

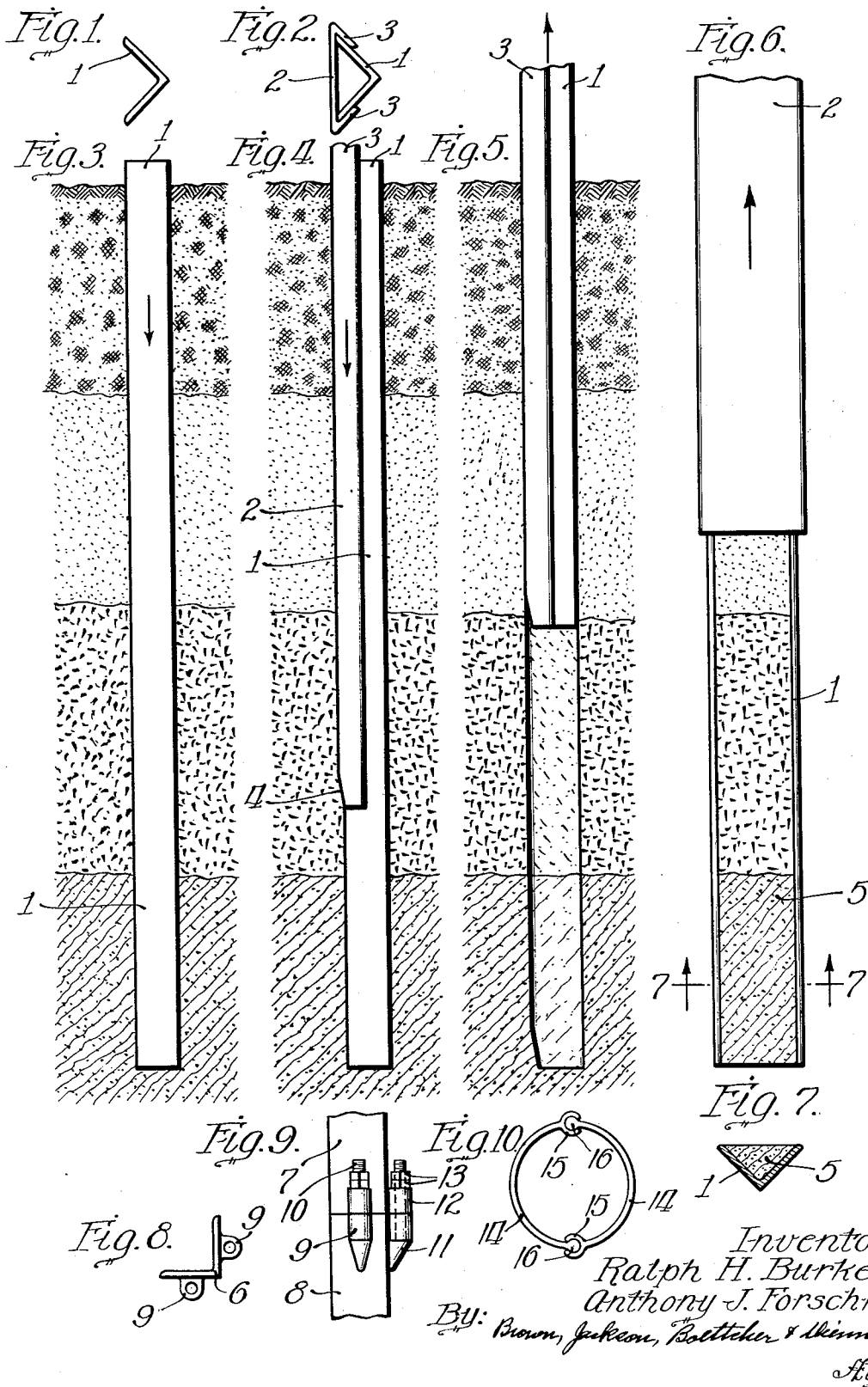
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METHOD OF AND MEANS FOR TAKING SOIL TESTS

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This invention relates to the taking of soil tests, and has to do more particularly with a method for taking such tests and means for practicing such method.

In building and analogous operations, it is desirable that tests be taken of the soil where a structure is to be erected to determine the condition and nature of the soil prior to commencement of building operations. This is commonly done to determine the extent and nature of the foundation required, in order that construction companies bidding on a particular work or job may be in a position to determine the probable amount of work, material and related factors probably involved in the construction of the foundation.

It is known to make tests of the soil by means of an auger or boring tool which penetrates the soil to a considerable depth. Tests made in this manner are not altogether satisfactory because the soil is cut up and loosened by the operation of the tool. While testing by means of a boring tool indicates approximately the location and thickness of the various strata through which the tool passes, the condition of such strata cannot be determined accurately from the boring. Furthermore, the boring test does not give an accurate cross-section of the soil penetrated in such manner that the various strata can be observed and inspected as a group or unit and in their natural and undisturbed condition.

It is also known to dig test pits for determining the character of the various strata of the soil. While these pits provide an accurate section of the soil penetrated thereby, this method is objectionable in that it requires considerable time and is comparatively expensive.

The primary object of our invention is to provide a method whereby the above-noted objections to the present methods of making soil tests are avoided, and an accurate and thoroughly reliable test of the soil can be made expeditiously and with facility. More specifically, our invention has as one of its primary objects the provision of a method whereby a column or core of soil

is separated from the surrounding soil in such manner that the strata of this column remain in their natural and undisturbed condition, the column thus separated being withdrawn from the soil and exposed, without being disturbed, for inspection and consideration. It is also an object of our invention to provide simple and efficient means for carrying out the method set forth. Further objects and advantages of our invention will appear from the detailed description.

In the drawing:—

Figure 1 is a plan view of one of the members of the testing device of our invention;

Figure 2 is a plan view of the testing device of our invention, showing the members thereof in assembled relation;

Figures 3, 4, 5 and 6 are views illustrating the successive steps of our method, Figures 3, 4 and 5 showing, in section, the soil to be tested and the manner of procuring a column or core of such soil, Figure 6 being on an enlarged scale and illustrating the column of soil obtained and the manner of exposing the same for observation;

Figure 7 is a section taken substantially on line 7—7 of Figure 6;

Figure 8 is a plan view of a member similar to that of Figure 1, but adapted for attachment to a similar member;

Figure 9 is a fragmentary elevation of two members similar to the member of Figure 8, illustrating the means for securing such members together;

Figure 10 is a plan view of a modified form of device for practicing the method of our invention.

In one form of the device of our invention we provide a member 1 of approximately V-shape in cross-section and open at one side, this member being of considerable length and constituting, in effect, an elongated trough. Member 1 is conveniently formed of angle iron and is adapted to be driven into the soil, in any suitable or preferred manner, to the desired depth. A channel member 2 cooperates with member 1, flanges 3 of member 2 being disposed to fit about the

outer edge portions of the arms of member 1, in substantial parallelism with and adjacent the outer faces of such arms. In this manner, member 2 is mounted for sliding movement along member 1 and is held against movement away from member 1. When the channel member 2 is in operative relation to the angle member 1, this channel member provides a closure for the outer side of the angle member. Preferably, though not necessarily, the lower end of channel member 2 is inclined downwardly and inwardly, at 4, toward member 1. This inclining or beveling of the lower end of member 2 is advantageous in that it urges this member toward member 1, when the channel member is driven into the soil along member 1 which has previously been driven into the soil.

In practicing the method of our invention, the angle member 1 is first driven into the soil to the desired depth and so as to penetrate the various strata of the soil, as shown in Figure 3. When thus driven into the soil, member 1 serves to partially separate a core or column of soil from the surrounding soil, it being noted that member 1 is of non-continuous cross-section so that the column of soil thus partially separated from the surrounding soil remains in its original condition with the strata of the soil in their natural and undisturbed condition and relation. After the member 1 has thus been driven to the desired depth, member 2 is driven downwardly along member 1, as in Figure 4, the channel member being driven to the same depth as the angle member. Member 2 slides downwardly along member 1, and is urged toward the same by the beveled or inclined lower portion 4, as above described. As the channel member is driven downwardly, it completes the separation of the column of soil from the surrounding soil. This column of soil retains its original condition, so that the various strata of the column thus separated from the surrounding soil correspond accurately in their condition and relation to the strata of the surrounding soil. The core or column of soil thus separated is firmly held by friction between the members 1 and 2, these members and the core being then withdrawn from the soil as a unit, as indicated in Figure 5. In this manner, we separate, with expedition and accuracy, a column or core of soil from the surrounding soil, this core preserving accurately the condition and relation of the strata of such surrounding soil.

The core thus separated, after being withdrawn together with the members 1 and 2 as above explained, is then exposed for observation and inspection, by sliding the channel member 2 lengthwise off of the angle member 1, as indicated in Figure 6. For this purpose, the core, together with members

1 and 2, after being withdrawn from the soil is disposed in approximately horizontal position with the channel member 2 uppermost, this member being then slid off of member 1 and exposing the entire core or any desired portion thereof. The member 1, when thus disposed, serves as a trough to support and retain the core, as in Figure 7. As will be clear from Figures 2 and 7, the inner surface of member 1, with which the core 5 of soil contacts, is of materially greater area than the inner face of channel member 2 with which the core 5 contacts. As a result, when member 2 is slid off of member 1 no objectionable disturbance of core 5 occurs, so that this core gives an accurate cross-section of the soil penetrated by the members 1 and 2, the various strata of the soil being in the same condition and relation as in the surrounding soil from which the core or column was taken. The method of our invention, therefore, provides simple and highly efficient means for determining with precision the relation and condition of the strata of the soil tested.

The members 1 and 2 of the device of our invention may be of any desired length, within practical limits. If desired, such members may be made up in sectional form, as shown in the modified form of Figures 8 and 9. In this form, the angle member 6 is shown as formed in two sections 7 and 8, the latter of which is provided with suitably disposed lugs 9 through which extend bolts 10 having downwardly tapering heads 11. These bolts pass through lugs 12 at the lower end of section 7, nuts 13 being screwed upon the bolts and bearing against the upper faces of lugs 12. Also, the channel member may be formed in sections secured together in the same manner as the sections of the angle member, and the sections of the angle member and of the channel member may be secured together in any suitable or preferred manner.

In the modified form of testing device illustrated in Figure 10, we employ two members 14 of approximately semi-circular shape, each of these members being provided at one edge with a socket element 15 extending lengthwise thereof and, at its other edge, with a bead element 16 extending lengthwise thereof and fitting into the cooperating socket element 15 of the other member 14. The members 14 are, in general, similar in construction to sheet piling of known type.

The members 14 of Figure 10 are used in the same manner as members 1 and 2 of Figures 1 to 7, inclusive, for obtaining a column or core of soil for test purposes. After the core, together with the enclosing members 14, has been withdrawn from the soil, either of these members may be slid lengthwise off of the other for exposing the core. The members 14 are driven into the

soil separately and successively, and either of these members may be driven first. In this connection, it is to be noted that in the form of our testing device illustrated in Figures 1 to 9, inclusive, either of the members of such device may be driven first though we prefer to drive the angle member first since it encloses the greater portion of the core of soil to be taken and effectively retains the core during driving of the channel member.

Preferably, the device for taking of the core of soil consists of two members, as illustrated and above described. In its broader aspects, however, our invention comprehends any suitable method and means for separating a column or core of soil from the surrounding soil and withdrawing the column thus separated and exposing it for observation and inspection, while maintaining the strata of the soil column in their original or natural condition and relation. With regard to the device for separating and withdrawing the core of soil, our invention comprehends any suitable device for this purpose, and such device may comprise a plurality of members which, when successively driven into the soil in juxtaposed and co-operating relation, serve to separate a column or core of soil from the surrounding soil and to enclose such core effectively and in such manner as to withdraw the core with such members upon withdrawal of the latter, the members of the device preferably being separable for exposing the core in the manner above described.

What we claim is:—

1. In combination in a device of the character described, a trough-like member open at its lower end and at one side and adapted to be driven into the soil, and a second member adapted to be driven into the soil at and along the open side of the first member and to close said open side, said members having means for holding them in cooperating relation with said second member closing the open side of the first member.

2. In combination in a device of the character described, a trough-like member open at its lower end and at one side and adapted

to be driven into the soil, and a second member slidable lengthwise of the first member at the open side thereof and adapted to be driven into the soil adjacent said first member and in position to close the open side thereof, the inner surface of the first member being of appreciable greater area than the inner surface of the second member and said second member being of sufficient width to close the open side of the first member.

3. The method of taking samples of soil, which comprises driving into the soil and to a considerable depth extending through a plurality of soil strata a trough-like member open at its lower end and forming two sides of a triangle and thereby partially separating a column of soil from the surrounding soil, driving into the soil and along the open side of said member a flat member forming the third side of the triangle and thereby completing severing of the column from the surrounding soil, the area of contact of the enclosed column with said members being sufficient to assure retention of said column between the members during withdrawal of the latter, and withdrawing said members and the column of soil enclosed thereby as a unit from the surrounding soil.

4. The method of taking samples of soil, which comprises driving into the soil and to a considerable depth extending through a plurality of soil strata a member open at its lower end and at one side and shaped in cross-section to enclose more than half of the perimeter of a desired column of soil, driving into the soil and along the open side of said member a second member of proper extent to close the open side of the first member thereby completing severing of the desired soil column from the surrounding soil, the area of contact of the enclosed column with said members being sufficient to assure retention of said column between the members during withdrawal thereof, and withdrawing said members and the column of soil enclosed thereby as a unit from the surrounding soil.

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