Sept. 28, 1937. H. PENNINGTON 2,094,022

RETRIEVING SAND TESTER

Filed Jan. 3, 1936 3 Sheets-Sheet 1

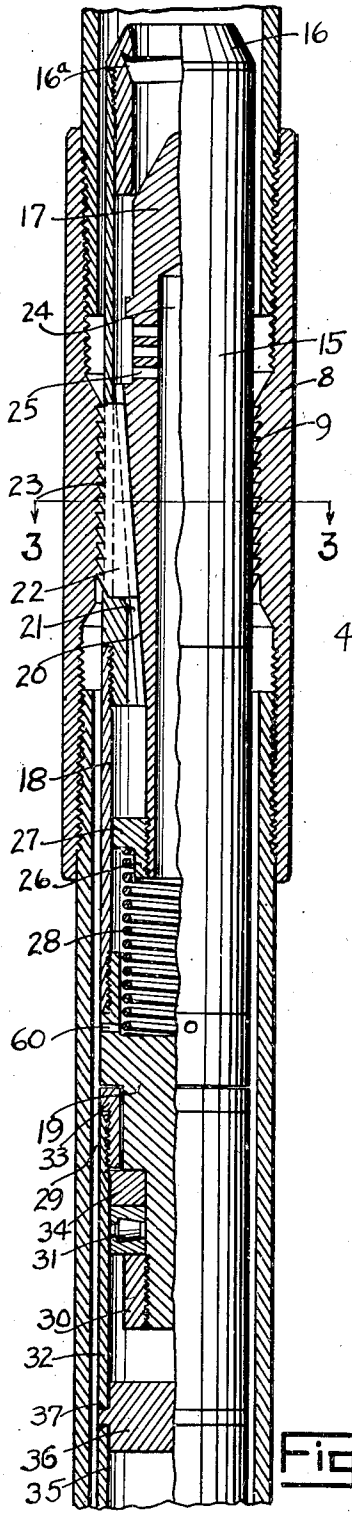


Fig. 1.

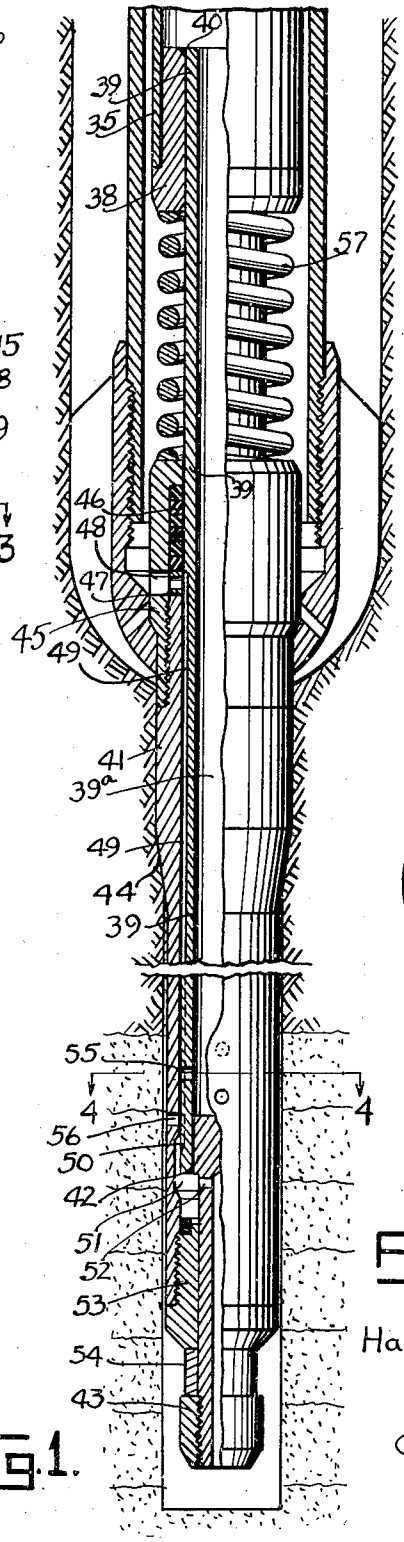


Fig. 2.

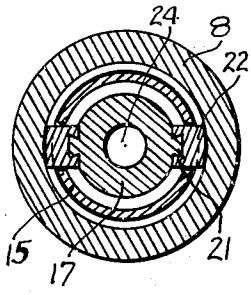


Fig. 3.

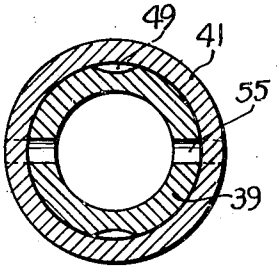


Fig. 4.

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RETRIEVING SAND TESTER

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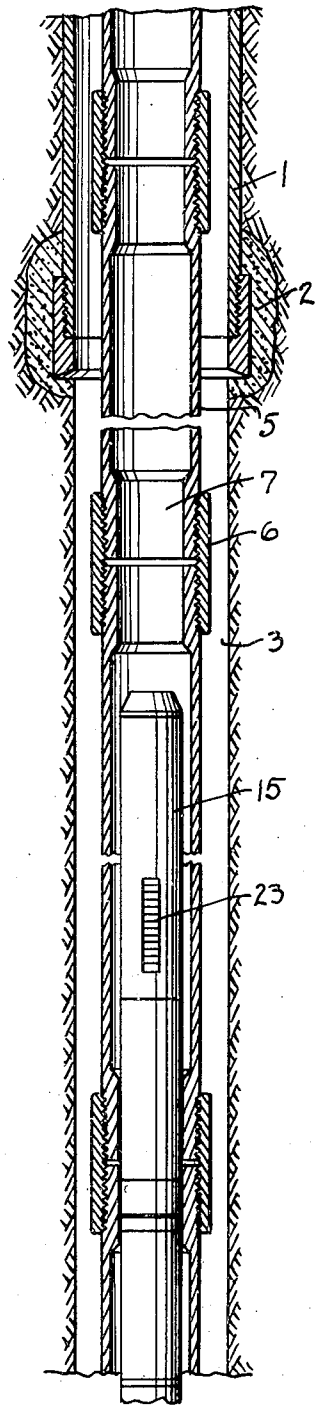


Fig. 5.

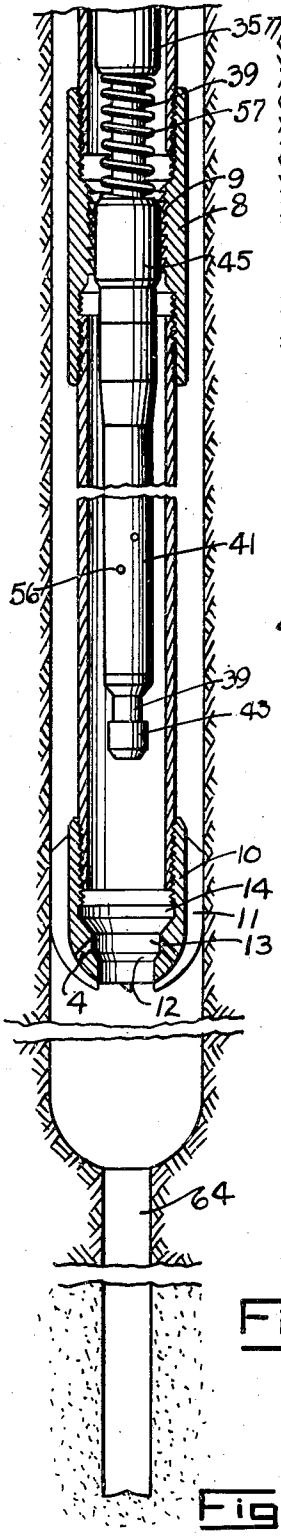


Fig. 6.

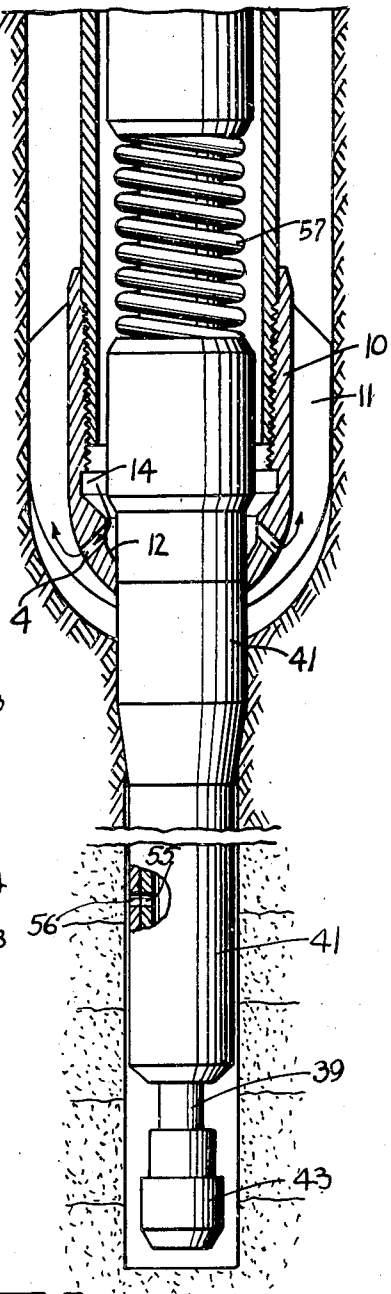


Fig. 7.

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RETRIEVING SAND TESTER

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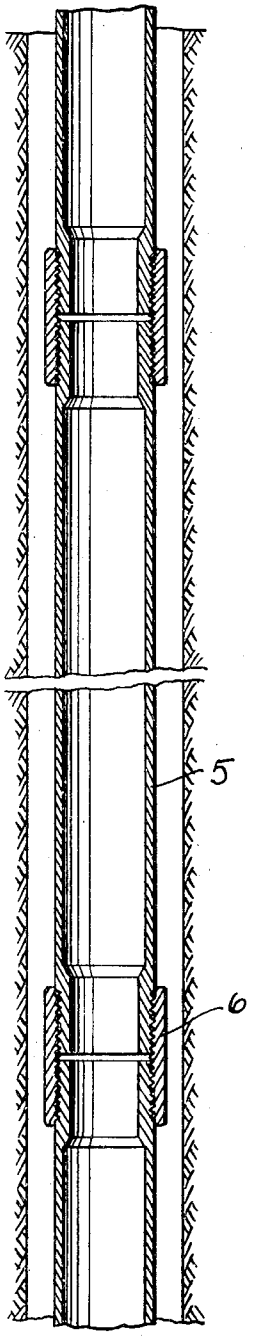


Fig. 8.

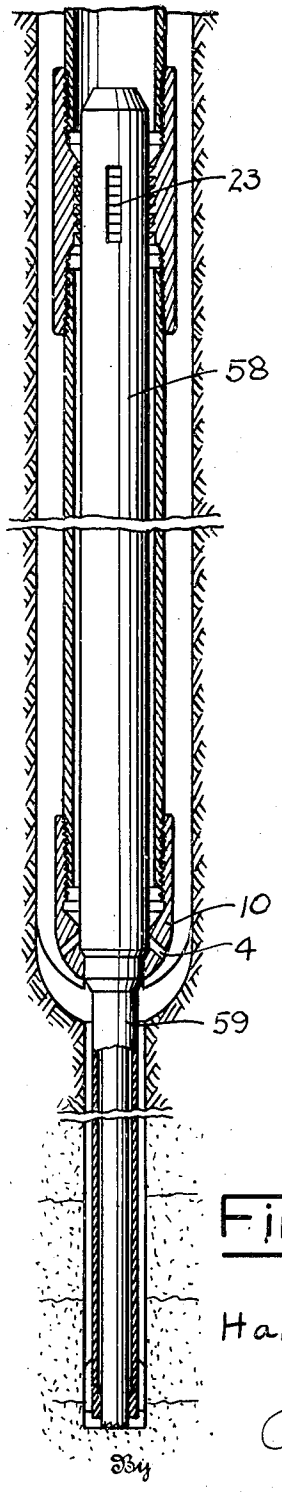


Fig. 9.

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Patented Sept. 28, 1937 2,094,022

UNITED STATES PATENT OFFICE

2,094,022

RETRIEVING SAND TESTER

Harry Pennington, San Antonio, Tex.

Application January 3, 1936, Serial No. 57,329

27 Claims. (Cl. 166—1)

My invention relates to sand testers such as are now employed in making a test of the formation at the bottom of the well to determine whether or not productive sand has been reached.

In prospecting in particular, and of course in development of a discovered field, or in drilling wells to a lower depth in search of production in lower horizons, a current method is to run a small hole ahead of a large hole in order to leave a shoulder on which to set casing, should production be discovered in the small lower hole called the rat hole.

In many operations the method of doing this is to core drill in a rat hole during the day and to ream down at night, leaving a full gauged hole to bottom, ready for the next crew to begin rat-holing or core drilling in daylight. The core obtained in the rat hole operation gives the driller an accurate log of the well and also gives him an indication of when oil or gas formation is reached.

In any event, a shoulder is necessary on which to set casing in order to develop production found below in a rat hole, for the rat hole made in core drilling is usually of such a diameter as to leave a shoulder at the bottom of the full sized hole on which casing can be set. For example, when setting 7" OD casing the rat hole made by the coring bit may be 6¼" in diameter and the full hole diameter may be 9⅞". In this rat hole a test is made by introducing a testing device. The tester includes means to pack off the upper end of the rat hole to prevent fluid from above entering the same and a closed chamber in the lower end of the tester may be opened when seal with the rat hole is accomplished so as to receive a sample of the formation in the rat hole below the packer. The chamber may be then closed and the tester withdrawn from the hole.

It is an object of my invention to provide a testing device and methods of operation whereby tests of this character may be made, said device being capable of use while the drill stem and drill are still in the hole. I desire to make tests of the formation without the necessity of withdrawing the drill stem and bit which are employed in drilling into the formation.

It is another object to provide a detached testing device which can be circulated down and latched into position to take a sample of the fluid from the formation and, after taking such samples, to be returned again to the surface by the circulation of the liquid employed in drilling.

It is another object to provide a releasable means for latching the testing device firmly in position while the test is being made.

Further objects include the control of the circulation through the drill stem and the tester so that the well may be washed and the drill stem and drill bit rotated while the test is being made, so that there will be no danger of caving in of the formation due to a stoppage of circulation.

It is a further object of the invention to provide a device of the character stated which will enable the pilot hole to be drilled previous to the making of the test also without withdrawing the drill stem, the pilot drilling mechanism being constructed on the same plan as my well testing device.

Further objects and advantages of the invention will be more clearly understood from the specification taken with the drawings herewith.

In the drawings, Fig. 1 is a central longitudinal section through a drill stem equipped to handle my invention, the upper end of the testing device being shown partly in elevation and partly in longitudinal section.

Fig. 2 is a similar view disclosing the lower end of the drill stem and tester shown in position preparatory for making a test.

Fig. 3 is a transverse section on the plane 3—3 of Fig. 1.

Fig. 4 is a similar transverse section on the plane 4—4 of Fig. 2.

Fig. 5 is a section through the well bore showing a drill stem having constrictions therein through which the well tester is shown as passing.

Fig. 6 is a similar view of the lower end of the drill stem showing the drill bit with the tester in position above its seat in the drill bit.

Fig. 7 is an enlarged view similar to Fig. 6 but showing the tester in operative position to take a sample of the formation.

Fig. 8 is a longitudinal section through the well bore with the drill stem therein equipped to operate with my core drill; and

Fig. 9 is a view of the lower end of the drill stem and bit with my retrieving core barrel in position to drill the pilot hole ahead of the main portion of the well bore.

Referring to Figs. 5 and 6, I have shown a well bore equipped for a portion of its length with a well casing 1, the lower end of which has been sealed by the usual cement 2 into close contact with the formation. The well bore 3 has been extended downwardly below the casing and, as shown in Fig. 6, a pilot bore or rat hole 64 has been drilled down into what is believed to be a producing formation.

The drill stem 5 may be of ordinary construction having tool joints connecting the sections thereof together. I have shown pipe sections the ends of which are upset internally and threaded on the outside to engage with couplings 6, which secure the ends of the sections together. There is thus provided at each of the joints a passage 7 which is somewhat more constricted than the portion of the drill stem section between the ends.

At a point spaced above the lower end is a special nipple or coupling 8, which has the constricted inner portion thereof provided with downwardly extending ratchet teeth 9.

At the lower end of the drill stem is a core bit 10 having radial cutting blades 11 thereon to cut the formation. The interior of the bit head is provided with a downwardly tapered seat 12 for the testing device. Above the seat 12 is a cylindrical area 13 adapted to fit closely with the tester, as will be later noted. Downwardly directed passages 4 in the head connect with this cylindrical area to provide an outlet for the flushing fluid passing downwardly through the stem when the tester closes the core opening. Above the cylindrical area the interior of the head is widened out at 14 to provide a chamber for the passage of the fluid.

My tester is adapted to be moved downwardly through the drill stem by fluid circulation. It includes an upper latching section formed within a housing 15 shown best in Fig. 1. This housing is a tubular barrel and at the upper end thereof is a tubular bushing 16, the outer surface of which is tapered upwardly. An inner groove 16a is provided into which a spear may engage if it is desired to remove the tester by wire line means. Said bushing is threaded into engagement with the upper end of the housing and its interior provides a cylinder into which the upper extension 17 of the plunger may fit. The lower end of the housing is connected with a short nipple 18, which is threaded at its lower end for engagement with the lower bushing 19.

Within the housing 15 is the plunger which operates the latching device. This plunger has a body 20, the outer surface of which is formed with opposite downwardly and inwardly inclined track-ways 21, the outer surfaces of which are formed with tenons engaging within mortises in the inner faces of wedge shaped latching dogs 22 fitting through openings in the housing. The connection between the dovetailed tenons and the latching dogs allows a longitudinal sliding movement of the dogs on the track-way provided on the outer surface of the plunger so that when the plunger is moved relatively downward the dogs will be pushed outwardly and the teeth 23 on their outer surfaces will engage with the teeth 9 in the drill stem coupling.

The plunger body 20 is hollowed out from its lower end upwardly to a point adjacent the extension 17. From the inner chamber 24 thus provided there are lateral fluid passages 25 leading to the interior of the housing. Flushing fluid is thereby allowed to pass downwardly from the drill stem around the upper end of the plunger and through the openings 25 to the interior passage 24.

The housing has lateral slotted openings through which the dogs 22 may move and it will be noted that the dogs fitting within these openings are prevented from longitudinal movement in either direction relative to the housing. The lower end of the plunger is provided with a nut 26 having an upper radial flange 27 engaging closely within the nipple 18 previously noted. Below the nut 26 is a compression spring 28 which bears at its lower end upon the bushing 19 and at its upper end upon the flange 27, thus tending to hold the plunger 20 in its elevated position with the dogs withdrawn within the housing.

The bushing 19 has a lateral outlet port 60 allowing fluid from the interior of the housing to pass outwardly into the space 29 between the tester and the drill stem. Said bushing has its lower end reduced in diameter and an annular nut or ring 30 is screwed thereon. This ring serves as a support for an anti-friction bearing 31 upon which is supported a lower sleeve or housing 32. Said sleeve has a nut 33 screwed on the inner upper end thereof above a ring 34 which rests upon the bearing race. It will thus be seen that the bushing 19 may be rotated relative to the sleeve 32 because of the swivel connection thus provided.

The sleeve 32 is connected at its lower end to a second sleeve 35 by means of a plate 36 which closes the interior of the two sleeves and also serves to connect them together, said plate being welded at 37 into connection with the two sleeves. The lower end of the sleeve 35 has an inner collar 38 which is in turn connected with the inner test tube 39 to which it is welded at 40.

The tube 39 is extended downwardly and telescoped within the packer sleeve 41. The lower end of the tube is welded into connection with a reduced extension 42 on the tube which projects downwardly below the packer sleeve and has at its lower end an annular nut 43, which projects from the outer surface of the tube and acts as a stop member, as will later appear. The extension 42 closes the lower end of the tube against entrance of fluid thereto from below.

The packer sleeve is of greater thickness at its upper end and is tapered at 44 to engage within the seat in the rat hole and form a frictional seal therewith. The upper end of the packer sleeve has a lantern or cap 45, the upper end of which is directed inwardly and fits closely about the test tube. A plurality of packing rings 46 within the cap makes a close seal with the test tube so that no fluid can pass at this point. Below the packing rings is a metal ring 47 having openings therethrough which register with openings 48 in the cap 45 whereby fluid from the interior of the drill stem can pass through to the exterior of the test tube. A longitudinal channel is provided on the outer surface of the test tube by externally formed grooves 49 therein, said grooves running vertically along the outer surface of the tube to a point indicated at 50 where the fluid may issue into the chamber 51 formed in the lower end of the packer tube. The fluid may pass then from the chamber 51 through openings 52 in the test tube extension 42 below the closed lower end of said tube, and from thence downwardly out the lower end of said extension.

The lower end of the packer sleeve is closed about the extension 42 by means of an inner nut or sleeve 53, said sleeve having between its lower end and the nut 43 on the test tube a spacing sleeve 54. The test tube has inlet openings 55 at opposite points within the packer sleeve, as shown in Figs. 2 and 4, said openings being normally out of registration with similar openings 56 in the packer sleeve 41. Said packer sleeve is held downwardly on the test tube with these openings out of registration through means of a

spring 57, which, as shown in Fig. 2, separates the lower end of the latching mechanism from the testing device.

It is to be noted that the length of my tester is sufficient to extend from one joint in the drill pipe to another joint, so that it can be more effectively acted upon by the flushing fluid.

When the rat hole has been drilled ahead ready to make a test as shown in Fig. 6, the testing device may be introduced at the upper end of the drill stem and circulated downwardly by the flushing fluid to engage within its seat in the interior of the drill bit 10. While it is thus being moved downwardly the fluid will pass through the drill and upwardly in the well bore outside of the drill stem. When the testing device first engages through the bit and within the upper end of the rat hole, as shown in Fig. 7, the circulation will be cut off through the central opening and will pass out through the lateral outlets 4. The drill will be raised from the bottom of the hole and the pressure of the pumping fluid upon the piston 17 will tend to move the testing tube downwardly into its seat in the drill bit and when this is accomplished the plunger will move relatively downward and expand the latching dogs 22 into locking engagement with the drill stem. This will prevent the testing device from being moved upwardly during the testing operation.

When the testing device is thus seated in the bit, as shown in Fig. 2, the circulation outwardly into the hole will be temporarily cut off and the fluid will then pass downwardly through the testing device and out the lower end into the rat hole. The drill stem may be raised together with the testing device so that circulation may then pass upwardly out of the rat hole and allow the hole to be washed clear of cuttings and foreign material. The device may then be set back on the bottom of the hole with the packer sleeve in sealing engagement with the walls of the rat hole.

The lowering of the weight of the drill stem on the tester will then cause the upper latching portion of the tester to move downwardly relative to the test tube and this relative downward movement will compress the spring 57 and allow the tube to be moved to its lowest position where the openings 55 therein register with the openings 56 in the packer tube and allow the material in the rat hole to enter into the testing device, and pass upwardly in the test tube. If the material in the hole is under pressure of gas the pressure will surge into the device and by compressing any air which is present will fill the chamber below the partition 36 and above the closed end 42 of the tube extension with a sample of the well fluid. The outlet through the passage 49 will be closed against escape of fluid from the rat hole due to the previous downward movement of the test tube relative to the packer sleeve which brings the upper end of the channel 49 away from the opening 48 and thus leaves a closed rat hole.

When the sample has been taken in this manner the drill stem is again raised off the bottom to relieve the pressure on the testing device to close the chamber 39a and the circulation of fluid in the hole is reversed, the fluid flowing down on the outer side of the drill stem and up through the inside thereof, carrying with it the testing device with its sample to the surface. The upward flow of fluid will engage below the piston 20, moving the piston upwardly relative to the latching dogs into the bushing 16, and thus withdrawing said dogs and releasing the locking engagement of the testing device with the drill stem.

The raising of the drill stem to release the pressure through the spring 57 upon the packer sleeve will allow the test tube to move upwardly in the packer sleeve and open the passage through the channel 49 so that circulation may take place around the test chamber. The openings 55 will move out of registration with the openings 56 and will be sealed against the entrance of fluid to the test chamber.

When the testing device is removed from the upper end of the drill stem tests may be made of the amount of pressure in the test chamber and the contents of the chamber may be examined to determine whether production is present.

In Figs. 8 and 9 I have shown how the rat hole may be drilled ahead by attaching a core drill at the lower end of the housing 58 similar to the housing of the testing device. The same latching mechanism may be employed to latch this housing to the interior of the drill stem after the housing has been pumped downwardly into position in the drill stem. I contemplate securing to the forward end of the housing a core barrel 59 adapted to project in advance of the bit and to drill a pilot hole of the desired depth in advance of the main bit. The particular construction of this core bit is not a part of the present invention and need not be further considered. It is to be understood, however, that by the use of a core barrel of this character the pilot hole can be drilled and the test made without withdrawing the drill stem and bit from the hole. The coring apparatus is capable of being pumped upwardly out of position after the rat hole has been drilled in the same manner as is the testing device.

The advantages of this construction lie in the speed with which the tests may be made of the formation and without the necessity of withdrawing the drill bit from the hole. The withdrawal of the drill bit and the drill stem and the discontinuing of the circulation of mud is often dangerous in that the walls of the well are liable to cave in. The making of a test thereafter becomes impossible until the well is again cleared of material. However, with my construction the drill stem and drill bit remain in the hole and rotation of the drill stem and circulation of the flushing fluid may continue throughout the testing operation. Thus I not only economize in time in making a test but I provide against cave-ins or similar difficulties by the continuing of rotation and circulation during the operation. It is also evident that after the test is completed the drill stem with the tester in position therein may be removed. This method is much less economical of time, however. The further advantages will be obvious to those skilled in the art.

What is claimed as new is:

1. A method of testing a formation encountered in drilling wells having a drill stem therein, including moving a closed chamber downwardly through said drill stem to a position projecting ahead thereof, circulating flushing fluid about said chamber to wash the well, sealing the well about said chamber to close off entrance of fluid from above to said chamber and the lower end of the well, opening said chamber below the point of said sealing and receiving a sample of the well fluid from the formation to be tested,

closing said chamber, and retrieving said chamber upwardly to the surface, leaving the drill stem in the well.

2. A method of testing formation encountered in drilling wells having a drill stem therein, including moving a closed chamber downwardly through said drill stem to a position projecting ahead thereof, sealing the well about said chamber to close off entrance of fluid from above to said chamber and the lower end of the well, opening said chamber below the point of said sealing and receiving a sample of the well fluid from the formation to be tested, closing said chamber, and retrieving said chamber upwardly to the surface, leaving the drill stem in the well.

3. A method of testing a formation encountered in drilling wells, having a drill stem therein, including moving a closed chamber downwardly through said drill stem to a position projecting ahead thereof, circulating flushing fluid about said chamber to wash the well, sealing the well about said chamber to close off entrance of fluid from above to said chamber to the lower end of the well, opening said chamber below the point of sealing and receiving a sample of the well fluid from the formation to be tested, closing said chamber, unsealing about said chamber to permit circulation of flushing fluid to the well bottom, and retrieving said chamber upwardly to the surface leaving the drill stem in the well.

4. A method of testing a formation encountered in drilling wells having a drill stem and drill therein, including moving a closed chamber downwardly through said drill stem to a position projecting ahead of said drill, circulating flushing fluid about said chamber to wash the well, sealing the well about said chamber to close off entrance of fluid from above to said chamber to the lower end of the well, opening said chamber below the point of said sealing and receiving a sample of the well fluid from the formation to be tested, closing said chamber, and forcing said chamber upwardly to the surface by the circulation of liquid outside said drill stem into the lower end thereof, leaving the drill stem and drill in the well.

5. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom including moving a closed chamber by fluid circulation downwardly through the drill stem and drill to the well bottom, sealing the well above the lower end thereof, opening said chamber at a point below said seal to receive a sample of fluid, closing said chamber, unsealing the lower end of the well, and moving said chamber with its sample upwardly to the surface.

6. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom, including moving a closed chamber by fluid circulation downwardly through the drill stem and drill to the well bottom, sealing the well above the lower end thereof, opening said chamber at a point below said seal to receive a sample of fluid, closing said chamber, unsealing the lower end of the well and circulating liquid upwardly through the drill and drill stem and causing the upward flight of said chamber to the surface.

7. In a well having a drill stem and drill therein the method of obtaining a sample of fluid from the formation at the well bottom comprising, moving a tester having a closed chamber downwardly through the drill stem to a sealing position in the lower end of said drill, circulating liquid around said tester to wash the well, forming a seal about said tester to close off the well above the lower end thereof, opening the chamber below said seal to receive a sample of fluid, closing said chamber, and removing said chamber with said sample.

8. In a well having a drill stem and drill therein the method of obtaining a sample of fluid from the formation of the well bottom comprising, moving a tester having a closed chamber downwardly through the drill stem to a sealing position in the lower end of said drill, circulating liquid around said tester to wash the well, forming a seal about said tester to close off the well above the lower end thereof, opening the chamber below said seal to receive a sample of fluid, closing said chamber, releasing said seal, raising and rotating said drill and circulating fluid downwardly about said drill stem and upwardly therethrough to carry said tester to the surface.

9. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom, comprising moving a closed chamber by liquid circulation through said drill stem and drill to the bottom of the well, washing about said chamber to clean the well, rotating the drill stem and, while rotating, sealing off the entrance of fluid from above the lower end of the well, opening the said chamber below the point of sealing to receive a sample of fluid, closing said chamber, raising said drill stem and unsealing the said lower end of the well, and circulating the flushing fluid upwardly through the drill stem to carry said chamber to the surface.

10. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom, comprising moving a closed chamber by liquid circulation through said drill stem and drill to the bottom of the well, washing about said chamber to clean the well, rotating the drill stem and, while rotating, sealing off the entrance of fluid from above the lower end of the well, opening the said chamber below the point of sealing to receive a sample of fluid, closing said chamber and employing the circulation of flushing fluid to raise said chamber to the surface.

11. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom comprising, leaving the drill stem in the well, drilling a small pilot hole ahead of the hole cut by said drill, lowering a tester having a closed chamber to the bottom of the well, washing about said tester to clean said pilot hole, extending said tester into said hole, sealing about the upper end of said pilot hole, opening said chamber to receive a fluid sample, closing said chamber, raising said drill stem to break said seal, and then circulating said tester back upwardly through said drill stem to the surface.

12. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom comprising, leaving the drill stem in the well, drilling a small pilot hole ahead of the hole cut by said drill, lowering a tester having a closed chamber to the bottom of the well, securing said tester against upward movement relative to said drill stem, washing about said tester to clean said pilot hole, extending said tester into said hole, sealing about the upper end of said pilot hole, opening said chamber to receive a fluid sample,

closing said chamber, raising said drill stem to break said seal, and then circulating said tester back upwardly through said drill stem to the surface.

13. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom comprising, leaving the drill stem in the well, drilling a small pilot hole ahead of the hole cut by said drill, lowering a tester having a closed chamber to the bottom of the well, washing about said tester to clean said pilot hole, extending said tester into said hole, sealing about the upper end of said pilot hole, continuing fluid circulation in the well above said seal and manipulating said drill stem to open said chamber below the seal, closing said chamber, raising said drill stem to break said seal, and then circulating said tester back upwardly through said drill stem to the surface.

14. In a well having a drill stem and drill therein, the method of obtaining a sample of fluid from the formation at the well bottom comprising, leaving the drill stem in the well, drilling a small pilot hole ahead of the hole cut by said drill, lowering a tester having a closed chamber to the bottom of the well, securing said tester against upward movement relative to said drill stem, washing about said tester to clean said pilot hole, extending said tester into said hole, sealing about the upper end of said pilot hole, continuing fluid circulation in the well above said seal and manipulating said drill stem to open said chamber below the seal, closing said chamber, raising said drill stem to break said seal, and then circulating said tester back upwardly through said drill stem to the surface.

15. An apparatus of the character described comprising a drill stem, a core drill thereon having a tapered seat therein, a well tester free to be moved through said drill stem, including an upper latching device, radially positioned latching dogs therein, hydraulically-operated means to extend said dogs to engage said drill stem, a testing tube below said latching device, a sample-receiving chamber in said tube having lateral inlet openings therein, a packer sleeve on said tube normally closing said openings, said tube being adapted to be moved by said drill stem downwardly relative to said packer sleeve to open said inlet openings to receive a sample of fluid from the well, said latch being acted upon by upward circulation of fluid in said drill stem to release said tester and allow said tester to be elevated by fluid pressure to the surface.

16. An apparatus of the character described comprising a drill stem, a core drill thereon having a tapered seat therein, a well tester free to be moved through said drill stem, including an upper latching device, radially positioned latching dogs therein, hydraulically-operated means to extend said dogs to engage said drill stem, a testing tube below said latching device, a swivel connection between said latching device and said tube, a sample-receiving chamber in said tube having lateral inlet openings therein, a packer sleeve on said tube normally closing said openings, said tube being adapted to be moved by said drill stem downwardly relative to said packer sleeve to open said inlet openings to receive a sample of fluid from the well, said latch being acted upon by upward circulation of fluid in said drill stem to release said tester and allow said tester to be elevated by fluid pressure to the surface.

17. A drill stem, a core drill thereon, a seat in said drill, a well tester unit adapted to be moved downwardly from the surface through said drill stem and seal in said seat, hydraulically operated means to latch said tester unit in said seat, means to seal off the lower end of the well, means to take a sample of the well fluid below said seal, said latch being released and said unit being carried upwardly in the drill stem by an upward circulation of liquid in the drill stem.

18. A drill stem, a core drill thereon, a seat in said drill, a well tester unit adapted to be moved downwardly from the surface through said drill stem and seal in said seat, hydraulically operated means to latch said tester unit in said seat, a closed test tube at the lower end of said unit, said tube being rotatable relative to the upper portion thereof, means on said tube to seal with the walls of the well, means to open said tube below said seal to take a sample and then to close the same, said unit being releasable for movement upwardly in said drill stem by an upward circulation of liquid in said drill stem.

19. A drill stem, a core drill thereon, a seat in said drill, a well tester unit adapted to be moved downwardly from the surface through said drill stem and seal in said seat, hydraulically operated means to latch said tester unit in said seat, said latch including radially positioned dogs toothed to engage the drill stem, a piston movable downwardly relative to said dogs to move said dogs into locking position, a closed test tube at the lower end of said unit, said tube being rotatable relative to the upper portion thereof, means on said tube to seal with the walls of the well, means to open said tube below said seal to take a sample and then to close the same, said unit being releasable for movement upwardly in said drill stem by an upward circulation of liquid in said drill stem.

20. A well tester for use with a drill stem and drill including a freely movable unit adapted to fit slidably through the joints of said drill stem and be moved therein by fluid pressure, to a seat in said drill, means to open up a passage for fluid past said unit into the well bottom for flushing the same, means to latch said unit in said drill stem, said passage being closed by downward pressure of said drill stem, means to seal off the lower end of the well, said tester being opened up to receive a sample of fluid below said seal by said downward pressure, said drill stem being rotatable while said sample is being taken, and means to close said unit and move it back upwardly in the drill stem responsive to fluid circulation.

21. In drilling a well with a rotary drill stem having a core drill thereon, the method of sampling the formation being drilled without removing said drill stem including; drilling a small pilot hole ahead of the main hole, washing said pilot hole, introducing a closed testing chamber into said pilot hole, sealing about said chamber at the upper end of said pilot hole, opening said chamber to receive a sample, closing said chamber and removing the same upwardly through said drill stem.

22. In drilling a well with a rotary drill stem, the method of sampling the formation being drilled without removing said drill stem including; drilling a small pilot hole ahead of the main hole, washing said pilot hole, and removing a sample of fluid from said pilot hole.

23. In a well being drilled by the rotary method, the method of sampling the formation being

drilled without removing the drill stem and core drill including, washing the lower end of the well, forming a seal with the walls of the well adjacent the lower end of the well, rotating said drill stem and continuing the circulation of flushing fluid and simultaneously removing a sample of the fluid below the point of sealing.

24. In a method of testing the production of an earth formation at the bottom of a drilled hole, the steps of lowering a pilot bit into a core drill, latching said pilot bit in place with its lower end protruding beyond said core drill a predetermined distance, drilling a "rat hole" into the formation with said pilot bit, withdrawing the pilot bit, lowering into said core drill a sample taking device including a closed receptacle adapted to receive a sample of the production, latching said device in place with a part projecting into said "rat hole", sealing off between said part and the wall of said "rat hole", opening communication between said receptacle and said sealed off space to receive a sample of the production from said "rat hole", sealing the receptacle, and withdrawing the sample taking device from the core drill with the sample therein.

25. In a method of testing the production of an earth formation at the bottom of a drilled hole, the steps of lowering a pilot bit into a core drill, latching said pilot bit in place with its lower end protruding beyond said core drill a predetermined distance, drilling a "rat hole" into the formation with said pilot bit, withdrawing the pilot bit, lowering into said core drill a sample taking device including a closed receptacle adapted to receive a sample of the production, latching said device in place with a part projecting into said "rat hole", sealing off between said part and the wall of said "rat hole", opening communication between said receptacle and said sealed off space to receive a sample of the production from said "rat hole", sealing the receptacle, and withdrawing the sample taking device from the core drill with the sample therein, and maintaining circulation of washing fluid throughout the process.

26. In a core drill device for taking a sample of the production of an earth formation, a fluid sample receptacle to be lowered into a core drill, means connected with said receptacle to project below the lower end of said core drill and to be lowered into a hole in the formation, means on said receptacle above said last mentioned projecting means for sealing off the bottom portion of said hole, means normally closing said receptacle against ingress of any outside substance, means for opening said receptacle to communication with the hole below said sealing means when said sealing means is set, and latching means for latching said receptacle in position within the core drill.

27. A method of obtaining an indication of the pressure occurring in a well bore in an earth formation, which comprises the steps of lowering a closed receptacle into the well bore, through the drill stem therein sealing the well bore about said receptacle below the drill, opening the receptacle to receive the formation at formation pressure, closing the receptacle to retain the pressure of the formation, and raising the receptacle through the drill stem to the surface to ascertain the pressure.

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