CROSS REFERENCE SEARCH ROOM

Aug. 12, 1958 R. L. HALBROOK ET AL 2,847,075

TOOL AND GUIDE THEREFOR

Filed June 13, 1956

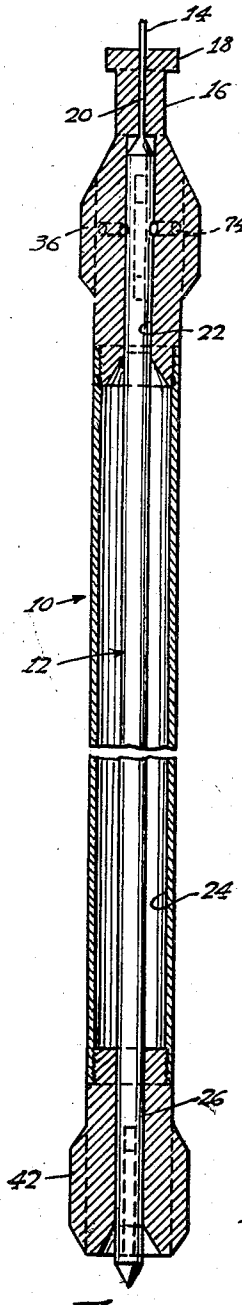


Fig. 1.

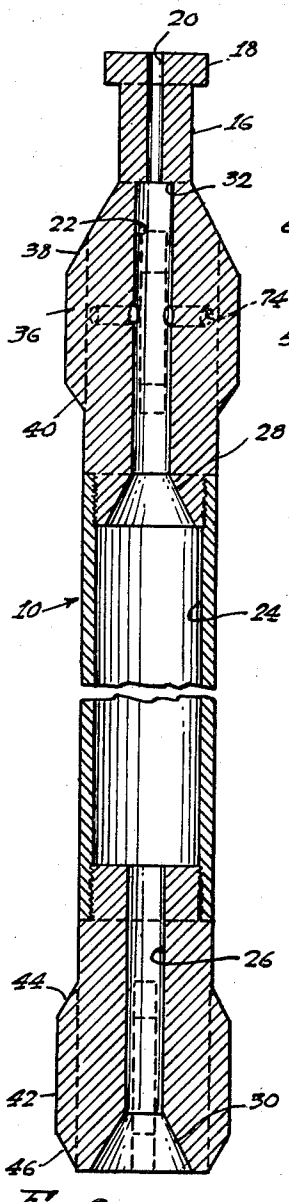


Fig. 2.

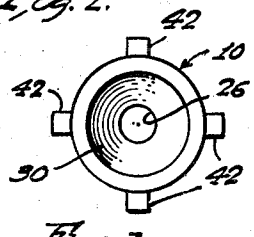


Fig. 3.

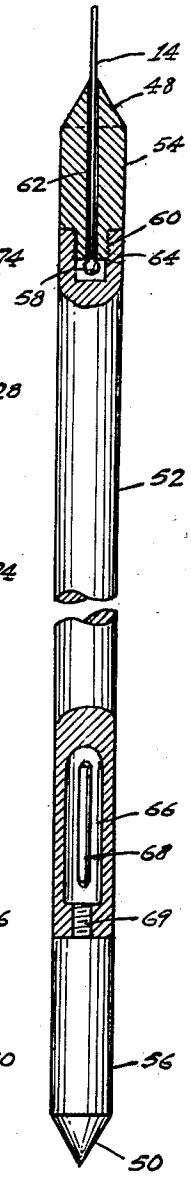


Fig. 4.

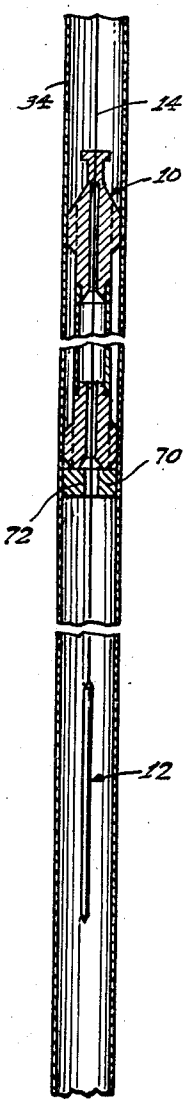


Fig. 5.

INVENTORS.
Ramon L. Halbrook
Marion S. Harris And
Kenneth S. Kennerly.
BY
Owen Cook
ATTORNEY.

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TOOL AND GUIDE THEREFOR

Raymon L. Halbrook, Marion S. Harris, and Kenneth S. Kennerly, Odessa, Tex., assignors to Gulf Oil Corporation, Pittsburgh, Pa., a corporation of Pennsylvania

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8 Claims. (Cl. 166—241)

This invention pertains to new and useful improvements in guide means, and more particularly relates to a tool and guide means therefor by which the tool can be lowered and threaded through a central opening in an obstruction in tubing.

Broadly, the invention involves a vertically elongated guide having a vertical passageway extending entirely therethrough with such guide including means for maintaining the passageway concentric with a tubing in which the guide is disposed. A tool which is to be guided through a central opening in an obstruction in the tubing is disposed within the passageway and is free for vertical movement downwardly from the guide; however, the passageway is restricted adjacent its upper end in such a manner that vertical movement of the tool upwardly from the guide is prevented. A flexible supporting element is secured to the upper end of the tool and extends upwardly from the guide through the restricted passageway. Such construction permits both the guide and the tool to be supported by the flexible supporting element and thereby lowered in the tubing until the guide engages upon and is supported by the obstruction in the tubing, whereupon the tool which is properly aligned with the opening in the obstruction passes freely downwardly through the opening to whatever depth desired.

Another aspect of the invention involves the guide being provided with means for by-passing fluids vertically, so that free vertical movement of the guide and the tool contained therein through the tubing is not prevented by fluids contained in the tubing, and so that the free flow of fluids in the tubing is not prevented by the guide and the tool.

The invention will be best understood in the light of the following description of a preferred embodiment of the invention taken together with the accompanying drawings illustrative of such embodiment of the invention, wherein:

Figure 1 is a broken longitudinal sectional view of the guide with the tool being shown therein in elevation;

Figure 2 is an enlarged broken longitudinal sectional view of the guide;

Figure 3 is a bottom end view of the guide;

Figure 4 is a broken elevational view, partly in section, of the tool on a larger scale than that used in Figures 2 and 3; and

Figure 5 is a reduced and broken sectional view illustrating the use of the tool and guide in tubing.

Referring now to the drawings, there is indicated generally at **10** a guide in which there is positioned a tool indicated generally at **12**. As illustrated in Figure 1, the tool **12** is supported upon an elongated flexible supporting element such as a wire line **14**, the guide **10** being in turn supported upon the tool **12**. Before proceeding with a detailed description of the enlarged views of the guide **10** and the tool **12** shown in Figures 2, 3, and 4, inclusive, it is to be understood that throughout the specification and in the claims, the word "tool" is meant to include all such devices normally referred to as tools in the usual

sense, where such tools possess certain essential external physical characteristics hereinafter to become apparent, and in addition, the word "tool" is also meant to include instruments or housings for instruments having the same external physical characteristics. For example, the tool **12** can be a housing for a measuring instrument or a source of penetrating radiations such as neutrons or gamma rays.

Attention is now directed to the enlarged illustrations of the guide **10** shown in Figures 2 and 3, wherein it will be seen that the guide **10** comprises an elongated, generally cylindrical tubular member of sectional character, as shown, and preferably formed of steel. Adjacent its upper end, the guide **10** has relatively reduced and enlarged portions **16** and **18**, respectively, that constitute a fishing neck, whereby the guide **10** can be easily retrieved in the event a fishing operation becomes necessary.

The guide **10** is provided with a vertical passageway that extends entirely therethrough, such passageway comprising four principal portions that are designated by the numerals **20**, **22**, **24** and **26** in the drawings. The passageway is circular in cross section throughout its entire length with the longest portion **24** thereof being substantially greater in diameter so that the overall weight of the guide **10** is reduced. As will be appreciated presently, the passageway portions **20** and **24** need not be circular in cross section, though such configuration is preferred for convenience in fabrication.

The passageway portions **22** and **26** are of equal diameters so that the wall thickness of the guide **10** is greater adjacent the passageway portions **22** and **26** affording greater strength for guiding means subsequently to be described. The lower extremities of each of the passageway portions **22** and **26** is downwardly flared or tapered as indicated at **28** and **30**, respectively, for a purpose that will presently become apparent.

The passageway portion **20** is substantially smaller in diameter than the other portions of the passageway, being only sufficiently large in diameter to permit free sliding movement of the supporting line **14** therethrough, with the passageway portion **20** constituting a restriction in the passageway and defining at its juncture with the passageway portion **22** an annular shoulder **32**.

Means is provided for maintaining the central axis of the passageway through the guide **10** concentric with that of a tubing **34** (see Figure 5) in which the guide **10** is vertically movable. Such means preferably takes the form of a plurality of circumferentially spaced, vertically extending ribs **36** carried by the guide **10** about that portion thereof through which the passageway portion **22** extends. The ribs **36** extend radially outward from the guide **10** and terminate equidistant from the central axis of the passageway. Preferably, each of the ribs **36** tapers upwardly at its upper end and downwardly at its lower end as indicated at **38** and **40**, respectively, so that the ribs **36** can easily pass by minor irregularities on the inner surface of the tubing **34** during vertical movement upwardly or downwardly of the guide **10** in the tubing **34**. The guide **10** carries a corresponding set of ribs **42** about that part thereof through which the passageway portion **26** extends, it being noted that the upper and lower extremities of the ribs are tapered as indicated at **44** and **46**, respectively, so that such ribs **42** can easily pass minor irregularities on the inner surface of the tubing **34**. Thus, it will be seen that the sets of guide ribs **36** and **42** cooperate with the tubing **34** to maintain the central axis of the passageway that extends vertically through the guide **10** concentric with the tubing **34**.

The external configuration of the tool **12** is that of an elongated cylindrical body having a diameter slightly smaller than the diameter of the passageway portions **22**

and 26 of the guide 10, with the upper and lower extremities of the tool 23 being tapered upwardly and downwardly, respectively, as indicated at 48 and 50. Another important external feature of the tool 12 is that the line 14 contacts the tool 10 at its upper extremity centrally of the tapered part 48 thereof along the axis of the tool 12. The external features of the tool 12 thus far described, namely, the generally circular cylindrical configuration of the same, its tapered upper and lower extremities, and the point of attachment to the line 14 are the sole features of the tool 12 that are more or less essential, though in some circumstances, as will become apparent hereinafter, it can be that the upper and lower extremities of the same, particularly the latter, need not be tapered.

Proceeding now with a detailed description of a preferred embodiment of the tool 12 where the same is for the purpose of measuring temperatures, it will be seen that the tool 12, preferably formed of steel, comprises an elongated central body portion 52, a headpiece 54, and a tail piece 56. The upper end of the body portion 52 is provided with a recess 58, and the lower end of the headpiece 54 is reduced, as at 60 and threadingly engaged with the body portion 52 in the upper part of the recess 58 as shown. The headpiece 54 is provided with a small bore 62 extending centrally therethrough. The line 14 extends through the bore 62 into the recess 58, and within the recess 58 the line 14 is provided with an enlargement, such as a knot 64 therein so as to prevent the line 14 from being removed from the tool 12.

The body portion 52 is provided with a central chamber 66 adjacent its lower end that is adapted to contain a measuring instrument such as a maximum reading thermometer indicated at 68 and cushioning material for the latter, not shown. The tail piece 56 is provided with a reduced upper end portion 69 that threadingly engages the body portion 52 in an opening at the lower end of the body portion 52 that opens into the chamber 66, as shown. Sealing means such as a gasket, not shown, can be interposed between abutting portions of the body portion 52 and the tail piece 56 to prevent the ingress of fluids into the chamber 66, as will be appreciated by those skilled in the art.

Attention is now directed to Figure 5 wherein the use of the tool 12 and the guide 10 therefor is shown. The tool 12 and guide 10, therefor, assembled as shown in Figure 1, are lowered within the tubing 34 by the line 14, until the guide 10 engages and is supported upon an obstruction 70 in the tubing 34 having a central opening 72 therethrough of a diameter greater than that of the tool 12, whereupon the tool 12 passes downwardly from within the guide 10 and through the opening 72 to whatever depth that may be desired, as shown. The tool 12 is enabled to pass through the opening 72 by reason of the ribs or guide fins 36 and 42 maintaining the central axis of the passageway portions 22 and 26 of the guide 12 concentric with the tubing 34 and therefore also keeping the tool 12 aligned with the opening 72. After the tool 12 has been allowed to remain at the depth desired for a sufficient time for the thermometer 68 to have obtained a maximum reading of the temperature of the contents of the tubing 34 at such a position, the tool 12 is again raised through opening 72 by use of the line 14 thence upwardly into the passageway in the guide 10 until the upper tapered extremity 48 of the tool 12 engages the shoulder 32 within the guide 10. Continued raising of the tool 12 by the line 14 raises the guide 10 along with the tool 12, so that both can be removed from the tubing 34. It is to be expressly noted that the tapered upper end portion 48 of the tool 10 facilitates upward entry of the tool 12 into the opening 72, and that thereafter such tapered upper end portion 48 cooperates with the downwardly flared parts 28 and 30 of the passageway portions 26 and 22 to guide and facilitate repositioning of the tool 12 within the guide 10.

In order that fluids contained within the tubing 34 do not interfere with vertical movement of either or both the tool 12 and the guide 10, or conversely, so that such elements do not interfere with the free passage of fluids vertically within the tubing 34, the guide 10 is provided with lateral openings 74 from the passageway portion 22 so as to by-pass fluids, it being noted that the circumferential spacing of the ribs 36 and 42 also facilitates by-passing of fluids. If deemed necessary or expedient, additional lateral openings, not shown, can be provided in the guide 12 from any of the passageway portions 22, 24, and 26. Exemplary of the many types of obstructions having a central opening therethrough that may be included within tubings is the cross-over nipple and choke assembly illustrated in Figure 27 appearing on page 4003 of volume 3 of the 21st (1955-56) edition of the "Composite Catalogue of Oil Field and Pipe Line Equipment," published by World Oil. Obviously, the obstruction in the tubing can be of an intentional nature or the same can be due to inadvertance such as damage to the tubing 34 from external or internal causes. It is, of course, not essential that the opening 72 through the obstruction be of circular cross section, it only being essential that the opening be of such limited cross sectional extent as to not obstruct a downward projection of the passageway portions 22 and 26. It will be evident also that the lower end portions of the tool 12 need not be tapered as indicated at 50 whenever the opening through the obstruction is of a greater diameter than the passageway portions 22 and 26. The same consideration applies with respect to the upper end portion of the tool 10 being tapered as shown at 48.

Those skilled in the art will appreciate that the tool 12 can include devices requiring electrical connection to recorders or electrical energy sources at the earth's surface, in which eventuality, the flexible supporting element 14 can comprise a cable including electrical conduit means, not shown, for achievement of such ends.

In view of the foregoing, the principles of the invention as illustrated and described in connection with the preferred embodiment thereof will be fully understood. Obviously the illustrated embodiment is subject to numerous variations without departing from the spirit of the invention, and accordingly, attention is directed to the appended claims for ascertainment of the actual scope of the invention.

We claim:

1. A vertically elongated guide having a vertical passageway extending entirely therethrough, said guide being adapted to be raised and lowered within vertical tubing of circular cross section, said guide including means adjacent the upper and lower ends thereof concentric with such tubing, the lowermost end portion of the passageway being upwardly and inwardly tapered, a vertically elongated tool reciprocably disposed within the passageway for free vertical movement downwardly from the guide, said guide also being provided with means for vertically by-passing fluids, said passageway having a restricted portion adjacent the upper end thereof preventing vertical movement of the tool upwardly from the guide, and a flexible supporting element secured to the upper end of the tool and extending upwardly from the guide through the passageway.

2. Vertical tubing of circular cross section having a substantially uniform diameter, an obstruction in said tubing intermediate the ends thereof, said obstruction having a vertical opening therethrough that is concentric with the tubing, a vertically elongated guide disposed within the tubing above said obstruction, said guide having a vertical passageway extending entirely therethrough, the lowermost end portion of the passageway being tapered upwardly and inwardly, said guide being vertically movable in the tubing and including means adjacent the upper and lower ends thereof for maintaining the passageway concentric with the tubing, said guide being engageable with

said obstruction to limit downward movement of the guide, a vertically elongated tool reciprocably disposed within the passageway for free vertical movement downwardly from the guide, said passageway having a restricted portion adjacent the upper end thereof preventing vertical movement of the tool upwardly from the guide, said tool being freely movable vertically through the opening in the obstruction, and a flexible supporting element secured to the upper end of the tool and extending upwardly from the guide through the passageway.

3. A vertically elongated guide having a vertical passageway extending entirely therethrough, said guide being adapted to be raised and lowered within vertical tubing of circular cross section, said guide including means for maintaining the passageway concentric with such tubing, a vertically elongated tool reciprocably disposed within the passageway for free vertical movement downwardly from the guide, said passageway having a restricted portion adjacent the upper end thereof preventing vertical movement of the tool upwardly from the guide, and a flexible supporting element secured to the upper end of the tool and extending upwardly from the guide through the passageway, the lower end portion of the passageway being tapered upwardly and inwardly with the extreme upper end portion of the tool surrounding the supporting element and tapering upwardly and inwardly.

4. A vertically elongated guide having a vertical passageway extending entirely therethrough, the lowermost end portion of the passageway being tapered upwardly and inwardly, said guide being adapted to be raised and lowered within vertical tubing of circular cross section, said guide including means for maintaining the passageway concentric with such tubing, a vertically elongated tool reciprocably disposed within the passageway for free vertical movement downwardly from the guide, said guide also being provided with means for vertically by-passing fluids, said passageway having a restricted portion adjacent the upper end thereof preventing vertical movement of the tool upwardly from the guide, and a flexible supporting element secured to the upper end of the tool and extending upwardly from the guide through the passageway, said first-mentioned means comprising vertically spaced contactors for free sliding engagement with the inner surface of tubing.

5. A straight, vertically disposed, tubular member, a pair of vertically spaced sets of circumferentially spaced, vertically extending ribs on the exterior of the tubular member, said ribs extending radially from the tubular member and terminating equidistant from the central axis of the tubular member, an elongated tool disposed within the tubular member, said tool being freely movable downwardly from the tubular member, said tubular member having an internal restriction adjacent its upper end constituting a shoulder that is engageable with and prevents upward movement of the tool from the tubular member, and a flexible supporting element secured to the upper end of the tool and extending upwardly from the tubular member through the restriction therein.

6. A vertically elongated guide having a vertical passageway extending entirely therethrough, said guide being adapted to be raised and lowered within vertical tubing of circular cross section, said guide including means for maintaining the passageway concentric with such tubing, a vertically elongated tool reciprocably disposed within the passageway for free vertical movement downwardly from the guide, said passageway having a restricted portion adjacent the upper end thereof preventing vertical movement of the tool upwardly from the guide, and a flexible supporting element secured to the upper end of the tool and extending upwardly from the guide through the passageway, the extreme upper end portion of the tool surrounding the supporting element and tapering upwardly and inwardly, the lower end portion of the tool being tapered downwardly and inwardly.

7. A straight, vertically disposed, tubular member, a pair of vertically spaced sets of circumferentially spaced, vertically extending ribs on the exterior of the tubular member, said ribs extending radially from the tubular member and terminating equidistant from the central axis of the tubular member, an elongated, substantially cylindrical tool disposed within the tubular member, said tool being freely movable downwardly from the tubular member, said tubular member having an internal restriction adjacent its upper end constituting an annular shoulder that is engageable with and prevents upward movement of the tool from the tubular member, said tubular member having a lateral opening therein below said restriction, and a flexible supporting element secured to the upper end of the tool and extending upwardly from the tubular member through the restriction therein.

8. A straight, vertically disposed, tubular member, a pair of vertically spaced sets of circumferentially spaced, vertically extending ribs on the exterior of the tubular member, said ribs extending radially from the tubular member and terminating equidistant from the central axis of the tubular member, an elongated, substantially cylindrical housing disposed within the tubular member, said housing being freely movable downwardly from the tubular member, said tubular member having an internal restriction adjacent its upper end constituting an annular shoulder that is engageable with and prevents upward movement of the housing from the tubular member, said tubular member having a lateral opening therein below said restriction, a flexible supporting element secured to the upper end of the housing and extending upwardly from the tubular member through the restriction therein, and a measuring instrument in said housing.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,847,075 August 12, 1958

Raymon L. Halbrook et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 2, for "23" read -- 12 --; column 4, line 52, before "concentric" insert -- for maintaining the passageway --.

Signed and sealed this 28th day of October 1958.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON

Commissioner of Patents