Sept. 11, 1928. 1,683,642

S. H. WILLISTON

SIDE WALL SAMPLER

Filed March 30, 1925

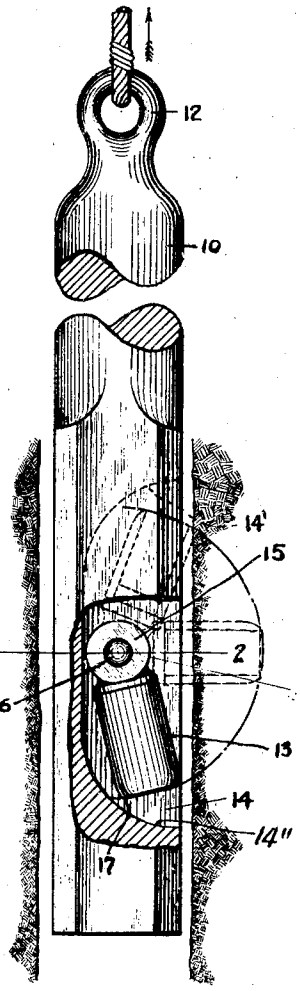


Fig. 1.

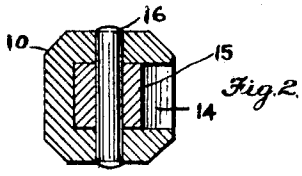


Fig. 2.

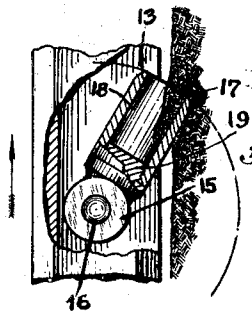


Fig. 3.

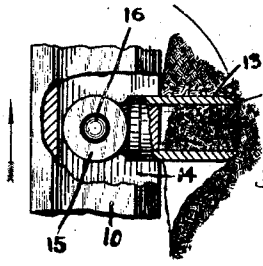


Fig. 4.

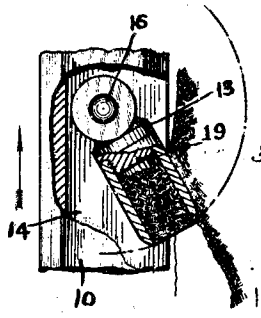


Fig. 5.

Witnesses
Edward R. Parker.
Fred W. Hill.

INVENTOR
Samuel H. Williston
BY
William S. Glucksman
ATTORNEY

Patented Sept. 11, 1928. 1,683,642

UNITED STATES PATENT OFFICE.

SAMUEL H. WILLISTON, OF MARACAIBO, VENEZUELA.

SIDE-WALL SAMPLER.

Application filed March 30, 1925. Serial No. 19,547.

This invention relates generally to a device for taking samples and more particularly to a device for sampling the formation at different levels of the sides of a well or hole drilled in the earth's surface.

In the drilling of wells or determining the geological formation of certain areas, it is found desirable and necessary to obtain the nature of the earth's formation at various strata or depths in order to determine the presence or absence of oil, water, gas or minerals, or from such samples to determine the character of the surrounding locality, and in this way make determinations from which it is possible to locate oil, water, gas or minerals.

To obtain this information, the sampling must necessarily be made with considerable accuracy. Heretofore in obtaining samples for making determinations of the nature of the surface of the earth as the drilling operations proceed, the augers or drills used have been modified to obtain samples, or where augerlike samplers have been used these all necessarily required modification entailing cumbersome designs and structure which, aside from being expensive, introduced uncertainties in the procuring of the desired samples and caused interruptions in the drilling operation. At a great depth the control was required to be made from a considerable distance and the devices were of an augerlike nature and had to be operated by a turning motion of the connecting rod, they thereby introduced items of considerable expense and uncertainty of operation. Also these devices did not insure certainty of sampling, as the portion of earth collected usually was disengaged or sometimes was washed away from the collecting chamber in the ascent to the top of the well or drill hole from which the sample had been taken.

One object of this invention is to provide a sampler for obtaining portions of the earth from a well or drill hole at any desired predetermined depth, whether from near the bottom of the well or at any point of the side walls; one that is independent of the drilling mechanism or operation; one that assures the sample being taken from any predetermined depth regardless of the depth of the hole already driven; one that is operated merely by a tension member; one that is automatically operative upon withdrawal; one in which the sample is procured merely by a change of direction of the movement of the sampler; and one that removes a sample core from the side of the hole.

A further object of this invention resides in the provision of a sampler which breaks off the material to be collected and insures against the loss of such sample from the sampler, regardless of the fact that the sampler may pass through water veins or strata which will ordinarily disengage the collected material from the sampler.

A still further object of this invention resides in the provision of a sampling device which will collect portions from predetermined depths of wells, drill holes or the like without introducing inaccuracies due to accidental collection of other material by scraping of the walls of the drill hole at any other depth, particularly when the sampler is withdrawn from the drill hole.

A still further object of this invention resides in the provision of a sampling device having pivotal motion in obtaining the sample from a side wall, in which the pivotal motion is obtained as the result of a longitudinally bodily movement of the sampling device, and more particularly as a result of a change in the direction of such movement.

A still further object of my invention is the provision of a member, so arranged and constructed, that upon an upward movement thereof, a sample core will be removed and collected therein.

To attain these objects and such further objects as may appear herein or hereinafter be pointed out, I refer to the accompanying drawings forming a part hereof, in which—

Fig. 1 is a side elevation partly broken away of my device in a section of a well or drill hole;

Fig. 2 is a section on a line 2—2 of Fig. 1;

Figs. 3, 4 and 5 are broken sections showing the operation at different stages.

Upon viewing Fig. 1 of the drawing, it will be observed that there is here shown a body member or saddle 10 preferably heavily weighted and having at its upper end, means such as the eyelet 12 for securing thereto a member such as a cable or rope by

which the saddle 10 is to be let down into or withdrawn from the well or drill hole. This body member 10 is cut away preferably, although not necessarily, intermediate of its ends so as to provide a recess or cavity 14 open to the side. Mounted within this cavity or recess 14 for pivotal movement, about a horizontal axis, is the sampler 13 which may be given any preferred shape and is preferably made tubular or recessed and which is illustrated in the drawings as cup shaped, as at 18, and is provided at its open end with the annular cutting edge 17 and is of a size to receive the desired sample or core cutter, as will be hereinafter described. The sampler is provided with a reduced screw-threaded boss 19 and the cup 18, which is made in the form of a sleeve, has its inner end screwed onto said boss. For pivotally mounting this sampler 13 within the cavity 14, the sampler is provided with the lug or evelet 15 pivotally mounted on the horizontally positioned pin 16 carried from the opposite walls formed by the recess 14.

The distance horizontally from the axis of rotation of the sampler 13 about its pivot to the open side of the recess 14 is illustrated in the drawings as substantially the distance from this point to the bottom of the recess 18 in the sampler so that when the sampler is in horizontal position, as shown in Fig. 4, the recess or cup portion 18 of the sampler 13 will extend substantially for its full distance horizontally beyond the body member or saddle 10. It will also be observed that the recess 14 is of a width at least equal to or substantially greater than the width of the sampler so that the sampler can be received or be nested therewithin and that the height of the recess 14 is such as to receive the sampler 13 within it, both when the sampler 13 is moved to its position vertically above the pin 16, as shown in dotted lines in Fig. 1, and when it is moved to its pendent position as shown in full lines in said figure.

Upon viewing Fig. 1 it will be observed that the upper and lower walls 14′ and 14″ of the recess 14 are so formed as to position the sampler in an unbalanced position and prevent the same from being moved in a position from the vertical away from the opening of the recess. The upper and lower walls are therefore curved to prevent the sampler from moving counter-clockwise upwardly from its position in full lines, shown in Fig. 1, to a position beyond the vertical line through the longitudinal center of the device, and it is prevented from having any clockwise movement from its position shown in full lines in said figure, to a position beyond the vertical, so that the sampler may without any difficulty be positioned in the best operable position. As shown in dotted lines in Fig. 1, the sampler cup is prevented from tumbling to the position shown in full lines, or into any intermediate position by the walls of the drill hole.

In operation the body member 10 is permitted to descend into the drill hole or well, preferably by means of a cable or rope 11 attached to the eyelet 12 and dropped to any predetermined depth, care being taken, however, to arrange the sampler in the position shown in Fig. 3 so that while on the one hand it will tend to swing clockwise downwardly, due to the fact that its position is away from the vertical line, it will not tumble completely when inserted into the drill hole by reason of the wall of the drill hole preventing the same. In this position, during the descent of the sampler device, no resistance will be afforded by the cup within the sampler device and will slide freely in contact with the wall of the drill hole. When the predetermined point at which the sample to be taken has been reached, the direction of movement of the member 10 is reversed. Upon the initial portion of such reverse movement the combined effect of the upward movement of the member 10 and the tendency of the sampler 13 to swing, as above described, due to its unbalanced position, will cause the lower portion of the cutting edge 18 to engage the wall of the drill hole. Continued upward pull continues the rotary movement of the sampler cup and the material to be collected from the side walls is scraped into the container and the cup is forced into the wall of the drill hole to stamp or cut out a portion of the sample and then break it off by the combined bodily upward, longitudinal movement of the whole device and the downward, rotary movement of the sampler cup.

It will be observed that as the dimension of the sampler and the sampler cup in its unbalanced position, or in a position where it protrudes from the recess is greater than the drill hole, certainty of operation will be assured, while particularly powerful, penetrating action of the collector or cutter member into the wall will be had, due to the toggle joint action that is effectuated and due to the relative distance of the pivot point 6 from the wall of the well, with reference to the full length of the sampler cup. The sampler will gradually be forced into the side wall for the full length of the cup 18 which is reached when the sampler is in its horizontal position, as shown in Fig. 4.

Upon the continuation of this reverse movement, the sample collected will be forced into the cup for the full depth thereof and thereafter clear the wall of the well and assume the pendent position, as shown in Fig. 5, fully nesting itself within the recess, as shown in full lines in Fig. 1. In this position the sampler offers no resistance to the continued upward movement to the surface or top of the well, and at the same time protection

against loss of the sample collected and retained within the cup is provided.

In this way it will be observed that a sample may be obtained from the side wall or any portion of the drill hole or well without requiring any other control of a sampling device than a tension member, such as a cable or core, by which the sample is suspended, and further that the sample may be obtained at any depth with great accuracy as to the position at which the sample is to be taken, and with unerring certainty of procuring such sample.

It will also be observed that by the method of procuring the sample, as herein above described, wherein the sample is substantially stamped out from the side walls, that in this way a sample is obtained in which an undisturbed condition of the soil, earth or material that is to be collected is shown. The value of a sample so collected will be apparent to those skilled in the art, who have in mind the study of the soil conditions incident to operations of the kind herein contemplated. After the sample is taken the cup 18 is unscrewed from the boss 19 and the sample is then pushed out.

It will also be observed that though I have described and claimed my device as operated by a flexible rope or cable, a rod or chain may be used equally well. The device may thus be arranged for sampling by a pushing action as well as by a pulling or withdrawn movement.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. A side wall sampler comprising in combination a sinker member, a sample container carried thereby and a flexible cable for operating said device.

2. A side wall sampler comprising in combination a sinker member of substantially the size of the well, a sample container carried thereby and a flexible cable for operating said device.

3. A side wall sampler comprising in combination a sinker member, a sample container pivotally carried thereby and a flexible cable for operating said device.

4. A side wall sampler for drill holes of wells or the like comprising a body member arranged for longitudinal movement within the well cavity and having a sample carrier capable of cutting out a core from the wall to be sampled by longitudinal movement of the body member relative to the well walls.

5. A side wall sampler for drill holes of wells or the like comprising a body member arranged for lowering or raising within the well cavity and having a sample carrier pivotally mounted on said body member and capable of cutting out a portion of the wall to be sampled by longitudinal movement of the body member relative to the well walls.

6. A side wall sampler for drill holes of wells or the like comprising a body member arranged for lowering or raising within the well cavity and having a sample collector pivotally mounted on said body member and capable of cutting and breaking a portion of the wall to be sampled by longitudinal movement of the body member relative to the well walls.

7. A side wall sampler for drill holes of wells or the like comprising a body member arranged for lowering or raising within the well cavity and having a sample carrier capable of cutting out by laterally penetrating a portion of the wall to be sampled by longitudinal movement of the body member relative to the well wall.

8. A side wall sampler for drill holes of wells or the like comprising a body member, a collector member pivotally mounted therein, said collector member being formed to be put in operative position by a relative longitudinal movement of said body member in the drill hole.

9. A side wall sampler for drill holes of wells or the like comprising a body member, a collector member pivotally mounted therein, said collector member being formed to be given an arcuate movement by a relative longitudinal movement of said body member in the drill hole.

10. A side wall sampler for drill holes of wells or the like comprising a body member and a collector member pivotally mounted thereon and arranged for a tumbling movement and capable of operative engagement by a relative longitudinal movement of the body member in the drill hole, said collector member being of such size as to cut off a sample from the well wall when tumbling.

11. A side wall sampler for drill holes of wells or the like comprising a body member, a recess, open to one side of said body member, a tubular collector member pivotally mounted in said recess, capable of full pivotal movement through the opening of the recess, said recess being formed to maintain the pivotal member in an unbalanced position, but permitting complete reception thereof within the walls defining said recess.

12. An earth sampling device movable into and out of a cavity in the earth; said device including cutting means, and means carried by the device operable to force said cutting means into cutting engagement with a side wall of a cavity whereby subsequent movement of the device will cut a sample of earth material from said side wall.

13. An earth sampling device movable into and out of a cavity in the earth; said device including cutting means on one side only, and automatic means for forcing said cutting means into cutting engagement with a side wall of a cavity in which the device is disposed whereby subsequent movement of

the device will cut a sample of earth material from said side wall.

14. An earth sampling device movable into and out of a cavity in the earth; said device including cutting means, and automatic means carried by the device for forcing said cutting means into cutting engagement with a side wall of a cavity in which the device is disposed whereby subsequent movement of the device will cut a sample of earth material from said side wall.

15. An earth sampling device movable into and out of a cavity in the earth; said device including cutting means on one side only, and means adapted to react from a side wall of a cavity at one point to force said cutting means into cutting engagement with another wall, whereby subsequent movement of the device will cut a sample of earth material from said wall.

16. An earth sampling device movable into and out of a cavity in the earth; said device including cutting means, and means carried by the device adapted to react from a side wall of a cavity at one point to force said cutting means into cutting engagement with said side wall at another point, whereby subsequent movement of the device will cut a sample of earth material from said side wall.

17. An earth sampling device movable into and out of a cavity in the earth; said device including cutting means on one side only, and automatic means adapted to react from a side wall of a cavity at one point to force said cutting means into cutting engagement with said side wall at another point, whereby subsequent movement of the device will cut a sample of earth material from said side wall.

18. An earth sampling device movable into and out of a cavity in the earth; said device including cutting means, and automatic means carried by the device adapted to react from a side wall of a cavity at one point to force said cutting means into cutting engagement with said side wall at another point, whereby subsequent movement of the device will cut a sample of earth material from said side wall.

19. A side wall sampler movable into and out of a cavity in the earth; said sampler comprising a cutter adapted to cut a section from a side wall and having therein a space for the reception and retention of the sample section so cut and means coacting with and carrying the cutter and so arranged and constructed that as the sampler is moved longitudinally of the cavity, the cutter will be held substantially axially of and within the confines of the walls of the cavity in the earth during a portion of such movement and during another portion of the movement, the cutter will be forced into the side wall of the cavity so as to cut a sample therefrom.

20. A side wall sampler movable into and out of a cavity in the earth; said sampler comprising a cutter adapted to cut a section from a side wall and having therein a space for the reception and retention of the sample section so cut and means for carrying the cutter so that as the sampler is moved longitudially of the cavity, the cutter can move from a position axially and within the confines of the walls of the cavity in the earth to a position in which it can be forced into a side wall thereof so as to cut a sample therefrom, said means being constructed and arranged so that when the cutter reaches a predetermined position longitudinally of the cavity, a longitudinal movement of the cutter from such predetermined position will force the cutter into the side wall of the cavity to cut a sample section therefrom and retain such section.

21. A side wall sampler movable into and out of a cavity in the earth; said sampler comprising a cutter carried at one side thereof and adapted to cut a section from a side wall and retain such section for removal therewith, said sampler being laterally expansible and arranged and constructed so that at any desired point the sampler can be caused to expand laterally into reactive engagement with spaced parts of the side wall of the cavity so as to cause the cutter to cut a sample section from the side wall of the cavity for removal therewith.

22. A side wall sampler for drill holes of wells or the like comprising, a body member of approximately the size of the drill hole and provided with a recess, and a collector member for receiving a side wall sample mounted in said recess and capable of being put into operative engagement with the well wall by longitudinal movement of said body member in the drill hole.

23. A side wall sampler for drill holes of wells or the like comprising, a body member of approximately the size of the drill hole and provided with a recess, and a collector member for receiving a side wall sample and pivoted in said body recess for operative engagement with the well wall and also for arcuate movement to collect a sample upon a longitudinal movement of the body member in the drill hole.

24. A side wall sampler for drill holes of wells or the like comprising, a body member of approximately the size of the drill hole and provided with a recess, and a tubular collector member for receiving a side wall sample and pivoted in said body recess for operative engagement with the well wall and also for arcuate movement to collect a sample upon a longitudinal movement of the body member in the drill hole.

25. As a sub-combination in a side wall sampler for well holes, a sample collector having a cutter at its outer end for penetrating a well hole side wall and provided with

a pocket for receiving and retaining a sample, and means at the inner end of the collector for movably mounting it on a sampler body.

26. As a sub-combination in a side wall sampler for well holes, a sample collector including a removable sample receiving and retaining pocket provided with a cutter at its receiving end, said collector also including means for movably mounting it on a sampler body.

In testimony whereof, I have hereunto signed my name this 5th day of March, 1925.

SAMUEL H. WILLISTON.