

Sept. 17, 1963

J. H. LIEM ETAL

3,104,094

WIRE LINE GUIDE APPARATUS

Filed Aug. 17, 1961

2 Sheets-Sheet 1

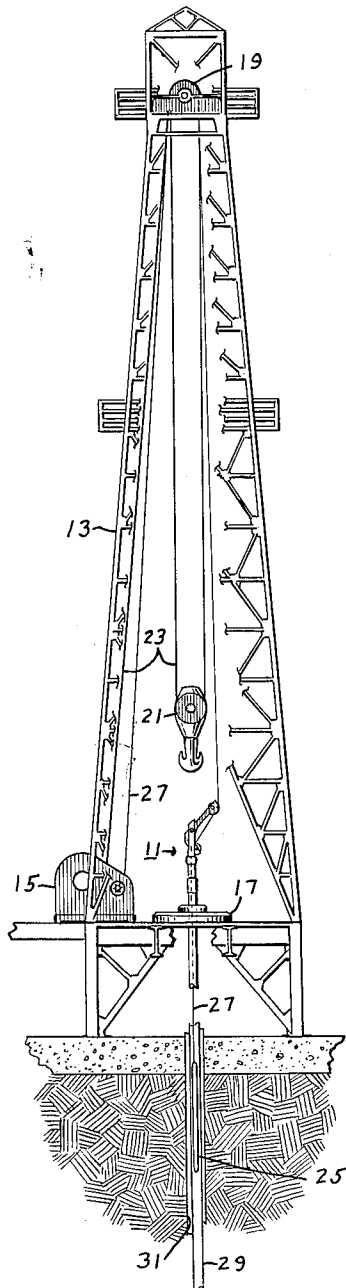


Fig. 1

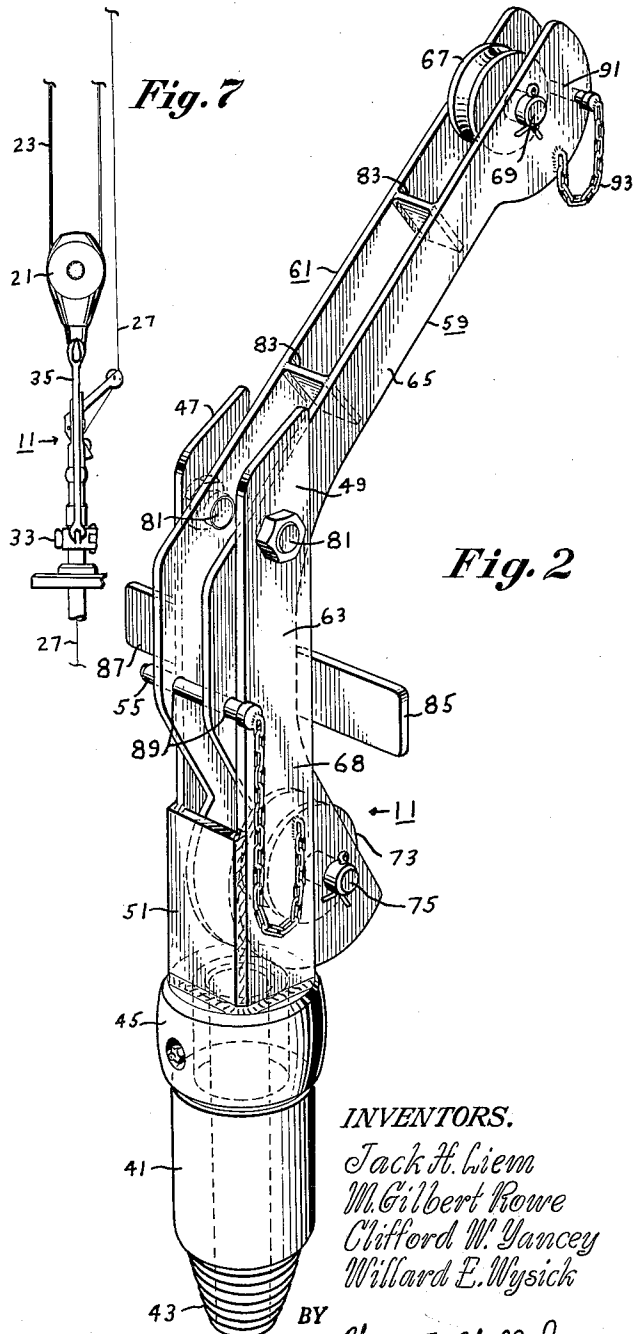


Fig. 7

Fig. 2

INVENTORS.

Jack H. Liem
M. Gilbert Rowe
Clifford W. Yancey
Willard E. Mysick

BY
Wm. T. Wofford
Attorney

Sept. 17, 1963

J. H. LIEM ETAL
WIRE LINE GUIDE APPARATUS

3,104,094

Filed Aug. 17, 1961

2 Sheets-Sheet 2

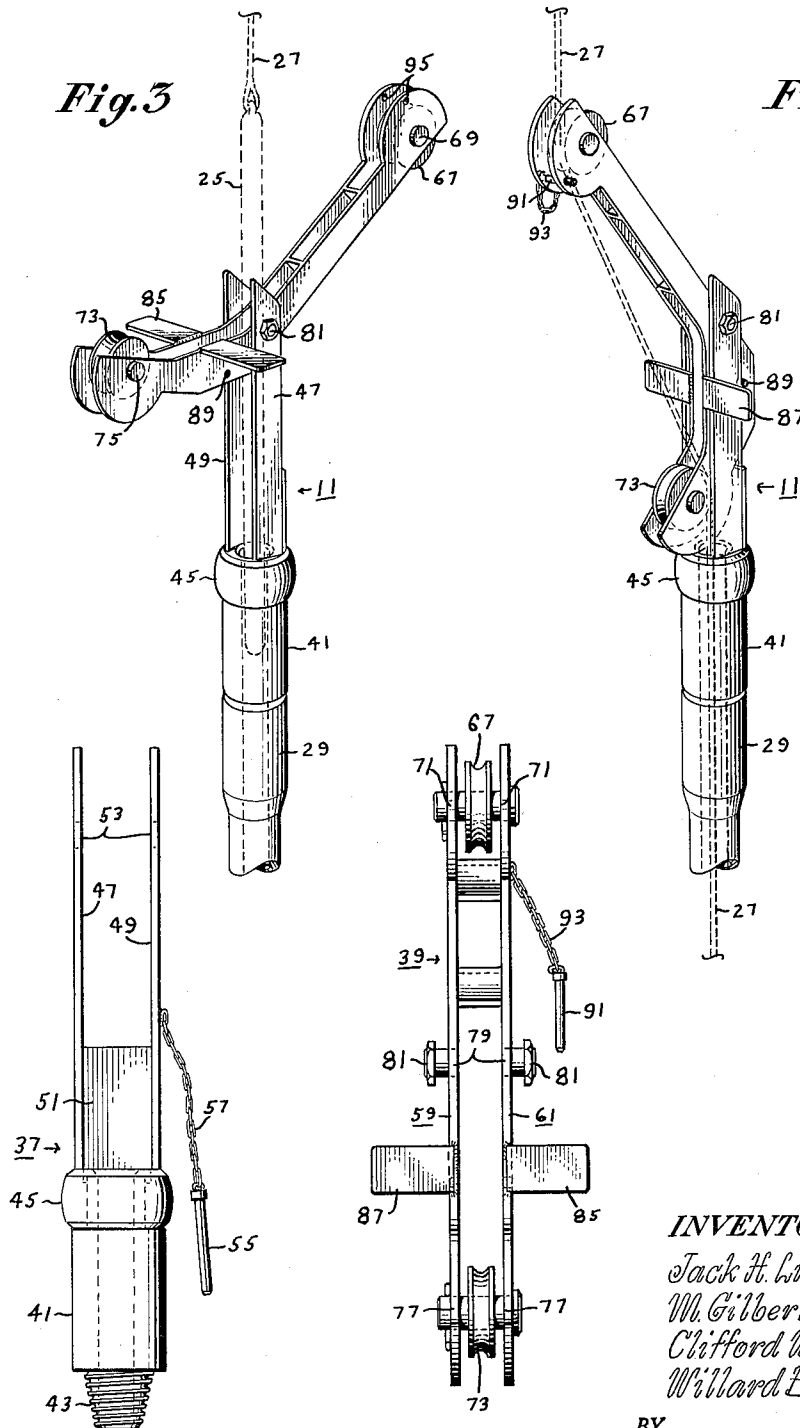


Fig. 5

Fig. 6

INVENTORS.

Jack H. Liem
W. Gilbert Rowe
Clifford W. Yancey
Willard E. Wysick

BY

Wm. T. Hofford
Attorney

1

3,104,094

WIRE LINE GUIDE APPARATUS

Jack H. Liem, New Orleans, La., Marcus Gilbert Rowe, Fort Worth, Tex., and Clifford W. Yancey and Willard E. Wysick, New Orleans, La., assignors to Rowan Drilling Company, Inc., Fort Worth, Tex.

Filed Aug. 17, 1961, Ser. No. 132,236

9 Claims. (Cl. 254-145)

This invention relates to wire line guide apparatus, and more particularly to apparatus for advantageously handling a wire line from which equipment is suspended in a bore hole.

In the drilling of bore holes, especially in the field of petroleum exploration and production, it is common practice to pass various tools and equipment into the bore hole for various purposes, the tool or tools being attached to the free end of a relatively small cable (called wire line, and also sometimes referred to as sand line), the cable being reaved off a winch drum. In many cases, the wire line is subject to rubbing or chafing as it enters the well head pipe, as well as on associated apparatus including the traveling block. Such rubbing and chafing can rapidly wear the wire line to such extent that unless it is replaced, the suspended tool or equipment may be lost in the bore hole. Both replacement of a long wire line and fishing for a lost tool can be quite time-consuming and expensive.

The present invention contemplates the provision of improved wire line guiding apparatus which will allow the working of wire line tools and equipment, while eliminating the rubbing and chafing of the wire line as above mentioned.

The present invention, though not restricted thereto, is especially applicable to the situation wherein the wire line tool is passed down inside the drill string pipe, and wherein it is desirable to work the pipe up and down and also rotate it while the wire line tool is in the bore hole.

It is accordingly a general object of the present invention to provide improved wire line guide apparatus.

More specifically, an object of the present invention is to provide improved wire line guide apparatus which will prevent chafing of the wire line on the well head pipe, as well as on associated apparatus, including the traveling block.

Another object of the invention is to provide improved wire line guide apparatus which does not require threading of the wire line through the guide apparatus.

Another object of the invention is to provide improved wire line guide apparatus which can be applied to the wire line while the tool or equipment is suspended thereon and supported from the wire line winch drum.

Another object of the invention is to provide improved wire line guide apparatus which is simple, economical, easily manipulated, and effective.

These and other objects are effected by the present invention as will be apparent from the following description taken in accordance with the accompanying drawings, forming a part of this application, in which:

FIGURE 1 is a general view, partially broken away, and partially in section, showing the guide apparatus of the present invention installed on a conventional bore hole drilling rig;

FIGURE 2 is a schematic perspective view showing the guide apparatus of the present invention completely assembled and in operating position;

FIGURE 3 shows the assembled apparatus in its open position, with the wire line tool being passed through the guide and into the drill string pipe;

FIGURE 4 shows the assembled guide apparatus in

2

operating position and with wire line passing through the guide and down into the drill string pipe;

FIGURE 5 is a schematic rear elevational view showing the support portion of the guide apparatus;

FIGURE 6 is a schematic front elevational view showing the sheave arm portion of the guide apparatus; and

FIGURE 7 is a schematic fragmentary side elevational view showing the guide apparatus installed as in FIGURE 1, but with the elevators and bails in position.

In FIGURE 1, a tool in accordance with a preferred embodiment of the present invention and indicated generally at 11, is shown installed on a conventional drilling rig which includes the usual mast, or derrick 13, draw works 15, turntable 17, crown block 19, and traveling block 21. The traveling block 21 is suspended on the usual cable 23 which is controlled by a winch drum on the drawworks 15. A tool 25 is suspended on the wire line 27 within the drill pipe 29 which is shown extending down inside a bore hole 31. For convenience herein, the "kelly" is considered as being merely a part of the drill pipe. The wire line 27 passes from the tool 25 upwardly through the guide 11 and thence upwardly past the traveling block 21, over a sheave in the crown block 19, and thence downward and onto a winch drum in the draw works 15. For clarity, the elevators and bails have been omitted in FIGURE 1, but are shown in FIGURE 7. Referring now to FIGURE 7 there is shown the traveling block 21 and its supporting cable 23, the turntable 17, and the drill pipe 29. The guide 11 is installed on the drill pipe 29, the same as in FIGURE 1. The elevators 33 are clamped just below the drill pipe upper tool joint, and the bails 35 are hooked on to the traveling block and the elevators with the bails straddling the guide 11.

Referring now particularly to FIGURES 2, 5 and 6, it may be seen that the wire line guide in accordance with a preferred embodiment of the present invention is made up of a support portion 37 (shown by FIGURE 5) and a sheave arm portion 39 (shown by FIGURE 6), with the sheave arm portion adapted for pivoting on the support portion to make up the guide assembly 11 as shown by FIGURE 2.

The support portion 37 includes a short cylindrical section 41 incorporating a standard male joint 43 at its lower end mounting a conventional type swivel 45 at its upper end. A pair of pivot support members 47, 49 are integrally fixed at their lower ends to the upper portion of the part of the swivel 45 that is rotatable relative to the short cylindrical section, and extend upwardly therefrom in mutually spaced parallel relation. The pivot support members 47, 49 are preferably made of heavy metal strap material, and are braced by a stiffener plate 51 which is welded to each member 47, 49 and to the upper face of the swirl 45, thus bridging between the support members at their lower rear portions. The support members are provided with a pair of axial aligned openings 53 at their upper end portions for a purpose to be presently discussed. A locking pin 55 is fixed to one end on a short retainer chain 57, having its other end fixed to one of the support members 49. The purpose of the locking pin 55 will be presently explained.

The sheave arm portion 39 includes a pair of juxtaposed parallel spaced side members 59, 61 which are preferably made of heavy metal plate material. Each side member 59, 61 has the general shape in profile of a flat bottomed trough having sloping sides. The trough bottom may be considered as the central portion 63 of the side members 59, 61, one sloping side as the upper or long wing 65 of the respective side member, and the other sloping side as the lower or short wing 68 of the respective side member. Each side member 59, 61 may

3

also be considered as having the general shape of a modified bell crank (the pivot is not at the apex of the legs), or a dog-leg. An upper sheave 67 is journaled on an upper pin shaft 69 which extends through and is supported on axially aligned openings 71 located at the free end portions of the side member long wings 65. A lower sheave 73 is journaled on a lower pin shaft 75 which extends through and is supported by axially aligned openings 77 located at the free end portions of the side member short wings 68. The long wing portions 65 of the side members 59, 61 have a pair of axially aligned openings 79 located at their lower end portion, which openings are also aligned with the openings 53 at the upper end portions of the pivot support members 47, 49. Adjacent openings of the long wings and support members are pinned together for pivoting action by means of short pivot bolts or stub shafts 81. Stiffener plates 83 bridging between the long wing portions 65 of the side members 59, 61 are provided to add rigidity to the structure. A stop plate 85, 87 is fixed to each side member 59, 61 at the front central portion 63 thereof and extends laterally outwardly therefrom so as to bear against the front face of the respective pivot support members 47, 49 and thus provide a limit for the clockwise pivoting motion of the sheave arm 39. The central portions 63 of the side members 59, 61 are wider than the pivot support members 47, 49 so that when the sheave arm 39 is in its maximum clockwise position, parts of the side member central portion 63 extend rearwardly beyond the rear faces of the pivot support members, and are provided with a pair of axially aligned openings 89 for receiving the locking pin 55 so that the locking pin bears against the rear faces of the pivot support members 47, 49 thus preventing counter clockwise pivoting motion of the sheave arm 39. Actually then, when the locking pin 55 is in place, the sheave arm 39 is locked against pivoting motion in either direction. A wire line retainer pin 91 is fixed to a short chain length 93 which in turn is fixed to one side member 59 adjacent the upper sheave 67, and is received by axially aligned openings 95 in the side members 59, 61. Thus, this retainer pin 91 is disposed parallel to the sheave pivot shaft 69 and spaced outwardly from the sheave periphery, so that the wire line is prevented from jumping off the sheave 67.

In operation, the wire line guide 11 of the present invention is first installed on the drilling rig by simply making up the guide tool joint 43 with a corresponding joint of the drill pipe 29 upper end (or rotary joint). Then the sheave arm 39 is pivoted to its open position (as shown by FIGURE 3) and the tool or equipment 25 which is suspended on the wire line 27 is passed down through the guide 11 and into the drill pipe 29. It should be noted that there is no obstruction between the support members 47, 49 when the guide is in the open position, and of course, the swivel 45 and the cylindrical section 41 both have central bores. Thus, any equipment that has small enough diameter to be received within the drill pipe 29 can also be passed down through the guide 11. After the tool 25 has cleared the guide 11, the sheave arm 39 is pivoted to its operating position (as shown by FIGURE 4). As the sheave arm moves to its operating position, the front side of the upper sheave 67 receives the wire line 27, as does the rear side of the lower sheave 73, forcing the wire line 27 to offset. When the stops 85 have contacted the support members 47, 49, the locking pin 55 is inserted, as is the retainer pin 91. The guide 11 is now loaded and ready for operation. When the guide 11 is in operating position, the lower sheave 73 rear periphery is located such that the wire line 27 will be centered within the swivel 45 and drill pipe 29 bores, and at the same time, the wire line passing over the upper sheave 67 is offset sufficiently to clear the traveling block 21.

Next, the elevators 33 are latched around the drill pipe 29, and the bails 35 are hooked on to the elevators

4

and the traveling block 21. Thus, the drill pipe 29 can be worked up and down and also rotated at any time while the wire line tool 25 is in the bore hole 31.

To bring the wire line tool 25 up out of the hole 31, the bails 35 are removed when the tool nears the guide, and then the locking pin 55 and retainer 91 are simply removed and the sheave arm 39 is pivoted to its open position so that the tool 25 may be withdrawn up through the guide 11.

It will be apparent from the foregoing that the present invention provides simple, economical, easily manipulated and effective wire line guide apparatus which will prevent chafing of the wire line; which can be applied to the wire line while the tool is suspended in a bore hole, and which does not require threading of the wire line through the guide apparatus.

While the present invention has been shown in only one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

We claim:

1. Wire line guide apparatus for use with bore hole drilling rigs of the type having a draw works, a turntable, a crown block, a traveling block suspended from the crown block and controlled from the draw works, and a string of drill pipe in a bore hole having an upper end terminating in a tool joint; said guide apparatus comprising: a support structure including a conduit section having a tool joint at its lower end mateable with the said drill pipe tool joint, and a pair of spaced juxtaposed pivot support members extending upwardly from said conduit section; and a sheave arm structure including a pair of juxtaposed parallel spaced side members having the general profile of a modified bell crank having an upper arm longer than a lower arm, means pivotally fixing said side members adjacent the lower end of said upper arm to respective pivot support members at their upper end portions, an upper sheave journaled on said upper arm adjacent the outer end thereof, a lower sheave journaled on said lower arm adjacent the outer end thereof, means detachably locking said sheave arm structure in operating position such that wire line passing over said lower sheave will be centered in the bore of said conduit section, said sheave arm structure allowing unobstructed space above the bore of said conduit section when said sheave arm structure is in the open position.

2. Wire line guide apparatus for use with bore hole drilling rigs of the type having a draw works, a turntable, a crown block, a traveling block suspended from the crown block and controlled from the draw works, and a string of drill pipe in a bore hole having an upper end terminating in a tool joint; said guide apparatus comprising: a support structure including a conduit section having a tool joint at its lower end mateable with the said drill pipe tool joint, a swivel section mounted at the upper end of said conduit section, and a pair of spaced juxtaposed pivot support members extending upwardly from said swivel section; and a sheave arm structure including a pair of juxtaposed parallel spaced side members having the general profile of a modified bell crank having an upper arm longer than a lower arm, means pivotally fixing said side members adjacent the lower end of said upper arm to respective pivot support members at their upper end portions, an upper sheave journaled on said upper arm adjacent the outer end thereof, a lower sheave journaled on said lower arm adjacent the outer end thereof, means detachably locking said sheave arm structure in operating position such that wire line passing over said lower sheave will be centered in the bore of said conduit section, said sheave arm structure allowing unobstructed space above the bore of said conduit section when said sheave arm structure is in the open position.

3. Wire line guide apparatus adapted for maintaining

5

a wire line centered at the entrance to a conduit and offset above the conduit when in the operating position, while allowing clear space above the conduit bore when in the open position, said guide apparatus comprising: sheave arm structure including an upper sheave and a lower sheave, means supporting said lower sheave in position for centering a wire line at the entrance to a conduit and said upper sheave in a position above and offset from said lower sheave when said sheave arm structure is in its operating position, and means allowing pivoting of said sheave arm structure to an open position wherein there is an unobstructed space in said sheave arm structure above the conduit.

4. Wire line guide apparatus adapted for maintaining a wire line centered at the entrance to a conduit and offset above the conduit when in the operating position, while allowing clear space above the conduit bore when in the open position, said guide apparatus comprising: sheave arm structure including an upper sheave and a lower sheave, means supporting said lower sheave in position for centering a wire line at the entrance to a conduit and said upper sheave in a position above and offset from said lower sheave when said sheave arm structure is in its operating position, means allowing pivoting of said sheave arm structure to an open position wherein there is an unobstructed space in said sheave arm structure above the conduit, and means for detachably retaining sheave arm section in its operating position.

5. Wire line guide apparatus adapted for maintaining a wire line centered at the entrance to a conduit and offset above the conduit when in the operating position, while allowing clear space above the conduit bore when in the open position, said guide apparatus comprising: sheave arm structure including an upper sheave and a lower sheave, means supporting said lower sheave in position for centering a wire line at the entrance to a conduit and said upper sheave in a position above and offset from said lower sheave when said sheave arm structure is in its operating position, means allowing pivoting of said sheave arm structure to an open position wherein there is an unobstructed space in said sheave arm structure above the conduit, and swivel means interposed between said supporting means and the conduit.

6. Wire line guide apparatus adapted for maintaining a wire line centered at the entrance to a conduit and offset above the conduit when in the operating position, while allowing clear space above the conduit bore when in the

6

open position, said guide apparatus comprising: sheave arm structure including an upper sheave and a lower sheave, means supporting said lower sheave in position for centering a wire line at the entrance to a conduit and said upper sheave in a position above and offset from said lower sheave when said sheave arm structure is in its operating position, means allowing pivoting of said sheave arm structure to an open position wherein there is an unobstructed space in said sheave arm structure above the conduit, means for detachably locking said sheave arm structure in its operating position, and swivel means interposed between said supporting means and the conduit.

7. Wire line guide apparatus adapted for maintaining a wire line centered at the entrance of a conduit and offset above the conduit when in the operating position, while allowing clear space above the conduit when in the open position, said guide apparatus comprising: a conduit, swivel means mounted at the upper end of said conduit, pivot support means extending upwardly from said swivel means, a sheave arm structure including an upper sheave and a lower sheave, means pivotally supporting said sheaves on said pivot support means such that said lower sheave will support a wire line centered within said conduit and said upper sheave will support a wire line above and laterally offset from said lower sheave when said sheave arm is in operating position, said pivot support means and said sheave arm structure providing unobstructed space above said conduit when said sheave arm is in the open position.

8. The invention as set forth in claim 7, wherein said means pivotally supporting said sheaves includes stop means adapted for bearing against said pivot supporting means when said sheave arm structure is in the operating position.

9. The invention as set forth in claim 8, wherein said stop means prevents rotation of said sheave arm structure relative to said pivot support means in one direction and detachable retainer means prevents such rotation in the opposite direction.

References Cited in the file of this patent

UNITED STATES PATENTS

523,034	Fourman	July 17, 1894
2,283,048	Collett	May 12, 1942
2,391,290	Berger	Dec. 18, 1945
2,728,462	Fincher	Dec. 27, 1955
3,047,078	Postlewaite	July 31, 1962