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CORE SAMPLE APPARATUS

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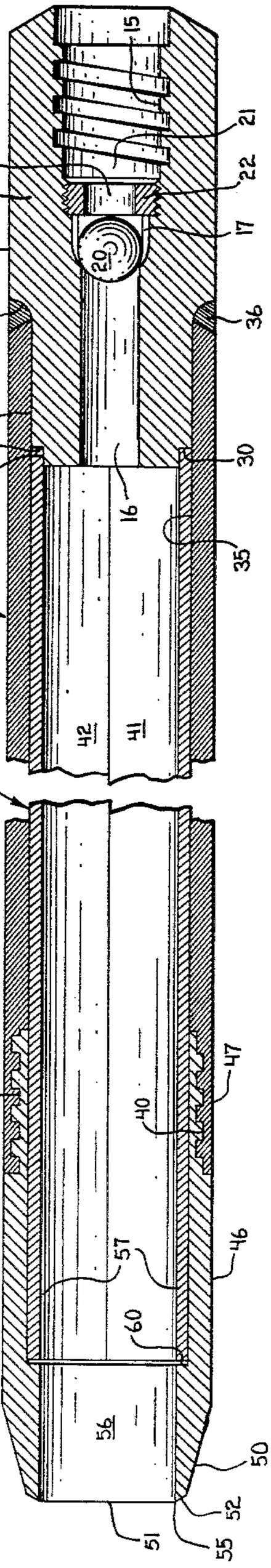

Fig. 2.

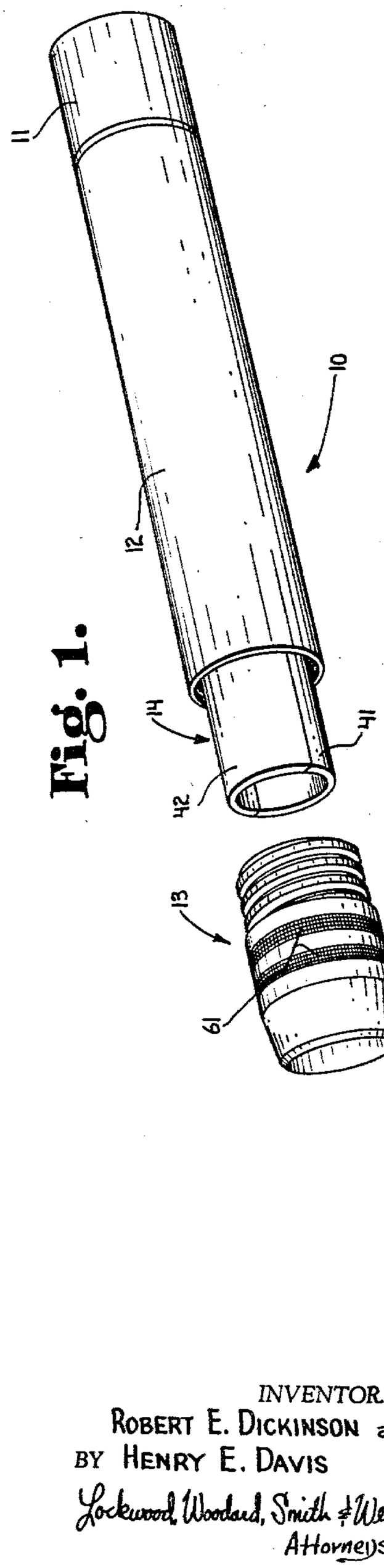

Fig. 1.

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1

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CORE SAMPLE APPARATUS

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1 Claim. (Cl. 175—239)

The present invention relates to an improved device for taking a specific type of soil sample.

It has been the practice for many years to take an undisturbed sample of the soil in order to evaluate the soil for design purposes, for example, for buildings, roads and the like. The most commonly used tool for this purpose is the common split barrel spoon sampler. This sampler consists of a central tube or barrel which is split in half lengthwise and held together at one end by a drive shoe with fine threads and at the other end by a drive head with fine threads. The sampler is driven into the soil by means of a drop weight of a specific size and mass. The soil enters the sampler through the open end of the drive shoe and is contained within the split tube. After the sampler has been filled with the soil sample, it is retrieved from the ground, dissassembled, and the sample removed.

Such conventional split spoon samplers require relatively long periods of time for cleaning prior to assembly because of the necessity of thoroughly cleaning the fine threads thereof. Furthermore, the threads at each end of the split tube must be threaded and unthreaded each time a sample is taken which requires a substantial period of time. Also, when the sampler is driven too deeply, the soil becomes too highly compacted within the split tube and the tube bulges. Such a condition damages the split tube and frequently makes necessary replacement if the damage is significant. Furthermore, such split tubes frequently fracture at the junction of the split tube and the drive shoe or drive head.

Consequently, it is one object of the present invention to provide an improved split barrel sampler.

Another object of the present invention is to provide a sampler of the present nature which does not require relatively long periods of down time for cleaning, assembly and disassembly.

Still another object of the present invention is to provide a sampler of the present nature which can be quickly and easily disassembled to obtain the sample without disconnecting the sampler from the drill pipe.

A further object of the present invention is to provide a sampler of the present nature which is more durable and long lasting than presently available samplers of this type.

One manner in which soil is tested with the split type of sampler is by the well known Terzaghi method and tables. These tables have been compiled as a result of an extensive amount of knowledge and effort and are intended for use with a split type sampler having an internal diameter of 1⅜" and an external diameter of 2". A further object or advantage of the present sampler is that it is particularly adapted for manufacture with such Terzaghi dimensions whereby the results found with the present device using the Terzaghi method can be more accurate.

Related objects and advantages will become apparent as the description proceeds.

One embodiment of the present invention might include a sampler comprising a cylinder open at one end and with its other end adapted for attachment to a drill pipe. A split sleeve liner is received in the cylinder and projects from the open end thereof. A drive shoe covers

2

the projecting end of the liner and is threadedly connected to the cylinder.

The full nature of the invention will be understood from the accompanying drawings and the following description and claim.

FIG. 1 is an exploded perspective view of a sampler embodying the present invention.

FIG. 2 is a section taken longitudinally and axially of the sampler of FIG. 1.

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawing and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring more particularly to the drawings, there is illustrated a sampler 10 which includes a drive head 11, a cylinder 12, a drive shoe 13 and a split liner 14. The drive head 11 had a central axial bore 16 which makes up a part of a passage extending completely through the drive head 11. The passage further includes an enlarged cup-shaped portion 17 into which the bore leads. Received within the cup-shaped portion 17 is a ball-check 20 which functions to prevent flow of fluid from a counterbore 21 and the enlarged portion 17 in to the bore 16 but permits flow of fluid from the bore 16 into the cup-shaped portion 17 and the counterbore 21.

The ball-check 20 is retained in place by a retainer screw 22 having a central opening 25 therethrough. The counterbore 21 is threaded with relatively large box thread which adapts the drive head 11 for attachment to standard drill pipe. The drive head 11 is formed externally with a reduced diameter portion 26 which is joined to the enlarged diameter portion 27 of the drive head by a rounded shoulder 30. The external diameter of the drive head is further reduced at 31 whereby the drive head forms a recess 32 with the internal surface 35 of the cylinder 12.

The cylinder 12 is welded to the drive head at 36 so that the external surface of the cylinder 12 and the drive head are aligned and form a composite smooth cylindrical shape externally thereof. The cylinder 12 is formed with an internal box thread at 40 but otherwise has a smooth cylindrical shape.

Received within the cylinder 12 and within the recess 32 is the split liner 14. This liner projects out of the end of the cylinder 12 and includes two semi-cylindrical sections 41 and 42. After the test sample has been taken so that it is received within the liner 14, the two sections 41 and 42 are separated, thsu exposing the sample in as undisturbed fashion as posible. Depending upon the type of soil being tested, the liner 14 can be composed of various materials, for example, steel, aluminum, brass or plastic. For most applications, however, the metal liner is preferable.

The drive shoe 13 has an externally threaded reduced diameter portion 45 which is threadedly received within the threads 40 of the cylinder 12. It will be noted that the external surface 46 of the drive shoe is thereby aligned with the external surface 47 of the cylinder producing a smooth composite cylindrical shape. The external surface of the drive shoe 13 has a generally frustoconical shape 50 at its distal end. At the extreme distal end 51 of the drive shoe, the external surface 52 tapers more sharply inwardly to define an annular point 55 which assists in penetrating the soil. Internally of the distal end of the drive shoe 13, there is formed a re-

duced diameter portion **56** which is in alignment with the internal surfaces **57** of the split liner. The reduced diameter portion **56** terminates in a shoulder **60** which limits movement of the split liner **14** and retains it in position within the cylinder **12**.

The sampler of the present invention is used by being attached to a standard drill rod of a conventional drill rig, for example, incorporating a tower and cathead, one example of such a rig being B–16 combination rotary and percussion rig manufactured by Mobile Drilling Company, Inc. of Indianapolis, Indiana. Of course, in carrying out the present invention, only the percussion feature and not the rotary feature of the rig would be used.

In taking a sample, it is conventional to use a 140 pound hammer which drives the sampler into the ground for a distance of 6" during which driving operation the number of blows of the hammer are counted. The sampler is then further driven into the ground a distance of 12" during which driving operation the number of blows are counted. Because the first 6" of the sample have possibly been affected by previous drilling procedure, only the latter 12" of the sample are used in the consideration of the nature of the soil and the test procedure.

As is suggested in FIG. 1, the drive shoe **13** can be easily unthreaded from the cylinder **12** to permit easy and convenient removal of the split liner **14** from the cylinder. This removal can be accomplished even though the drive head **11** is still secured to the lower end of the drill pipe. It can be seen that the only step necessary to obtain access to the liner **14** is the unthreading of the drive shoe **13**, said drive shoe being externally knurled at **61** to assist in this removal. Because of the fact that the drive shoe is connected to the cylinder by means of a heavy box thread, it is not necessary to spend a long period of time cleaning the threads prior to connection.

From the above description, it will be evident that the present invention provides an improved split barrel sampler. Because of the double walled nature of the liner and the cylinder, the device of the present invention has greater strength than previously available split barrel spoon samplers. Furthermore, the double-layered nature of the liner and the cylinder of the present invention particularly adapts the present invention for use in the Terzaghi method which is designed for a sampler having an internal diameter of 1⅜" and an external diameter of 2".

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention and the scope of the claim are also desired to be protected.

The invention claimed is:

A sampler comprising a drive head having a passage bored therethrough, said drive head bore being counterbored at one end and tapped with a large box thread adapted to be received upon the end of a drill pipe, a check valve within said passage and arranged to permit fluid flow from said bored to said counterbored passage portion but not from said counterbored to said bored passage portion, said drive head having a reduced external diameter adjacent said other end and an enlarged external diameter at said one end, said enlarged and reduced diameter portions being joined by a radial shoulder, an elongated cylinder telescoped at one end onto said drive head at said reduced diameter portion in abutment with said shoulder and welded thereto, said cylinder being internally threaded at said other end with a large box thread, said drive head having a further reduced diameter portion at said other end which defines a recess with said cylinder, a cylindrical liner received within said cylinder and split along the length thereof at two 180° locations, said cylindrical liner extending out of the other end of said cylinder, a drive shoe of generally cylindrical configuration, said drive shoe being threadedly coupled at one end to said cylinder and having an external surface in alignment with the external surface of said cylinder, said drive shoe tapering inwardly at its other end and having an internal shoulder against which said liner seats whereby the unfastening of said drive shoe from said cylinder allows removal of said liner without disturbing a collected sample.

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