferentially arranged therein and head 2 is provided with a pin 12, engaging with groove 11, preventing any longitudinal movement of element 9, but permitting the free and independent rotation thereof relative to head 2 and case 1. A ball bearing 13 interposed between end 10 and head 2 reduces friction between the head and the element 9 when said element is bearing against the end of a sucker-rod as hereinafter described. Element 9 is provided with an enlarged lower and cylindrical end 14, projecting into and working within sleeve 4, said lower end having a tapered and notched frictional socket 15 for engagement with a broken or otherwise loose sucker rod *b*′. End 14 is also provided with a pin or lug 16 which projects into a slot in sleeve 4, said slot having a longitudinal runway part 17 and a transverse or circumferential retaining part 17′. A spring 18 is interposed between sleeve 4 and head 2, and exerts a downward pressure on the sleeve, said sleeve being normally held in a set position by relatively turning said inner element 9 and the case until lug 16 engages with retaining part 17′ of said circumferential slot, as hereinafter described. Sleeve 4 is further provided with slots 19 which engage with links 20 that are interposed between sleeve 4 and case 1, and that extend downward and are connected with gripping elements as the slips 21 which have cylindric internal concave and external convex faces, the internal face of each being co-axial with the tool and the external face being aslant downwardly inward so that said faces downwardly converge. The links 20 have circumferentially enlarged ends 22 which engage with correspondingly-shaped radial grooves 23 in slips 21, said links sliding freely in said

grooves and having hooked ends 24 sliding in and engaging with said slots 19 of sleeve 4. Within and spaced above the lower end of case 1, there is suitably fixed a bushing 25. Preferably the bushing is made a fraction larger than the bore of the case and the case is heated and shrunk thereon. Said bushing is provided with opposed downwardly converging cylindric guiding grooves 26 in which said slips fit and slide, the external cylindric backs 27 of the slips corresponding with said grooves.

The bottoms of grooves 26 are inclined and converge toward the axis of case 1 as they approach the bottom of bushing 25, so that the slips are thus given a transverse movement when longitudinally actuated by sleeve 4 and links 20, and they approach each other as they approach the bottom of guide bushing 25, so that teeth 28 on their inner faces will be brought into contact with any interposed object as the rod b', when the slips are depressed; the teeth 28 preferably pointing inward and upward to increase the hold.

The slots 19 are slightly longer than the engaging hooked ends 24 of links 20, so that when the device is released sleeve 4 will be driven by spring 18 against said links and the blow imparted thereby to the slips 21 will the more firmly drive them against the sucker-rod. The slips 21 are provided on their cylindric backs with outer tongues or runners 29 in the upper ends of which the grooves 23 extend radially and corresponding slots 30 are provided in case 1 to accommodate said runners as the slips run up and down in the grooves 26.

A beveled shoe 31 fixed on the lower end of case 1 has a sharp circular lower edge 32 provided with notches forming corners 33 which may enter between the pump tubing a and the loose end of the sucker-rod b, thus to force the sucker-rod in from the tubing so that when the tool is rotated the rod may enter the shoe and allow the rod to be received between the slips as the tool is lowered.

To set the instrument the pin 12 will be driven out of the head 2, the head will then be unscrewed and the spring 9 removed. Then an instrument such as a piece of rod, not shown, will be inserted through the receiving end of the tool and the slips 21 will be pushed up out of the way and the tool brought into contact with the lower end of the sleeve 4 and the sleeve will be pushed toward the upper end of the case until the mandrel can be taken hold of and turned to bring its lug 16 into the transverse limb 17′ of the retaining slot. Then the instrument may be inserted into the socket 15 and the tool held upright may be sustained by said instrument, thus holding the upper end of the mandrel in the normal position shown in Figs. 2 and 3. Then the spring 9 may be dropped into place, the head 2 brought onto the top thereof and the spring compressed thereby into the case in which the head 2 is then screwed home, whereupon the pin 12 will be driven into place through the annular groove 11 thus to hold the mandrel in normal position, whereupon the instrument may be withdrawn and the tool is ready for use. The pin z will then be screwed into the box of the sucker-rod by means of which in due course well-known to those skilled in the art the sucker-rod socket may be lowered into the well. In this operation the usual elevators may be applied to the shank 3 which forms the elevator seat below the collar 3″, and when the tool has been brought into the well tubing a wrench, not shown, may be applied to the wrench seat x below the collar y and the pin z; and the sucker-rod b may then be screwed onto the pin z, and then the sucker-rod sections will be successively screwed together and lowered as heretofore customary until the tool comes to a stop. Then the tool may be rotated by the wrench thus causing the shoe 31 to shift the broken rod b' so that it will enter the receiving end of the tool. The tool will then be lowered until the upper end of the rod section engages the corrugated socket 15 whereupon further rotation of the tool will displace the limb 17′ of the rotating slot from the lug 16 and will bring the longitudinal limb 17 of said slot into position to receive the lug 16 to allow the sleeve to be driven downward by the spring 9.

The sleeves acting through the links 20 drive the slips 21 down into forcible contact with the sucker rod so that upon lifting the tool the slips will take hold of the sucker rod and positively hold the same until released. To release the sucker-rod the pin 12 may be driven out and the head 2 unscrewed; and since the lug 16 is in the longitudinal limb 17 of the retaining slot, the case and contents except the mandrel can be slipped down the sucker-rod; the mandrel being thereby pushed out of the case.

Wedges 34 corresponding in width to the runners 29 are inserted into the ways or grooves 35 in the bushing 25. These wedges are retained in place by the shoe 31 when the same is screwed home, and they serve to support the runners 29 and force the slips inward as the slips are driven down by the spring 9, thus bringing the slips close together when they are at the lower portion of their movement. The slots 30 accommodate the runners 29 when the slips are pushed upward and allow the slips to move outward until the outer cylindric faces rest snug against the case 1. This arrangement gives great amplitude of radial movement of the slips, thus allowing a wide range of adjustment for accommodating and

gripping small rods and the boxes and other large parts of the sucker-rod to be grappled. To renew the slips or to change them for grappling a different size of sucker-rod, the shoe-member 31 is unscrewed and the wedges 34 removed from the recesses or ways 35 in bushing 25. The slips 21 will then drop down, and the links 20 may be detached from the sleeve 4 by pressing the upper ends of the links outward through the slots 30 in case 1. Other slips may be substituted and the slips and links re-assembled in the reverse manner.

From the foregoing description it will be seen that I have shown my invention applied to a grappling tool for sucker-rods which may have become broken or lost within a well tubing, but it is to be understood that the device may be utilized for various analogous purposes and in various analogous ways.

I claim:—

1. A sucker rod socket comprising a case, spring-operated slips in the case to grip a sucker rod, a movable sleeve in the case, and means connecting the sleeve to the slips and normally holding the slips in set position, said connecting means being released by relative movement between the sleeve and case.

2. A sucker rod comprising a case, spring operated slips in the case to grip a sucker rod, a rotatable sleeve in the case, and means connecting the sleeve to the slips and normally holding the slips retracted, said connecting means being released by relative rotation of the sleeve and case.

3. In a grappling tool for sucker rods the combination with a cylindrical case and a shank at the upper end of said case, of an internally beveled member screw-threaded to the lower end of said case having a notched edge to direct the end of a sucker rod within the case as the tool is rotated, and grappling mechanism within the case, said grappling mechanism being retained therein by said beveled member.

4. In a grappling tool for sucker rods, the combination with a cylindrical case, a shank at the upper end of said case and a notched member at the lower end of said case to direct the sucker rod within the case, of grappling mechanism within the case, and means releasable by relative movement between the casing and grappling mechanism for retaining the grappling mechanism in a set position.

5. In a grappling tool for sucker rods, the combination with a cylindrical case having a shanked head and an internally beveled member at the lower end, of a grappling mechanism within said case provided with slips having downwardly and inwardly slanting faces to seat against the beveled portion of said beveled member, means for retaining the grappling mechanism in a set position, and means for releasing the mechanism from the set position when engaged by the sucker rod.

6. In a grappling tool for sucker rods, the combination with a cylindrical case having a shanked head and an internally beveled member at the lower end, of a grappling mechanism within said case, having a sliding member which rotates in unison with the tool, said sliding member being normally in a set position and a non-sliding member within said sliding member, said non-sliding member revolving independently of said tool, and means carried by said non-sliding member for holding said sliding member in the set position.

7. In a grappling tool for sucker rods, the combination with a cylindrical case having a shanked head, and a notched member at the lower end to direct a sucker rod within the case, of a grappling mechanism within said case comprising means for gripping the sucker rod, means for holding the gripping means in a set position, and means operated by rotation for releasing said holding means, when engaged by the sucker rod.

8. In a grappling tool for sucker rods, the combination with a cylindrical case having a shanked head and a notched member at the lower end to direct the sucker rod within the case, of a sleeve within said case sliding longitudinally therein, said sleeve having longitudinal slots in the walls thereof, lugs projecting from the walls of said case and engaging said slots, means for gripping the sucker rod operated by said sleeve, means for holding the sleeve in a set position, and means for releasing said sleeve when engaged by the sucker rod.

9. In a grappling tool for sucker rods, the combination with a cylindrical case rotating to direct the sucker rod within the case, and a shanked head on the case, of bushing secured in the lower end of said case, slips to grip the sucker rod sliding in said bushing, a sleeve in said case sliding longitudinally therein above said slip, links connecting said slips with said sleeve, a spring interposed between said shanked head and said sleeve, and means for normally holding said sleeve in a set position against the tension of said springs.

10. In a grappling tool for sucker rods, the combination with a cylindrical case rotating to direct the sucker rod therein, of two opposed slips to grip the sucker rod sliding within said case, teeth in each slip pointing inwardly and upwardly, a sleeve movable longitudinally in said case and actuating said slips, a spring in said case actuating said sleeve, and means releasable by movement of the sleeve for holding said sleeve in a set position.

11. In a grappling tool for sucker rods, the combination with a cylindrical case hav-

ing guideways and slips to grip the sucker rod sliding in the guideways within the case, the surface of said guideways converging toward the center of the case, a sleeve for actuating said slips to and fro in said guideways, said sleeve having a slot disposed longitudinally and circumferentially in the wall thereof, a co-axial sleeve retaining element rotating independently within said sleeve and case, a lug on said co-axial element engaging with said slot, said lug being in said circumferential part of said slot in the set position, and a corrugated socket on said co-axial element to engage the end of the sucker rod, said sleeve being released from the set position by the rotation of said co-axial element.

12. In a grappling tool for sucker rods, the combination of a case rotating to direct the sucker rod therein, slips to grip the sucker rod within the case, means releasable by rotation for maintaining said slips in an open position, and means for performing the positive function of closing said slips when released by the action of the sucker rod after it has entered the casing.

13. The combination with an outer case rotating to direct a sucker rod therein, of an inner sleeve sliding in said outer case and rotating therewith, a bushing integral with said outer case, slips to grip the sucker rod sliding to and fro in said bushing, links connecting the inner sleeve and slips, a spring for actuating said inner sleeve, and an inner co-axial sleeve retaining element rotating independently of said outer case, said co-axial element normally holding the inner sleeve in a set position but releasing the same when actuated by a sucker rod.

14. The combination with an outer case rotating to direct a sucker rod therein, of slips to grip the sucker rod within the case, an inner co-axial element, and means operable by movement of said inner element for holding the slips in the set position, said slips being released by the opposite rotations of the outer case and the inner element respectively.

15. In a grappling tool for sucker rods, the combination with an outer case having a solid shanked head and rotating to direct a sucker rod therein, of a bushing in said case integral therewith, an inner sleeve sliding longitudinally in said outer case, means for actuating said inner sleeve, slips to grip the sucker rod actuated by the inner sleeve, said slips sliding in said bushing, and an inner co-axial sleeve retaining element within said outer case and inner sleeve, said inner co-axial element rotating independently of said outer case, ball bearings disposed in said shanked head to insure freedom of rotation to said co-axial element, a pin working in a groove in said co-axial element to prevent longitudinal movement thereof, and a lug carried by said co-axial element to hold said inner sleeve in a set position, said co-axial element being actuated by the sucker rod to release said inner sleeve.

16. In a grappling tool for sucker rods, the combination with a cylindrical case having a shanked head and an internally beveled member at the lower end for directing the end of a sucker rod within the case as the tool is rotated, of a sleeve within the case and movable longitudinally therein, a bushing fixed within said case, a spring thrusting said sleeve downwardly, slips sliding in said bushing and actuated by said sleeve, and a retracting and retaining member within and co-axial with said case and rotating independently of said case, said retaining member normally holding the sleeve in a set position against the tension of said spring but releasing the sleeve when rotated by contact with the sucker rod.

17. In a grappling tool for sucker rods, the combination with an outer case having a shanked head and a beveled member at the lower end for directing a sucker rod within the case as the tool is rotated in one direction, of an inner retaining member co-axial with said case and rotating in the opposite direction when in contact with the sucker rod, a sliding spring actuated sleeve intermediate said case and retaining member, said sleeve being connected for rotating in unison with said case, slips for gripping the sucker rod within the case, means connecting the slips and sleeve and actuated by said sleeve, and means carried by the retaining member for holding the sleeve in a set position.

18. The combination with an outer case and an inner retaining member revolving in opposite directions, of slips having a transverse and longitudinal movement within said case, a spring actuated sleeve intermediate said case and retaining member actuating said slips, said sleeve sliding longitudinally in said case to force said slips together, and means releasable by relative rotation of the case and retaining member and carried by said retaining member to hold said sleeve in the set position, substantially as shown.

In testimony whereof, I have hereunto set my hand at Los Angeles, California this 7th day of January 1914.

EVAN E. OSBORNE.

In presence of—
JAMES R. TOWNSEND,
L. BELLE WEAVER.