

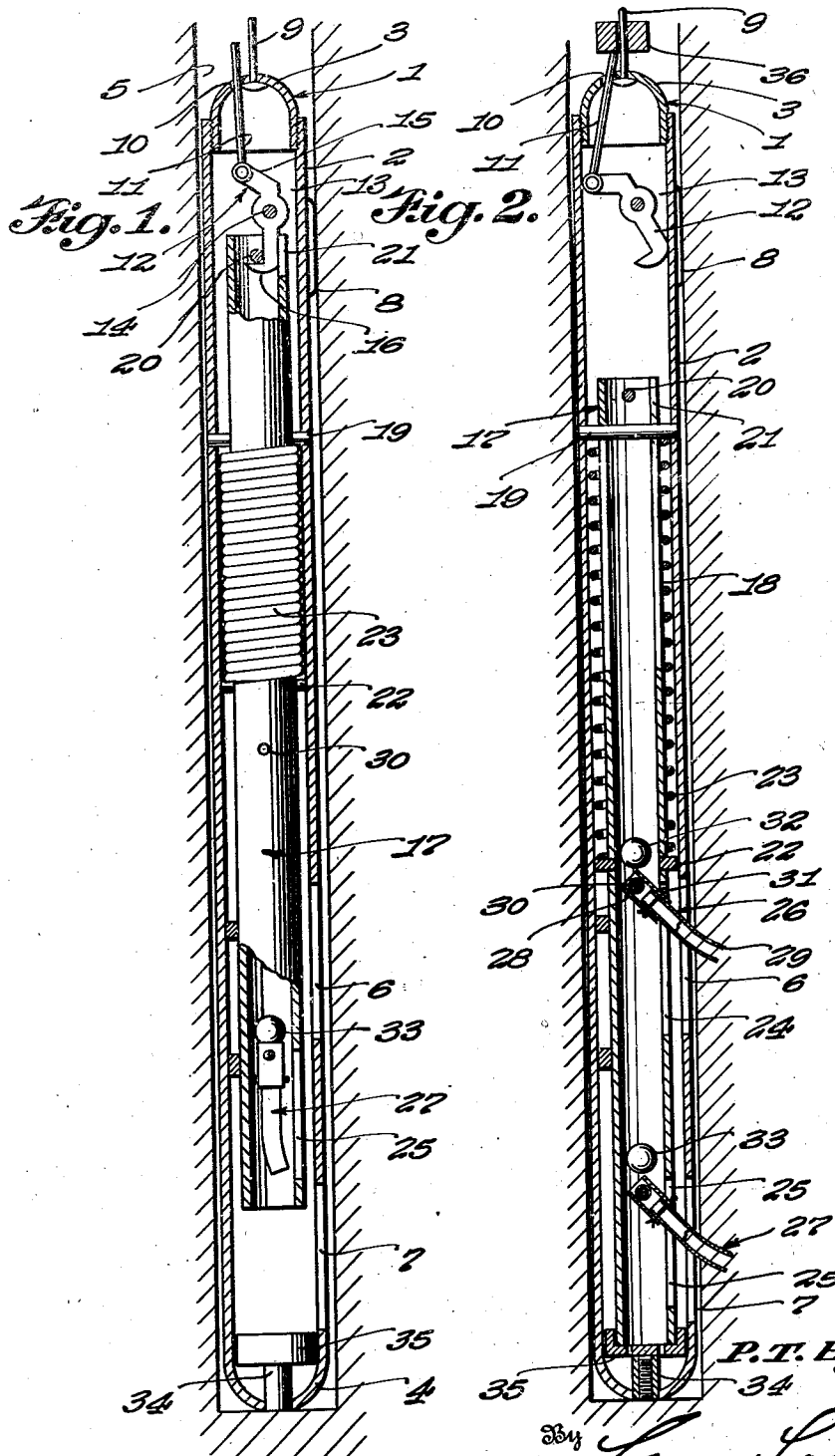
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SIDE WALL SAMPLER

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Inventor

P. T. Bynum

By *Lacy Lacy* Attorney

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## SIDE WALL SAMPLER

Pink T. Bynum, Beeville, Tex.

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8 Claims. (Cl. 255-1.4)

This invention relates to an improved side wall sampler.

It is well known that the most effective types of side wall samplers in use up to the present time require movement within the well bore in order to effect a sampling operation. It has been clearly proven that devices which have to be drawn up or down within the well bore are often moved several feet within said bore before sampling is effected. This faulty condition is sometimes caused by irregularities within the well bore such as extremely hard walls, cavities or clots of heavy mud. Such movement of the sampler will often prevent the removal of samples at the desired point along the bore, with the result that the sampling operation turns out to be of little or no value. Also, if sampling tubes of sufficient lengths to span cavities or large bores are used, such tubes would become jammed and would break off within the bore.

One object of my invention is, therefore, to provide a side wall sampler which will not have to be moved within the well bore in order to effect its proper operation.

Another and very important object of my invention is to provide a side wall sampler which may be lowered into a well and can be held in suspension at any point along the well bore and may be actuated for obtaining side wall samples without the need of movement of the suspending cable or rope.

A further object of my invention is to provide a side wall sampler employing resilient actuating means which may be conveniently controlled and actuated from the surface of the well.

A further object of the invention is to provide a device of this character wherein the sampling tubes employed will be shifted in a direction at an angle to the well bore by a sudden thrust for assuring penetration into firm formations.

A still further object of the invention is to provide a side wall sampler wherein the sampling tubes are so mounted that fluid in the well bore will deflect the tubes outwardly into sampling position upon sudden downward movement thereof.

Another object of the invention is to provide a side wall sampler which will be rugged in construction and light in weight.

And still another object of the invention is to provide a side wall sampler which will be characterized by maximum flexibility in operation.

Other and incidental objects of the invention, not particularly mentioned hereinbefore, will be-

come apparent during the course of the following description.

In the drawing:

Figure 1 is a vertical sectional view, partly in elevation, showing my improved side wall sampler as it would appear in a well bore and ready for a sampling operation, and

Figure 2 is a vertical sectional view of my side wall sampler in operative position within a well bore and showing the sampling tubes in engagement with a formation along said well bore.

Referring now to the drawing wherein, as will be seen, like numerals of reference designate similar parts throughout the views. The numeral 1 indicates in general the housing of my improved side wall sampler. The housing 1 includes a tubular body 2 which is closed at its upper end by a cap 3, said cap being of substantially hemispherical shape and being screwed into the upper end of said body. The body 2 is provided with a curved closed lower end 4. As best seen in Figures 1 and 2 of the drawing, the housing 1 is adapted for disposition within a well bore of the type shown at 5. The tubular body 2 is provided with vertically spaced longitudinal slots 6 and 7, the purpose for which will be set forth in more detail hereinafter. In order to space the side of the body carrying the slots 6 and 7 from the wall of the well bore 5, I provide a spring 8 which is mounted on the outer surface of the body 2 near its upper end.

For suspending my improved side wall sampler in the bore 5, I provide a cable 9 which has its lower end anchored in the cap 3 axially thereof. The cap 3 is formed with an opening 10 which is disposed at a point near the cable 9 and is for the purpose of receiving therethrough the upper end portion of a trigger rod 11. The lower end of the trigger rod 11 is pivotally mounted in the upper end of a trigger 12, said trigger being pivotally mounted on a bracket 13, in the upper end portion of the body 2, by a pivot pin 14. The trigger 12 includes an integral lever 15, to which the lower end of the rod 11 is directly attached, and a detent 16, said detent being formed on the lower end of the trigger and extending laterally with respect to the body 2.

Mounted within the body 2 concentrically with respect thereto is a plunger 17. The plunger is formed with a slot 18 through which extends a mounting pin 19, said mounting pin also extending into the side wall of the body 2. By referring particularly to Figure 2 of the drawing, it will be seen that the plunger is slidably mounted in a vertical direction within the body but is limited

in its sliding movement to the length of the slot 18. At its upper end the plunger 17 is provided with a diametrically extending trigger pin 20 and, opposite said pin 20, the upper end of the plunger is slotted, as shown at 21.

Screwed into the plunger 17, substantially medially of its height, are spring abutment pins 22 which provide abutment for one end of a coiled spring 23 which is positioned about the plunger between the wall of said plunger and the inner wall of the body 2. The mounting pin 19 provides abutment for the upper end of said spring 23. It will be seen that the spring 23 will urge the plunger toward its lowermost position within the housing and that, as stated, the action of the mounting pin 19 in the slot 18 will limit downward travel of said plunger.

Formed in the plunger are vertically spaced and aligned slots 24 and 25 which slots will, as best seen in Figure 2, align with the slots 6 and 7 when the device is in operative position.

Pivotaly mounted within the plunger 17 are vertically spaced sampling tubes 26 and 27. The sampling tube 26 is located near the mid portion of the plunger while the sampling tube 27 is located near the lower end thereof. The sampling tubes 26 and 27 are of identical construction so that it is thought that a description of one will suffice for both. The sampling tube 26 includes an inner sleeve 28 and an outer sleeve 29. The inner sleeve 28 is mounted for swinging movement within the plunger by a transverse pivot pin 30. The outer sleeve 29 has its inner end telescoped or inter-engaged within the outer portion of the inner sleeve 30 and is held in position therein by means of a cotter key 31. It is desired particularly to point out that the outer sleeve 29 is curved outwardly towards its lower end. The purpose for this construction will be set forth in more detail hereinafter. Mounted within the plunger and above the sampling tubes are ball valves 32 and 33.

As will be clearly seen in Figure 2, the lower end wall 4 of the body 2 of the housing 1 has mounted therein an axially disposed internally threaded sleeve 34. Mounted within the lower end of the body and above the sleeve 34 is a shifting cup 35.

The operation of my improved side wall sampler will now be described. Before lowering the device into the well bore, the plunger must be set to cocked inoperative position. To accomplish this, it is only necessary to engage a jack screw of conventional construction in the sleeve 34 and to rotate said jack screw so that the upper end thereof will engage the lower surface of the shifting cup 35. Continued rotation of the jack screw will cause upward shifting of the shifting cup and also upward movement of the plunger 17 within the body 2 against the tension of the spring 23. The jack screw is rotated until the plunger is raised a sufficient distance to permit engagement of the detent 16 of the trigger 12 with the trigger pin 20. When this action takes place, the spring 23 will be in full contracted position and the device will be ready for use. After the plunger has been moved to cocked inoperative position, the jack screw is removed with the result that the cup 35 will be allowed to return to the lowered position.

My improved side wall sampler is then lowered into the bore 5 a desired distance. In this connection it is emphasized that the device may be lowered to any point along the bore where it is desired to secure formation samples. When it is

desired to operate the device, it is only necessary to release a go-devil 36 along the cable 9. The go-devil will travel down the cable at a high rate of speed and will contact the upper end of the rod 11. When this action takes place, the rod will be shifted downwardly for rocking the trigger 12 out of engagement with the pin 20. Upon release of the trigger from the pin, the spring 23 will immediately expand for instantaneously shifting the plunger downwardly within the housing. This sudden downward shifting movement of the plunger will, of course, cause an upward rush of fluid within the bore and this fluid will engage the curved end portions of the outer sleeves 29 of the sampling tubes 26 and 27 and will cause said sampling tubes to deflect outwardly through the slots 6 and 24 and 7 and 25 and to penetrate the wall of the bore 5 for securing samples of the formation of said wall. After the samples have been secured, it is only necessary to exert pulling movement upon the housing, by means of the cable 9, for freeing the sampling tubes from the wall of the bore. The device may then be removed from the well. It is desired to point out that, during removal of the device from the well, the ball valves 32 and 33 will engage in the upper ends of the sampling tubes and will prevent displacement of the samples within the tube, which displacement otherwise might be caused by downward rush of fluid.

It is desired to call particular attention to the fact that my improved side wall sampler may be operated without the need of up and down movement of the entire device within the well bore. Moreover, in view of the particular construction, it may be spudded through mud, bridges and the like without danger of premature actuation or of damage.

It is also desired to emphasize that, due to the fact that the tubes 26 and 27 are curved outwardly, proper penetration thereof by the sudden rushing of fluid within the housing will be assured.

Having thus described the invention, what is claimed as new is:

1. A side wall sampler including a housing having a body, a trigger carried by the body, a plunger within the body, means normally urging the plunger downwardly within the body, means carried by the plunger and engageable with the trigger for retaining said plunger against the tension of the last-mentioned means, and a sampling tube carried by the plunger and movable laterally upon release of the trigger and consequent downward movement of the plunger and upward rush of fluid in the plunger to engage a side wall for a sampling operation.

2. A side wall sampler including a housing, a plunger in the housing, means urging the plunger downwardly, and a sampling tube in the plunger and shiftable laterally by fluid moving upward through the plunger upon downward movement of said plunger to engage the side wall of a well bore for securing samples thereof.

3. In a side wall sampler, a plunger, and means carried therein and shiftable laterally by contact with fluid moving through the plunger for engaging the wall of a well bore for obtaining samples from the well bore.

4. In a side wall sampler, a shiftable plunger, and a sampling tube in the plunger, said sampling tube being shiftable by contact with fluid moving through the plunger under pressure, upon shifting of the plunger, to penetrate the wall of a well bore for obtaining samples from said well bore.

5. A side wall sampler including a housing, a trigger in the housing, a plunger in the housing, a spring normally urging the plunger downwardly in the housing, said plunger being held in cocked, inoperative position by said trigger, and a sampling tube carried by the plunger and being movable into penetrating engagement with the wall of a well bore by engagement with fluid flow upon release of the trigger and consequent downward movement of the plunger.

6. A side wall sampler including a housing, a cap closing the housing at its upper end, means for suspending the sampler in a well bore, a rod in the housing and extending through the cap, a trigger in the housing and connected with said rod, a plunger in the housing, means urging the plunger downwardly in the housing, means limiting downward movement of the plunger in the housing, means on the plunger and connecting the plunger with the trigger for retaining the

plunger in cocked inoperative position, sampling means on the plunger, and means slidable on said first mentioned means and engageable with the rod for releasing the trigger and permitting said second mentioned means to urge the plunger downwardly in the housing, said sampling means being deflected outwardly, upon contact with fluid under pressure during downward travel of the plunger, to penetrate the wall of a well bore for obtaining samples from said wall.

7. A slide wall sampler as recited in claim 5, wherein the sampling tube consists of a sampling tube having a curved outer end.

8. In a side wall sampler, a plunger, and a plurality of sampling tubes mounted in the plunger and being deflected by contact with fluid under pressure moving through the plunger to penetrate the wall of a well bore for taking samples from said wall.

PINK T. BYNUM.