Aug. 4, 1936. R. R. FORSTER 2,049,953

DEEP WELL TOOL SOCKET

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Fig. 1.

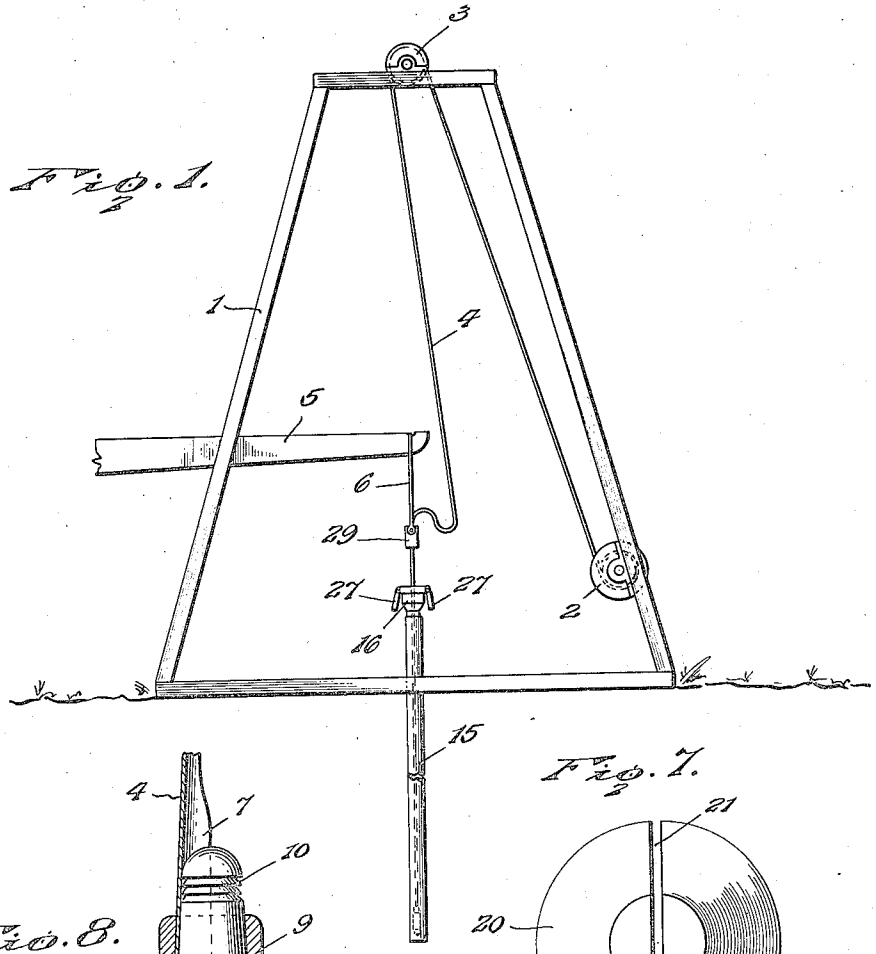


Fig. 8.

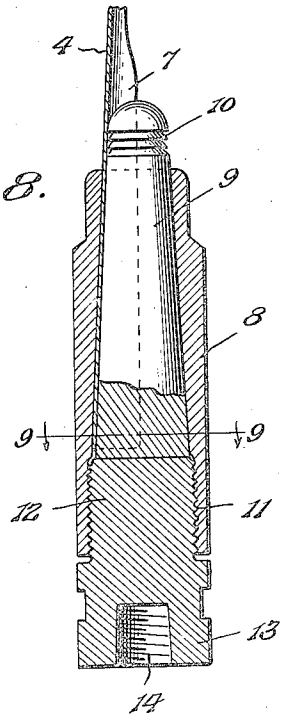
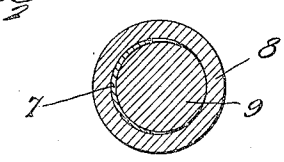


Fig. 7.

Fig. 9.



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Fig. 2.

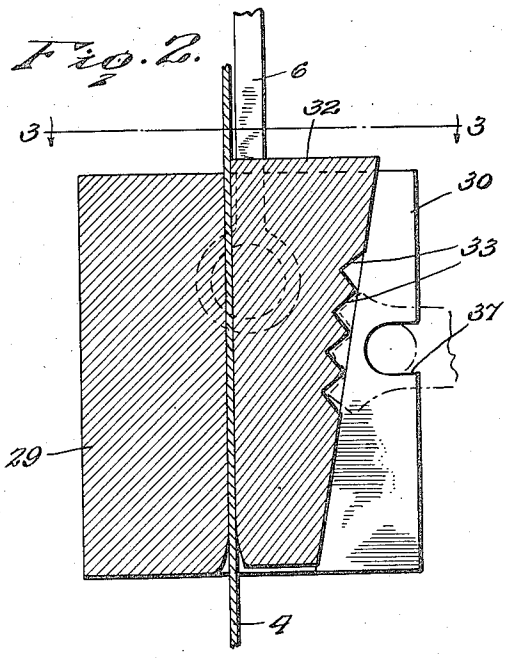


Fig. 3.

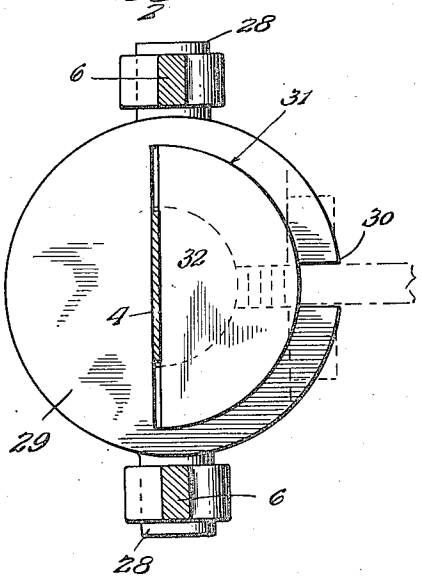


Fig. 4.

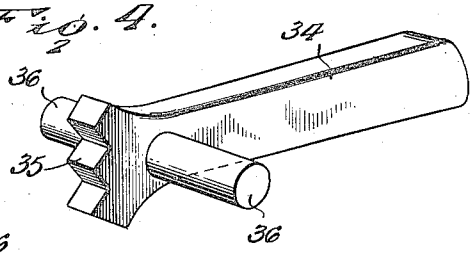


Fig. 5.

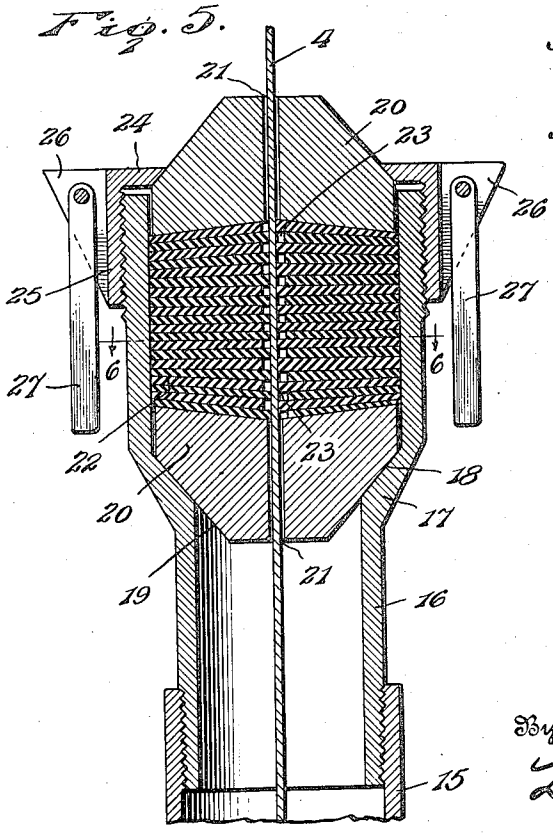
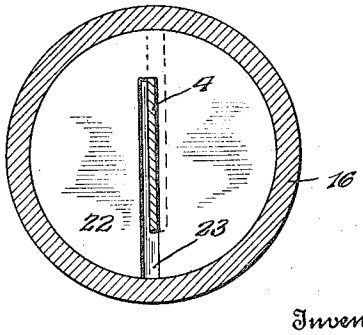


Fig. 6.



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Patented Aug. 4, 1936 2,049,953

UNITED STATES PATENT OFFICE

2,049,953

DEEP WELL TOOL SOCKET

Richard R. Forster, El Dorado, Ark.

Application September 17, 1934, Serial No. 744,446

5 Claims. (Cl. 255—26)

This invention relates to a deep well pumping and drilling apparatus and has special reference to the means for suspending the pumping or other tools, the object being to provide a very simple but strong and flexible suspension member which may be readily wound upon the usual drum and which will occupy very little room within the well casing or tubing. It is also an object of the invention to provide improved means for securing the suspending member to the tools and for connecting it with the walking beam. It is also an object of the invention to provide a novel packing for the suspension member. All these objects and other objects which will appear as the description proceeds are obtained in such a mechanism as is illustrated in the accompanying drawings and the invention resides in certain novel features which will be particularly defined in the appended claims.

In the drawings:

Figure 1 is an elevation of so much of a derrick or rig as is necessary for an understanding of the present invention.

Figure 2 is an enlarged longitudinal section through the upper clamping elements.

Figure 3 is a horizontal section on the line 3—3 of Figure 2.

Figure 4 is a detail perspective view of the tool for setting the upper clamp.

Figure 5 is a longitudinal section through the packing structure.

Figure 6 is a horizontal section on the line 6—6 of Figure 5.

Figure 7 is a detail plan view of one of the pressure elements employed in the packer.

Figure 8 is a longitudinal section of the lower clamping mechanism.

Figure 9 is a section on the line 9—9 of Figure 8.

In the drawings, the numeral 1 designates the usual derrick, 2 the drum mounted thereon, and 3 the pulley at the top of the derrick over which the tool-carrying or suspension member passes to and from the drum. 5 designates an end of the usual walking beam and 6 is the bail or link by which the tool-carrying or suspending member is hung upon the walking beam.

According to the present invention, the tool-carrying member 4 is a continuous flexible steel ribbon which may be of any desired length. This steel ribbon is highly tensile so that it will possess the strength necessary for successful use and may be readily trained over the pulley 3 and about the drum 2. In applying the ribbon to a tool such as a drill or pump, the lower end of the ribbon is rolled or folded into a semi-cylindrical form, as shown at 7, and this rolled end is engaged in a sleeve 8 having a circular bore which is tapered toward its upper end. A tapered key 9 is inserted upwardly through the sleeve 8 so as to fit within the fold or roll of the end of the ribbon, as clearly shown in Figures 8 and 9, and when this key is driven home it will very firmly clamp the end of the ribbon within the sleeve so that it will not pull out. The upper extremity of the key is provided with a series of annular grooves or serrations 10, which may be engaged by a fishing tool when necessity demands the use of such tool. The lower extremity of the bore of the sleeve 8 is straight and internally threaded, as shown at 11, so that it may be engaged around the threaded stud 12 rising from a sub 13, as shown clearly in Figure 8, the sub having a threaded socket 14 in its lower end to facilitate the attachment of any tool, the sub and the sleeve 8 both having faces whereby they may be engaged by a wrench or other turning tool. The upper end of the sub bears against the lower end of the key so that if the sub be screwed up the key will be driven home. The suspending ribbon with the attached tool is lowered within the usual well casing or tubing 15 and operates therein through the action of the walking beam 5 in the usual manner.

At the upper end of the tubing 15 a casing 16 is secured therein, said casing forming the body or enclosure for packing provided around the upper portion of the suspending ribbon. The casing 16 is expanded at a point between its ends, as shown at 17, and a shoulder 18 is thereby provided on the inner surface of the casing, said shoulder being preferably inclined downwardly, as shown. Fitted within the casing 16 and having its lower side tapered, as shown at 19, to rest upon the shoulder 18, is a clamping block 20 which has its upper surface dished, as clearly shown in Figure 5, and is formed with a diametrical slot or notch 21 opening through one side and extending across the center of the block so as to accommodate the suspending ribbon 4. A plurality of packing discs 22 is provided and these discs are of soft rubber and are supported by the lower clamping block, as shown in Figure 5. Each disc is formed with a slot or notch 23 opening through its edge and extending along a diameter of the disc to a point beyond the center thereof, as clearly shown in Figure 6. In assembling the packing discs, they are engaged with the suspending ribbon alternately from opposite sides thereof so that the respective slots or notches will overlap, as shown in Figure 6, and each notch will bear at its closed

end and at one side upon the ribbon so that an efficient engagement between the packing and the ribbon will be effected and the ribbon will be kept free of obstructing accumulations so that it will work easily at all times, and if any oil should be present on either surface of the ribbon it will be swept therefrom so as to be retained in the well instead of being carried upwardly beyond the mouth of the casing and lost by being split upon the ground. Any number of packing discs may be provided as deemed desirable under any given conditions, and upon the top packing disc a second clamping block **20** is placed, this second block being reversed relative to the lower block which has been described. The upper extremity of the casing **16** is externally threaded and a cap **24** having an internally threaded rim **25** is engaged therewith, said cap having a central opening with a beveled wall to engage around and bear upon the upper tapered side or end of the upper clamping block, as clearly shown in Figure 5. When the cap is turned home upon the casing, the upper clamping block will obviously be forced downwardly so that the packing discs will be compressed axially and expand radially to make a tight fit within the casing and thereby accomplish the function assigned to it. In order that the cap may be easily turned home, it is provided at diametrically opposite points with lugs or ears **26** to which short levers or handles **27** are pivoted and normally depend therefrom, as shown in Figure 5. When the cap is to be turned so as to ride downwardly on the casing or to be withdrawn therefrom, the handles **27** are raised and gripped by the operator so that the nut may be easily rotated, as will be readily understood.

The lower ends of the bail or link **6** are pivotally engaged upon trunnions **28** formed at diametrically opposite points of an upper clamping body **29** near the upper end of said body. As clearly shown in Figures 2 and 3 said clamping body **29** is of circular cross section and has a radial slot **30** formed therein opening through one side. At its center the body is formed with a semi-cylindrical bore **31** to receive a downwardly tapered key or wedge **32** of similar cross section, the bore being flared upwardly to receive the key with a snug fit. The suspending ribbon **4** is engaged edgewise through the slot **30** so that it may be entered into the semi-cylindrical bore whereupon it is turned to rest against the straight wall of the bore, as clearly shown in Figure 3. The tapered key is then inserted downwardly through the bore so that the flat side of the key will bear against the ribbon and firmly clamp it against the flat wall of the bore. In order that the key may be easily moved home into binding engagement with the bore of the clamping body, a series of notches **33** is formed in the convex surface of the key and extends longitudinally thereof, as shown in Figure 2. There is also provided a lever **34** which has one end provided with teeth **35** adapted to engage in the notches **33** so that if the lever be suitably fulcrumed and then rocked the key will be moved downwardly so as to clamp the ribbon in the body. The key is provided with lateral trunnions or posts **36** on its sides adjacent the key **35** and these posts or trunnions are adapted to be engaged in notches **37** formed in the side of the clamping body at opposite sides of the radial slot **30** therein and communicating with the slot. It will now be evident that if the end of the lever be pushed into the slot so that its teeth will engage the notches in the clamping key, the trunnions will seat in the notches **37** in the clamping body and will thereupon serve as a fulcrum about which the lever may be rocked to move the key into clamping position or in the opposite direction to release the ribbon when disengagement of the parts is for any reason desired.

From the foregoing description, taken in connection with the accompanying drawings, it will be seen that I have provided a very simple suspending device for use in deep wells and that said suspending device will be light but strong and will be very effectually clamped to the hanger on the walking beam and also very effectually connected with the tools to be operated. The desired packing around the mouth of the casing is provided for by an efficient structure which may be very easily disassembled when renewal of the packing is desired or necessary.

Having thus described the invention, what is claimed as new is:

1. A deep well apparatus comprising a flat flexible metal tool-suspending ribbon having its lower extremity formed into a concavo convex terminal, a clamping sleeve engaged around said terminal and having an upwardly tapered bore against one side of which the ribbon terminal may bear, and a tapered circular key fiitted in said tapered bore and clamping the terminal of the ribbon therein.

2. A deep well apparatus comprising a flat flexible metal tool-suspending ribbon having its lower extremity formed into a concavo convex terminal, a clamping sleeve engaged around said terminal and having an upwardly tapered bore against one side of which the ribbon terminal may bear, and a tapered circular key fitted in said tapered bore and clamping the terminal of the ribbon therein, said key being provided near its upper end with a plurality of serrations.

3. A deep well apparatus comprising a flat flexible metal tool-suspending ribbon having its lower extremity formed into a concavo convex terminal, a clamping sleeve engaged around said terminal and having an upwardly tapered bore against one side of which the ribbon terminal may bear, a tapered circular key fitted in said tapered bore and clamping the terminal of the ribbon therein, the lower extremity of the bore of the sleeve being cylindrical, and a sub secured in said cylindrical end of the bore and constructed to secure a tool, the upper end of the sub bearing against the lower end of the key.

4. Apparatus of the class described including tool suspending means formed at its lower end portion with an arcuate terminal, a clamping sleeve engaged around said terminal and having an upwardly tapered bore against one side of which said terminal may bear, and a tapered key removably fitted in said bore and adapted for clamping the terminal of said suspending means therein.

5 In apparatus of the class described including tool suspending means having its lower end portion formed into a concavo convex terminal, a clamping sleeve engaged about said terminal and having an upwardly tapered bore adapted for receiving one side of the terminal, and a tapered circular key removably fitted in said tapered bore and adapted for clamping the terminal of said suspending means therein, said key being provided near one end with a plurality of serrations for permitting engagement by a fishing tool.

RICHARD R. FORSTER.