F. L. CLEMENTS, JR.

DRILL BIT.

APPLICATION FILED MAR. 6, 1919.

1,332,105. Patented Feb. 24, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

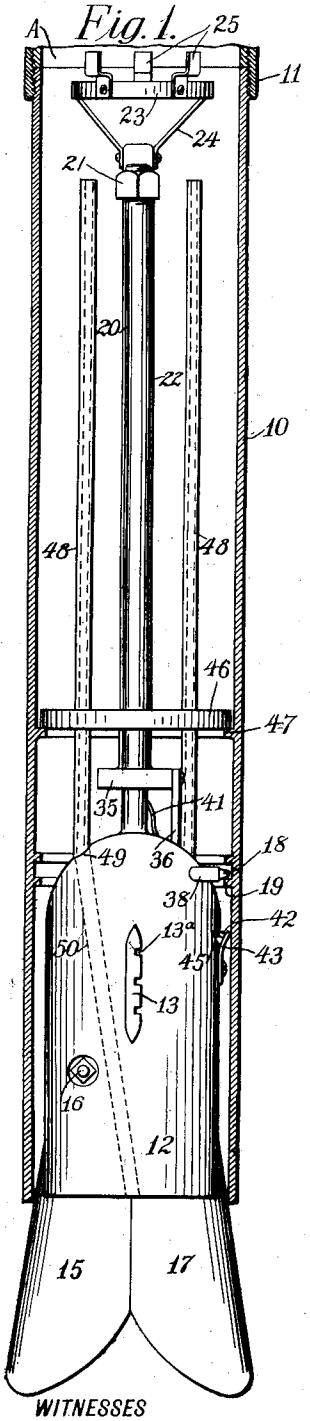


Fig. 2.

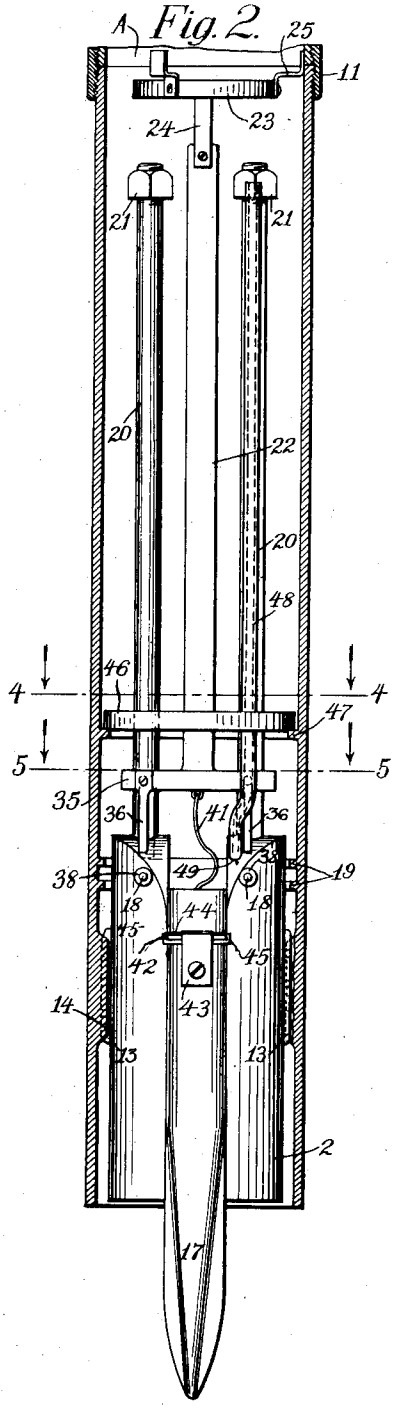
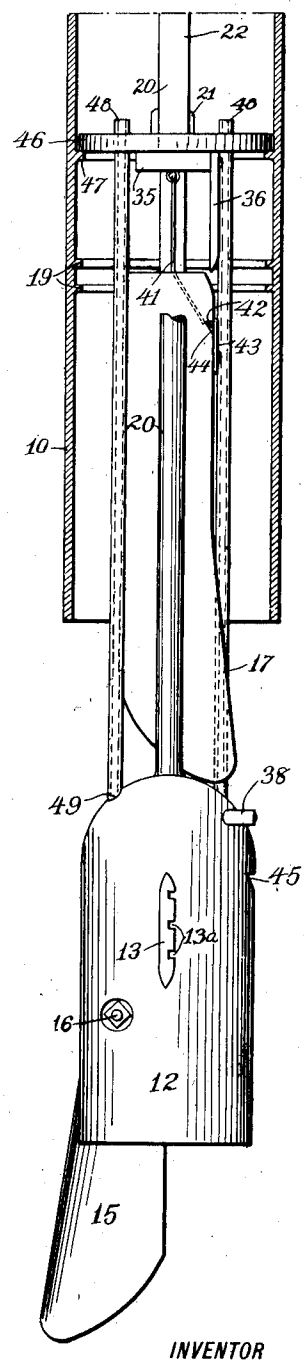


Fig. 3.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3A

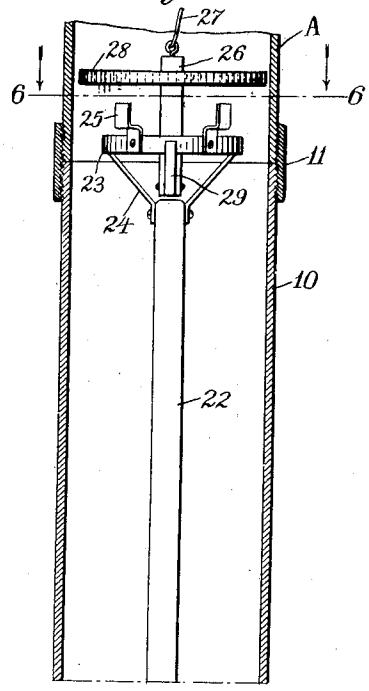


Fig. 4.

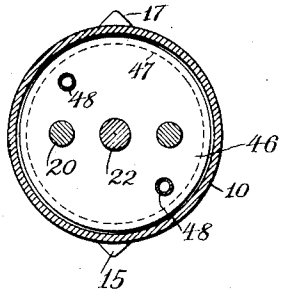


Fig. 5.

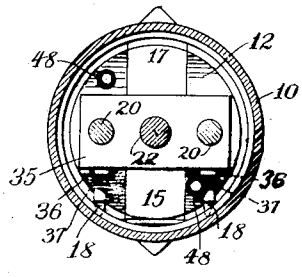


Fig. 6.

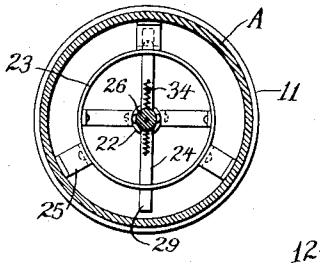


Fig. 7.

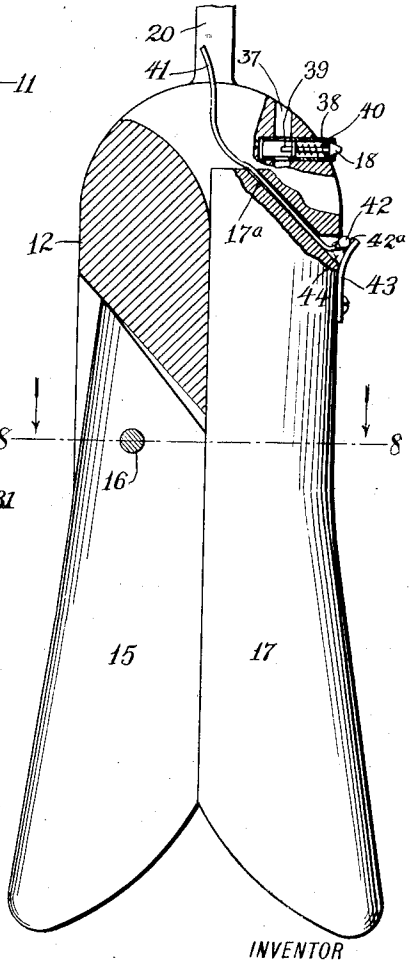


Fig. 10.

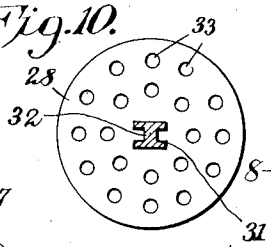


Fig. 8.

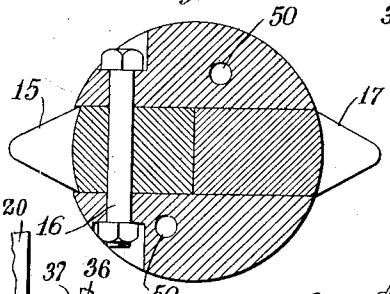
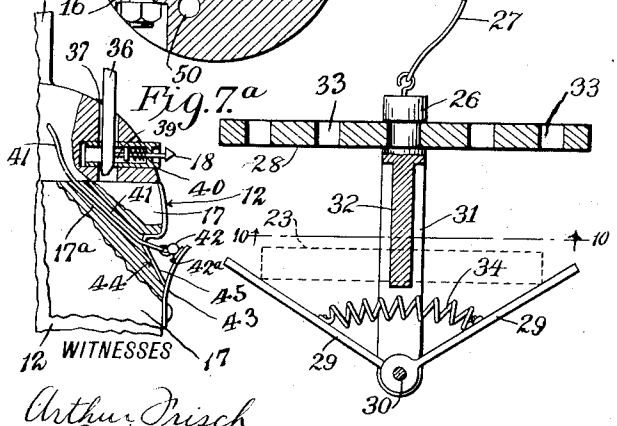


Fig. 7a

Fig. 9.



WITNESSES

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DRILL-BIT.

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To all whom it may concern:

Be it known that I, FRANK L. CLEMENTS, Jr., a citizen of the United States, and a resident of Houston, in the county of Harris and State of Texas, have invented a new and Improved Drill-Bit, of which the following is a description.

In drilling for oil by the rotary method in the usual manner, a bit is screwed to the bottom of a string of pipe, the whole being continuously rotated while muddy water is pumped down through the inside of the pipe passing through holes in the drill bit and returning to the surface around the outside of the pipe. The water washes out the material cut and loosened by the bit while the mud of the water plasters up the sides of the drilled hole. The string of pipe is known in the trade as the drill stem and the bit is usually about two inches larger at the working or drilling point than is the inside diameter of the drill stem. With bits of the form generally used it is necessary to remove and unscrew the drill stem every three joints whenever it is necessary to change the bit for sharpening or the like, and this is required every twenty-four hours or oftener, depending on the character of the formation in which the drilling is being done. Removal of the stem and renewal of the bit requires from four to six hours, more or less. To overcome the stated objection provision has been proposed for passing the bit through the drill stem, thereby constituting a saving of a great deal of time and labor over the present method, besides reducing the wear and tear on the machinery, piping, etc. My invention provides novel means for carrying out the passing of the bit through the drill stem, as hereinafter set forth.

Reference is to be had to the accompanying drawings forming a part of this specification, it being understood that the drawings are merely illustrative of one example of the invention.

Figure 1 is a longitudinal vertical section of the lower end of a drill stem showing my improved drill bit therein in side elevation;

Fig. 2 is a view similar to Fig. 1 but at right angles to the latter;

Fig. 3 is a view similar to Fig. 1 but with the parts in positions for pulling the drill bit out of the stem, the drill points and other parts in this figure being also shown as they are disposed after lowering the drill bit, and before final positioning of the drill points relatively to the stem for drilling;

Fig. 3ª is a vertical section of the lower end of the stem and showing in side elevation the upper portion of the drill bit lift and the grab therefor;

Figs. 4 and 5 are respectively horizontal sections on the lines 4—4, and 5—5, Fig. 2;

Fig. 6 is a horizontal section on the line 6—6, Fig. 3ª;

Fig. 7 is a sectional side elevation of the drill bit with the drill points in position for drilling;

Fig. 7ª is a fragmentary view similar to the upper right hand portion of Fig. 7 showing the latch pin in the projected position by the controlling finger shown in the lowered operative position, the view showing also a spring-pressed latch bar sectioned to indicate its fastened relation to its controlling spring.

Fig. 8 is a horizontal section on the line 8—8, Fig. 7;

Fig. 9 is a vertical section of the grab for engaging the lift and raising and lowering the drill bit.

Fig. 10 is a horizontal section on the line 10—10, Fig. 9.

In carrying out my invention in accordance with the illustrated example, a tubular section 10 is applied to the lower end of the pipe A constituting the drill stem, connection being effected by any suitable means as by a coupling 11. The section 10 constitutes a housing for the drill bit and coacting members are provided on said housing and on the body 12 of the bit, so that the latter will be turned with the turning of the stem, there being shown for the purpose a rib 13 on the bit body to be engaged by ribs 14 on the section 10 at the interior. Said ribs 13 may have, as shown, recesses 13ª to receive corresponding teeth on the ribs 14 but this is not absolutely necessary, as the interlocking function while drilling is well performed by the latches 18 hereinafter referred to.

The drill points may be of any suitable shape to suit the character of the formation to be drilled. One drill point 15 is secured to the body 12 by a bolt 16 or the like to be readily removed while a second drill point 17 is adapted to have vertical movement relatively to the body 12 for positioning the second point alongside the relatively fixed point 15 for drilling or to raise

said second drill point 17 to a position more or less approximately in tandem to the point 15 to pass the drill bit through the stem and its section 10. For latching the drill bit in the drilling position relatively to the drill stem reliance preferably is based on laterally disposed latch pins 18 suitably disposed on the body 12 and adapted to engage between two ribs 19 on the section 10 of the drill stem. The body 12 of the bit has upstanding guide rods 20 on the upper ends of which are stops 21 usually in the form of nuts, the purpose of which will appear as the description proceeds.

The bit is equipped with a lift to be engaged by a grab for raising and lowering the bit, said lift having means to control the latches 18 and to control the vertically movable drill point 17 as follows: The lift is in the form of a central upright rod 22 having at the upper end means to engage a grab, there being shown a frame or ring 23 secured to said rod by brackets 24 or the like and having offset bracket members 25 or equivalent guide elements to engage the inner surface of the drill stem A. The grab 26 is suspended from a cable 27 for raising and lowering the grab in the drill stem and has a disk 28 which gives weight to the grab and it is slightly less in diameter than the interior of the drill stem to center the grab. The major portion of the grab 26 is forked presenting spaced members 31 and grab arms 29 are pivoted as at 30 between the fork arms, and in the illustrated form, a cross bar 32 extends between the fork members as in Fig. 9. The disk 28 has perforations 33 for the free passage of water. The arms 29 are adapted to be engaged beneath the ring 23 of the rod 22, a suitable spring 34 being provided between said grab arms to hold them in engagement with the ring 23. The spring 34 will be an expansion spring on the grab when dropping the grab into the well for lifting the drill bit so that the arms 29 upon striking the ring 23 will yield inwardly and after passing said ring will be sprung outward to a grabbing position. The lower end of the rod 22 has a head 35 having depending latch fingers 36, adapted, when said head 35 is in the lowermost position on the rod 22, to pass into holes 37 (see Figs. 7ª and 10) and registering holes in the casing 38 in which each latch pin 18 is fitted. Each latch pin 18 has a stem 39 adapted to be engaged by the beveled lower end of a finger 36 to force the pin 18 outwardly against the tension of the spring 40 coiled about the stem 39 and normally tending to retract said latch pin to a position to not engage the ribs 19. Thus, the lowering of the fingers 36 serves to throw the latch pins outward to engaging position. A short length of light cable 41 extends from the head 35 of the latchrod 22 obliquely through a passage 17ª in the upper end of the drill point 17, and connects at its lower end with a transverse latch bar 42 rigidly fastened to a latch spring 43 secured by solder, as indicated by the reference character 42ª, Figs. 7 and 7ª, or by other suitable means to said point 17, said latch bar 42 being accommodated in a notch 44 in the point 17, and extending laterally at both ends to engage in notches 45 in the body 12 of the drill point when said notches 45 are in register with the notch 44. This latch bar 42 is used to raise the assembled bit into position for drilling after it has been passed down through inside of the drill stem.

A disk 46 is vertically movable relatively to the guides 20 and the rod 22 and is adapted to seat on an internal flange 47 on the casing 10 to form a water-tight connection with the latter. The disk has a central hole through which the stem 22 passes and holes at the sides of the center for receiving the guides 20. Also, the disk 46 has vertical holes slidably receiving water pipes 48 extending therethrough and rising from the drill bit body 12 at the inlets 49 of water passages 50 extending through said body 12, (see Figs. 1 and 8). By being arranged in this manner the disk 46 may move vertically along these water pipes 48 and upstanding guide rods 20, and in any position of bit, said water pipes 48 will protrude through the holes in said disk 46. In practice, while the drill bit is being lowered inside the drill stem, the drill bit parts and appurtenances will appear as shown in Fig. 3. When in the position of Fig. 3, the head 35 holds the weight of disk 46 and the latch fingers 36 on head 35 are not in the holes 37, thereby allowing the tension springs 40 to hold latch pins 18 away from inside of drill stem thereby allowing free movement of bit; at this time the latch bar 42 is held in place against drill point 17 by tension of small cable 41 caused by weight of bit on cable 27. It is to be noted that when the drill bit is being either raised or lowered the bottom of drill stem will be maintained at least several feet off bottom of hole.

The points 15, 17 will continue in the same relative positions throughout the entire length of the drill stem until the bit reaches the special section 10 and is positioned as in Fig. 3 and the disk 46 will have seated on seat 47 of stem section 10. The drill bit body 12 will not now go any lower, being held here by stop nuts 21 on ends of guides 20. Head 35 and drill point 17 will, however, continue to travel downwardly until drill point 17 is even with drill point 15 at the bottom. Up to this time all the spring latches (18, 42 and 43) hold the same positions as when first being lowered. When drill point 17 reaches a position as low as drill

point 15, the weight of all will be on disk 46 through guides 20, and cable 27 will be slightly loose. Latch bar 42 will now be directly over notches 45 in body 12 but will be held out of notches by spring 43. Cable 27 will now be raised causing latch bar 42 to catch in notches 45 in body 12, raising the fully assembled bit to position in Fig. 1. Without loosening up on cable 27 the drill stem is lowered until bit rests solidly on bottom of well hole. Cable 27 is then lowered allowing fingers 36 on head 35 to engage with and trip latch pins 18 and force said latch pins outwardly and against the inside of section 10 between ribs 19 which will lock bit in position for drilling. The grab 26 is now removed and bit is in position of Fig. 1 and spring 43 on latch bar 42 now holds latch bar 42 away from notches 45 in body 12. When body 12 is raised (and before drill stem is lowered and bit locked) disk 46 remains on seat 47 and the guides 20, stem 22 and water pipes 48 move upward through their respective holes in disk 46.

To remove bit from hole, the drill stem with section 10 is first raised several feet; grab 26 is then lowered down inside of drill stem, grab catching ring 23; cable 27 is slightly lifted which will raise head 35 thus disengaging fingers 36 from latch pins 18 and unlocking bit allowing body 12 to drop to position shown in Fig. 3. In order not to allow body 12 to drop and thus avoid any strain or jar it may be found more practicable to go through above operation before drill stem is raised off bottom and then to pull drill stem up sufficiently high for the drill point 15 to clear the bottom, and then remove bit. The bit points 15, 17 in being raised up through inside of the drill stem will have the same relative positions as when being lowered; also, all spring latches will have the same positions. With the upward movement of the bit body 12 and the bits, the head 35 carries disk 46 upwardly also.

I would state in conclusion that while the illustrated example constitutes a practical embodiment of my invention, I do not limit myself strictly to the mechanical details herein illustrated, since manifestly the same can be considerably varied without departure from the spirit of the invention as defined in the appended claims.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent:

1. A drill including a tubular stem section, a bit body having passages therethrough for the flow of water, means to establish or disestablish driving connection between the bit body and stem section when said body is in the lowered position, relatively movable drill points adapted to be positioned relatively to the body for drilling or for raising and lowering the bit, cable-controlled means for raising and lowering the bit, means to place and displace one drill bit relatively to the other through said cable-controlled means, and an element movable relatively to the bit body and the cable-controlled lift means and adapted to seat on the stem section above said body when the latter is lowered in the stem section, said element having holes therethrough, and water pipes on the bit body at the water passages and extending upwardly through the holes in said element to permit the flow of water therethrough to the body, said element, except for the water pipes, serving when seated, to effect a water-tight closure of the stem section, said member being adapted to be raised and lowered with the raising and lowering of the bit body and lift means.

2. A drill including a tubular drill stem section, a bit body movable relatively to said stem section to be received in the lower end thereof or to drop to a position below said stem section, a drill point fixed on said bit, a second drill point adapted normally to occupy a position on the bit body alongside the fixed point, the bit body and its fixed drill point being adapted to be dropped below the second drill point, an upstanding guide extending from the top the bit body and having stop means at the upper end thereof, an element above the bit body and relative to which the latter and its guide means are vertically movable, said element being adapted to engage said stop means for limiting the downward movement of the bit body and the fixed drill point relatively to the second drill point, lift means above and movable relatively to the bit body and its guide means, a connection between said lift means and the second drill point to sustain the second drill point against downward movement while the bit body moves below the stem section, and latch means on the second drill point adapted to engage the bit body for maintaining said second drill point in drilling position, said latch means being controlled by the relative movement of the lift means; together with latch means on the bit body controllable by said lift means and normally tending to engage the stem section.

FRANK L. CLEMENTS, JR.