

Aug. 22, 1933.

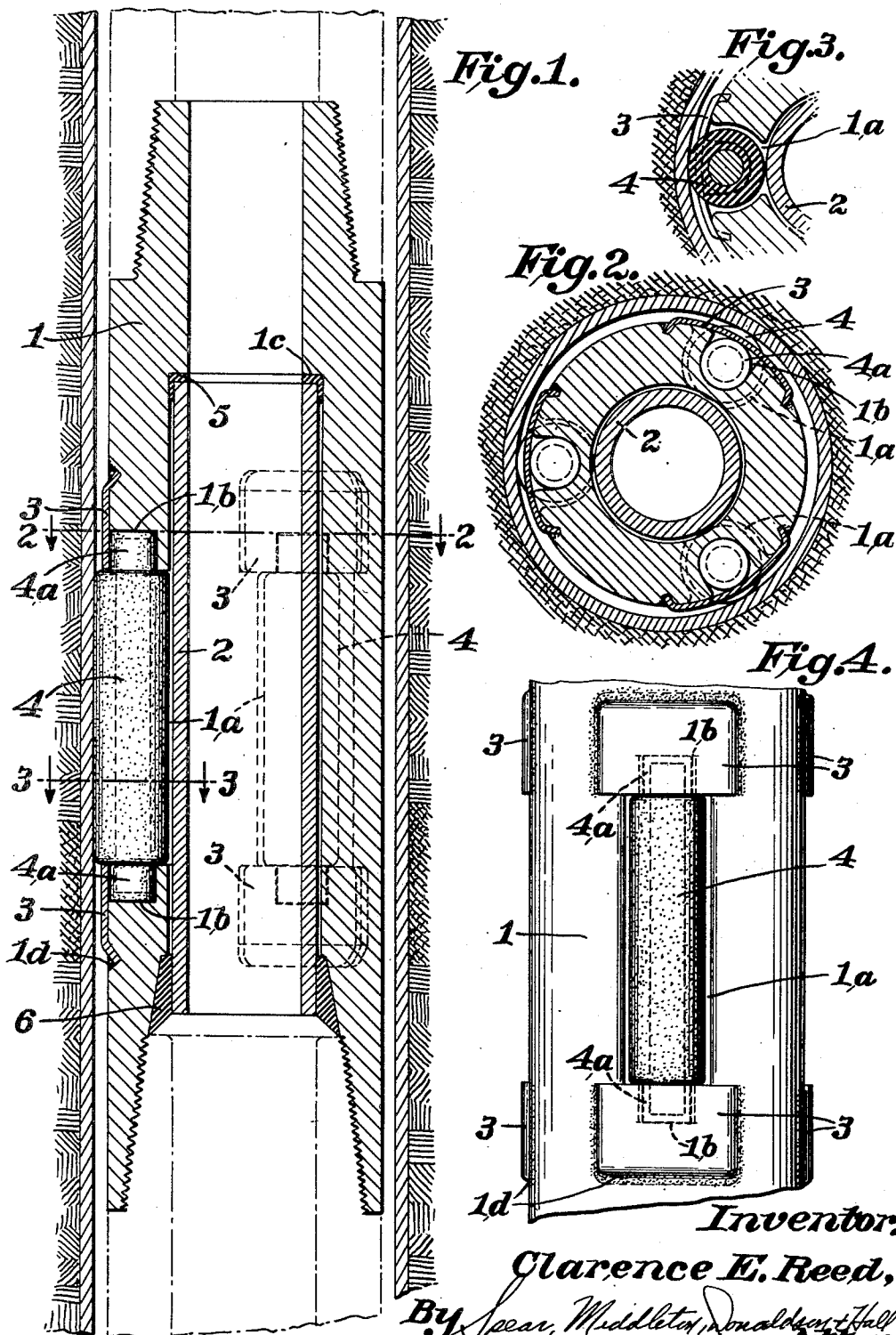
C. E. REED

1,923,328

ANTIFRICTION COUPLING FOR DRILL STEMS

Filed July 7, 1930

2 Sheets-Sheet 1



Inventor:
Clarence E. Reed,
By *Spear, Middleton, Donaldson & Hall*
Attys.

Aug. 22, 1933.

C. E. REED

1,923,328

ANTIFRICTION COUPLING FOR DRILL STEMS

Filed July 7, 1930

2 Sheets-Sheet 2

Fig. 5.

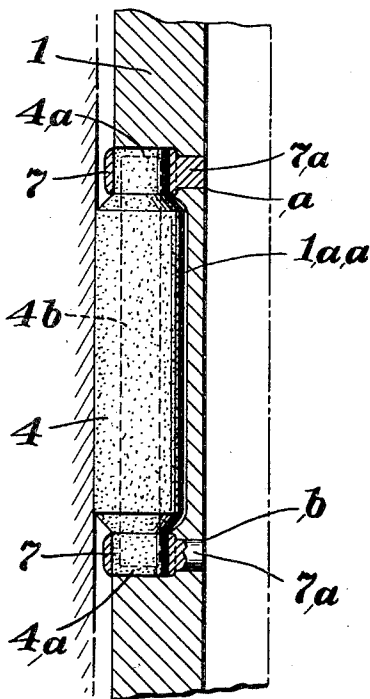


Fig. 7.

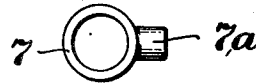


Fig. 6.

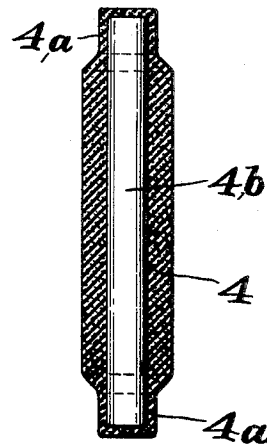


Fig. 8.

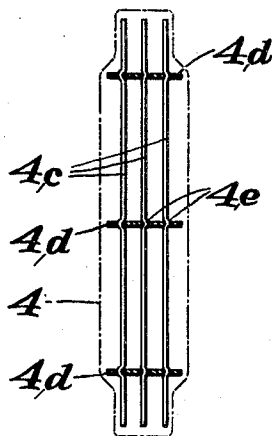
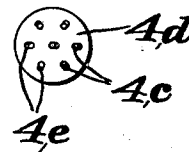


Fig. 9.



Inventor:

Clarence E. Reed,

By Spear, Middleton, Donaldson & Hall
Attys.

UNITED STATES PATENT OFFICE

1,923,328

ANTIFRICTION COUPLING FOR DRILL STEMS

Clarence E. Reed, Wichita, Kans.

Application July 7, 1930. Serial No. 466,310

10 Claims. (Cl. 255—28)

This invention pertains to drill stems used in the rotary method of earth boring, and particularly to coupling members of such stems used inside the casing in a well of great depth.

The present invention involves the provision of guard means associated with the coupling to prevent abrasive contact of the coupling with the surrounding casing.

The coupling members commonly used heretofore are of heat treated hardened steel and as the drill stem rotates these couplings have direct friction rub on inside of the casing and frequently wear through the casing, which sometimes collapses and often leaks water from the surrounding strata into the oil sand or well.

An object is to provide a coupling that will stand the hard service but have no metal to metal contact with the casing.

Another object is to provide a centering-device comprising rotary guard means on said coupling that will roll on the casing without wearing the same and that will mechanically hold the stem centered in the casing, thus preventing crooked holes and maintaining the well truly vertical. Crooked holes are caused by reason of excessive drilling weight causing the stem to bend or buckle and throw the bit into an eccentric motion when rotating and cutting the earth formation.

Another object is the provision of rotary guard means on said coupling of relatively soft non-abrasive material such as rubber which will prevent wear of the casing, said means having metal reinforcement.

A further object is the provision of novel means for retaining the guard rollers in place.

A further object is to provide a rotary guard means and retaining means therefor which present no interfering projections beyond the surface of the coupling.

Other objects will appear hereinafter.

The invention consists in the features specified in the accompanying description and pointed out with particularity in the appended claims.

In the drawings

Figure 1 is a vertical sectional view showing the drill stem and coupling within the well casing.

Fig. 2 is a sectional view substantially on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 1.

Fig. 4 is a face view of the coupling embodying my invention and showing the mounting of the guard roller in the coupling.

Fig. 5 is a view of a modified form of mounting for the rotary guard roller.

Fig. 6 is a view of the rotary guard roller with its steel core.

Fig. 7 is a view of the roller retaining collar or bearing member having a shank to seat in a radial hole in the tool joint body.

Fig. 8 shows a modified construction of reinforced guard roller.

Fig. 9 is a plan view of the reinforcement shown in Fig. 8.

The body 1 may be a forging or a casting threaded at each end to correspond with threads of the stem. The body may be made with simply a bore therethrough, but I prefer to form the flushing fluid passageway by means of a piece of pipe sealed or welded in place as at 6 and having a tight joint at its other end where it seats against shoulder 1c and is sealed water tight by packing ring 5.

In the body are slots 1a to carry each a guard roller 4. Three are shown in drawings, but any number may be used. These guard rollers have ends 4a of reduced diameter seated in a recess 1b of the body at each end of the slot. It is to be noted that these rollers are almost entirely within the body of the tool joint, only a small portion projecting beyond the periphery of the body, and there are no lugs or other heavy metal projections beyond the wall of the tool joint body. The metal strip 3 retains the roller in place and prevents it from falling out, but takes no working loads. These loads are absorbed by the tool joint body. This strip is short and crimped at its edges to set into a groove or depression 1d in the body, and may be welded in place at the grove 1d.

It will be noted that neither the guard rollers 4 nor their retaining plates or clips 3 present any projecting lugs and their surfaces which project slightly beyond the surface of the coupling body 1 are rounded to permit free passage of the cutting shoe thereover.

Twisted off drill stems and "stuck pipe" or drill stems are very common in drilling wells. The usual practice is to "wash down", that is to say, go down over the stuck drill pipe stem with a larger size pipe with a cutting shoe on the bottom. Fluid under pressure is at the same time pumped down inside this larger pipe around the stuck pipe to wash it free. For this reason any tool joint coupling must be free of projecting steel lugs and for this reason, the rotary reamer body, familiar to the trade from exploitation of other inventions of this petitioner, cannot be used at every pipe joint in a drill stem and is not used as a coupling even when it is used at one or two points in the stem. The rotary reamer body

heretofore used presents projections which do not permit of the use of the cutting shoe as does the coupling of the present invention.

This invention provides a tool joint or coupling of proven merit, embodying all the strength, economy and usefulness of the well known commercial forms, and adds thereto a large water or fluid passage of novel design, and by the provision of non-abrasive rollers seated and retained within the body in the novel manner set forth, prevents all wear caused by contact of the tool body and the casing in the well. This invention does not interfere in any way with the circulation of fluid.

The "overshot" or cutting shoe will pass over the coupling of this invention as readily as over the usual type tool joints, there being no projecting lugs.

Figures 5, 6, 7, 8 and 9 illustrate a modification of the roller mounting and details of the roller. The tool joint body 1 may be forged with a recess 1a in its side and the holes a and b drilled to receive the shank 7a of a yoke or collar 7 surrounding the reduced end 4a of the roller. The shank may be welded to the body. The roller 4 may be of any yieldable non-abrasive material, preferably rubber, and reinforced by a steel core 4b which may be one piece or made of several wires 4c held in relative position by discs 4d the wires passing thru holes 4e drilled therein as illustrated in Figs. 8 and 9. The wires may be crimped as shown in Fig. 8 and held by the spacer discs 4d.

I claim:

1. A coupling member for rotary drill stem sections having recesses formed therein, rollers mounted in said recesses and projecting outwardly therefrom, said rollers being held in place by sheet metal clip members having crimped edges seated and secured in grooves formed in the body of the coupling member said clips being free from projecting lugs and having a rounded surface.

2. A coupling member for earth boring rotary drill stem sections having slots through its wall communicating with a central bore, recesses at the ends of said slots, rollers in the slots and having reduced ends bearing in said recesses, smooth surfaced clip members having crimped edges secured in grooves formed in the coupling body, said clip members engaging said reduced ends of the rollers and holding the rollers in place, said rollers being substantially within and extending slightly beyond the surface of said coupling body to engage the casing.

3. A coupling member according to claim 2 in which said central bore in the coupling member is larger at one end and presents a shoulder at the juncture of the larger and smaller portions, and a pipe inserted in the enlarged portion of the bore and secured in engagement with said shoulder with interposed packing, the bore of the pipe being equal to the smaller of the bores of the coupling member, said pipe closing the communication between said slots and said central bore.

4. A non-abrasive roller for hollow drill stem sections of earth boring apparatus said roller having metal reinforcement wires extending longitudinally therein to give stiffness and retain the roller shape under working pressures, and bracing elements for said wires spaced from each other longitudinally thereof and engaging the wires to retain the wires evenly distributed in the roller.

5. Means retaining a non-abrasive roller within a section of a hollow rotary drill stem of earth boring apparatus, including a member having a portion lying across a reduced part of the roller and another portion for attachment to the cylindrical surface of the said section of stem, said member being free from lug projections beyond the line of the body of the said section and lying with its side adjacent the said cylindrical surface.

6. A non-abrasive roller for drill stem sections of earth boring apparatus, said roller being of yieldable, non-abrasive material and reinforced by metal wires held together by spaced apart discs having holes through which the wires pass.

7. A coupling member for rotary drills comprising a tubular body formed with slots intermediate its length and recesses at ends of the slots, rollers in said slots having pintles at their ends received in said recesses, said rollers projecting outwardly from the slots, and retainer plates for said rollers fitting flat against said body with portions extending across the recesses to retain the pintles therein.

8. In combination with a hollow rotary drill stem section of earth boring apparatus, a non-abrasive roller within the wall of said stem, said roller having a metal core, the ends of which lie in seats in the wall of said hollow section.

9. A coupling member for hollow drill stem sections having a central fluid passage and having also a laterally open recess for the insertion therein of a guard member, a non-abrasive roller inserted in said recess and serving as said guard member, said roller having its ends engaged by the coupling member, and under load contacting a wall of said coupling member lying between it and the fluid passage through said coupling.

10. A hollow coupling member for earth boring rotary drill stem sections free from annular grooves and having individual recesses spaced apart around the periphery of said coupling with said recesses extending lengthwise of the coupling and each of said recesses opening out through the periphery of the said coupling, and guard means consisting of elongated rollers of non-abrasive material mounted individually in said recesses and projecting slightly therefrom to prevent contact of the coupling member with the surrounding casing, the periphery of the coupling at points between said recesses being free from projections thereby affording space between said coupling and the well casing for the upflow of flushing fluid, substantially as described.

CLARENCE E. REED.