

May 12, 1959

J. R. YANCEY ET AL
SIDE WALL TESTER

2,886,109

Filed Oct. 26, 1954

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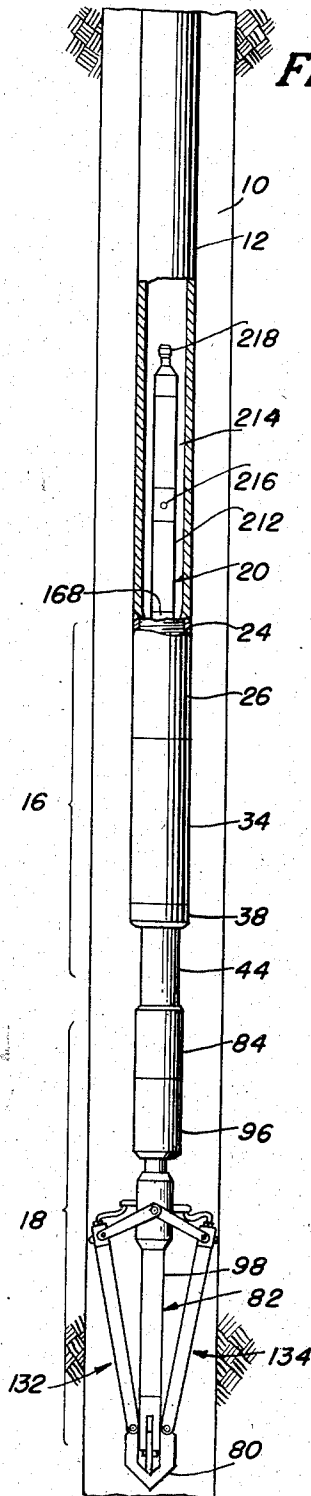
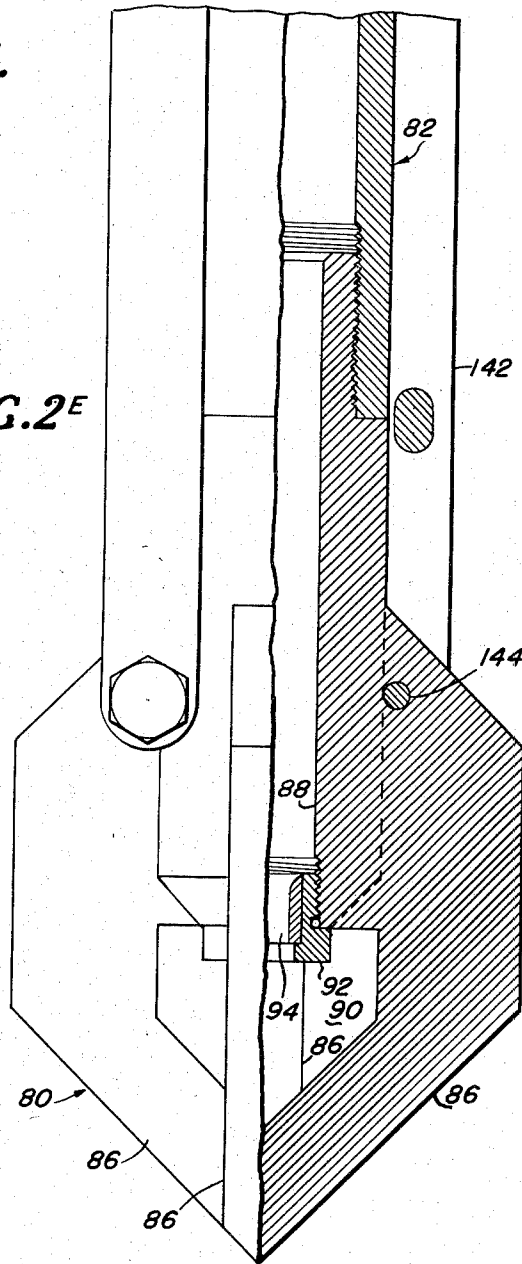


FIG. 2^E



INVENTORS

JOHN R. YANCEY
EARL J. ROBISHAW

BY

Cushman, Parley & Cushman
ATTORNEYS

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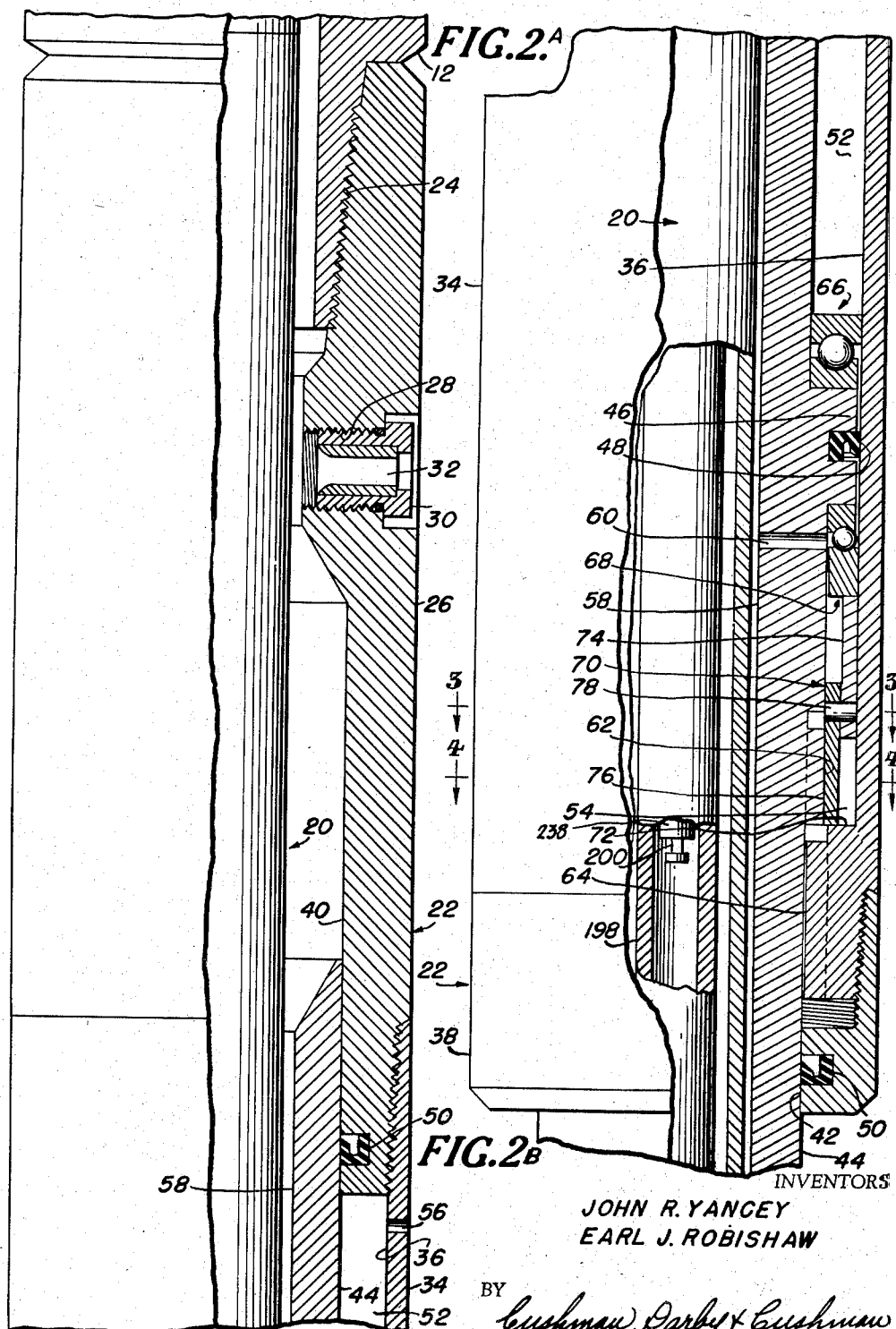
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FIG. 3.

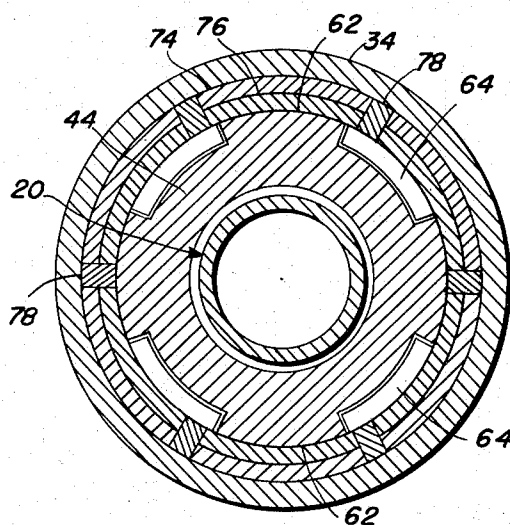


FIG. 4.

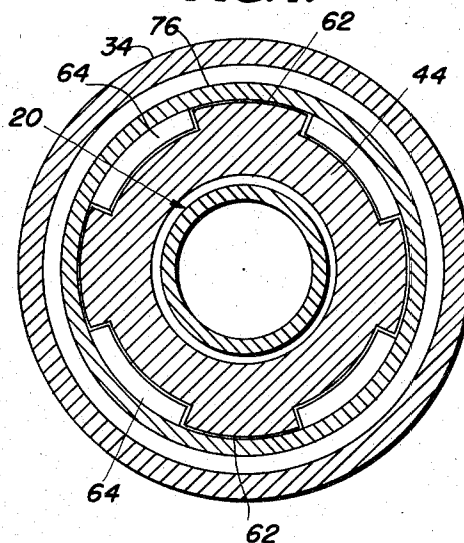


FIG. 5.

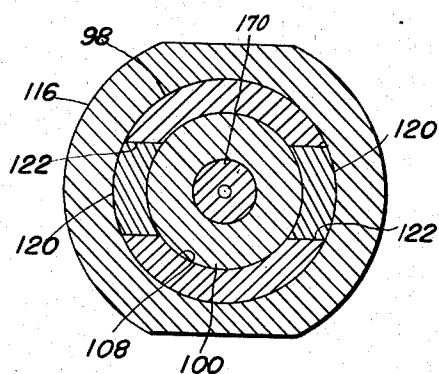
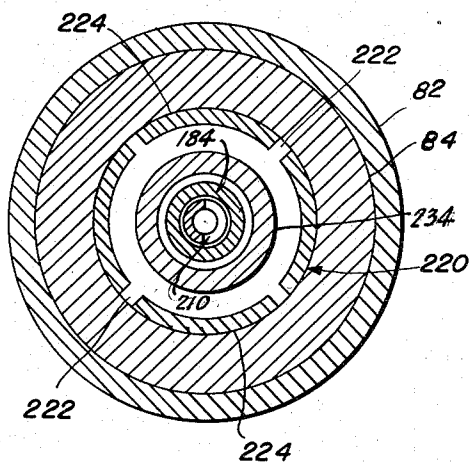


FIG. 6.



INVENTORS

JOHN R. YANCEY
EARL J. ROBISHAW

BY *Cushman, Darby & Cushman*
ATTORNEYS

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J. R. YANCEY ET AL

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FIG. 7.

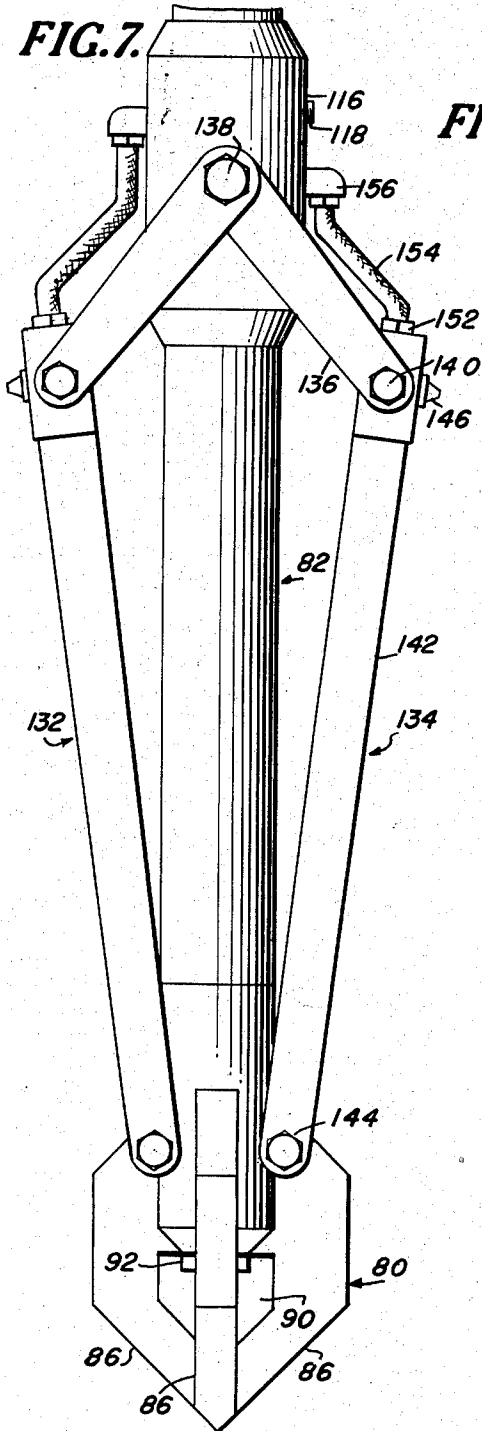
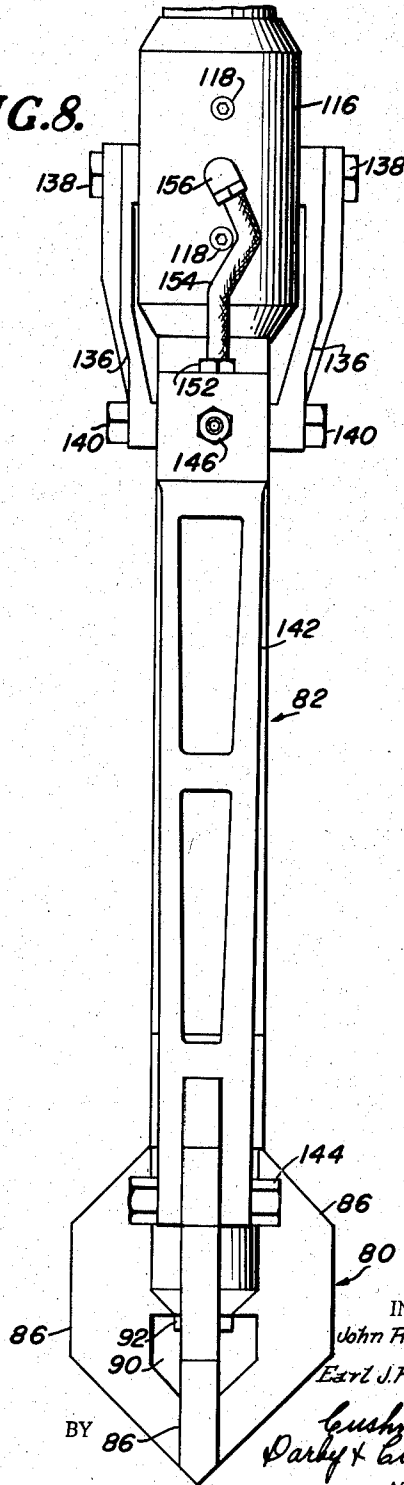


FIG. 8.



INVENTORS
John R. Yancey
Earl J. Robishaw
Cushman,
Darby & Cushman
ATTORNEYS

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2,886,109

SIDE WALL TESTER

John R. Yancey and Earl J. Robishaw, Houston, Tex.;
Sue Robishaw, executrix of said Earl J. Robishaw,
deceased

Application October 26, 1954, Serial No. 464,840

17 Claims. (Cl. 166—100)

This invention relates to tools for testing wells, especially oil wells, and more particularly pertains to an improved tool for obtaining samples of well side wall formation fluids.

Tools for obtaining samples of side wall formation fluids are known in the art, but are subject to a number of practical disadvantages. Many such tools are carried solely on the end of a drill string and require a complete round trip of the tool, i.e., pulling the drill string, for each sample obtained. Another disadvantage of existing side wall formation testers is that such tools not infrequently become irretrievably stuck in the well.

It is, therefore, an object of this invention to provide an improved tool for obtaining samples of well side wall formation fluids.

It is another object of this invention to provide an improved side wall formation tester in which a sample container is lowerable and retrievable through a drill string on a wire line, to thus eliminate the necessity of pulling the string for each sample obtained.

It is another object of this invention to provide an improved side wall formation tester carried on a drill string wherein the inlet end of a sample-receiving conduit is forced into fluid-receiving engagement with the side wall of a well by fluid pressure in the string, and wherein means are provided for maintaining such inlet end at a constant elevation in the well, even though the drill string is subject to stretch or elongation at increasing pressures therein.

It is another object of this invention to provide improved means for connecting a side wall formation tester to a drill string to maintain the tester stationary in a well while the string is rotated, but including safety means for rotating the tester by the string to free the tester from the well in case it should become stuck therein.

It is a further object of this invention to provide an improved side wall formation tester of the character described that is easily operable and provided with several safety features which assure that it can be retrieved from the well.

Other objects and advantages of the invention will become apparent from the following description and accompanying drawings, in which:

Figure 1 is an elevational view, partially in vertical section, illustrating a side wall formation tester embodying this invention connected to a drill string and in operative position in a well.

Figures 2A, 2B, 2C, 2D, and 2E are enlarged fragmentary views, partially in vertical section, illustrating successive sections of the complete tool shown in Figure 1.

Figure 3 is a sectional view taken on line 3—3 of Figure 2B, with the barrel 198 omitted.

Figure 4 is a sectional view taken on line 4—4 of Figure 2B, with the barrel 198 omitted.

Figure 5 is a sectional view taken on line 5—5 of Figure 2D.

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Figure 6 is a sectional view taken on line 6—6 of Figure 2C.

Figure 7 is an enlarged elevational view of the lower portion of the tool shown in Figure 1.

Figure 8 is a view corresponding to Figure 7, but taken at right angles thereto and illustrating certain parts of the tool in a contracted condition.

Referring now to Figure 1 of the drawings, there is shown a well 10 having a drill string 12 therein supporting a side wall formation tester embodying this invention. The tester essentially comprises a swivel 16 secured to the drill string 12, a tubular operating body 18 supported by the swivel, and a sample container 20 lowerable on a wire line (not shown) through the drill string and the swivel into operative position in the body.

The swivel 16, which is best illustrated in Figures 2A and 2B, comprises a threadedly-connected three-part tubular housing 22 that is screwed onto the lower end of the drill pipe 12, as at 24. Just below its threaded connection to the string 12, the upper part 26 of the housing 22 is provided with an interiorly-threaded radial opening 28 within which is screwed an exteriorly-threaded orifice fitting 30 that forms a circulation port 32, for reasons later explained. The intermediate part 34 of the housing 22 is interiorly enlarged to form a cylinder 36, while the lower part 38 of the housing is in the form of an apertured cap closing the lower end of the cylinder. Rotatably journaled within the respective bores 40 and 42 of the upper and lower housing parts 26 and 38 is a tubular stem 44 having a circumferential enlargement or piston 46 slidably cooperating with the cylinder 36. Preferably, the piston 46 and the respective bores 40 and 42 of the upper and lower housing parts 26 and 38 carry packing rings 48 and 50 which are disposed to seal with the cylinder 36 and the stem 44, respectively. Thus, the cylinder 36 is separated into two chambers 52 and 54, the upper chamber 52 being vented to the well 10 through a lateral port 56 (Figure 2A) at its upper end, while the lower chamber 54 is in communication with the central bore 58 of the stem 44 via a radial port 60 (Figure 2B) therein. Preferably, the maximum cross-sectional area of the lower cylinder chamber 54 is slightly greater than the cross-sectional area of the housing bore 40 within which the stem 44 is journaled.

By reason of this construction, when drilling fluid pressure is increased within the drill string 12 and such pressure becomes effective on an area equal to that of the bore 40 to elongate the drill string, as later will become evident, such pressure acts on the piston 46 to lift the stem 44 relative to the housing 22 to compensate for such stretch or elongation in the drill string and to maintain the tubular body 18 of the formation tester at a constant elevation in the well 10. In other words, drill string pressure results in a small upward force on the body 18 sufficient to carry its weight and maintain it in a floating condition in the well 10 so that the body 18 can be restrained against vertical movement in the well by engagement with the side walls thereof, as later explained.

Below the stem piston 46, the opposed peripheries of the stem 44 and the housing 22 are provided with normally-disengaged axially-engageable splines or clutch teeth 62 and 64, respectively. Preferably, antifriction thrust bearing assemblies 66 and 68 are carried by the stem 44 on opposite sides of the piston 46, and a collapsible shear ring assembly 70 is interposed between the lower bearing assembly 68 and an upwardly-facing interior shoulder 72 on the housing part, to thereby maintain the swivel stem 44 in an axial position relative to the housing 22 wherein the splines 62 and 64 cannot engage, so that normally the stem is freely rotatable within the housing. The shear ring assembly 70 comprises a pair of concentric axially-offset rings 74 and 76 connected together by a

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plurality of circumferentially-spaced pins 78, which are shearable under a predetermined load. Hence, if the body 18 of the tester should become stuck in a well, the drill string 12 may be placed under sufficient tension to shear the pins 78 and collapse the assembly 70, to thus permit the splines 62 and 64 to engage. Whereupon, rotation of the string 12 can be imparted to the body 18 to facilitate freeing the same from a stuck or hung condition in the well.

Referring now to Figures 2C, 2D, and 2E of the drawings, the tubular body 18 of the tool is made up of three parts, a lower guide head 80, an intermediate cylinder 82 threadedly connected thereto, and a top sub 84 threadedly connecting the cylinder to the swivel stem 44. The guide head 80 has four circumferentially-spaced centrally-cut-out wings 86 and is of an overall major diameter, preferably greater than that of the other parts of the tester, to both center the tester in a well and protect the other portions of the tester when running into and out of the hole 10. Threaded into the lower end of the central passageway 88 in the head 80, which passageway terminates at an open space 90 at the inner edges of the wings 86, is an orifice fitting 92 forming a circulation port 94.

The cylinder 82 has an interiorly and exteriorly-enlarged upper section 96 and a correspondingly reduced lower section 98. Slidably received in the cylinder 82 is an open-ended tubular piston 100 having an exteriorly-enlarged upper portion 102 equipped with a sealing ring 104 for sealing with an enlarged portion 106 of the cylinder bore. The enlarged bore portion 106 is separated from a reduced lower bore portion 108 thereof by an upwardly-facing shoulder 110 engageable by a corresponding shoulder 112 on the piston 100 to limit downward movement of the latter. The enlarged bore portion 106 is vented to the well 10 by a radial port 114 adjacent the shoulder 110. A collar 116 is slidably mounted on the lower section 98 of the cylinder 82 and is connected to the piston 100 for axial movement therewith by a plurality of cap screws 118 which extend through spacer elements 120 that are limitedly slidable in vertical slots 122 in the wall of the cylinder section 98. A coil compression spring 124 is interposed between the lower end of the piston 100 and a ring 126 seated on an upwardly-facing interior shoulder 128 in the cylinder 82, to thus maintain the piston 100 in its uppermost position, as is shown in Figures 2C and 2D. Preferably, a spring-retaining and enclosing sleeve 130 is threaded into the lower end of the piston 100 and slidably engages the inner periphery of the ring 126.

Two diametrically-opposite toggle linkages 132 and 134 are connected to the collar 116 and to the guide head 80, as best shown in Figures 7 and 8. Since both toggle linkages are identical, a description of the linkage 134 will suffice for both. The linkage 134 consists of a pair of links 136 pivotally mounted on opposite sides of the collar 116, by cap screws 138, and having their other ends pivotally connected, as by cap screws 140, to one end of a long arm 142, the other end of which is pivotally connected by a bolt 144 to one of the four circumferentially-spaced wings 86 of the guide head 80. The bolt 144 preferably is weaker than the cap screws 138 and 140, for reasons later explained. The arm 142 has a curved inner side fitting closely against the side of the cylinder section 98 and a corresponding curved portion of the head 80. The upper end of the long arm 142 has a nozzle-like fitting 146 threaded into the outer side thereof and adapted to be forced into sealed fluid-receiving engagement with the side wall formation of the well 10, as shown in Figure 1, upon outward pivotal movement of the arm 142 effected by the links 136 on downward movement of the collar 116 by the piston 100, as is later explained. Preferably, the interior of the fitting 146 is provided with a transverse screen 148 to prevent clogging of the same by particles of the side wall formation.

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Extending from the fitting 146, the arm 142 is provided with an upwardly-extending passageway 150 having a fitting 152 threaded into the upper end thereof for connecting a flexible conduit 154 to the passageway. The other end of the flexible conduit 154 is connected to a fitting 156 which extends radially through the collar 116 and a spacing element 120 and is threaded into a radial port 158 in the piston 100. It will be noted that the piston port 158 is at a different elevation than the corresponding port 160 for the other linkage 132, for reasons later explained.

The enlarged portion 102 of the piston 100, as shown best in Figure 2C, is provided with an upwardly-facing inside seat 162 for engagement by a corresponding shoulder 164 on a stinger 166 which constitutes a part of the sample container 20 and which is threaded into the lower end of the cylindrical body portion 168 thereof. Below the shoulder 164, the stinger 166 is exteriorly reduced for snug reception within the piston 100 and terminates in a detachable tip 170 which extends downwardly within the lower portion of the piston 100 and has an exterior circumferential groove 172 disposed on a level with the piston port 158 when the container 20 is seated on the seat 162. The tip 170 preferably carries a pair of circumferential sealing rings 174 on opposite sides of the groove 172 which snugly engage the wall of the central passageway in the piston 100 to thereby seal the communication between the groove 172 and the port 158 when the container 20 is seated in the piston 100.

From the bottom of the groove 172, an interior passageway 176 extends upwardly through the stinger 166. Slidably mounted in a slightly-enlarged section 178 of the passageway 176 is a check valve 180, while above the check valve the passageway is further enlarged, as at 182, for the threaded reception of a tubular valve housing 184 which is provided with a closed lower end and depends into the enlarged passageway section 182 in spaced relation to the walls thereof. A coil compression spring 186 is interposed between the lower closed end of the valve housing 184 and the top of the check valve 180 to urge the latter to seat. Slidably within the valve housing 184 is a tubular valve member 188 having a closed upper end and an outer circumferential groove 190 alignable with a radial port 192 in the valve housing in a predetermined relative axial position of the valve member, but normally out of such alignment, as shown in Figure 2C. A radial port 194 in the valve member 188 at the bottom of the groove 190 provides communication between the latter and the interior of the valve member. Preferably, the valve member 188 carries pairs of spaced circumferential sealing rings 196 on opposite sides of the groove 190.

Threaded onto the upper end of the tubular valve housing 184 is the lower end of a barrel 198 containing clockwork mechanism 238 for projecting a rod 200 (Figure 2B) downwardly into engagement with the closed upper end of the valve member 188. The barrel 198 has a downwardly-facing interior shoulder 202 that serves as a stop for engagement by an outer circumferential flange 204 on the upper end of the valve member 188. Radial ports 206 and 208 in the valve member 188 immediately below the flange 204 and in the barrel 198, respectively, provide communication between the interior of the valve member and the space in the container body portion 168 not occupied by the clockwork mechanism barrel. A coil compression spring 210 is interposed between the lower end of the valve member 188 and the closed bottom of the valve housing 184 to urge the valve member into engagement with the shoulder 202. In this position of the valve member 188, the groove 190 therein is out of alignment with the valve housing port 192, as shown in Figure 2C, so that the fitting 146 on the right-hand toggle linkage 134 is out of communication with the interior of the sample container body portion 168.

The clockwork mechanism 238 is conventional in the

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well tool art, so a detailed description thereof need not be given here. It is sufficient to state that the mechanism 238 is settable to slowly move the rod 200 downwardly into engagement with the valve member 188 after a predetermined period of time. Thus, for example, the mechanism can be adjusted so that the rod 200 is projected in, for example, thirty minutes, to engage and move the valve member 188 into a position wherein the groove 190 and port 192 are aligned.

Secured to the upper part of the body portion 168 of the sample container is a housing 212 (Figure 1) enclosing a conventional recording pressure gauge (not shown) that is in communication with the interior of the sample container body portion 168 so that it is responsive to and will record pressures of side wall formation fluids admitted to the sample container, as later described. Above the recording pressure gauge housing 212, the sample container 20 also carries a housing 214 enclosing a conventional recording pressure gauge (not shown) that is in communication, via port 216, with drill string fluid pressure, so that this gauge will record pressures of the drill fluid in the string 12. Above the pressure gauge housing 214, the sample container 20 carries a conventional spear head 218 for connection to a wire line (not shown) to lower and raise the sample container 20 through the drill string 12.

Threaded onto the upper end of the piston 100, as shown best in Figure 2C and Figure 6, is a latch 220 having circumferentially-spaced longitudinal slots 222 extending from the upper end thereof to provide a plurality of resilient fingers 224 that are exteriorly and interiorly enlarged at their upper ends to form latching dogs 226 received in an interior circumferential groove 228 in the sub 84 when the piston 100 is in its upper position. The dogs 226 and the groove 228 are provided with cooperating camming faces 230, to force the resilient fingers 224 inwardly as the piston 100 moves down from the position shown in Figure 2C, as later explained, while the inner side of each dog 226 is provided with a downwardly-facing shoulder 232. In order to accommodate this inward movement of the fingers 224, the stinger 166 is circumferentially reduced in diameter for a portion of its length, as at 234, which reduction provides an upwardly-facing shoulder 236 below the dogs 226, as is also shown in Figure 2C. Thus, when the piston 100 is in its down position, it will be seen that if the sample container 20 is moved upwardly, the upwardly-facing shoulder 236 on the stinger 166 will engage the downwardly-facing shoulder 232 on the dogs 226 of the latch 220, so that the sample container 20 cannot be withdrawn without moving the piston 100 back to its uppermost position, shown in Figure 2C.

In operation of the side wall formation tester, the tubular body 18 and the swivel connection 16 are secured to the end of a drill string 12 and run into the bore hole. During this operation, the string 12 can be rotated in conventional fashion, while circulation of drilling fluid through the string is maintained. Thus, drilling fluid will flow through the swivel connection 16 and through the tubular body 18 for discharge from the circulation port 94 at the lower end of the latter. A small portion of the drilling fluid will be by-passed through the lateral circulation port 32 in the swivel connection 16, and when the tool has reached the desired elevation in the hole at which a test of the side wall formation is to be made, drilling fluid pressure is increased slightly whereby the drilling fluid will pass through the radial port 158 in the piston 100, through the flexible conduit 154, and through the fitting 146, to thereby flush out these parts and clean the same of any bits of formation or wall cake that may be present therein. Thereupon, the sample container 20 is attached to a wire line and lowered down through the drill pipe 12 until it seats on the piston seat 162. When the container 20 is so seated, it will block passage of drilling fluid downwardly through the piston 100 and

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thereby cause an increase in drilling fluid pressure which provides an indication at the surface that the container is properly seated. Circulation can be continued, however, because of the circulation port 32 in the swivel connection 16.

The pressure of the drilling fluid is then increased somewhat to thereby force the piston 100 downwardly and actuate the toggle linkages 132 and 134 to force the fittings 146 into firm engagement with the side walls of the hole. The clockwork mechanism 238, which was set at the surface, has at this time moved the rod 200 substantially into engagement with the valve member 188. Continued downward movement of the rod 200 by the clockwork mechanism serves to move the valve member 188 downwardly until the peripheral groove 190 therein registers with the lateral port 192 in the valve housing 184, whereupon formation fluid will flow into the fitting 146 at the right-hand side of Figure 2D, through the flexible conduit 154, the piston port 158, the registering stinger groove 172, upwardly through the stinger passage 176 unseating the check valve 180, through the registering valve housing and valve ports 192 and 194, and through the radial valve and barrel ports 206 and 208 into the sample container body portion 168. Thereafter, the rod 200 continues to move downwardly until the flange 204 on the valve member 188 engages the upper end of the valve housing 184, and in this position the peripheral groove 190 on the valve member 188 is out of registry with the radial port 192 in the valve housing 184, to thereby seal off the sample container body portion 168 and maintain it completely closed with a sample of side wall formation fluid therein. After the valve member 188 closes, the check valve 180 will also close, because of a lack of differential pressure thereacross. The check valve 180 augments the closing action of the slide valve 188 and assures that the sample container body portion 168 is closed when it reaches the surface.

After the predetermined period of time for which the clockwork mechanism is set, the pressure on the drilling fluid is reduced, to thereby permit the spring 124 to move the piston 100 upwardly and actuate the toggle linkages 132 and 134 to retract the fittings 146 from engagement with the side walls of the hole. Thereupon, the sample container 20 is retrieved by a wire line for analysis of the sample. It will be noted that, in the event that the spring 124 does not retract the toggle linkages, retrieving of the sample container 20 will serve to positively collapse the toggle linkages because of the aforescribed cooperation between the respective shoulders 236 and 232 on the sample container and the slip. In the event that the slip 220 cannot be so moved by the wire line to collapse the toggle linkages, tension on the drill string will shear the bolts 144, to thus collapse the linkages.

At the surface, the pressure records of the two pressure recorders may be compared to assure that a sample was taken properly. As is well known, the hydrostatic head of drilling fluid in a well must be greater than the pressure of the formation fluid or the well will blow out. Therefore, the formation pressure recorded on the recording pressure gauge in the housing 212 must always be less than the pressure recorded by the recording pressure gauge in the housing 214, or a sample has not been taken correctly. If the two gauges give the same maximum pressure readings, the fitting 146 has not been sealingly engaged with the formation during the taking of a sample.

After a sample has been taken in the aforescribed manner, another sample may be taken at the same location by again running the sample container 20 into the drill string 12 or the drill string may be raised or lowered to take a sample at another elevation in the hole. The apparatus also permits the taking of a sample at different circumferential locations at the same elevation in the well 10 without raising or lowering the drill string 12, and even the taking of samples at different elevations in the well without raising or lowering the drill

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string. For this purpose, it will be noted, as shown best in Figure 2D, that the fitting 146 carried by the linkage 132 at the left-hand side of the view cannot communicate with the interior of the sample container. Therefore, a sample is obtained only from the right-hand fitting 146 during any one sample-taking operation. In order to take a sample from the diametrically-opposite side of the well but at the same elevation therein, the stinger tip 170 is exchanged for one having an exterior peripheral groove, a lateral port, and the necessary sealing rings for effecting communication between the stinger passage 176 and only the lateral port 160 in the piston 100. Similarly, it will be seen that the two toggle linkages 132 and 134 may be constructed with links 136 and arms 142 of different relative lengths so that the fittings on the two linkages will have side wall engagement at different elevations, and, hence, by the use of interchangeable stinger tips 170 a sample can be obtained from each of the different side wall elevations engageable by the fittings 146.

It thus will be seen that the objects of the invention have been fully and effectively accomplished. It will be realized, however, that the specific embodiment shown and described for the purpose of illustrating the principles of the invention is subject to change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

We claim:

1. A side wall formation tester comprising: a tubular body lowerable into a well on a drill string; a tubular piston reciprocable in said body and having an upwardly-facing inside seat; resilient means urging said piston to an upper position; a container having a sample chamber lowerable through the string for seating engagement with said seat and for at least restricting the passage of drill fluid from the string through said piston, whereby increased drilling fluid pressure will move said piston to a lower position, said container and piston having a pair of ports in registering communication when said container is seated in said piston; a collar reciprocable on said body; means connecting said collar to said piston for reciprocation therewith; conduit means connected to said piston portion and having an inlet end; toggle means connected to said collar and to said body for lateral outward movement on movement of said piston to said lower position, said conduit means inlet end being mounted on said toggle means for formation-fluid-receiving engagement with the side wall of the well; means defining a passage leading from said container port to said sample chamber; a normally-closed valve controlling said passage; and time-controlled mechanism carried by said container for operating said valve.

2. A side wall formation tester comprising: a hollow body lowerable into a well on a drill string and having an inside seat; a sample container lowerable through the string into said body and into engagement with said seat, said container having an inlet port; a plurality of conduit means on said body, each having an inlet end disposed exteriorly of said body and an outlet end disposed interiorly of said body, all of said inlet ends being spaced apart and all of said outlet ends being disposed in vertically spaced relation, said port being in registering communication with only one of said outlet ends when said container is in engagement with said seat; means on said body for forcing said conduit means inlet ends into formation-fluid-receiving engagement with the side wall of the well; and valve means carried by said container for controlling communication between the interior thereof and said inlet port, whereby a plurality of containers each having an inlet port positioned for registering communication with a different one of said conduit means outlet ends can be employed in succession to take samples from selected side wall locations while said body is at a constant elevation in the well.

3. In a swivel joint for connecting a well tool to a

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drill string the combination comprising: a housing member; a stem member enclosed therein for rotary and axial movement relative thereto; clutch means on said members for drivingly rotating one member by the other, said clutch means being engageable by relative axial movement between said members in a direction to elongate the joint; and means engaged with said members for maintaining the latter in relative positions wherein said clutch means is disengaged, said engaged means being collapsible by a predetermined tensile load on the joint to permit said relative movement and engagement of said clutch means.

4. The structure defined in claim 3 in which the collapsible means includes a pair of concentric relatively-axially-displaced sleeves, and a plurality of shearable pins radially interconnecting said sleeves.

5. A side wall formation tester comprising: a hollow body lowerable into a well on a drill string and adapted to receive drilling fluid from the string; an arm pivotally mounted on said body for lateral movement relative thereto; conduit means on said body having an outlet end disposed interiorly of said body and an inlet end carried by said arm for formation-fluid-receiving engagement with the side wall of the well on lateral outward movement of said arm; reciprocating fluid motor means carried by said body and connected to said arm for effecting said lateral outward movement by operation of said motor means; means for communicating to said motor means the drilling fluid pressure in said body; a sample container lowerable through the string to a predetermined position within said body and having an inlet port to register and communicate with said outlet end of said conduit means when said container is in said position; and valve means carried by said container for controlling communication between the interior thereof and said inlet port.

6. The structure defined in claim 5 in which the body includes a through circulation passageway for communication with the interior of the drill string, said passageway being blocked between its ends by the container when the latter is received in said body, and means defining a lateral circulation port in said body above the point of blockage of said passageway by said container.

7. The structure defined in claim 5 including a tapered formation-penetrating nozzle-like device on the inlet end of the conduit means for penetrating and engaging the well side wall.

8. The structure defined in claim 5 including spring means engaged with the body and with the motor means for constantly urging the latter in a direction to move the arm laterally inwardly.

9. The structure defined in claim 5 including latch means connected with the motor means and detachably engageable by the container for mechanically operating said motor means in a direction to positively move the arm laterally inwardly and withdraw the inlet end of the conduit means from side wall engagement on upward movement of the container out of the hollow body.

10. The structure defined in claim 5 in which the connection between the motor means and the arm includes a collar reciprocable on the body by the motor means and a link connecting said collar and the arm for effecting lateral movement of the latter on reciprocation of said collar.

11. The structure defined in claim 5 wherein the connection between the motor means and the arm includes a link of a toggle mechanism and said arm constitutes the other link of said mechanism, and including a shearable pin pivotally connecting said arm to the body, whereby upward movement of said body with the inlet end of the conduit engaged with the well side wall will serve to shear said pin and permit lateral inward movement of said arm.

12. A side wall formation tester comprising: a hollow body lowerable into a well on a drill string and adapted

to receive drilling fluid from the string; a sample container lowerable through the string to a predetermined position within said body and having an inlet port; conduit means on said body having an inlet end disposed exteriorly of said body and an outlet end disposed interiorly of said body for registering communication with said inlet port when said container is in said position; means on said body operable by fluid pressure for forcing said inlet end of said conduit means into formation-fluid-receiving engagement with the side wall of the well; means in said body for communicating to said forcing means the pressure of drilling fluid in said body received from the string; valve means carried by said container for controlling communication between the interior thereof and said port; and longitudinally-contractible means having one end thereof connected to said body and the other end thereof adapted to be connected to the drill string for supporting said body on the string and passing drilling fluid from the string to the hollow body, said longitudinally-contractible means being operable by the pressure of drilling fluid passing therethrough to contract and compensate for stretch in the string caused by increasing fluid pressure therein, to thereby maintain said body at a constant elevation in the well during a sample-taking operation, irrespective of variations in drilling fluid pressure.

13. A swivel joint for connecting a well tool to a drill string comprising: a tubular housing member; a tubular stem member mounted therein for rotary and limited axial movement relative thereto; means on one of said members at one end of said joint for connecting said one member to a drill string; means on the other of said members at the other end of said joint for connecting said other member to a tool for supporting the latter and passing thereto drilling fluid from the string; cylinder and piston means one connected to one of said members and the other to the other of said members and responsive to fluid pressure for effecting contracting relative axial movement between said connecting means; and means in said joint for communicating to said cylinder and piston means the pressure of the drilling fluid passing through the joint whereby to effect contraction of the joint proportional to elongation of the string by drilling fluid pressure.

14. A swivel joint for connecting a well tool to a drill string comprising: a housing member; a stem member mounted therein for rotary and limited axial movement relative thereto; means on one of said members at one end of said joint for connecting said one member to a drill string; means on the other of said members at the other end of said joint for connecting said other member to a tool; means defining a passageway extending through both of said members for flow of drilling fluid from the string into a tool; means defining a cylinder between said members; means defining a piston on one of said members slidable in said cylinder, pressure in said cylinder on one side of said piston greater than on the other side thereof urging contracting relative axial movement between said connecting means; and means defining a port in one of said members for communicating pressure from said passageway to said cylinder on said one side of said piston to thereby effect contraction of said joint proportional to elongation of a drill string by drilling fluid pressure.

15. A side wall formation tester comprising: a hollow body lowerable into a well on a drill string and having an inside seat; a sample container lowerable through the string into said body into engagement with said seat and having an inlet port; conduit means on said body having an inlet end disposed exteriorly of said body and an outlet end disposed interiorly of said body for registering communication with said inlet port when said container is engaged with said seat; means on said body for forcing said inlet end of said conduit means into formation-fluid-receiving engagement with the side wall of the well; valve means carried by said container for controlling communication between the interior thereof and said port; and clockwork mechanism carried by said container and operable subsequently to the operation of said forcing means for moving said valve means from an initially closed to an open to a finally closed position.

16. A side wall formation tester comprising: a hollow body lowerable into a well on a drill string and having an inside seat; a sample container lowerable through the string into said body into engagement with said seat and having an inlet port; conduit means on said body having an inlet end disposed exteriorly of said body and an outlet end disposed interiorly of said body for registering communication with said inlet port when said container is engaged with said seat; means on said body for forcing said inlet end of said conduit means into formation-fluid-receiving engagement with the side wall of the well; valve means carried by said container for controlling communication between the interior thereof and said port; and mechanical means connected to said forcing means and detachably engageable by said container to positively withdraw said inlet end of said conduit means from side wall engagement on upward movement of said container out of said body.

17. A side wall formation tester comprising: a hollow body lowerable into a well on a drill string and having an inside seat; a sample container lowerable through the string into said body into engagement with said seat and having an inlet port; conduit means on said body having an inlet end disposed exteriorly of said body and an outlet end disposed interiorly of said body for registering communication with said inlet port when said container is engaged with said seat; means on said body for forcing said inlet end of said conduit means into formation-fluid-receiving engagement with the side wall of the well; valve means carried by said container for controlling communication between the interior thereof and said port; fluid-pressure-recording means carried by said container in communication with fluid pressure in the interior thereof; and additional fluid-pressure-recording means carried by said container in communication with fluid pressure in the drill string.

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