Jan. 15, 1952 J. R. YANCEY ET AL 2,582,403

DEFLECTOR CLEANSING DEVICE

Original Filed Dec. 17, 1945 2 SHEETS—SHEET 1

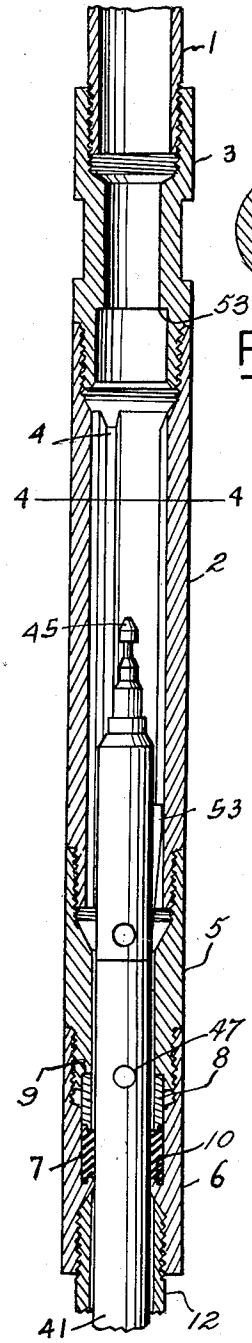


Fig. 1.

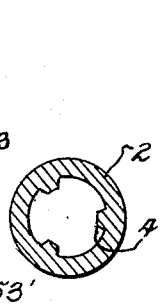


Fig. 4.

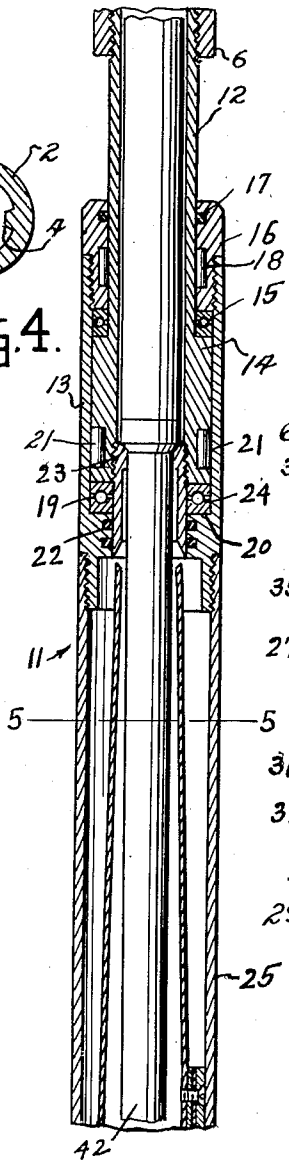


Fig. 2.

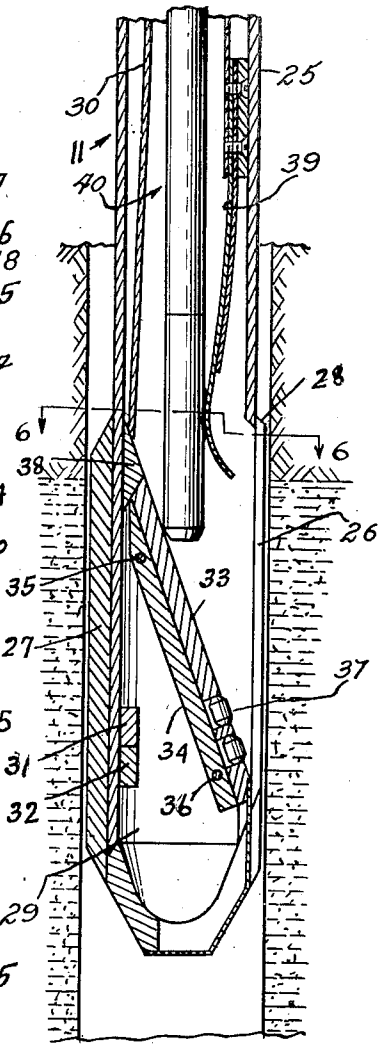


Fig. 3.

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DEFLECTOR CLEANSING DEVICE

Original Filed Dec. 17, 1945 2 SHEETS—SHEET 2

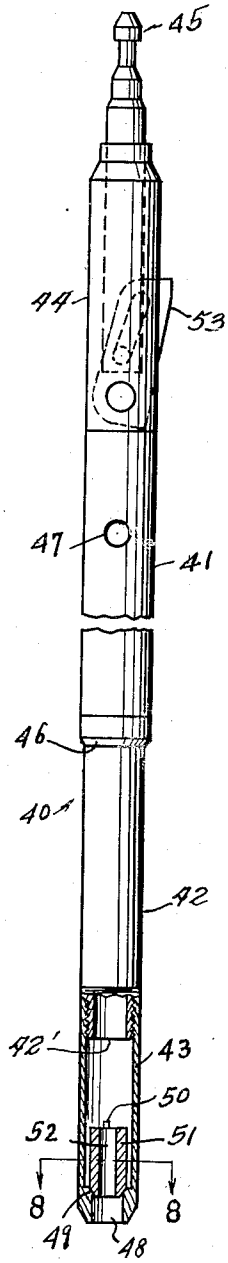


Fig. 7.

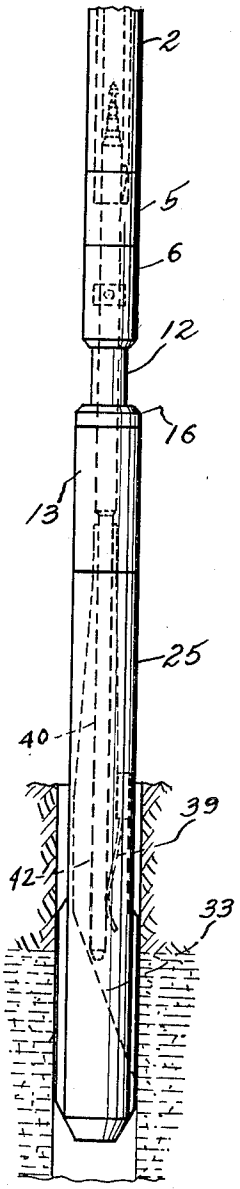


Fig. 9.

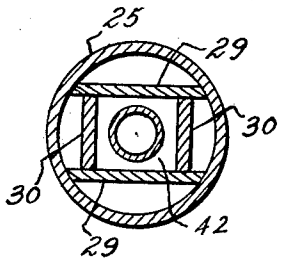


Fig. 5.

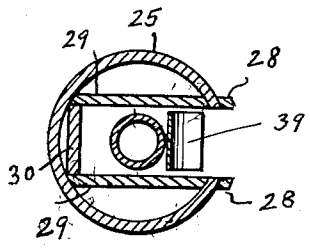


Fig. 6.

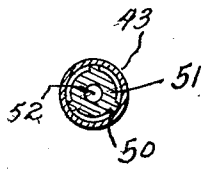


Fig. 8.

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DEFLECTOR CLEANSING DEVICE

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Original application December 17, 1945, Serial No. 636,936, now Patent No. 2,558,227, dated June 26, 1951. Divided and this application July 21, 1947, Serial No. 762,258

3 Claims. (Cl. 255—1.4)

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This invention relates to a deflector cleansing device and has been particularly designed to be lowered through a string of pipe in a well bore to cleanse the deflector preparatory to taking a side wall sample.

This application is a divisional application having been divided out of our co-pending application for Side Wall Core Taking Apparatus filed in the U. S. Patent Office December 17, 1945, under Serial No. 636,936 which issued as Patent 2,558,227, June 26, 1951.

An object of the invention is to provide a tool of the character described which may be lowered into a well pipe to a selected location above a core barrel deflector in the pipe and which includes a novel type of washing nozzle whereby clogging material may be removed from the deflecting face of a whip stock, or other deflector, preparatory to lowering the core taking device into the well and thereby assuring proper functioning of the core taking apparatus.

It is another object of the invention to provide a tool of the character described which is of very simple construction and which may be lowered into, and removed from, the well by the same equipment used for handling the core taking apparatus.

Other objects and advantages will be apparent from the following specification and illustrated by the accompanying drawings, wherein:

Figures 1, 2 and 3 are upper, intermediate and lower sections of the tool as applied in use in a well pipe.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a cross-sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a cross-sectional view taken on the line 6—6 of Figure 3.

Figure 7 is a side view, partly in section, of the deflector cleansing device.

Figure 8 is a cross-sectional view thereof taken on the line 8—8 of Figure 7, and

Figure 9 is a side view showing the deflector cleansing device in position and in dotted lines.

Referring now more particularly to the drawings wherein like numerals of reference designate the same parts in each of the figures, the numeral 1 designates a tubular drill stem which extends to the ground surface. The lower end of the drill stem is formed with a special tubular driving section 2 which may be connected thereto by a coupling 3. The section 2 has a plurality of inside longitudinal ribs 4 extending from the

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upper to the lower ends thereof and spaced apart.

Connected to the lower end of the section 2 there is an inwardly thickened reducing nipple 5 and connected to the lower end of the nipple 5 there is a coupling 6 which contains an annular seal ring 7 for a purpose to be hereinafter explained. Between the nipple 5 and the coupling 6 there is an inside gland 8 which breaks the joint between them. One end of this gland abuts the opposing end of the seal ring 7 and its other end abuts an inside annular shoulder 9 in the nipple 5. The opposite end of the seal ring 7 abuts an annular shoulder 10 in the coupling 6 so that when the coupling 6 is screwed onto the nipple 5 the seal ring 7 will be placed under the required compression. The passageway through the above described assembly of the nipple 5 and coupling 6 is of substantially the same inside diameter throughout.

It is to be understood that this washing tool may be used for washing any type of whip stock or deflector, but in the present illustration a special type of whip stock is shown which is designated generally by the numeral 11. It has a swivelling connection with the drill stem. This connection is formed between the tubular nipple 12 whose upper end is connected to the coupling 6, and the tubular housing 13 whose lower end is connected to the whip stock 11. The lower end of the nipple 12 extends into the housing 13 and within said housing is enlarged forming the external annular upwardly facing shoulder 14 which supports an anti-friction bearing assembly 15 which, in turn, is retained in place by the gland 16 which is screwed into the upper end of the housing 13. Countersunk into the gland 16 and surrounding the nipple 12 is a seal ring 17 and beneath said seal ring there are the roller bearings 18 mounted in the gland around the nipple 12. The lower end of the nipple 12 is supported on the anti-friction bearing assembly 19 which, in turn, is supported on an inside annular shoulder 20 formed by the inwardly thickened lower end of the housing 13. Adjacent the lower end of the nipple 12 and between the same and said housing there are the radial roller bearings 21 which are countersunk into said nipple and countersunk into the inwardly thickened lower end of the housing there are the annular seal rings 22.

Screwed into the lower end of the nipple 12 there is an annular stop, or seat, 23 which has a depending sleeve 24 which extends down through, and forms seals with, the seal rings 22,

An efficient swivel connection is thus formed between the drill stem and the whip stock whereby the latter is supported in the well by the former.

The whip stock as a whole is shown in detail in Figures 2, 3, 5 and 6. It comprises a tubular shell 25 whose lower end is downwardly tapered and above said taper is provided with a longitudinal side slot 26 which extends to said lower end.

Secured on the outside of the shell opposite said slot there is a longitudinal rib 27 and on opposite sides of the slot there are the longitudinal ribs 28, 28 which are secured to the outer side of the shell. These ribs 27 and 28 engage the formation of the well bore to hold the whip stock centered in the well bore.

Within the shell 25 there is a guide which is rectangular in cross-section as shown in Figure 5. This guide is fitted downwardly within the shell and is composed of side plates 29, 29 whose margins are bevelled to fit within the shell, and the cross plates 30, 30. The plates 29 and 30 are secured together, preferably, by welding. This guide is preferably flared downwardly as indicated in Figures 2 and 3. The plates 29 carry a transverse stop 31 which rests on the corresponding stop 32 to support the guide in the shell. Within the guide, and arranged at the lower end thereof, is a deflector plate assembly comprising the upper plate 33 which is mounted on the lower plate 34. This assembly is arranged opposite the slot 26 and declines forwardly. It is suppported by the transverse upper and lower pins 35 and 36 which extend transversely through the lower plate 34 and whose ends are anchored to the respective side plates 29. The upper face of this plate assembly is provided with the roller bearings, as 37, as illustrated in Figure 3. At the upper end of the plate assembly there is secured in the guide a transverse filler block 38 which is triangular in vertical cross-section and whose upper face is approximately flush with the upper face of the deflector plate assembly, as also shown in Fig. 3.

Anchored to the front plate 30 of the guide, above the slot 26, there is a spring 39 whose lower end is free and is outwardly turned.

The construction hereinabove described forms no part of the present invention but has been shown and described in order to better disclose the use and operation of the deflector cleaning device, it being understood that said cleaning, or washing, device can be advantageously used with any type of whipstock or deflector.

In operation for taking the core, or sample, from the side wall of the bore it is desirable and sometimes necessary to wash off the deflecting face of the whipstock such as the deflector plate 33, to relieve it of clogging material. For that purpose a nozzle pipe 40 has been provided, as shown in Figure 7. It may be composed of the upper and lower sections 41 and 42 to the lower end of the latter of which the tubular nozzle 43 is connected. Attached to the upper end of the section 41 there is a head 44 whose upper end carries a knob 45 which may be engaged by a conventional grapple, carried by a wire line, and by means of which the nozzle pipe may be lowered down through and withdrawn from the operating string. When it lands in home or washing position the external stop 46 thereof will rest on the internal stop 23 of said string. The nozzle pipe has an inlet opening 47 through which fluid may be forced from the operating string into the interior of the pipe

and on down through it onto the deflector to wash the same clean.

The lower end of the nozzle pipe has a nozzle opening 48 and above it has an inside annular seat 49. Above the seat there is a nozzle sleeve 51 having a restricted axial passageway 52 therethrough and also having external longitudinal spacer ribs 50. The sleeve 51 normally rests on the seat 49 but as the nozzle pipe is lowered through the operating string, which is filled with drilling fluid, the sleeve 51 is lifted from its seat so as to provide a passageway for the fluid around the sleeve 51 as well as through it thus increasing the capacity for the inflow of the fluid. The upper ends of the spacer ribs 50 extend above the sleeve 51 for engagement with the shoulder 42' formed by the lower end of section 42 to space the sleeve from such shoulder and permit liquid to flow around, as well as through, the sleeve 51 as the nozzle pipe is lowered through the drill string. When the nozzle pipe 40 has landed on home position with the stop 46 resting on the seat 23 and with the nozzle opening just above the deflector the fluid in the spring f may be subjected to pressure by a pump at the ground surface and the fluid will be forced under pressure down through the restricted passageway 52 which will increase its velocity and it will be forced under high pressure and at high velocity against the deflecting face and will cleanse the same of all obstructing matter preparatory to lowering the core taking device. The pressure of the spring 39 will hold the nozzle pipe 40 inwardly and at or near the upper end of the deflecting face during this cleansing operation.

The nozzle pipe may have a retractable latch 53 which is engageable under a shoulder 53' in the operating string to limit upward movement of the nozzle pipe in the string. This latch 53 is operatively connected with the knob 45 so that upon an upward pull of the knob by the wire line the latch will be released to permit withdrawal of the nozzle. This latch mechanism is of conventional construction and is well illustrated in U. S. Patent No. 2,285,024, to J. B. Ferguson, dated June 2, 1941.

The drawings and description are illustrative merely while the broad principle of the invention will be defined by the appended claims.

What we claim is:

1. A deflector cleaning device for use with side wall sampling apparatus adapted to be attached to a tubular operating string and having a sampler deflector and an inside seat above the deflector, said device comprising: a nozzle pipe adapted to be lowered through the string into the apparatus and having an external shoulder adapted to seat on said seat to locate the lower end of said pipe, at its lowermost position, immediately above the deflector, said pipe having an inlet opening above said external shoulder; a tubular nozzle on the lower end of said nozzle pipe having a nozzle opening and an inside seat around said opening; a tubular element within the nozzle movable downwardly into engagement with said inside nozzle seat and having a central restricted orifice for directing a jet of fluid through said opening toward the deflector, portions of the outer wall of said element being spaced from the inner wall of said nozzle to provide a passage therebetween and said element being movable upwardly under the influence of exterior pressure, whereby when fluid passes upwardly through said nozzle it flows through said passage as well as through said orifice for an increased volume

of flow; and means within said nozzle engageable by said element for limiting the upward movement of the latter while permitting said increased volume of flow.

2. A deflector cleaning device for side wall sample taking apparatus adapted to be attached to a tubular operating string and having a downwardly inclined sampler-deflecting surface therein and an upwardly facing inside seat for the sampler above said surface, said device comprising: a nozzle pipe adapted to be lowered through the string into the sample taking apparatus and having an external shoulder for engagement with the inside seat to locate the lower end of said pipe, at its lowermost position, immediately above the sampler-deflecting surface, said pipe being adapted to receive pressure fluid through the string; a nozzle on the lower end of said pipe having a discharge opening provided with an upwardly facing inside seat; an inwardly movable element within said nozzle normally seating on said nozzle seat and having a restricted discharge orifice therethrough for directing a jet of fluid through said nozzle opening toward the sampler-deflecting surface, said element being of smaller cross-sectional area than the interior of said nozzle minus the area of said orifice and being unseatable by exterior pressure to effect an increased volume of flow through said nozzle when fluid passes upwardly therethrough; and means within said nozzle engageable by said element to limit the inward movement thereof while permitting said increased volume of flow, whereby when said nozzle pipe and nozzle are lowered through the operating string said element is unseated to permit an increased volume of flow upwardly through said pipe and nozzle.

3. The combination with side wall sample taking apparatus adapted to be attached to a tubular operating string and having a downwardly inclined sampler-deflecting surface therein and an upwardly facing inside seat for the sampler above said surface of a nozzle pipe having an external shoulder for engagement with said seat, an inlet opening above said shoulder, and a lower end adapted to be positioned immediately above said deflecting surface when said shoulder and seat are engaged, a nozzle on said lower end having a discharge opening provided with an inwardly-facing inside seat, an inwardly-movable element normally seated on said seat and having a restricted discharge orifice therethrough for directing a jet of fluid through said opening toward said deflecting surface, said element being unseatable by exterior pressure and being of smaller cross-sectional area than the interior of said nozzle minus the area of said orifice to permit an increased volume of flow upwardly through said nozzle, and cooperating means on said nozzle and said element to limit the inward movement of said element while permitting said increased volume of flow.

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