June 1, 1943. C. L. ALLEN 2,320,550

WELL DRILLING BIT

Filed June 24, 1940

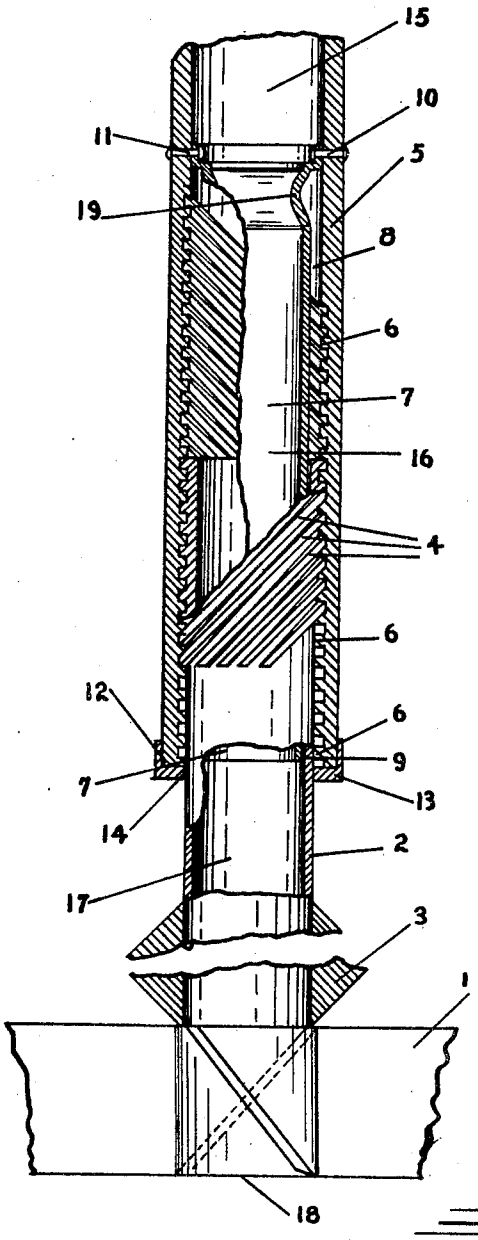


Fig. I

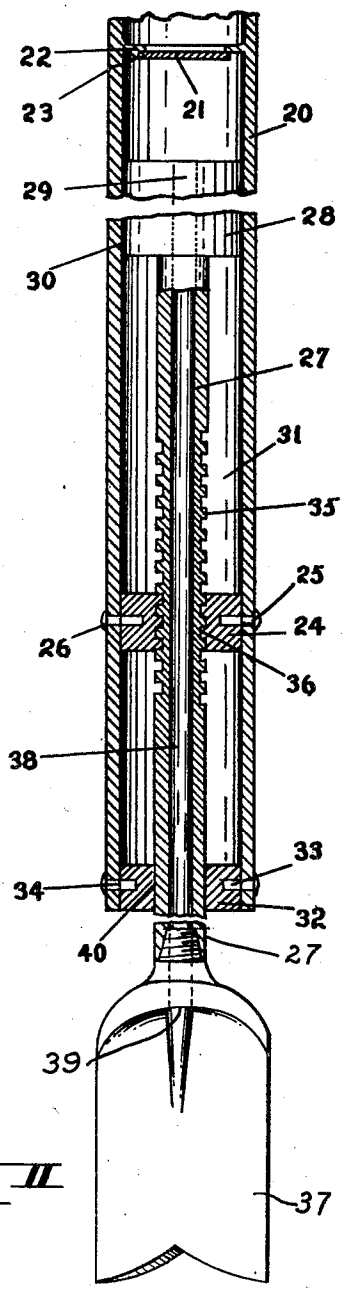


Fig. II

INVENTOR

Charles L. Allen

Patented June 1, 1943 2,320,550

UNITED STATES PATENT OFFICE

2,320,550

WELL DRILLING BIT

Charles L. Allen, Portland, Oreg., assignor of two and one-half per cent to Earl Brunk, Salem, Oreg.

Application June 24, 1940, Serial No. 342,067

2 Claims. (Cl. 255—27)

My invention relates to improvements in well drilling bits. Heretofore, well drilling bits have been solidly attached to a power driven shaft causing breakage to the shaft if the bit embeds itself in the formation being drilled.

In my device I place a male threaded shaft inside of a power driven female threaded shaft. The male threaded shaft has a bit attached thereto. The bit has a suitable weight attached upwardly therefrom and below the threads.

An object of my invention is to provide a bit that will not embed itself in any formation of ground being drilled.

A further object of my invention is to provide a bit that is threaded and attached to a threaded rotating shaft. A desired amount of weight is attached to the bit to determine the amount of cutting force the bit will have.

A further object of my invention is to provide a bit that if cutting too heavily or causing too much strain on the power driven shaft, will automatically adjust itself through the action of coacting threads and a predetermined amount of applied weight attached to the bit. A sudden embedding of the bit will cause the threaded bit shaft to cease rotating, therefore the power rotated threaded shaft will lift the bit upwardly out of the mire through the action of the coacting threads.

A further object of my invention is to provide a bit that is cheap to manufacture, simple in construction and a bit that is free from mechanical weaknesses.

I also provide a simple means for furnishing the bit with circulating fluids without allowing the fluid to pass through the threads which would cause wear. I therefore tightly enclose the threads.

In the drawing:

Fig. I is a sectional side view illustrating the threaded mechanism in conjunction with the drill bit, the drill bit stem and the drill pipe. I also illustrate a method of furnishing the bit with circulating fluids.

Fig. II is a sectional side view of a modified form of my device illustrating the threads on the outer periphery of a drill bit stem that coact with threads on the inner periphery of a nut. I also illustrate a method of furnishing the bit with circulating fluids.

Referring to the accompanying drawing, I show in Fig. I a drill bit 1 having a shaft 2 mounted upwardly thereon. Any suitable weight 3 or any means of downward pressure is mounted on shaft 2.

Upwardly on shaft 2, I place a plurality of threads 4. Threads 4 are placed on the upper top portion of shaft 2.

I also provide a drill pipe 5 having placed in its lower end a plurality of spiral threads 6 that coact with threads 4 on shaft 2.

Let it be noted that by rotating the drill pipe 5 clockwise there is a tendency to lift the drill bit 1 upwardly by coacting threads 4—6. It will also be noted that the weight 3 will allow the bit 1 to cut any formation of ground under ordinary conditions. When the bit 1 is cutting in excessively soft ground there is a tendency for the bit 1 to embed itself. When a predetermined amount of rotating force is applied to drill pipe 5 and the bit 1 becomes mired and stops, threads 6 in drill pipe 5 will run freely over threads 4 in drill stem 2, lifting the bit 1 upwardly until it is sufficiently raised out of the mire and freely allowed to rotate.

Let it also be noted that when drill bit 1, having the right amount of weight applied and having the correct angle to threads 4—6, bit will feed itself in any formation without embedding itself and causing breakage to drill pipe 5.

Upwardly on drill pipe 5, immediately above threads 6, I place any suitable nozzle 7 extending downwardly in the space 8 of drill pipe 5. Nozzle 7 also extends downwardly on the inside of shaft 2. I place any suitable packing gland 9 between the nozzle 7 and the shaft 2. Nozzle 7 is suitably attached on its upward end to drill pipe 5 by any suitable fastening bolts 10—11.

When circulating fluids are forced downwardly in pipe 5, nozzle 7 completely encloses threads 4—6, so no circulating fluids are allowed to get to threads 4—6.

On the lower end 12 of drill pipe 5, I place a suitable bearinged cap 13, being suitably packed at 14 to insure a tight connection between the bearinged cap 13 and the shaft 2 when the shaft 2 is rotably reciprocating upwardly and downwardly.

The circulating fluids coming from the surface, pass downwardly through drill pipe 5, illustrated at 15, then thru nozzle 7, illustrated at 16, thence downwardly through shaft 2, illustrated at 17, and out through the lower end of bit 18. To lessen the pressure of the circulating fluids in nozzle 7, I provide an inward protrusion 19 on the upper portion of nozzle 7.

Let it be noted that the nozzle 7 can be made of metal or any pliable material such as rubber.

In Fig. II, I provide a drill pipe 20, having mounted in its upper end a suitable check valve

21, being hingedly attached to lip 22 by hinge 23 upwardly from the bottom in casing 20. I provide nut 24 being solidly mounted by bolts 25—26.

Centrally in pipe 20, I vertically mount a hollow spiral threaded shaft 27. On the upper end of shaft 27, I place a suitable weighted piston 28, being hollow through its center as illustrated in dotted lines at 29. Piston 28 forms a tight sliding connection between piston 28 and pipe 20 as illustrated at 30, allowing no circulating fluids intended for the bit to pass therebetween into the compartment 31. Compartment 31 will be filled with suitable lubricating oils.

On the lower end of pipe 20, I place a suitable bearinged head 32, being solidly attached thereto by bolts 33—34.

Upwardly on shaft 27, I place a plurality of threads 35, that are allowed to run freely in threads 36, formed in nut 24. On the lower end of shaft 27, I mount any suitable bit as illustrated at 37.

The circulating fluids being forced from the surface, pass downwardly in drill pipe 20, passing through check valve 21, thence downwardly through piston 28, then through the hollow portion 38 of shaft 27 to the bit, ejecting itself through the bottom of the bit 39.

When the bit 37 isn't receiving enough circulating fluids to allow it to cut easily, it will embed itself in the formation being drilled, causing shaft 27 to stop, allowing the rotating nut 24 to lift the weighted shaft upwardly through the action of threads 35—36. In doing this, piston 28 will be moved upwardly closing check valve 21 and creating a pressure of circulating fluids between piston 28 and check valve 21. By doing this the circulating fluids will be forced downwardly with great pressure through the hollow shaft 38 and thence out through the bit 37 at 39.

When the piston 28 moves downwardly, the check valve 21 again opens and allows the circulating fluids to flow under their normal pressure.

This action is used only when the bit 37 is not receiving enough circulating fluids to allow it to cut freely.

It will also be noted that the bearinged head 32 is suitably packed and bearinged around shaft 27, as illustrated at 40, allowing nothing to pass therebetween.

It will be noted that in both of my devices the bit, while working, will continuously be feeding itself without any worry or obligation to the operator but to place the correct amount of weight on the bit before lowering the device in the hole. The weight will be judged by the condition of the formation. If it is soft and the bit is embedding itself frequently, the bit will be reciprocatively moving at the bottom of the rotating drill pipe adjusting its own bite.

Let it also be noted that a plurality of the above shown and described mechanisms may be used within the drill pipe 5—20.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is understood that it is not intended to confine the invention to the embodiment herein shown and described, as it is susceptible to embodiment of various forms all coming within the scope of the claims which follow.

What I claim is:

1. In self feeding bits, the combination of a drill bit, a drill bit shaft having threads formed upwardly thereupon, a suitable piston mounted on the uppermost top end of said shaft, said piston, shaft and bit being hollow through their central portion to allow circulating fluids to pass therethrough downwardly, a drill pipe having a nut solidly mounted therein, said nut having engaging threads to threads on said shaft, a suitable packed, bearinged head around said shaft mounted solidly in the lower end of said pipe, and a check valve mounted in said pipe above said piston to restrict the upward flow of circulating fluids on the upward stroke of said piston and thereby feeding circulating fluids through said bit.

2. In self feeding bits, the combination of a drill bit, a drill bit shaft having threads formed upwardly thereupon, a suitable piston being changeable for applying more or less weight to said bit, said piston, shaft and bit being hollow through their central portion to allow circulating fluids to pass therethrough downwardly, a drill pipe having a nut solidly mounted therein, said nut having engaging threads to threads on said shaft, a suitable packed, bearinged head around said shaft solidly mounted in the lower end of said pipe, a check valve mounted in said pipe above said piston to restrict the upward flow of circulating fluids on the upward stroke of said piston and thereby feeding circulating fluids through said bit, and any suitable power mechanism for rotating said drill pipe.

CHARLES L. ALLEN.