

Dec. 30, 1941.

G. T. OBERWETTER

2,268,514

SIDE WALL CORE TAKING APPARATUS

Filed July 15, 1940

2 Sheets-Sheet 1

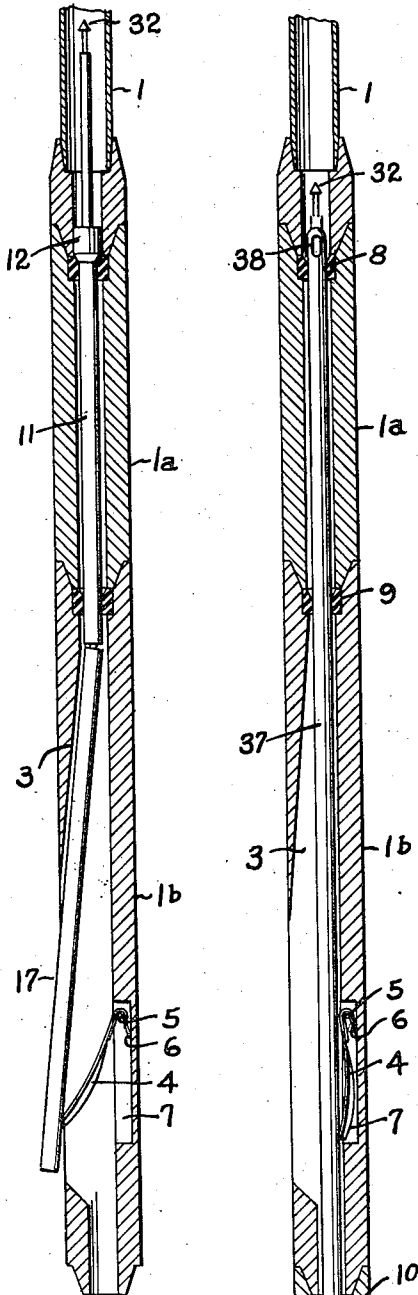


Fig. 1.

Fig. 2.

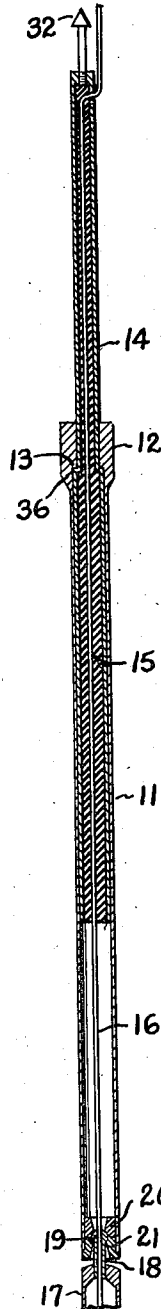


Fig. 3.

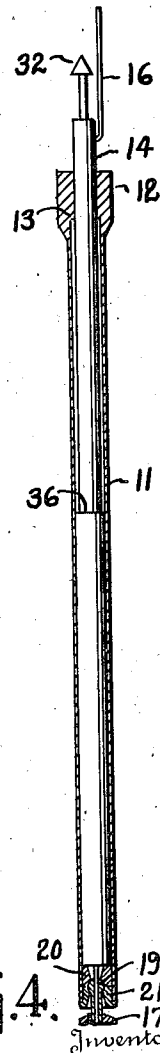


Fig. 4.

GEORGE T. OBERWETTER

E. V. Hardway
Attorney

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2 Sheets-Sheet 2

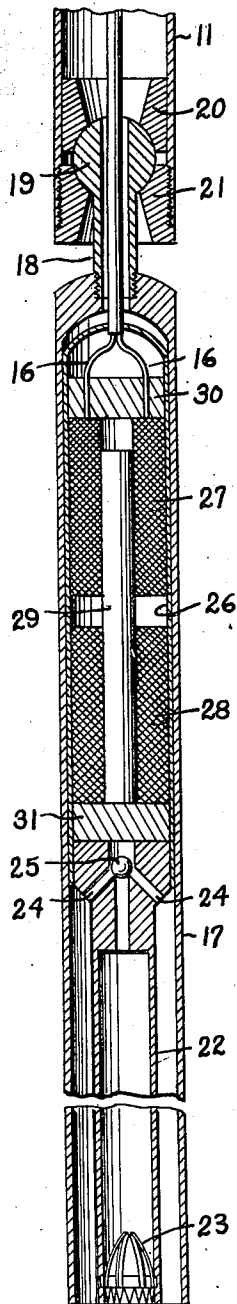


Fig. 5.

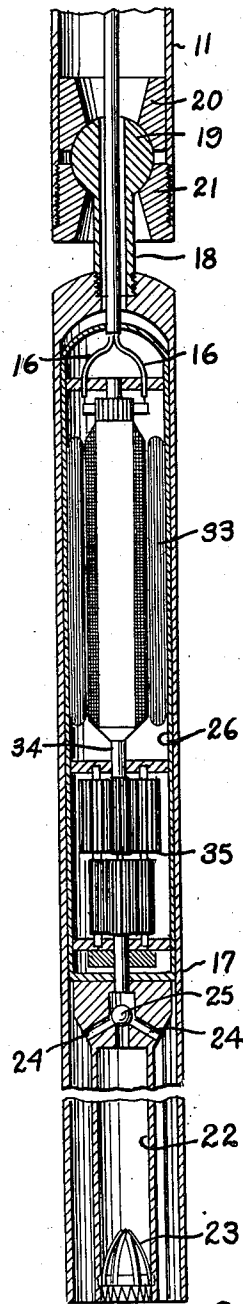


Fig. 6.

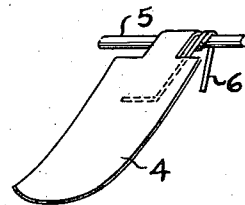


Fig. 7.

Inventor
GEORGE T. OBERWETTER

By E. V. Hardway
Attorney

UNITED STATES PATENT OFFICE

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SIDE WALL CORE TAKING APPARATUS

George T. Oberwetter, Houston, Tex., assignor of
two-thirds to Nell West, Harris County, Tex.

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13 Claims. (Cl. 255—1.4)

This invention relates to a side wall core taking apparatus.

An object of the invention is to provide apparatus of the character described which may be lowered through a drill stem and projected out through a guide in the stem and into the formation at the side of the bore and which includes a core receiving barrel to receive and entrap a core, or sample, of the side wall formation, said apparatus being withdrawable through the stem to the ground surface for the recovery and inspection of the core.

It is another object of the invention to provide a side wall core taking device which includes a core receiving barrel and a guide, or shield therefor, said apparatus including means for forcing the core barrel out of the shield and into the formation at the side of the bore being drilled.

It is a further object of the invention to provide in apparatus of the character described novel means for driving the core barrel whereby it may be caused to pierce the formation at the side of the bore and form a core of said formation which will enter and be trapped within the core barrel.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, examples of which are given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a side elevation of the apparatus shown mounted in the stem, a fragmentary view of the latter being shown partly in section.

Figure 2 shows a fragmentary, vertical, sectional view of the drill stem showing a fluid conducting pipe therein for use when the core taking apparatus is removed.

Figure 3 shows a vertical sectional view of a tubular anchor employed showing the cable guide therein in its upper position.

Figure 4 shows a similar view showing said guide in its lower position.

Figure 5 shows a fragmentary, vertical, sectional view illustrating the core barrel guide or shield with the core barrel therein and the driving mechanism for the barrel.

Figure 6 shows a similar view illustrating another type of barrel driving mechanism, and

Figure 7 shows a perspective view of the deflector.

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 the drill stem which is made up of sections and which extends to the ground surface.

Incorporated into the stem the required distance above the drill are the special, relatively thick, upper and lower sections 1a, 1b to the lower end of the latter of which there is connected a drill collar 2 providing for the attachment of the drill to the stem.

The drill stem is tubular throughout and at one side of the section 1b there is an elongated downwardly flared slot leading downwardly and outwardly from the passage through the stem. At the lower end of the slot there is a deflector 4 whose upper end is mounted to pivot on the pin 5. A spring 6 is mounted on the pin 5 one arm of which presses against the inside of the section 1b and whose other end engages behind the deflector 4 and normally holds the same in its outward or deflecting position. A recess 7 is provided within the section 1b to receive the deflector 4 when the latter is in retracted position as shown in Figure 2. The joints between the sections of the thickened portion of the drill stem may be sealed by annular packing such as 8, 9 and 10.

The numeral 11 designates an elongated, sleeve-like anchor whose upper end is enlarged forming the head 12 which tapers downwardly and is seated against and supported by the packing 8 when the apparatus is lowered to home position in the stem. The head 12 has an inside, downwardly facing shoulder 13.

Telescoped within the anchor 11 there is a cable guide which is preferably formed of an outside tubular jacket 14 and an inside core 15 preferably formed of insulating material. Electrical conductors 16, 16 extend axially through the cable guide and continue on up to the ground surface.

The numeral 17 designates a barrel guide, or shield, which is tubular in form and which is open at its lower end. Its upper end has a universal connection with the anchor 11 as shown in Figures 3 to 6, inclusive. This connection is formed by the tubular stem 18 connected to the upper end of the shield and whose upper end is formed with a ball joint member 19 confined within a socket formed within the glands 20, 21 in the lower end of the anchor 11. The conductors 16 extend through said joint connections as shown.

With the shield 17 there is a core barrel 22 whose lower end may be serrated, if desired,

forming a core drill and within said lower end there is a conventional core catcher 23 to retain the core which enters the barrel. The upper end of the barrel has the outlets 24 controlled by the upwardly opening ball valve 25 so as to permit the escape of any foreign matter in the core barrel as the core enters. In the form shown in Figure 5 there is an electro-magnetic hammer embodying the tubular housing 26 within which there are the upper and lower electro-magnets 27, 28 containing the slidable core 29 and having the upper and lower anvils 30, 31. The electrical conductors 16 are connected to the respective electro-magnets and it is contemplated that at the ground surface the conductors 16 will be controlled by an intermitter whereby the electro-magnets may be alternately energized and de-energized so as to oscillate the hammer 29 against the anvils. The core barrel is connected to the lower end of the housing 26 so that when the apparatus is lowered into the well as shown in Figure 1 and the cable through which it is lowered released or slacked off, the core barrel and the hammer will be released to the influence of gravity. The lower end of the shield 17 will engage against the side-wall of the bore as indicated in Figure 1 and the shield will serve as a guide to guide the core barrel into the wall. The operation of the hammer combined with the influence of gravity will cause the core barrel to penetrate the wall of the bore downwardly in a direction alongside the bore but diverging slightly downwardly and outwardly from the bore so as to enter the formation. The core of the formation will thus be formed which will enter the core barrel and be entrapped therein. The vibration imparted to the core barrel by the hammer combined with the force of gravity will gradually force the core barrel downwardly but said vibration will prevent it from sticking in the formation so that it cannot be withdrawn.

The operating cable has not been shown but it may be of any conventional type provided with a grapple for engaging over the conical shaped head 32 carried by the upper end of the jacket 14.

In the illustration shown in Figure 6 there is an electric motor 33 located in the housing 26 whose windings are connected with the conductors 16 and which has a driven shaft 34 operatively connected with the corresponding core barrel 22 through the reduction gearing 35 whereby said core barrel may be rotated. When this form of the apparatus is lowered to home position in the drill stem a switch at the ground surface may be closed for connecting the conductors 16 with a source of electrical supply whereupon the motor 33 will be driven and the core barrel 22 rotated. As the operating cable is slackened off the motor and core barrel will move downwardly through the guide 17 and the core barrel will penetrate into the formation at the side of the bore forming a core which will enter and be entrapped in the core barrel. In both forms as the core barrel moves downwardly the cable guide 14, 15 will move downwardly with it until said guide lands on the gland 20.

When it is desired to withdraw the core barrel, of either form, the operating cable may be pulled upwardly until the external, annular shoulder 36 on the cable guide engages the shoulder 13 whereupon the entire apparatus may be withdrawn from the well and drilling proceeded with.

However, before proceeding with drilling a fluid

conducting pipe 37 should be lowered into the drill stem. It will pass through the upper and lower bearings 8 and 9 and its lower end will force the deflector 4 inwardly or into retracted position as shown in Figure 2 and the lower end of the pipe 37 will finally land on the packing 10. The upper end of this pipe 37 has suitable inlets 38 above the packing 8. The drilling fluid will therefore be conducted through the pipe 37 and on downwardly through the drill stem and will not pass outwardly through the slot 3.

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

What I claim is:

1. The combination with a tubular driving member for a well drill having a guideway therein, of a core taking device adapted to be dropped through the driving member and including a tubular shield and a core receiving barrel in the shield, a deflector arranged to deflect said core taking device through the guideway and means for projecting the barrel from the shield into the side wall of a well bore.

2. The combination with a tubular driving member for a drill having a guideway, a support in the driving member, a core taking device adapted to be dropped through said driving member and to land on, and be supported by, said support, said core taking device including a movably mounted shield and a core barrel in the shield, a deflector effective to deflect the shield through said guideway, said core barrel being movable downwardly relative to the shield and being adapted to penetrate into the wall of a well bore upon such downward movement to entrap a core.

3. The combination with a tubular driving member for a drill having a guideway, a support in the driving member, a core taking device adapted to be dropped through said driving member and to land on, and be supported by, said support, said core taking device including a movably mounted shield and a core barrel in the shield, a deflector effective to deflect the shield through said guideway, said core barrel being movable downwardly relative to the shield and being adapted to penetrate into the wall of a well bore upon such downward movement and to entrap a core and means for withdrawing said core taking device and the entrapped core from the driving member.

4. The combination with a tubular driving member for a well drill shaped to be lowered into a well and having a guideway and a support above the guideway, of a core taking device shaped to be dropped through the driving member and to land on the support and including a tubular shield and a core barrel within the shield, a deflector below the guideway arranged to deflect the core taking device laterally from the driving member through the guideway and means within the shield in operative connection with the core barrel and effective to cause the core barrel to penetrate the formation at the side wall of the bore to form a core within the core barrel.

5. The combination with a tubular driving member for a drill having deflecting means, of a core taking device shaped to drop through the driving member, a support in the driving member arranged to receive and support said core taking device, said core taking device including a movably mounted shield and a core barrel therein arranged to be deflected by the deflecting

means into engagement with the side wall of the bore, said core barrel being movable downwardly relatively to the shield to penetrate the side wall of the bore and to entrap a sample thereof.

6. The combination with a tubular driving member for a drill having deflecting means, of a core taking device shaped to drop through the driving member, a support in the driving member arranged to receive and support said core taking device, said core taking device including a movably mounted shield and a core barrel therein arranged to be deflected by the deflecting means into engagement with the side wall of the bore, said core barrel being movable downwardly relative to the shield to penetrate the side wall of the bore and to entrap a sample thereof and means within the shield operatively connected with the core barrel for assisting such further downwardly movement of the core barrel.

7. A core taking device comprising a tubular driving member for a drill shaped to be lowered into a well bore and having a lateral guideway, core entrapping means shaped to be dropped through the driving member and to be directed through the guideway into the wall of a bore to form and entrap a core of the wall formation, said core entrapping means being withdrawable through the driving member and a tube adapted to close said guideway and to form a continuation of the liquid conducting conduit through the driving member.

8. A core taking device comprising a tubular driving member for a drill shaped to be lowered into a well bore and having a lateral guideway, core entrapping means shaped to be dropped through the driving member and to be directed through the guideway, said core entrapping means including a tubular anchor, a tubular shield having a pivotal connection with the anchor, a core barrel within the shield and movable downwardly relative to the shield to penetrate the side wall of the bore and to entrap a core of the side wall formation.

9. A core taking device comprising a tubular driving member for a drill shaped to be lowered into a well bore and having a lateral guideway, core entrapping means shaped to be dropped through the driving member and to be directed through the guideway, said core entrapping means including a tubular anchor, a tubular shield having a pivotal connection with the anchor, a core barrel within the shield and movable downwardly relative to the shield to penetrate the side wall of the bore and to entrap a core of the side wall formation, means mounted in the anchor for limiting said relative movement of the bore barrel, said means being engageable with the anchor for withdrawing the core taking device.

10. A core taking device comprising a tubular driving member for a drill shaped to be lowered into a well bore and having a lateral guideway, core entrapping means shaped to be dropped through the driving member and to be directed through the guideway, said core entrapping

means including a tubular anchor, a tubular shield having a pivotal connection with the anchor, a core barrel within the shield and movable downwardly relative to the shield to penetrate the side wall of the bore and to entrap a core of the side wall formation, means mounted in the anchor for limiting said relative movement of the core barrel, said means being engageable with the anchor for withdrawing the core taking device and forming a connection for an operating cable whereby the core taking device may be withdrawn from the driving member.

11. A core taking device comprising a tubular driving member for a drill shaped to be lowered into a well bore and having a lateral guideway, core entrapping means shaped to be dropped through the driving member and to be directed through the guideway, said core entrapping means including a tubular anchor, a tubular shield having a pivotal connection with the anchor, a core barrel within the shield and movable downwardly relative to the shield to penetrate the side wall of the bore and to entrap a core of the side wall formation, means mounted in the anchor for limiting said relative movement of the core barrel, said means being engageable with the anchor for withdrawing the core taking device, and an electrically operable means within the shield, operatively connected with the core barrel for assisting the downward movement of the core barrel relative to the shield.

12. A core taking device comprising a tubular driving member for a drill shaped to be lowered into a well bore and having a lateral guideway, core entrapping means shaped to be dropped through the driving member and to be directed through the guideway, said core entrapping means including a tubular anchor, a tubular shield having a pivotal connection with the anchor, a core barrel within the shield and movable downwardly relative to the shield to penetrate the side wall of the bore and to entrap a core of the side wall formation and an electrically operable hammer within the shield operatively connected with the core barrel for assisting the downward movement of the core barrel relative to the shield.

13. A core taking device comprising a tubular driving member for a drill shaped to be lowered into a well bore and having a lateral guideway, core entrapping means shaped to be dropped through the driving member and to be directed through the guideway, said core entrapping means including a tubular anchor, a tubular shield having a pivotal connection with the anchor, a core barrel within the shield and movable downwardly relative to the shield to penetrate the side wall of the bore and to entrap a core of the side wall formation and an electrically driven motor within the shield geared to the core barrel for rotating the same upon said downward movement of the core barrel relative to the shield.

GEORGE T. OBERWETTER.