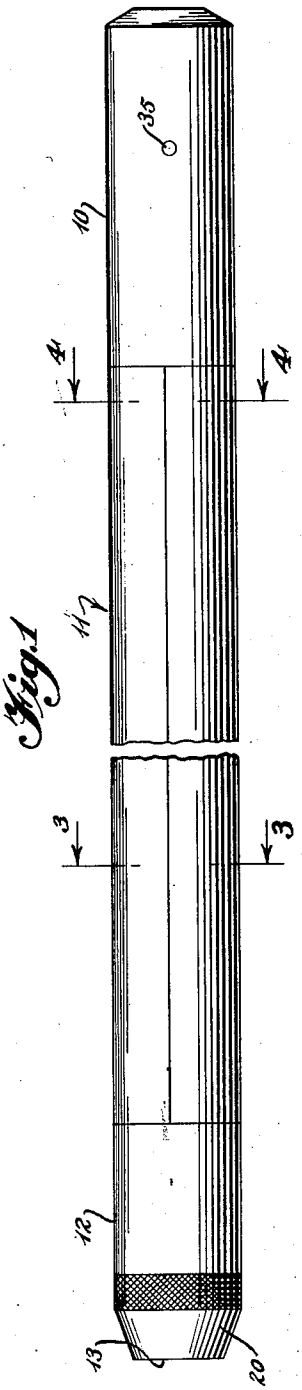
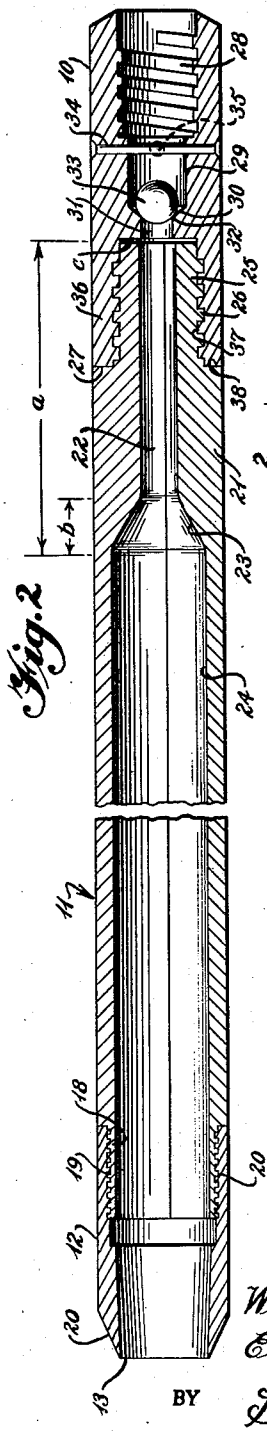
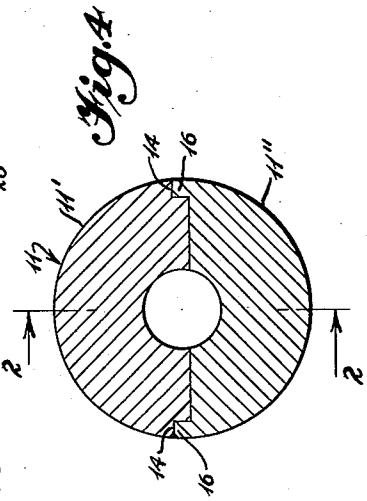
June 11, 1957 W. L. ACKER, JR., ET AL 2,795,395

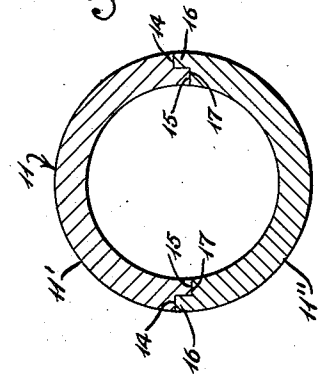
HEAVY DUTY SOIL SAMPLER

Filed March 29, 1955









INVENTORS

William L. Acker, Jr.

Eugene J. Lynch

BY Beale & Jones

ATTORNEYS

United States Patent Office 2,795,395
Patented June 11, 1957

2,795,395

HEAVY DUTY SOIL SAMPLER

William L. Acker, Jr., Scranton, Pa., and Eugene J. Lynch, Woodside, N. Y.

Application March 29, 1955, Serial No. 497,542

5 Claims. (Cl. 255—1.4)

Our invention is directed to improvements in soil samplers.

Split tube soil samplers have been used for years and comprise in general a main tubular body which is split longitudinally so as to provide two halves, a threadedly secured shoe with a cutting surface at the lower end, and a coupling head threadedly secured to the upper end. The main tube wall is relatively thin, and the wall at the upper and lower end is still thinner where it is threaded and coupled to the shoe and to the head. These samplers are driven into the ground with a heavy weight to recover earth samples and when retracted are disassembled so that the split tube may be separated longitudinally to leave the core sample intact. In repeatedly driving these core samplers into the ground and due to the abuse that they receive, the head section frequently opens up, mushrooms out over the upper end of the split tube portion or splits up to the sides and fails completely. This is a common fault in sampler tubes of this type, and in spite of the shoe being in cutting contact at the leading end of the sampler, it outlasts the head. In actual practice about as many heads are used as sampler tubes, namely, the split tube making up the main body.

It is an object of our invention to provide an increased wall thickness at the upper end of the main body of the sampler tube and to increase the wall thickness of the lower end of the head coupled thereto in such proportion to the rest of the main body and the head that failure on repeated use does not take place.

Another object of the invention is to provide an increased wall thickness at the upper end of the main body of the split tube and to form thereon deep and coarse threads which cooperate with similar internally made threads in the lower end of the cooperating head such that the head section can be very rapidly screwed up, or unscrewed, as the case may be.

A still further object of the invention is to provide at the upper end of the split tube portion of the sampler tube a transverse shoulder adjacent the reduced threaded end such that the shoulder receives in abutting engagement the lower transverse end of the threaded head.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that the detailed description and specific example is given by way of illustration only and, while indicating the preferred embodiment of the invention, is not given by way of limitation, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

For a more complete understanding of the nature and scope of the invention reference is had to the drawing in which:

Fig. 1 is a side view of the core sampler;

Fig. 2 is a longitudinal cross-sectional view taken along section line 2—2 of Fig. 4;

Fig. 3 is a transverse section view on an enlarged scale

of the main body of the core sampler along line 3—3 of Fig. 1; and

Fig. 4 is a transverse enlarged sectional view of the upper end of the main body of the core sampler along line 4—4 of Fig. 1.

Throughout the description like reference numerals refer to similar parts.

The core sampler is made up of a tubular head **10**, a longitudinally split tube **11** coupled at its upper end to the lower end of the head **10** and a shoe **12** coupled to the lower end of the split tube **11** and having a lower end **13** tapered to an annular cutting edge. In practice, the head is about one-quarter in length of the whole length of the split tube **11** from the extreme ends of its threaded ends. The split tube **11** is shown fore-shortened in the drawing here presented.

Split tube **11** as shown in Fig. 3 has a wall thickness which is about one-sixth of the outside diameter of the tube at that section. The split tube is formed in two parts **11'** and **11''** which are joined together longitudinally. Part **11'** has a longitudinally extending groove **14** at each side which is generally L-shaped in cross-section or in the form of a tenon. Split tube portion **11''** is formed with a tongue **16** of like configuration to groove **14** and is received therein, and this tongue at its inner portion joins with a transverse longitudinal flat face portion **17** which abuts transverse portion **15** on split tube portion **11'** so as to form a tight cooperating joint. This same joint is carried throughout the length of the split tube **11** and is also shown in transverse cross-section in Fig. 4.

The lower end of split tube **11** has a reduced cylindrical portion **18** which is threaded throughout its length as at **19** and is received within the interior threaded upper end of shoe or bit **12** as indicated at **20**. The lower or bottom end of the shoe or bit **12** tapers inwardly on its outer surface as indicated at **20** so that it forms a leading or bottom cutting edge **13**. The inner wall of bit **12** tapers inwardly a small amount so that a slight restriction is formed in the throat of the bit **12** to help hold the soil sample in the tube when it is withdrawn from the soil.

Now referring to the upper end of the split tube **11**, it will be observed that the upper portion as indicated through the length *a* is approximately one-fourth the whole length of the tube **11** and has an increased thickness in its annular wall **21** thereby forming a reduced size of longitudinal central aperture **22** therethrough whose inner cylindrical wall increases in cross-sectional diameter through the longitudinal length indicated at *b* to form a wall **23** having a frustrum of a cone shape which joins with the cylindrical inner wall **24** of the main body of the split tube **11**. The upper end **25** of split tube **11** has a reduced wall thickness which is about one-half the thickness of the wall portion **21** and is provided with coarse, square threads of about three per inch as indicated at **26**. Between the reduced threaded portion **25** at the upper end of split tube **11** and the increased wall thickness portion **21**, there is a transversely extending flange portion **27** which has abutting engagement with the lower end of the head **10**.

Head **10** is formed with an axially extending aperture therethrough with the upper end internally threaded at **28** for about one-third the length of the head. Internally of this upper threaded end **28** is a reduced cylindrical axially extending aperture portion **29** whose lower end converges at **30** to the reduced axial cylindrical portion **31** and forms therebetween a seat portion **32** against which the ball valve **33** may rest and seal off the axial passage through the head. Ball **33** freely moves within the cylindrical portion **29** within the head **10** and is held therein by a transversely extending rivet **34** passing

through the walls of head **10** at the upper portion of cylindrical cavity **29**. Vent holes **35** are provided through the wall of the head at the upper end of internal cylindrical portion **29**. Thus, the sampler is thrust into the soil with end **12** down, any pressure built up in tube **24** raises ball valve **33** and the pressure is released through the vent holes **35**. The lower end of head **10** has a wall thickness as indicated at **36** which is of a thickness equal to about the thickness of the reduced threaded upper end of split tube **11**. This lower end has an internally threaded portion **37** which receives the threaded upper end **26** of the split tubes while the lower end has a transverse face as at **38** which has abutting engagement with the shoulder **27** on the split tube **11**. The longitudinal length of the threaded recess **37** is slightly greater than the length of the reduced threaded end **26** so that a slight gap is left as indicated at *c* between the extreme end of the split tube **11** and the bottom of the threaded recess **37** and the lower end of head **10**. This gap thus permits the coarse, square threads and the abutting shoulder **27** with the transverse end **38** on head **10** to take up the thrust when the sampler is driven into the ground. The internally threaded upper end **28** of head **10** receives a section of coupling rod in the customary manner.

By this construction a rugged and heavy duty core sampler is provided. The thickened wall upper end of split tube **11** as indicated through the length *a* is so proportioned that the threaded upper neck **25** and the transverse shoulder **27** serve as seats for receiving the lower end of head **10**. Any thrust against the head **10** as imparted by the drive weights acting on extension rods (not shown) coupled to the upper end of head **10** is received by the square threads **26** and the transverse shoulder **27** on split tube **11**. Shoulder **27** is annular and is nearly one quarter the diameter of the split tube **11** in width and forms a rugged base against which the lower face **38** of like size on head **10** seats. The large threads on the coupling between head **10** and split tube **11** as indicated at **26** and **37** serve not only to take up some of the thrust along with the shoulder **27** but also permits quick coupling and uncoupling.

Heavy duty core samplers made according to our invention have proved to be unfailing and the heretofore mushrooming of the heads down over the upper end of the split tube as well as the fracture of the wall of the head as by splitting lengthwise has now been entirely avoided.

In operation the sampler **11** is coupled to a drive rod at its screw socket end **28** and is then driven into the soil. The bit **12** cuts as at **13** a sample and tube **24** is filled. As the soil enters the bit **12**, should any pressure build up, the ball valve **33** is raised from its seat and the pressure passes off through passage **31** by seat **30** and ball valve **33** on out the vent holes **35**. The tapered restriction in the throat of bit **12** helps hold in the sample in tube **24**. The ball check valve **33** seals off the top of the sampler and as the tube is raised the sample is retained within the tube **24**.

We claim as our invention:

1. A tubular driven soil sampler comprising a tubular head having an aperture extending axially therethrough, a longitudinally split barrel detachably coupled at its upper end to said head, a tubular bit detachably coupled to the lower end of said barrel, said bit tapering to an annular cutting edge at its lower end and having its inner wall tapering a small amount inward toward the lower end thereby forming a slight restriction in its throat at its lower end, said head being shorter than said split barrel and formed with a threaded recess at its upper and lower ends, said threaded recesses having walls whose thickness is approximately equal to one-quarter the diameter of the head, the lower end of said head being threadedly connected to the upper end of said split barrel and having a transversely extending face at its lower end, said split barrel having its upper end formed with an increased wall thickness and a reduced threaded upper end portion threadedly received in the threaded lower end of said head, said reduced threaded upper end of the barrel having a wall thickness approximately equal to the surrounding wall thickness of the head, the upper end of said barrel adjacent said reduced threaded end having a wall thickness approximately equal to one-third the diameter of the barrel at its greatest diameter and extending lengthwise of the barrel for a distance approximately equal to the length of the reduced upper end thereof, and terminating in a forward transverse shoulder having abutting engagement with the lower end of said head, whereby on coupling to the upper end of said head and driving said sampler, the lower end of said head has a thrust engagement with the shoulder formed on the upper end of the split barrel and remains in engagement therewith without splitting up the side of the head or mushrooming out over the split barrel upper end on repeatedly being driven into the ground.

2. A tubular driven soil sampler, comprising a tubular head having an aperture extending axially therethrough, a longitudinally split barrel detachably coupled at its upper end to said head, a tubular bit detachably coupled to the lower end of said longitudinally split barrel, said bit tapering to an annular cutting edge at its lower end and having an internal working throat at its lower end, said head being approximately one-fourth the length of the split barrel and having an axially extending threaded recessed upper end adapted to threadedly receive a coupling member therein, a wall thickness approximately one-quarter the diameter of the head, and a threaded recessed axially extending lower end adapted to receive said longitudinally extending split barrel and extending approximately for one-third the length of the head, said lower end having an annular wall thickness approximately one-quarter the diameter of said head and a transversely extending end face on the lower end thereof, said split barrel having a reduced upper end threaded externally for reception in said lower threaded end of the head, a transversely extending shoulder for abutting engagement with the lower end face of said head, the wall thickness of said upper end of the split barrel adjacent the upper threaded reduced end being approximately one-third the diameter of said split barrel and extending from said shoulder along said split barrel a distance approximately equal to the length of said reduced upper threaded end.

3. A tubular driven soil sampler according to claim 2 wherein said head has a tapered seat intermediate said threaded ends and about said axially extending aperture, a ball check seated on said seal and movable to permit an open passage from the lower end to the upper end of said head, means for holding the ball in said head and vent means extending through the wall of the head just below the upper threaded recessed end.

4. A tubular driven soil sampler according to claim 3 wherein said split barrel is formed of two halves, one of said halves having a longitudinally extending rectangular shape in cross-section recess extending along opposite edges while the other half has longitudinally extending projections received by said recesses on the first half.

5. A tubular driven soil sampler according to claim 4 wherein the upper end of the split barrel has the axially extending aperture therethrough of uniform circular cross-section throughout the threaded upper and thickened wall end thereadjacent, said split barrel gradually increasing in inner circular cross-section adjacent said thickened walled upper end to a uniform circular cross-section having a reduced wall thickness.

References Cited in the file of this patent

UNITED STATES PATENTS

1,495,474	Fletcher	May 27, 1924
1,867,024	Oliver	July 12, 1932
2,230,808	Mohr	Feb. 4, 1941
2,318,062	Dames	May 4, 1943