Aug. 3, 1937. D. B. MONROE 2,089,153

OIL WELL SURVEYING INSTRUMENT

Filed Oct. 16, 1936

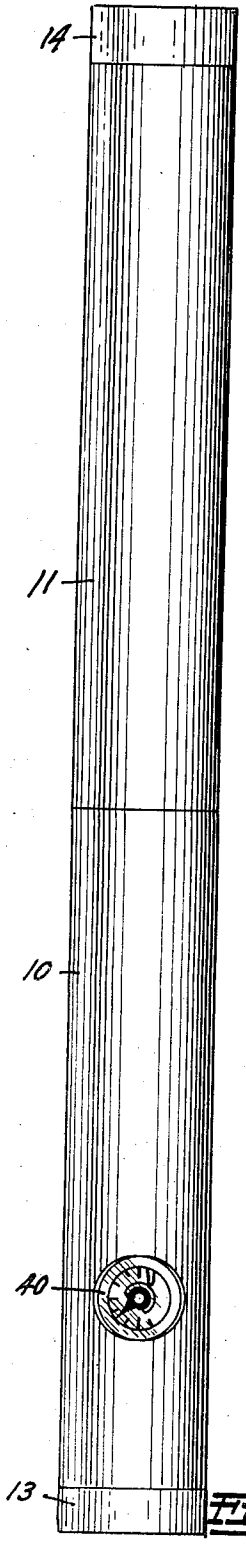


Fig 1

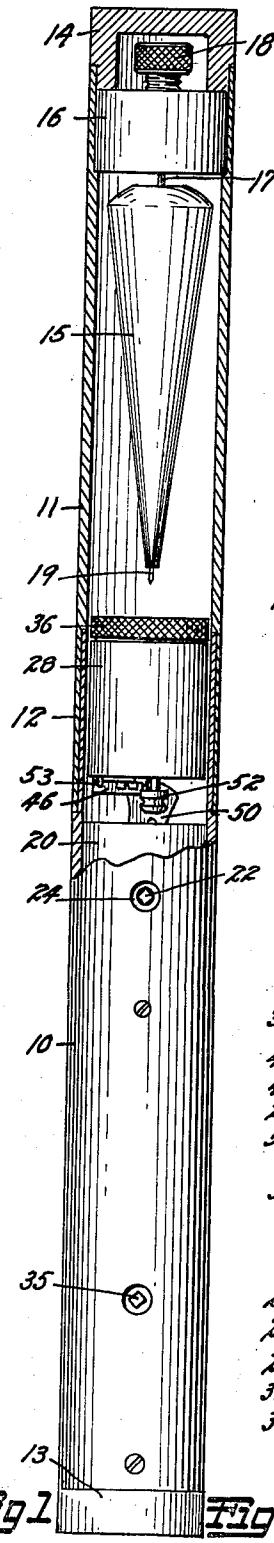


Fig 2

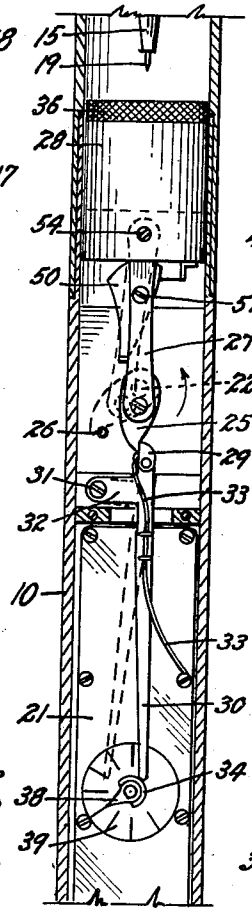


Fig 3

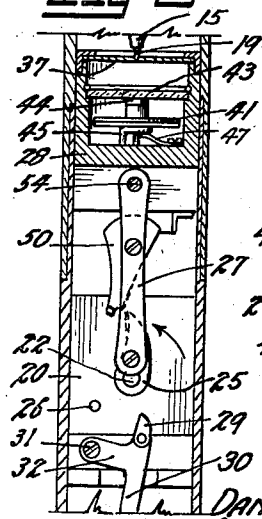


Fig 4

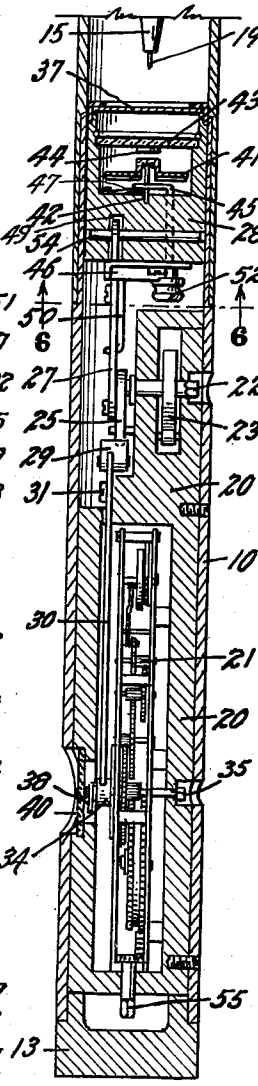


Fig 5

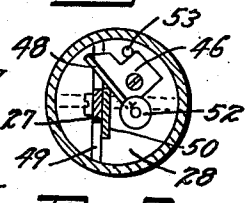


Fig 6

INVENTOR.
DANIEL B. MONROE
BY
ATTORNEY.

Patented Aug. 3, 1937 2,089,153

UNITED STATES PATENT OFFICE

2,089,153

OIL WELL SURVEYING INSTRUMENT

Daniel B. Monroe, Denver, Colo.

Application October 16, 1936, Serial No. 106,019

11 Claims. (Cl. 33—205.5)

This invention relates to an oil well surveying instrument more particularly of the type illustrated in applicant's Patent No. 2,057,787 of which this application is a continuation in part.

The principal object of the invention is to provide a highly efficient mechanism which can be placed within a drill pipe or at any other desired position in the tool string of a drilling well to indicate at a predetermined time, both the exact direction and amount of deviation from the vertical of said drill pipe or drill.

Another object of the invention is to so construct the device that it can be manufactured in an exceedingly small diameter without affecting its reliability or its accuracy.

A further object is to so construct the device that all of the operating parts will be completely enclosed, so as to be not only protected from moisture, accidents, etc., but also from unskilled tampering.

A still further object of the invention is to provide a target marking device for a device of this character in which the marking operation will be completed instantly so as to prevent damage to the target and its marking while withdrawing the instrument from the well and in which the compass will be instantly and accurately locked at the time of marking of the target.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:—

Fig. 1 illustrates a side elevation of the complete instrument ready for use.

Fig. 2 illustrates the opposite side thereof, partially broken away to show the interior elements.

Fig. 3 is a vertical section through the instrument casing illustrating the indicating mechanism in the "set" position.

Fig. 4 is a similar view illustrating the mechanism in an intermediate or marking position.

Fig. 5 is a vertical section taken at right angles to the section of Fig. 3.

Fig. 6 is a horizontal section, looking upwardly on the line 6—6, Fig. 5.

The entire operating mechanism is enclosed in a sealed tubular housing consisting of a lower housing section 10 and an upper housing section 11, telescopically fitted together as shown at 12 to provide a smooth continuous external surface. The lower and upper portions of the housing are closed by means of lower and upper sealing caps 13 and 14 respectively.

The upper housing section 11 contains a freely swinging plumb bob 15 suspended from a head member 16 upon a suitable flexible member 17. The position of the plumb bob and the adjustment of the length of its flexible member 17 is accomplished by means of an adjusting screw 18 in the block 16. The lower extremity of the plumb bob terminates an accurate needle point 19.

The lower section 10 of the housing contains a cylindrical block 20, in which is mounted a clock movement 21. The movement 21 is of special construction to allow it to be positioned in a long narrow enclosure. To accomplish this, the gear train of the movement is placed in vertical, longitudinal alignment so that the width of the casing need only equal the diameter of the largest gear therein.

The clock movement is provided with an hour shaft 35 and a winding stem 55.

The upper extremity of the block 20 rotatably supports a crank shaft 22. A suitable helical spring 23 constantly tends to rotate the crank shaft in a counter-clockwise direction. It can be rotated in the opposite direction by means of a key inserted in a key hole 24 and engaging a squared extremity on the crank shaft 22. The inner extremity of the shaft 22 carries a crank member 25, the extreme movement of which is stopped by means of a stop pin 26. The crank 25 is connected by means of a connecting rod 27 to a slidably mounted case 28 so that, as the shaft 22 rotates, it will reciprocate the case upwardly and downwardly. The bottom of the case is slotted as shown at 49 to receive the extremity of the connecting rod which is hinged therein on a wrist pin 54. The upper face of the case 28 carries a cardboard target disc 37 which is removably held in place by a knurled bezel ring 36.

The shaft is prevented from rotating until a predetermined time interval has elapsed by a pawl 29 carried upon the extremity of a trigger lever 30. The trigger lever 30 is formed with a side arm 32 which is hingedly mounted on a hinge pin 31. The pawl 29 can swing forwardly on the lever 30 to allow passage of the crank 25 to the "left", but cannot swing rearwardly so that the crank is prevented from returning to the "right", until the entire trigger lever is

released. The pawl is held in the engaging position by means of a wire spring 33. The spring 33 also acts to return the lever 30 to the engaging position after it has been released.

This lower extremity of the lever 30 normally rests against a half cylindrical cam 34 mounted upon the hour shaft 35 of the movement 21. The cam 34 has a flat side which, when turned upwardly, will release the lever 30 and allow it to swing past the cam. The cam is of course rotated by the clock movement 21.

It is desired to call attention to the fact that the lower leg of the lever 30 is much longer than the upper leg thereof so that a great leverage is provided at its lower extremity. Due to this construction very little weight is placed on the cam 34 so that the accuracy of the clock movement although it is of the delicate watch type is not interfered with. The shaft 35 also carries an indicating hand 38 which indicates time intervals on a scale 39. The scale 39 is visible through the lower part of the housing 10 through a glass window 40 and is preferably indexed in five minute intervals.

In setting the instrument for use, the operator turns the crank shaft 22 clockwise to bring the point of the crank 25 behind the tip of the pawl 29. He then sets the time hand 34 backward the desired time interval on the dial 39. This is all done from the exterior by means of a suitable key. He then lowers the instrument in the drill pipe to the desired point and in the well and allows it to remain until the preset time interval has elapsed.

When the pointer 38 reaches its vertical position, the flat side of the cam 34 will be brought below the lever 30 allowing the spring 23 to cause the crank 25 to push the upper extremity of the lever 30 to the right (in Fig. 3) thereby releasing the crank 25. The latter instantly snaps around almost a complete revolution until it is stopped by the stop pin 26 as shown by the broken line position in Fig. 3. As the crank passes its uppermost position, see Fig. 4, the cardboard target 37 will be pressed against the needle point 19, thereby marking the target to indicate the degree of deviation from the vertical. Instantly after the marking is accomplished, the target is withdrawn to the broken line position of Fig. 3.

Therefore the target remains in contact with the needle point only a fraction of a second, so that any subsequent movements of the instrument in withdrawing it from the well and otherwise handling it will not cause the needle point to tear or damage the target and point.

As thus far described, the instrument gives only the degree of deviation or inclination of the drill hole. It is of course necessary to also know the compass direction of the deviation or inclination. This is accomplished by mounting a magnetic compass disc 41 in the case 28 upon the usual pivot pin 42.

A glass face 43 is placed over the compass disc with a suitable clamping pad 44 beneath its mid-point. A compass locking member 45 extends from about the needle 42 downwardly through the casing 28, terminating in a knob 52. A spring 47 constantly urges the locking member 45 upwardly. A swinging latch member 46 is pivoted on the bottom of the case 28. This member has an upturned edge 48 which can be swung between the knob 52 and the case 28 to hold the locking member 45 withdrawn. When in the latter position, the latch member appears as in Fig. 6, extending across the slot 49 of the connecting rod 27. A releasing pawl 50 is pivoted on a pivot screw 51 on the side of the connecting rod 27. The lower extremity of this pawl is in the path of swing of the crank 25. The upper extremity of the pawl bears against the latch member 46.

Let us assume that the compass disc is in the released position of Fig. 5 and the releasing member 45 is being held withdrawn by the latch member 46. At the time when the lever 30 is released by the arrow in Fig. 4 and in passing, will strike the releasing pawl 50, causing the upper extremity of the latter to swing the latch member 46 from beneath the knob 52. This allows the spring 47 to snap the releasing member 45 upwardly to lift the compass disc 41 from its needle 42 and clamp it against the pad 44, as shown in Fig. 4, thereby locking the compass in the position it was in when the target reached the marking position.

The instrument may be used in any of the usual enclosing barrels for lowering and guarding it in the drill pipe.

It is desired to call attention to the fact that the joint 12 allows the two sections of the housing to be separated to provide access to the target 37 and view of the compass 41. When closed, however, this long telescopic joint makes a water tight seal in the housing. No leakage can enter to the clock movement since the block 20 fits tight into the lower housing section of the housing and the shafts 22 and 35 are tight therein.

While a specific form of the improvement has been described and illusrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:—

1. In an oil well surveying instrument of the class described, the combination of a rotary member; a compass case; a connecting rod connecting said compass case with said rotary member so that the latter will reciprocate said case at predetermined times; a magnetic compass mounted in said case; and means for locking said compass in consequence of the reciprocation of said case.

2. In an oil well surveying instrument of the class described, the combination of a rotary member; a compass case; a connecting rod connecting said compass case with said rotary member so that the latter will reciprocate said case at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; and means for causing said locking member to contact said compass in consequence of the reciprocation of said case.

3. In an oil well surveying instrument of the class described, the combination of a rotary member; a compass case; a connecting rod connecting said compass case with said rotary member so that the latter will reciprocate said case at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; a spring for moving said locking member toward said compass; a latch for holding said locking member withdrawn from said compass; and means for releasing said latch in consequence of the reciprocation of said case.

4. In an oil well surveying instrument of the class described, the combination of a rotary

member; a compass case; a connecting rod connecting said compass case with said rotary member so that the latter will reciprocate said case at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; a spring for moving said locking member toward said compass; a latch for holding said locking member withdrawn from said compass; and a latch releasing member actuated by said rotary member to release said latch in consequence of the reciprocation of said case.

5. In an oil well surveying instrument of the class described, the combination of a rotary member; a compass case; a connecting rod connecting said compass case with said rotary member at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; a spring for moving said locking member toward said compass; a latch for holding said locking member withdrawn from said compass and a latch releasing member pivoted on said connecting rod in the path of movement of said rotary member so that when contacted by the latter it will act to release said latch to allow said compass locking member to contact said compass.

6. In a device of the class described, a reciprocating compass case; a magnetic compass in said case; a compass locking member extending from adjacent said compass through the lower extremity of said case; means for urging said member upwardly against said compass; and a latch member on the bottom of said case for withholding said member until a predetermined time.

7. In a device of the class described, a reciprocating compass case; a magnetic compass in said case; a compass locking member extending from adjacent said compass through the lower extremity of said case; means for urging said member upwardly against said compass; a head formed on the lower extremity of said locking member; a latch member pivoted on the bottom of said case so that it may be swung beneath said head to hold said locking member withdrawn; and means for swinging said latch member out of contact with said head at predetermined times.

8. In an oil well surveying instrument of the class described, the combination of a rotary member, a compass case; a connecting rod connecting said compass case with said rotary member so that the latter will reciprocate said case at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; a head formed on the lower extremity of said locking member; and a latch member pivoted on the bottom of said case so that it may be swung beneath said head to hold said locking member withdrawn, said latch member being positioned in the path of movement of said connecting rod so that movement of the latter will act to release said latch member.

9. In an oil well surveying instrument of the class described, the combination of a rotary member; a compass case; a connecting rod connecting said compass case with said rotary member at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; a head formed on the lower extremity of said locking member; a latch member pivoted on the bottom of said case so that it may be swung beneath said head to hold said locking member withdrawn; and a latch releasing member carried by said connecting rod in the path of movement of said rotary member so that rotation of the latter will cause said latch releasing member to contact said latch at predetermined times to release the latter from said head.

10. In an oil well surveying instrument of the class described, the combination of a rotary member; a compass case; a connecting rod connecting said compass case with said rotary member so that the latter will reciprocate said case at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; a head formed on the lower extremity of said locking member; a latch member pivoted on the bottom of said case so that it may be swung beneath said head to hold said locking member withdrawn; a latch releasing member carried by said connecting rod in the path of movement of said rotary member so that rotation of the latter will cause said latch releasing member to contact said latch at predetermined times to release the latter from said head; and means for releasing said rotary member at predetermined times.

11. In an oil well surveying instrument of the class described, the combination of a rotary member; a compass case; a connecting rod connecting said compass case with said rotary member so that the latter will reciprocate said case at predetermined times; a magnetic compass mounted in said case; a compass locking member extending from a position adjacent said compass; a head formed on the lower extremity of said locking member; a latch member pivoted on the bottom of said case so that it may be swung beneath said head to hold said locking member withdrawn; a latch releasing member carried by said connecting rod in the path of movement of said rotary member so that rotation of the latter will cause said latch releasing member to contact said latch at predetermined times to release the latter from said head; means for releasing said rotary member at predetermined times, said latter means comprising: a lever pivoted intermediate its extremities, one extremity of said lever being in the path of movement of said rotary member; and a clock actuated cam positioned to release the other extremity of said lever at predetermined times.

DANIEL B. MONROE.