The Hong Piston Sampler

L'échantillonneur à piston Hong

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Summary

The principal feature of the Hong Piston Sampler is the omission of piston rod extension to the surface.

In taking undisturbed samples of soils with conventional piston sampler, under certain conditions, the use of long piston rod extensions can be an annoying feature. By eliminating this feature, undisturbed sampling operation is simplified.

The locking device in this Sampler is positive and does not depend on friction. This paper discusses the principle and operation of the Sampler,

Sommaire

La caractéristique principale de l'échantillonneur à piston Hong est la suppression de la tige de piston remontant jusqu'au sol. Dans certains cas l'obligation de manipuler des longs éléments de tige de piston peut être gênant lorsqu'on prend des échantillons intacts avec un échantillonneur de type classique. La suppression de la tige simplifie les opérations de prélèvement.

La fermeture de l'appareil est parfaite et indépendante de la friction et ne dépend pas du frottement.

Dans ce rapport l'auteur expose le principe et le fonctionnement de l'appareil.

Introduction

The general practice of obtaining undisturbed samples of soils involves the use of thin wall samplers of either piston type or simply an open tube type. The tube is pushed or pressed into the soils in one continuous motion. However, in normally consolidated clays with low sensitivity there is a tendency (but not a normal practice) to advance the sample tube by driving. For soft cohesive materials or soils not highly preconsolidated and having high sensitivity, the stationary piston sampler is generally used.

It is commonly recognized that the piston sampler offers a better recovery of samples and due to the function of the piston the sample is less likely to be disturbed. However, in the conventional piston sampler, the piston rods are carried up to the surface and clamped in a fixed position. Normally the piston rod is fixed in a sort of frame work which is attached to the casing. This is satisfactory when the casing is held stationary in the ground.

The use of the piston rod extension is a cumbersome operation. In addition to the increased amount of work in the operation, there is always a possibility for mechanical malfunction. The Hong Piston Sampler eliminates this additional activity in the undisturbed sampling operation. It also possesses certain other improvements over the conventional piston samplers.

Discussion of the Sampler

The Hong Sampler, presently manufactured by Sprague et Henwood, Inc., is designed for use with 4 inch nominal diameter casing for recovery of 3 inch diameter undisturbed samples, although other sizes can be made.

In assembled stage the thin wall (approximately 0·0163 inch) sample tube attached to the drive head is inside the piston cylinder, the bottom edge of which is at the level of the cutting edge of the sample tube. The piston cylinder heat is just above the top of the sample tube. The bottom of the piston is at the cutting edge of the tube with the vacuum release plug in place. Two short 1/2 inch diameter piston rods connected to the piston extend through the holes at the sample tube drive head and remain fixed at the piston cylinder head by means of threaded rings and piston rod yokes. A solid rectangular ratchet bar through a rectangular hole at the piston cylinder head connects to the sample tube drive head at one end and a 3-fin centering guide at the other. This constitutes the entire assembly.

From the top of the 3-fin guide regular drill rods extend to the surface.

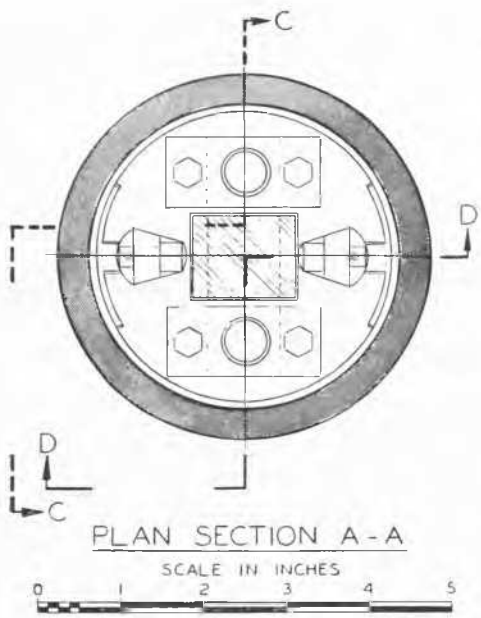
Operation

To use the sampler, casing is required for the entire depth of the hole where undisturbed samples are obtained. Casing is utilized to hold the piston in fixed position. In exceptional cases, where casing is not sufficiently tight in the ground to support the weight of the piston, it is necessary to hold the casing stationary by other means on the surface.

After all the soil inside the casing is cleaned out in the normal manner down to the shoulder of the special casing drive shoe, the entire sample assembly is lowered into the casing. The piston cylinder comes to rest on the inside shoulder of the casing drive shoe. Inasmuch as only the drill rod extends to the surface, the Sampler tube can be advanced either by pressing or driving. As the sample tube advances below the casing, the piston is held in position by the piston cylinder which is supported in place by the casing. A positive locking device engages one of the notches on the ratchet bar, keeping every part of the Sampler in its relative position as the whole assembly is withdrawn from the hole.

To detach the sample tube, first remove the piston cylinder. remove the four screws that hold the tube to the drive head and slide out the ratchet lock control to the fixed position, thus disengaging the lock. The ratchet bar is then pushed up to withdraw the drive head from the tube. The vacuum release plug is thus exposed and removed. The sample can then be sealed and the tube capped in the usual manner.

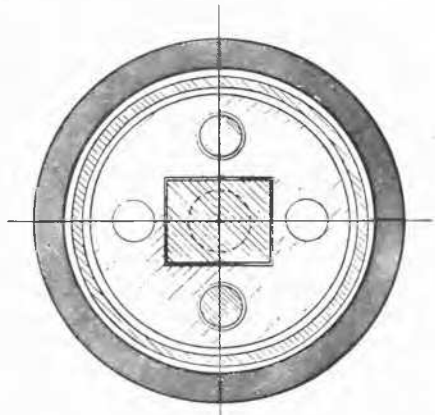
The casing drive shoe allows "BX" size or 2-1/2 inches diameter casings to pass through in an event that the hole is advanced deeper for recovery of smaller or ordinary dry samples. Three inch diameter sampler of conventional piston type or Shelby tube sampler can also be used without any interference from the casing drive shoe.



PLAN SECTION A-A

SCALE IN INCHES

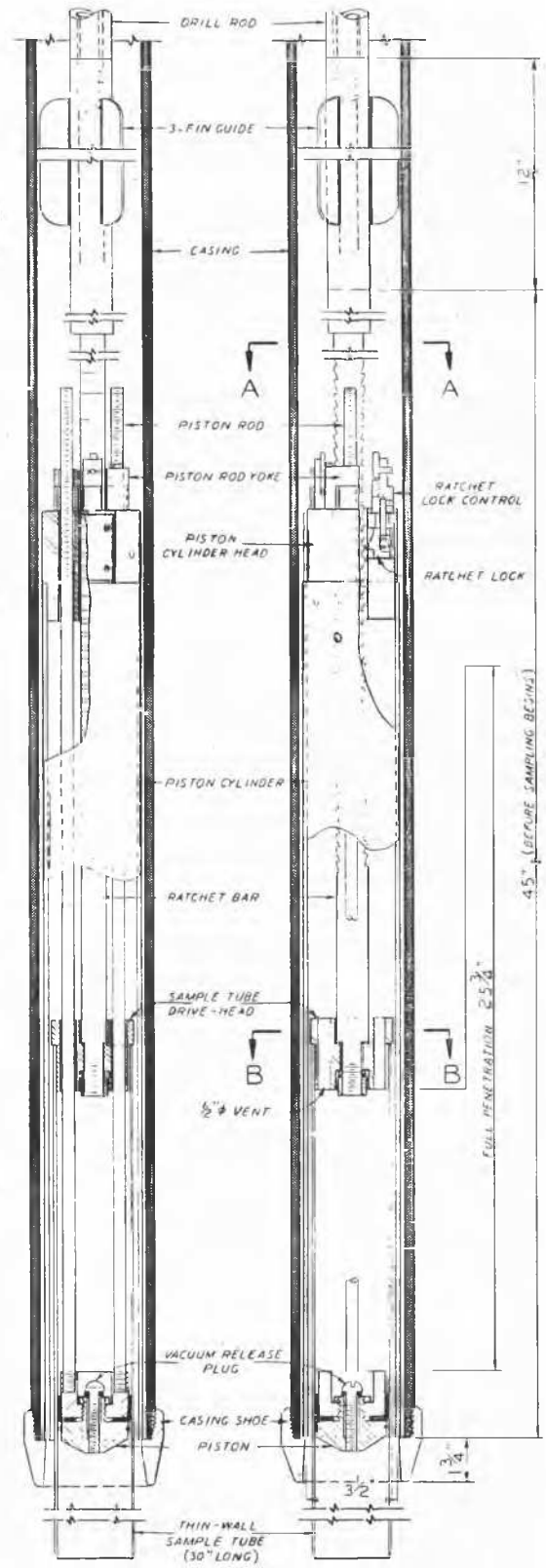
0 1 2 3 4 5



SECTION B-B

SCALE IN INCHES

0 1 2 3 4 5



SECTION C-C SECTION D-D

SCALE IN INCHES 0 1 2 3 4 5 10

For the finer point of operation, the use of another 3-fin centering guide is recommended near the top of the hole.

Conclusions

(1) The Hong Sampler has been used successfully on a number of projects recovering undisturbed samples of soils having very high sensitivity.

(2) Because only the drill rod extends above the surface the Sampler is receptive to simple methods of penetration by either pressing or driving.

(3) Only simple tools are needed for operation of the Sampler.

(4) The only integral part of the Sampler that needs to be detached is the vacuum release plug. It is an inexpensive machine screw and easily obtainable from any local hardware supplier.

(5) Although it appears that the necessary use of casing is disadvantageous, it is the only positive way to keep the bored hole open. Casing is normally used, however, in a large percentage of projects.