

July 4, 1939.

F. THRIFT

2,164,598

CORE TAKING APPARATUS

Filed April 13, 1934

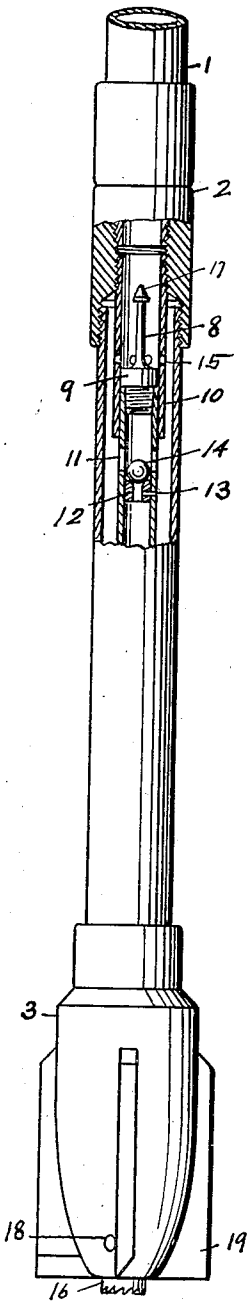


Fig. 1.

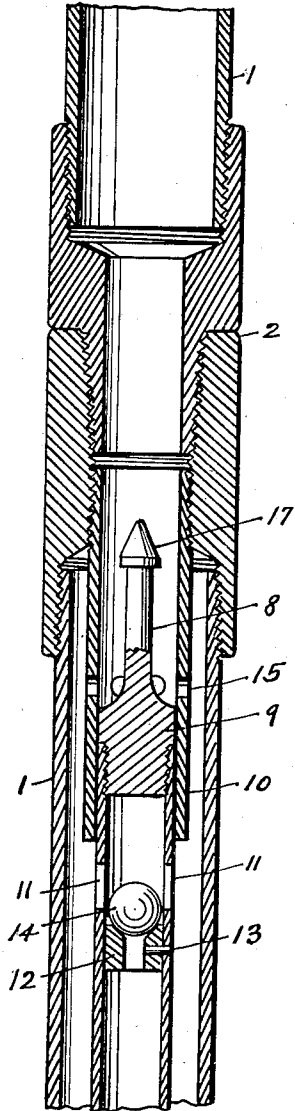


Fig. 2.

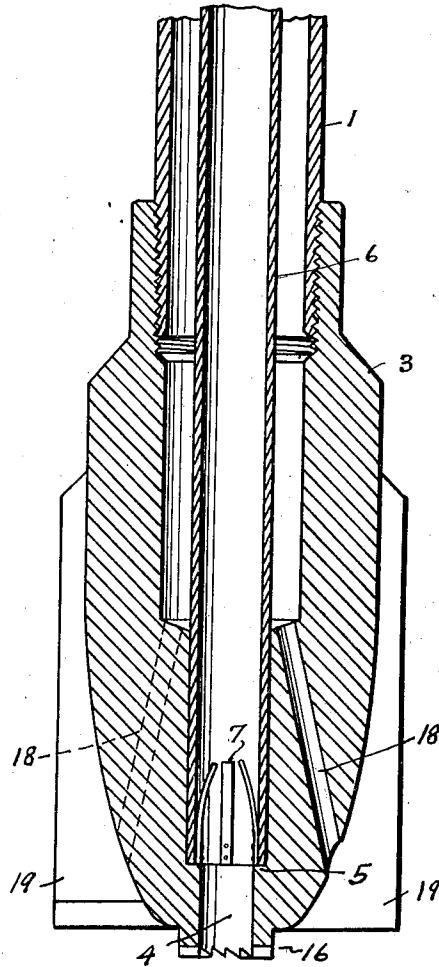


Fig. 3.

Inventor
Fred Thrift.

By
Hardway Kathey
Attorney

UNITED STATES PATENT OFFICE

2,164,598

CORE TAKING APPARATUS

Fred Thrift, Whitsett, Tex.

Application April 13, 1934, Serial No. 720,405

9 Claims. (Cl. 255—72)

This invention relates to a core taking apparatus.

An object of the invention is to provide apparatus of the character described for taking
5 cores or samples of the formation encountered during well drilling operations and embodies a core barrel with novel means whereby the same may be landed in position in, and maintained in position in, the drilling apparatus by the pressure of the drilling fluid.

Another object is to provide the combination with drilling apparatus of a core barrel arranged to be held in position therein, in readiness to take a core or sample, by the pressure of the drilling
15 fluid and having means for closing the channel, through which the drilling fluid is delivered to the drill, in case the barrel is displaced from core receiving position to indicate to the operator that the barrel has been so displaced.

A further object is to provide in a device of the character described, a novel construction whereby the drilling fluid may be utilized to force the core barrel into its final position in the drill
20 stem and whereby the pressure of the drilling fluid will be released when the core barrel has landed in home position to indicate to the operator that the core barrel is in home position to take a core or sample.

The invention disclosed herein comprises certain improvements in construction and method of operation over my Patent No. 1,999,428, Core taking apparatus granted April 30, 1935.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawing, wherein:

Figure 1 shows a side view of the core taking apparatus shown partly in section.

Figure 2 shows a vertical sectional view of the intermediate portion thereof, and

Figure 3 shows a vertical sectional view of the drill as attached to the lower end of the drill stem, showing the lower end of the core barrel in home position.

Referring now more particularly to the drawing wherein like numerals of reference designate similar parts in each of the figures, the numeral
50 1 designates a tubular drill stem whose sections are connected by suitable tool joints as 2 and attached to the lower end of the drill stem there is a drill 3 of any conventional construction, and having an axial bore 4 through the lower end thereof, for the inlet of the sample. Above its

lower end the bore 4 is reduced in diameter forming the seat 5 to receive and support the lower end of the tubular core barrel 6. The lower end of this core barrel has sample retaining means of any conventional construction. As shown the
5 core retaining means comprise flexible fingers 7 whose lower ends are secured in the core barrel and whose upper ends are inwardly curved and free.

There is a stem 8 whose lower end is enlarged
10 forming the plunger 9 and the lower end of this plunger is connected to the upper end of said barrel preferably by threads. This plunger and the upper end of the barrel fits closely within the cylinder 10 whose upper end is screwed into
15 the tool joint above. Beneath the upper end of the core barrel said barrel is provided with lateral openings 11 and within the barrel beneath said openings there is the valve seat 12 pinned in place by the pin 13, or otherwise secured therein. The seat is normally closed by means of the upwardly opening wall valve 14.

The cylinder 10 is provided with the outlet ports 15 which are cleared by the plunger 9 when the core barrel reaches its home position.

The upper end of the rod 9 is formed with a conical shaped head 17 for a purpose to be hereinafter stated and the lower end of the drill may be formed with a pilot core bit 16 of any selected design.

In carrying on drilling operations when it is desired to take a core, the core taking apparatus may be assembled as shown and a suitable grapple attached to the head 17 and the apparatus let down through the drill stem by means
35 of a cable attached to the grapple; or the core barrel may be dropped through the stem without the use of a cable.

The lower end of the core barrel 6 will enter the enlarged upper end of the bore 4, and the
40 plunger 9 will enter the tool joint above and the drilling fluid above, under pump pressure, will force said plunger 9 downwardly through the cylinder 10 until said plunger clears the ports 15 at which time the lower end of the core barrel
45 will land on the seat 5, thereupon the pressure being released the pump will be speeded up indicating that the barrel has landed in some position.

The grapple may then be detached from the
50 head 17, if a cable has been used to lower the barrel, and the cable removed and drilling may then be proceeded with. A core or sample of the formation will enter the bore 4 and pass up into the core barrel above. Any liquid that may

be in said core barrel will pass out through the seat 12, the valve 14 lifting for that purpose, and said liquid will pass on out through the openings 11. While the core is being taken drilling fluid will be forced under pressure down through the drill stem and will pass out through the channels 18, 18 which lead from said drill stem and diverge through the drill 3 whereby drilling fluid is discharged in front of the respective cutter blades or other cutters 19.

The pressure of the drilling fluid against the plunger 9 will ordinarily maintain the barrel in home position in readiness to receive the sample; but if the core should engage beneath the barrel or for any reason the barrel should be lifted off its seat so that a core or other sample does not enter the barrel the plunger 9 will move upwardly with the barrel and close the ports 15 to the end that the pump is stalled or the pressure increased to indicate to the operator that a core is not being taken.

Sometimes the core which enters the barrel will expand or lengthen sufficiently to lift the barrel and close the ports 15, thereby blocking the fluid passage and causing an increase of pressure to indicate to the operator that the barrel has been displaced from its home position.

As will be understood, therefore, I utilize the increase in back pressure on the drilling fluid to indicate either a filling or obstructing of the core barrel, and preferably effect this increase by lifting or elevating the barrel by means of upward pressure thereon created by filling or clogging, the lifting movement serving to obstruct the flow and increase the back pressure. By the expression "filling of the barrel", as used in the claims, is meant either a complete filling of the barrel or any obstruction which causes an increase in pressure.

When a core or sample has been taken the cable and grapple may be lowered and the grapple engaged over the head 17, and the core barrel with the sample therein may then be removed in an obvious manner.

What I claim is:

1. A core taking apparatus comprising a tubular stem having a drill attached to the lower end thereof and provided with a sample receiving inlet, said stem forming a conduit through which fluid under pressure may be supplied to the drill, a cylinder in the stem having an outlet port through which said fluid may pass, a barrel movable downwardly into and upwardly out of the stem, the upper end of the barrel forming a plunger arranged to enter the cylinder as the barrel moves downwardly whereby the pressure of the fluid in the stem above may act to force the plunger downwardly to clear said port and to move the barrel downwardly to seat its lower end on the drill in alignment with the inlet, said barrel being unanchored to the stem to permit upward pressure against the barrel to move the barrel upwardly relative to the stem to cause the plunger to block said port to effect an increase of pressure of the pressure fluid.

2. A core taking apparatus including a tubular drill having a fluid conduit, a core barrel adapted to be supported in said drill and retained therein by hydraulic pressure, means for introducing fluid under pressure to said conduit, and means actuated by upward pressure on the core barrel for interrupting the flow of fluid through the conduit and increasing the pressure of the fluid above the core barrel to indicate that the core barrel has been raised off of its seat, said

last mentioned means including a cylinder carried by said drill and having a port through which the fluid may pass, and a plunger non-movably carried by the upper end of barrel and normally clear of said port when the barrel is seated in the drill but movable to a position to close the port when the core barrel is elevated.

3. A core taking apparatus including a tubular drill having a sample receiving inlet and a seat located above said inlet, a core barrel adapted to be supported in said drill on said seat and retained thereon by hydraulic pressure, means for introducing fluid under pressure to said drill, means actuated by upward pressure on the core barrel for interrupting the flow of fluid and increasing the back pressure thereof to indicate that the core barrel has been raised off its seat, and a check valve mounted in the upper portion of said core barrel and normally positioned below said last mentioned means when the core barrel is seated in the drill stem, said valve being normally held on its seat by the pressure of the fluid but being adapted to be relieved from said pressure when said last mentioned means interrupts the flow of fluid through the conduit.

4. A core taking apparatus including a tubular drill stem having a fluid conduit, a core barrel adapted to be supported in said drill stem and retained therein by hydraulic pressure, means for introducing fluid under pressure to said conduit, means actuated by upward pressure on the core barrel for interrupting the flow of fluid through the conduit and increasing the pressure of the fluid above the core barrel to indicate that the core barrel has been raised off its seat, said last-mentioned means including a plunger carried by said core barrel and movable to a position to close said conduit when the core barrel is raised, said core barrel being provided with a valve seat positioned below said plunger and a port positioned between the valve seat and plunger and placing the interior of the barrel in communication with the interior of the drill stem, and a valve associated with said seat and normally maintained on said seat by the pressure of the fluid passing through said conduit, said valve being relieved from pressure of the fluid when the plunger closes said conduit.

5. A core taking apparatus including a tubular drill stem having a fluid conduit, a core barrel adapted to be supported in said drill stem and retained therein by hydraulic pressure, means for introducing fluid under pressure to said conduit, means actuated by upward pressure on the core barrel for interrupting the flow of fluid through the conduit and increasing the pressure of the fluid above the core barrel to indicate that the core barrel has been raised off its seat, said last-mentioned means including a cylinder carried by said stem and having a port through which the fluid may pass, and a plunger carried by the barrel and normally clear of said port when the barrel is seated in the drill stem but movable to a position to close the port when the barrel is elevated, said core barrel being provided with a valve seat positioned below said plunger and a port positioned between the valve seat and plunger and placing the interior of the barrel in communication with the interior of the drill stem, and a valve associated with said seat and normally maintained on said seat by the pressure of the fluid passing through said conduit, said second-mentioned port being so arranged with respect to the first port when the core barrel is seated, that closing of the first port by the

plunger will not close the second port whereby said valve will be relieved from fluid pressure when a core is being taken.

5 6. A core taking apparatus comprising a tubular stem having a drill attached to the lower
end thereof and provided with a sample receiving
inlet, said stem forming a conduit through which
10 fluid under pressure may be supplied to the drill,
a cylinder in the stem having an outlet port
through which said fluid may pass, a barrel mov-
able downwardly into and upwardly out of the
stem, the upper end of the barrel forming a
15 plunger arranged to enter the cylinder as the
barrel moves downwardly whereby the pressure
of the fluid in the stem above may act to force
the plunger downwardly to clear said port and
to move the barrel downwardly to seat its lower
20 end on the drill in alignment with the inlet, said
barrel being unanchored to the stem to permit
upward pressure against the barrel to move the
barrel upwardly relative to the stem to cause the
plunger to block said port to effect an increase
25 of pressure of the pressure fluid, said barrel be-
ing provided with a valve seat below said plunger
and a port above said seat to place the interior
of the barrel in communication with the interior
of the stem, and a valve associated with said seat
30 and normally maintained thereon by the pressure
of the fluid passing through the conduit, said
valve being relieved from pressure of the fluid
when the plunger blocks said first mentioned
port.

7. A core taking apparatus including a tubular
35 drill stem having a fluid conduit, a core barrel
adapted to be positioned in said drill stem and
retained in operative position by hydraulic pres-
sure, means for introducing fluid under pressure
through said conduit, means actuated by upward
40 pressure on the core barrel for interrupting the
flow of fluid through the conduit and increasing
the pressure of the fluid above the core barrel
to indicate that the core barrel has been raised
from operative position, and a valve mounted in
45 the upper portion of said core barrel and nor-
mally positioned below said last mentioned
means when the core barrel is in operative posi-

tion in the drill stem, said valve being normally
held on its seat by the pressure of the fluid but
being adapted to be relieved from said pressure
when said last mentioned means interrupts the
flow of fluid through the conduit.

8. A core taking apparatus including a tubular
5 drill stem having a fluid conduit, a core barrel
adapted to be supported in said drill stem and re-
tained therein by hydraulic pressure, means for
introducing fluid under pressure to said conduit,
10 means actuated by upward movement of the core
barrel for interrupting the flow of fluid through
the conduit and increasing the pressure of the
fluid above the core barrel to indicate that the
core barrel has been raised in the stem, said last
15 mentioned means including a plunger carried
by the core barrel and movable to a position to
close said conduit when the core barrel is raised,
said core barrel being provided with a port posi-
tioned to place the interior of the barrel in com-
20 munication with the interior of the drill stem
and being so arranged with respect to the plunger
that the closing of said conduit by the plunger
will prevent the entrance of the fluid under said
increased pressure through the port.

9. A core taking apparatus including a tubular
25 drill stem having a fluid conduit, a core barrel
adapted to be positioned in said drill stem and
retained in operative position by hydraulic pres-
sure, means for introducing fluid under pressure
30 through said conduit, means actuated by upward
pressure on the core barrel for interrupting the
flow of fluid through the conduit and increasing
the pressure of the fluid above the core barrel to
indicate that the core barrel has been raised in
35 the stem, said core barrel being provided with a
port positioned to place the interior of the barrel
in communication with the interior of the drill
stem and being so arranged with respect to said
fluid interrupting means that the interruption
40 to the flow of fluid through said conduit by said
last mentioned means will prevent the entrance
of the fluid under said increased pressure through
the port.

FRED THRIFT. 45