Nov. 15, 1938. M. A. LOTTINGER 2,136,748

MEANS FOR SETTING WHIPSTOCKS IN WELLS

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Fig. 1.

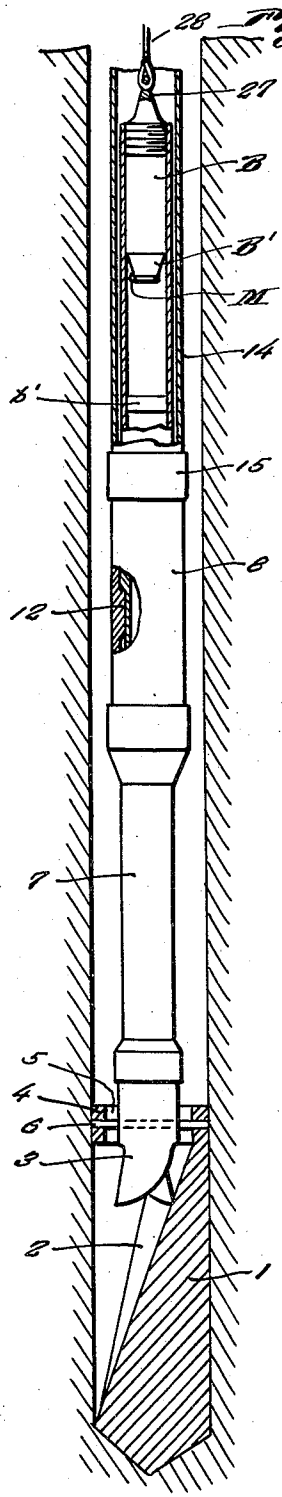


Fig. 2.

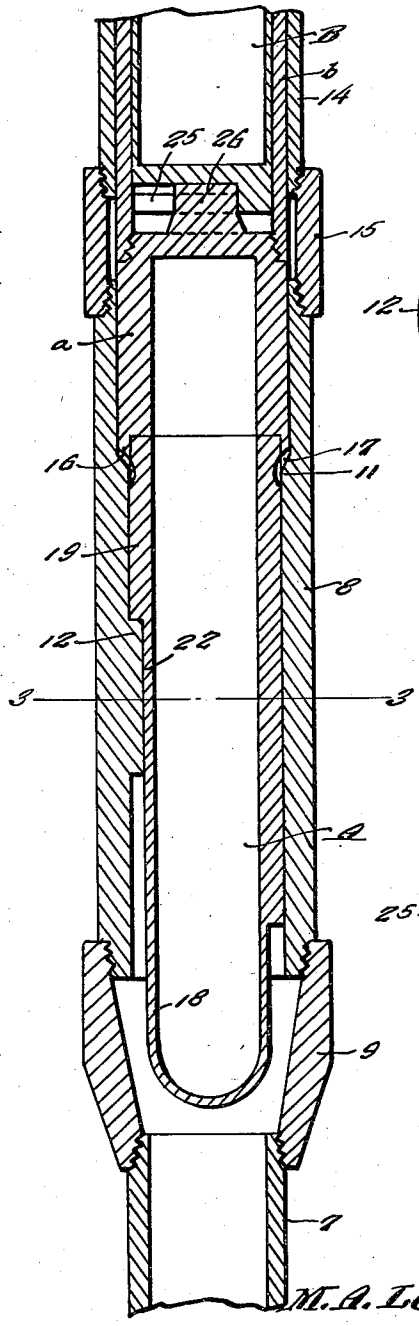


Fig. 3.

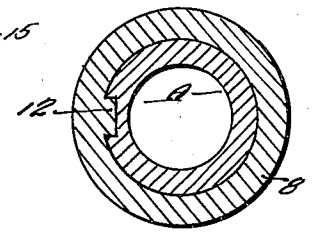
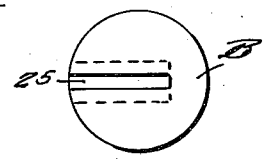


Fig. 4.



Inventor

M. A. Lottinger

By Clarence A. O'Brien and Hyman Berman Attorney

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Fig. 5.

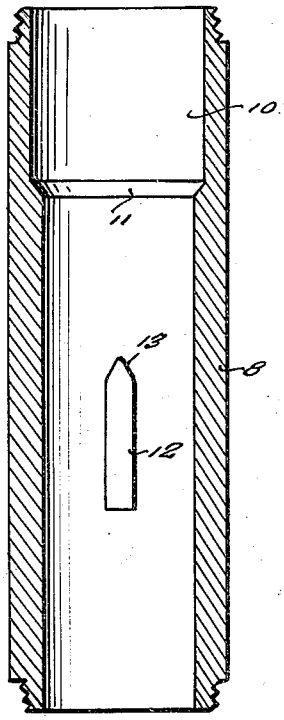
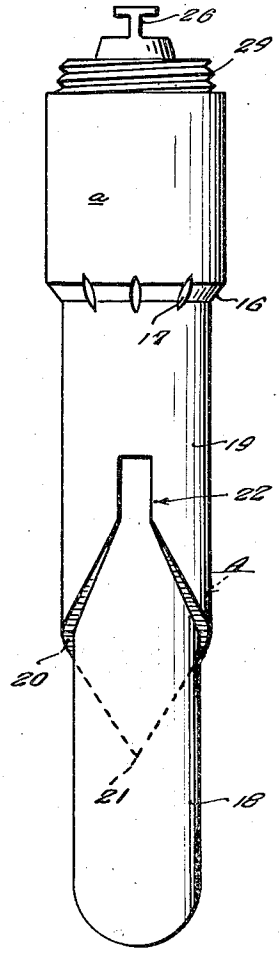


Fig. 6.



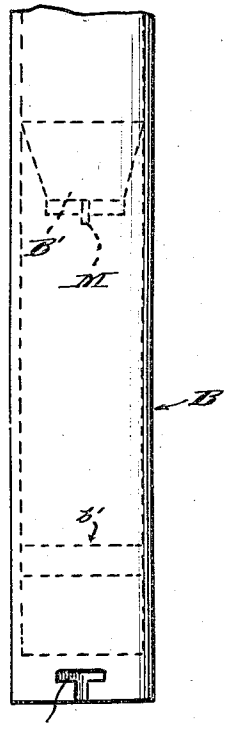


Fig. 7.

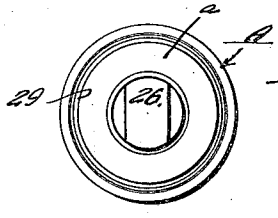


Fig. 8.

Inventor

M. A. Lottinger

By Clarence A. O'Brien
Hyman Berman

Attorneys

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UNITED STATES PATENT OFFICE

2,136,748

MEANS FOR SETTING WHIPSTOCKS IN WELLS

Morris A. Lottinger, Houma, La.

Application December 13, 1937, Serial No. 179,585

2 Claims. (Cl. 255—1)

This invention relates to means for and a method of setting a whipstock in a well bore in a minimum of time with the least expense in labor and material, and with the utmost accuracy in the desired direction, the general object of the invention being to provide guiding means in the drill pipe for the surveying assembly or instrument to position the same in a certain position relative to the face of the whipstock and to provide a marker on a part of the instrument which will photograph on the compass chart to indicate, when the photograph is made, the direction in which the face of the whipstock faces in the well bore so that the drill pipe can be turned to turn the whipstock in the desired direction.

This invention also consists in certain other features of construction and in the combination and arrangement of the several parts to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claims.

In describing the invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:—

Figure 1 is a sectional view with parts in elevation and parts broken away showing the lower portion of a drill line in a well with the shank of the bit connected with the whipstock and with the surveying instruments in the line.

Figure 2 is a longitudinal sectional view through the key sub, a portion of the lower part of the drill pipe and through a portion of the non-magnetic casing which forms part of the drill pipe or line and showing the guiding pin and a portion of the surveying instrument in position.

Figure 3 is a section on the line 3—3 of Figure 2.

Figure 4 is a bottom plan view of the surveying instrument.

Figure 5 is a longitudinal sectional view through the key sub and showing the key therein.

Figure 6 is an elevation of the guiding pin.

Figure 7 is an elevation of the surveying instrument with the interior parts thereof shown in dotted lines.

Figure 8 is a top plan view of Figure 6.

In these drawings, the numeral 1 indicates the whipstock which is of usual or any suitable construction and is provided with the sloping concave face 2 for deflecting the bit 3 in the usual manner. The whipstock has a circular upper end 4 having an opening 5 therein through which the shank of the bit passes, the lower part of the bit being larger than the hole so that when the drill pipe is raised the bit will raise the whipstock with it. A pin or bolt 6 passes through the circular part 4 and the shank of the bit and extends in a direction in which the face of the whipstock faces. This pin or bolt is of such construction that it will shear when the weight of the drill line or pipe comes upon the same. It will, of course, be understood that in order to place the bit in the hole 5 the shank must be passed through the hole from the underside. A length of drill pipe 7 is connected with the upper end of the shank and the lower end of the tubular key sub 8 is suitably connected to the upper end of the pipe 7, such as by means of the coupling 9. The member 8 has its bore formed with an enlarged part 10 at its upper end to provide a sloping annular shoulder 11 at the junction of the enlarged part with the rest of the bore and a longitudinally extending key 12 is formed on an internal wall of the member 8, intermediate the ends of the small part of the bore and said key is formed with a wedge-shaped upper end 13. A length of non-magnetic pipe 14 has its lower end suitably connected with the upper end of the member 8, such as by means of a coupling 15 and the lower end of the rest of the drill line is suitably connected with the upper end of the non-metallic pipe 14. The parts are so arranged that when they are connected together tightly the key 12 will be in alignment with the pin or bolt 6, as shown in Figure 1.

The letter A indicates the aligning pin which is of elongated form and of tubular construction with its lower end rounded and closed, as shown in Figure 2. The upper portion of the aligning pin is enlarged as shown at *a* and this part is made of non-magnetic material while the rest of the pin is made of steel. An annular bevel shoulder 16 is formed at the junction of the part A with the part *a* and recesses 17 are formed in the shoulder to permit the passage of fluid when this shoulder 16 is resting on the shoulder 11. The upper portion of the steel part of the pin has an exterior diameter greater than the lower part 18 of the pin, as shown at 19. The enlarged part 19 has its lower end terminating in a cam edge 20 which extends from a low point 21 and slopes upwardly in opposite directions around the pin to a notch 22 formed in the thickened or enlarged part 19 which is in a vertical plane diametrically opposite the plane of the starting point 21. Thus when the pin enters the key sub 8 its reduced lower part 18 will pass readily through the sub and by the key 12 but when the ridge end 13 of the key strikes the sloping or cam

edge 20 the pin will be caused to partly rotate as it passes down through the member 8 until the key 12 enters the notch 22. Thus the pin will always be exactly positioned in the sub or member 8. As the cam edge 20 terminates in a point 21 and the key terminates in the ridge 13 if the point should happen to strike the ridge of the key it would simply slip off of the same and then the pin A would be turned by engagement of the cam edge with the ridge end of the key until the key enters the notch 22 so that there is no danger of the pin not being turned to a position where the key will enter the notch and when the key enters the notch the pin will be in a certain position which is related to the aligned position of the key 12 the pin or bolt 6 and the face 2 of the whipstock. When the pin properly engages the key 12 the shoulder 16 will engage the shoulder 11 of the member 8, as shown in Figure 2, but the recesses 17 will prevent a suction being created in the drill pipe below the part *a* of the pin A so that the aligning pin can be readily pulled upwardly in removing the parts from the drill pipe line.

Any suitable type of magnetic surveying machine can be used with the invention, a portion of this machine or instrument being shown at B with its case at *b* and said instrument includes the magnetic compass *b'* and the plumb bob B' which is provided with a marker M. This marker is so arranged that it will be photographed on the compass chart when the photographic device of the surveying instrument is actuated so that the marker will appear in the photograph. The bottom of the instrument B has a T-shaped transversely extending slot 25, the stem of which opens out through the bottom and with one end of the slot closed and the other opening out through a side wall of the instrument. This slot extends lengthwise of the plane of the marker M and is also in alignment with the key 12 and the pin or bolt 6 as well as the face of the whipstock so that when the photograph is made the resultant picture will show by the marker M on the compass chart the direction of location of the face of the whipstock so that by turning the drill pipe line the whipstock can be placed in the desired position to cause the bit to make the well bore slope in the desired direction. The slot 25 receives the T-shaped head 26 on the upper end of the aligning pin A so that the surveying instrument and the aligning pin must be placed together in a certain relation and when the aligning pin is in the key sub the marker will be in alignment with the key 12 and with the bolt and face of the whipstock as before explained. The lower end of the case *b* of the instrument is threaded to the upper end of the part *a* of the aligning pin A and the upper end of the case *b* has a bail 27 thereon for receiving the cable 28 by which the surveying instrument and aligning pin are lowered into the drill pipe and removed therefrom.

As the aligning key is connected directly with the surveying instrument the upper part *a* must be made of nonmagnetic material as it is this part which is connected with the instrument case by threads at the lower end of the case engaging the threaded part 29 on the part *a* and this part *a* should be of sufficient length so as to space the main instrument up in the non-magnetic drill pipe section 14, so as to not cause interference with the compass of the survey instrument. As before stated the T-shaped keyway and key keep the surveying instrument in line with the keyway or notch 22 in the aligning pin and so connects the pin with the instrument as to cause the pin to move with the instrument in introducing the parts into the pipe line and removing them from the pipe line.

As before stated the shank of the bit is passed upwardly through the hole 5 in the top part of the whipstock and the pin or bolt 6 pass through the hole in the top part of the whipstock and in the shank. Then the pipe section is connected to the shank, with the member 8 connected with the top of the pipe section and with the non-magnetic member 14 connected with the top of the member 8 and with the rest of the drill line connected with the upper end of the member 14. Then the parts are lowered into the well to place the whipstock at the desired depth and spaced from the bottom of the well. Marks are then made on the drill pipe and on the rotary at the top of the well so as to indicate the position the drill pipe should be held in. Then the aligning pin is fastened to the bottom of the surveying instrument and the parts lowered into the drill pipe by the cable 28. The key 12 in the member 8 will properly position the aligning pin and surveying instrument and then the picture is made and the instrument with the pin pulled out of the drill pipe and the picture is developed. As the mark M, key 12 and keyway 22 are in alignment with the bolt 6 and the face of the whipstock the image of the mark M on the picture will indicate in which direction the whipstock is facing. Then the drill pipe is turned to place the whipstock in the desired position and while the drill pipe is being held with tongs to keep the same from turning the drill pipe is lowered until the whipstock seats on the bottom of the well after which the weight of the parts will shear the bolt 6. Then the drill pipe can be turned to drill the deflected hole by the bit which has been deflected by the sloping face of the whipstock. After the hole is deflected the drill pipe can be pulled out and as the wide lower part of the bit engages the top part of the whipstock the whipstock will be pulled out of the well with the drill pipe.

With this invention there is only one trip made into the well with the drill pipe and one trip made with the wire line attached to the surveying instrument and aligning pin, to complete the operation of deflecting a well bore in any desired direction.

It is to be understood that any type of whipstock can be used with the invention though the drawings show the type provided with the collar on top with the bit connected to the collar by the shear pin and the parts are so arranged that when the pipe is pulled from the well the whipstock will also be pulled from the well. However, and as before stated any type of whipstock can be used with the invention, such as those which are to be pulled from the well after the bore has been deflected as well as those which are to remain in the well.

It is thought from the foregoing description that the advantages and novel features of the invention will be readily apparent.

It is to be understood that changes may be made in the construction and in the combination and arrangement of the several parts provided that such changes fall within the scope of the appended claims.

Having described the invention, what is claimed as new is:—

1. Means for positioning a whipstock in a well comprising a drill line, a bit at the lower end of

the line, means for detachably connecting the bit with the upper end of the whipstock, said line including a tubular section having a longitudinally extending key therein provided with a pointed upper end, said section being located above the whipstock, an elongated aligning pin of tubular construction for fitting in the tubular section, said pin having a longitudinally extending keyway therein having its lower end open, for receiving the key, means in the aligning pin for automatically directing the key into the keyway as the aligning pin is lowered into the key carrying section, said key being in alignment with the operative face of the whipstock, a photographic surveying instrument connected to the upper end of the aligning pin and including a compass and a marker positioned in alignment with the keyway and to photograph on the compass, and means for lowering the instrument with the aligning pin thereon into the drill line and for removing said parts from the drill line.

2. Means for positioning a whipstock in a well comprising a drill line, a bit at the lower end of the line, means for detachably connecting the bit with the upper end of the whipstock, said line including a tubular section having a longitudinally extending key therein provided with a pointed upper end, said section being located above the whipstock, an elongated aligning pin of tubular construction for fitting in the tubular section, said pin having a longitudinally extending keyway therein having its lower end open, for receiving the key, means in the aligning pin for automatically directing the key into the keyway as the aligning pin is lowered into the key carrying section, said key being in alignment with the operative face of the whipstock, a photographic surveying instrument connected to the upper end of the aligning pin and including a compass and a marker positioned in alignment with the keyway and to photograph on the compass, and means for lowering the instrument with the aligning pin thereon into the drill line and for removing said parts from the drill line, and means for detachably connecting the surveying instrument to the aligning pin, said means comprising a horizontal T-shaped slot in the lower end of the instrument having its inner end closed and its outer end opening through a side of the instrument and a T-shaped projection on the upper end of the aligning pin for entering the slot, the slot being in alignment with the marker and the projection being in the vertical plane of the keyway.

MORRIS A. LOTTINGER.