June 9, 1942. P. M. REA 2,285,838

FISHING TOOL

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FIG. 1.

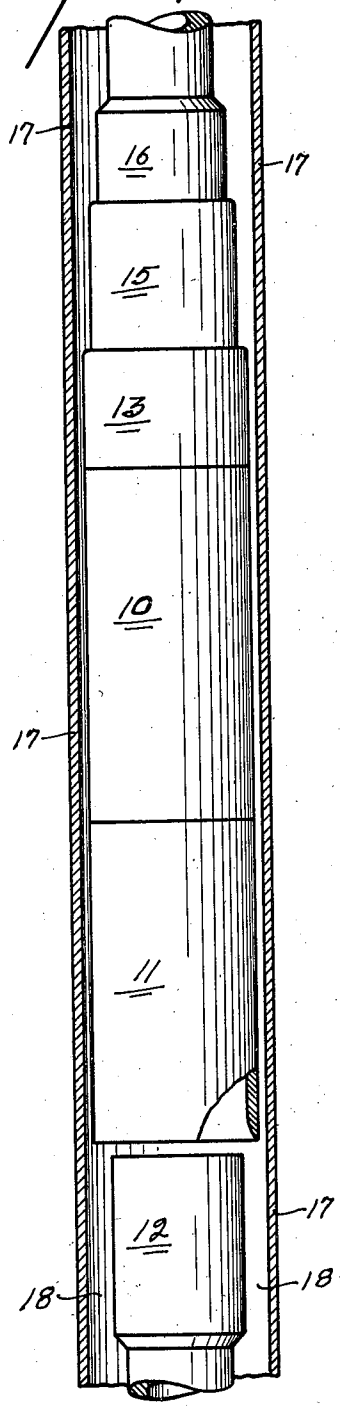
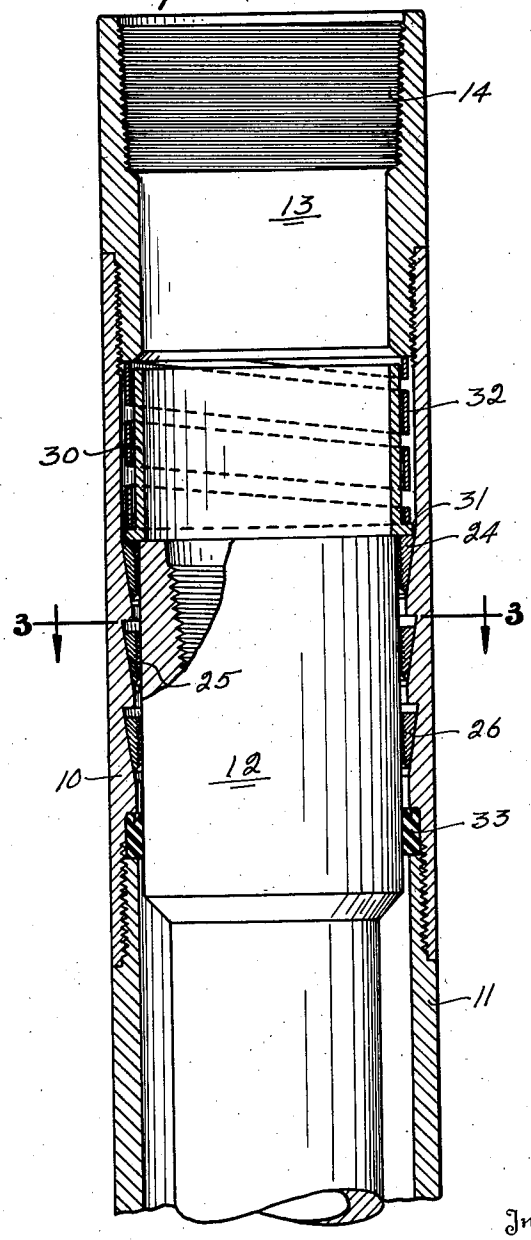


FIG. 2.



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FIG. 3.

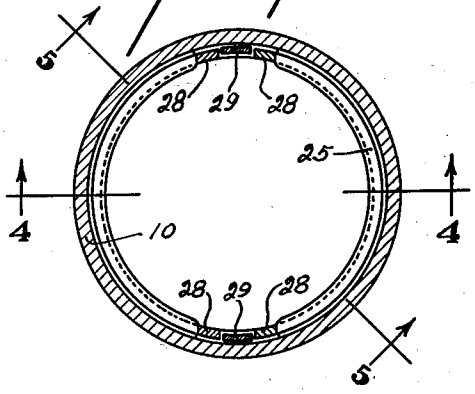


FIG. 5.

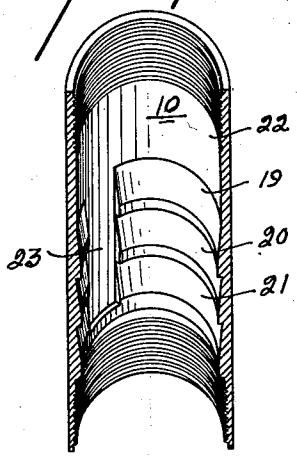


FIG. 4.

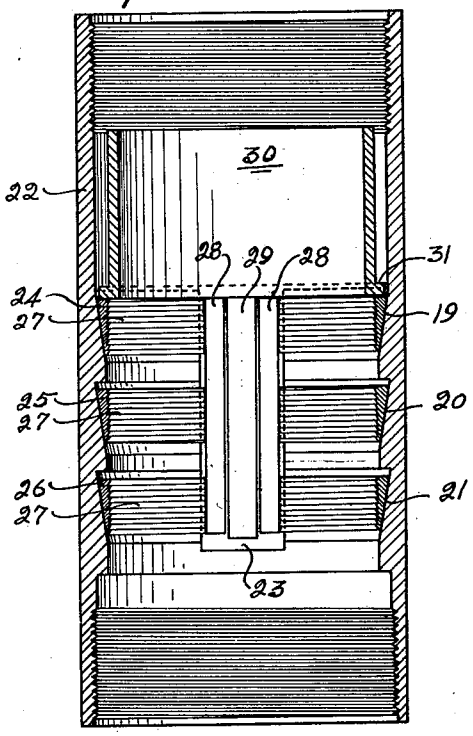


FIG. 6.

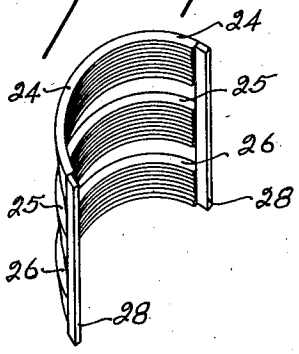
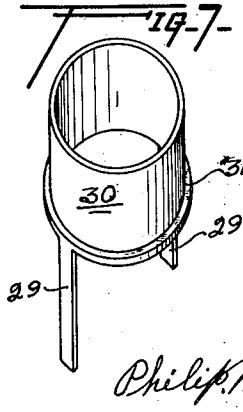


FIG. 7.



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UNITED STATES PATENT OFFICE

2,285,838

FISHING TOOL

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Application July 3, 1939, Serial No. 282,685

4 Claims. (Cl. 294—102)

My invention relates to fishing tools for removing from wells, cylindrical objects such as drill stem, tubing, and the like, and more particularly to fishing tools of the type commonly known as an "overshot."

Overshots are designed to be passed over the exterior of the pipe or "fish" and to engage its periphery, in contradistinction to the "spear" type which is adapted to pass into the "fish" and engage the wall of its bore.

In most types of overshot, radially sectioned pipe slips seated upon tapered slip seats formed in the "bowl" or housing are utilized as the medium for engaging the "fish." Due to the fact that the annular space lying between the well casing and the "fish" is in most instances very limited, and due to the fact that the overshot must operate in this annular space, others have heretofore resorted to a plurality of vertically spaced tapered slip seating surfaces, and have provided slips having vertically spaced outer tapered surfaces conforming to the taper of the slip seating surfaces. This practice has made it possible to construct the slips with a minimum of wall thickness and consequently the wall thickness of the "bowl" could be left sufficiently thick to pass over the "fish" and yet have the strength to withstand the bulging action of the slips against the slip seats when the "fish" is engaged and attempt is made to raise it in the well.

U. S. Patent No. 1,234,041 to Knapp discloses a slip assembly in which the member 12 has two vertically spaced slip seating surfaces 14 which seat the slip segments. This principle has recently been applied to fishing tools in order to save wall thickness and yet distribute the outward thrust along a greater surface of the bowl as above described. Patent No. 2,128,430 to Pryor also shows an application of this principle to an "overshot," but uses his slips to catch "fish" of different diameters. It is pointed out that should a single long tapered slip seat be used, for instance as long as Pryor's two seats, the wall of the bowl would have to be much greater in thickness than is necessary when two spaced seats are provided. Also, that the permissible diameter of the "fish" is limited by the inside diameter of the slips when they are at the upper end of their permitted travel.

The prime object of the present invention is the provision of an "overshot" designed to permit an increase in the thickness of the bowl wall without increasing its outside diameter, thus obtaining greater strength.

Another object is the provision of a tool of this class in which the slip segments are positively held in operative relation to the bowl and to each other.

A further object is to provide an overshot which is releasable from the "fish" should the "fish" be found to be immovable.

Other objects of the invention are to provide a tool of this class which is simple in construction and assembly; which is so designed that its lifting load is evenly distributed over a considerable space in the bowl, yet the slips of which are extremely thin so as to permit operation in confined annular spaces; which is durable; and, which will be efficient in accomplishing all of the purposes for which it is intended.

In the drawings:

Figure 1 is an elevational view of the complete tool located within a well casing, and showing a "fish" about to be engaged thereby;

Figure 2 is an elevational sectional view of the tool with the "fish" engaged therein;

Figure 3 is a horizontal sectional view taken substantially along the line 3—3 of Fig. 2, the "fish" having been removed;

Figure 4 is an elevational sectional view of the bowl, slips, and key member, and taken substantially along the line 4—4 of Fig. 3;

Figure 5 is an elevational sectional view of the bowl with the slips and key member removed, and taken substantially along the line 5—5 of Fig. 3;

Figure 6 is a perspective view of one of a pair of slip segments used in the bowl; and,

Figure 7 is a perspective view of the key member for positioning the slip segments radially within the bowl.

Like characters of reference designate like parts in all of the figures.

In the accompanying two-sheet drawing, Fig. 1 illustrates the manner in which the overshot is installed for use in a well. The reference numeral 10 indicates as a whole a tubular body or bowl to the lower end of which is threadedly connected a tubular guide shoe 11 having an open lower free end for passing over a "fish." In the drawings, the "fish" is illustrated as being the upper end of a section of usual upset drill stem 12, but the device may function to engage other cylindrical objects. While the shoe 11 is illustrated as being only a usual tubular guide, it may if desired be supplanted by other types of shoe such as a usual wall hook, milling tool, or the like, not shown.

The upper end of the bowl 10 is threadedly connected to an upper tubular body section 13 having threads 14 for engagement with a suitable "sub" 15 having a usual tool-joint boss in its upper end for connection to the lower end 16 of a drilling stem string. A usual well casing, within which the tool functions, is indicated as a whole by the reference numeral 17 and the annular space between the inner surface of the casing 17 and the outer surface of the "fish" is indicated at 18.

As may best be seen in Fig. 5, the inner surface or wall of the bowl **10** is provided with a plurality of vertically spaced, downwardly and inwardly tapering, annular slip seating surfaces **19, 20** and **21**. The slip seating surfaces are integral with the wall of the bowl **10** and extend slightly inwardly beyond the bore of the bowl, which bore is indicated by the numeral **22**. A pair of oppositely disposed vertical slots, one of which is indicated by the reference numeral **23** (Fig. 5), are cut through the slip seats to a depth even with the bore **22**.

In Fig. 6 is shown one of a pair of arcuate segmental slip sections which operate within the bowl **10** upon the slip seats to engage the "fish." Each slip segment consists of three substantially semi-circular vertically spaced ribs **24, 25** and **26** which have their outer surfaces tapered to conform to the taper of the slip seats, and which have threads **27** on their inner surfaces. Similar ends of the ribs **24, 25** and **26** are rigidly connected together by vertically disposed bars **28** which, when the segments are installed within the bowl **10**, rest within the slots **23** thereof. It may readily be seen that when the slip segments are disposed within the bowl, the bars **28** will contact the sides of the slots **23** and prevent rotation of the slips within the bowl.

As clearly shown in Figs. 3 and 4, the combined width of two of the bars **28** is less than the width of one of the slots **23**, and consequently, in order to hold the slip segments outwardly upon the slip seats, it is necessary to provide a means for holding the adjacent bars **28** apart. This is done by two legs or keys **29** which depend from an annular follower **30** (Fig. 7). The follower **30** has an exterior upwardly facing shoulder **31** for seating the lower end of a helical compression spring **32**. The section **13** when screwed into the bowl **10** contacts the upper end of the spring **32** and urges it into compression. Consequently the spring exerts a downward force upon the follower which in turn urges the slip segments downwardly in an obvious manner. However, downward movement of the slips is limited by the amount of lateral play of the two bars **28** and the key **29** within the slots **23**. This play is sufficient to permit the slip segments to move inwardly toward each other a sufficient distance for the threads **27** to engage the "fish" **12**, but is not sufficient to permit the slip segments to move downwardly off their seats.

A resilient sealing ring **33** is provided in the lower end of the bowl **10** in order to seal between the exterior of the "fish" **12** and the wall of the bowl. The ring **33** makes it possible to circulate a fluid downwardly through the string **16**, the "sub" **15**, the section **13**, through the bowl **10**, and into the "fish," so that the "fish" may be washed loose from the casing or well, if desired.

In assembly, the slip segments and follower **30** are merely dropped into the bowl and the spring **32** is placed upon the shoulder **31**. The section **13** is then screwed into the bowl **10**, and the device is then ready for installation on the lower end of a drill stem string.

In operation, when the tool is lowered over the "fish," it contacts the slip segments and raises them sufficiently to enter the bowl until its upper end contacts the lower end of the follower **30**. This stops further downward movement of the tool. The tool is then raised, and since the spring is urging the slip segments in a downward direction, the threads **27** of the slips frictionally engage the "fish."

Since the slip segments are made of harder metal than the "fish," they cut into the "fish," and the greater the upward pull on the bowl, the tighter the gripping action of the slips due to the tapered seats.

If, after the "fish" has been engaged by the slips, it is desired to release the same and remove the tool, the drill stem string is lowered sufficiently to release the gripping action of the slips, and the tool is then rotated to unscrew the slips from the "fish."

It is thought that the apparatus shown and described herein will function within a narrower annular space **18** to support more weight than any previously conceived "overshot" of the slip type. The present tool is both releasable and circulating, and has proven under tests to accomplish all of the objects for which it is intended.

Obviously the slot and key arrangement may be employed in connection with an overshot having a single slip seat with segmental slips thereon.

I claim:

1. In a fishing tool: an overshot bowl; a plurality of vertically spaced tapered slip seats in the bowl and having vertical slots intersecting them; slips upon the seats formed in segmental sections, each section comprising a plurality of substantially semi-circular fish engaging members having their exterior surfaces tapered to conform with said seats; vertically disposed bars holding the ends of the members in spaced relation and lying within said slots; and, a tubular follower slidably disposed within the bowl above the slips and having legs extending downwardly into the slots and between the bars, said legs adapted to hold the slip segments upon their seats.

2. In a fishing tool: an overshot bowl; a plurality of tapered slip seats vertically spaced therein, said seats intersected by transverse slots of a depth not greater than the thickness of the seats; vertically spaced segmental pipe gripping slips slidably disposed upon the seats; a key in the slots and between the adjacent ends of the slip segments for holding them on said seats; and, means integral with the key and urged to bear upon the slips for limiting movement of the key vertically coincidental with vertical movement of the slips in the bowl.

3. As a sub-combination in overshot fishing tools, an overshot bowl including: a tubular body for enveloping a "fish;" a plurality of vertically spaced tapered slip seats formed in the bore of the body; and, longitudinally extending slots intersecting said seats, said slots being of a depth no greater than the thickness of said slip seats.

4. In an overshot fishing tool, the combination with a bowl having a plurality of vertically spaced slip seats, and a similar plurality of vertically spaced interconnected segmental slips adapted to seat upon said seats, of a slip follower adapted to bear downwardly upon the uppermost slip segments, including: a tubular sleeve; and spaced depending legs integral with the sleeve to reside between adjacent ends of said slip segments to maintain the same upon their seats.

PHILIP M. REA.