Jan. 20, 1942. N. W. MATTHEWS 2,270,325

AUXILIARY ELECTRODE FOR GROUND RESISTANCE MEASUREMENT

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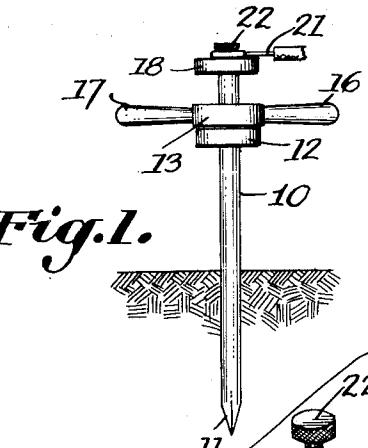


Fig. 1.

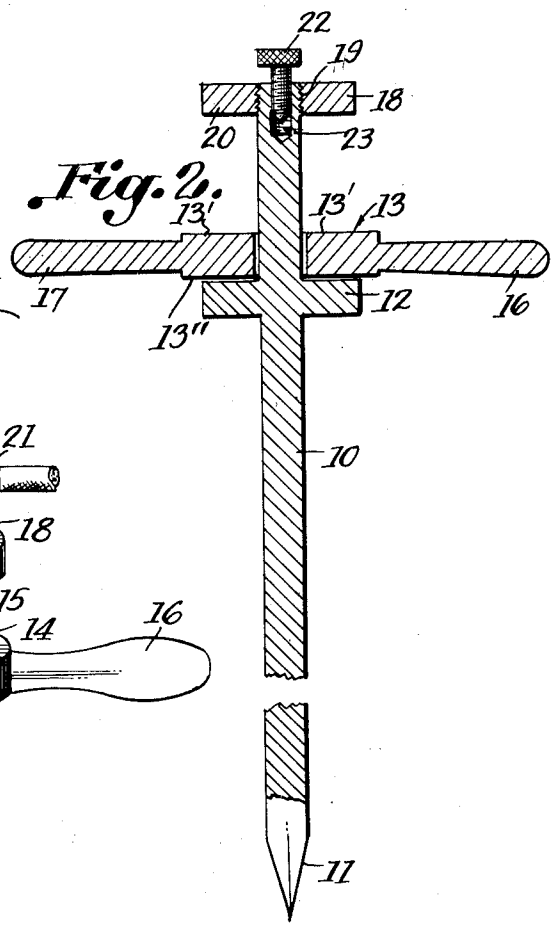


Fig. 2.

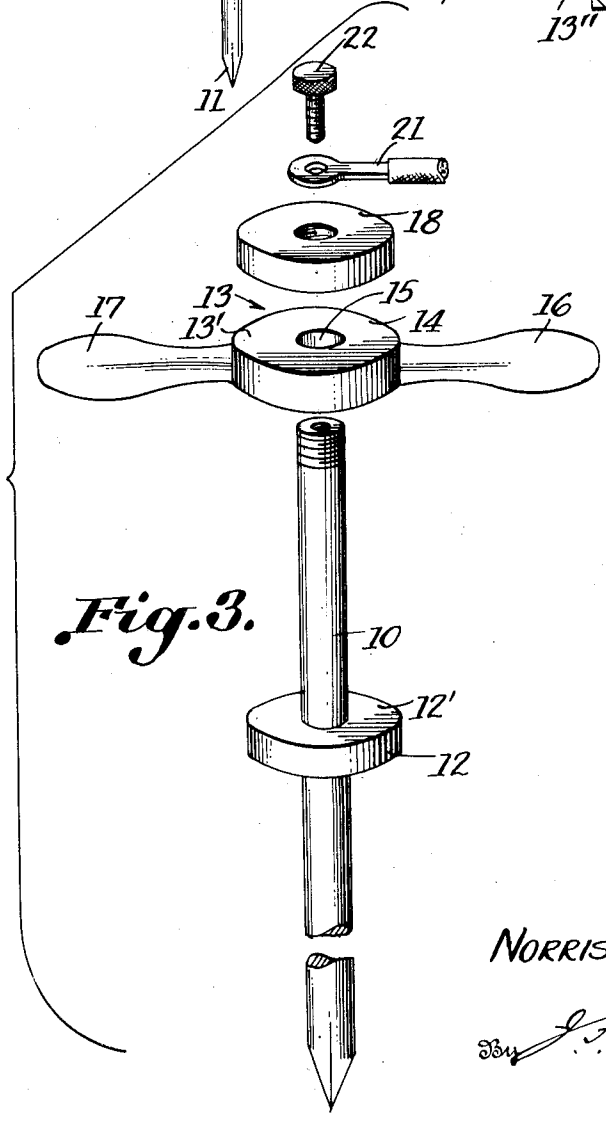


Fig. 3.

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AUXILIARY ELECTRODE FOR GROUND RESISTANCE MEASUREMENT

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Application January 18, 1941, Serial No. 375,090

3 Claims. (Cl. 174—7)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to the measurement of ground resistance and to a ground electrode for facilitating the taking of such measurements.

Ground electrodes in the form of stakes of conducting material, such as metal, have been provided for use in determining the relative resistance of the earth at different points. These electrodes or stakes, usually two in number, may be driven into the earth at desired locations and connected to a suitable meter. After each reading the stakes are withdrawn from the earth for re-use at other locations. The physical exertion required in the course of a day, to drive these stakes to the proper depth and then remove them, and especially that of withdrawing the stakes from hard ground, is often more than one qualified to take the measurements can endure without experiencing considerable fatigue.

The purposes of this invention are to provide for reducing the manual labor involved in driving and withdrawing ground electrodes of this general class; to provide for attaining these desirable objectives by means of a ground electrode of a construction adapted to facilitate its insertion to the proper depth and removal from the earth; and also to provide a ground electrode for these purposes of relatively simple and yet rugged and durable construction which may also be comparatively inexpensive to manufacture.

In accordance with this invention a portion of the upper end of a ground electrode, which normally protrudes above the surface of the soil in which the electrode is inserted, may be provided with a fixed abutment in the form of an anvil adapted to receive the blows of an impacting device, such as a hammer, which may be carried by the electrode and supported for axial movement relative thereto. Preferably, two such abutments or anvils are spaced along the upper or protruding end portion of the electrode to provide for selectively impacting either the lower or upper anvil for driving or withdrawing the electrode, respectively.

The features of the invention are illustrated in the accompanying drawing, wherein;

Fig. 1 is a side elevation of a ground electrode inserted in the soil;

Fig. 2 is an axial section through the electrode and its impacting device as shown in Fig. 1; and

Fig. 3 is a perspective view of the electrode shown in Figs. 1 and 2 with parts thereof separated to illustrate a manner in which the electrode may be made and assembled.

In the embodiment selected for illustration the ground electrode comprises a shank 10 having a pointed end 11 adapted to be inserted into the soil where the tests are to be made, and spaced along the upper end portion of the shank 10 which normally protrudes above the ground, the shank 10 is provided with a lower fixed abutment 12 constituting an anvil which may be in the form of a radial flange formed integral with the shank 10 and having an upwardly-facing impact-receiving surface 12'. For impacting this anvil to drive the electrode into the ground, there may be provided an impacting device or hammer 13, preferably having flat, substantially radial upper and lower impacting surfaces 13' and 13'' for engaging similar opposing impact-receiving anvil surfaces. Preferably, this hammer comprises an annular central body portion 14 having a central opening 15 adapted to fit freely about the shank 10. The body portion 14 may be, and preferably is equipped with substantially radially-extending and oppositely-disposed handles or manual grips 16 and 17. Preferably, at or near the upper end of the electrode the shank 10 thereof is equipped with a fixed abutment or anvil 18 which may be in the form of an annular member threaded onto the upper end of the shank, as indicated at 19, and having a downwardly-facing impact-receiving surface 20. A conductor 21 may be connected to this electrode in any suitable manner, as by means of a terminal or attaching screw 22 secured in a threaded axial bore 23 in the upper end of the shank 10.

In using this electrode, the pointed lower end 11 of shank 10 may be thrust into the earth by grasping handles 16, 17 and moving them downwardly along the shank to bring the hammer 13 against the lower anvil 12, and then forcing the handles downwardly so as to push the lower end of the shank into the earth. To drive the electrode further into the earth to the desired depth, which may differ from that illustrated in Figure 1, depending upon the character and condition of the soil, the operator may withdraw and thrust handles 16, 17 downwardly to cause impacts between the hammer and the lower anvil until the resulting axial thrusts have lodged the lower portion of the shank in the soil at the proper depth. When it is desired to remove this electrode from the soil, the grips 16 and 17 provide a convenient means for withdrawing it either with a single upward motion which brings the hammer 13 against the upper anvil 18 and pulls the electrode out of the soil, or, if the electrode is not easily loosened from the soil in this manner, repeated upward thrusts of the grips 16 and 17 will cause the hammer 13 to deliver blows axially

of the electrode against the upper anvil 18 so as to loosen and withdraw the electrode from the soil.

From the foregoing it will be seen that I have provided a ground electrode having oppositely-facing, fixed impact-receiving anvil surfaces and cooperating oppositely-disposed hammer surfaces which facilitate driving and withdrawing the electrode, and yet the latter is convenient to carry, easily manipulated, and consists of few relatively simple parts which are comparatively inexpensive to manufacture and assemble. While the impact-receiving surfaces of the anvils have been shown as disposed on two anvils and the impact-delivering surfaces of the hammer have been illustrated as opposite faces of the same member, it will be understood that in some instances it may be desirable to change this arrangement, as for example, by providing only one anvil having oppositely-facing surfaces disposed between opposing faces of two hammer members. Various other modifications will occur to those skilled in this art, when informed by this specification, but it should be understood that the invention is not limited except as indicated by the appended claims.

The invention described herein, if patented, may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

I claim as my invention and desire to secure by my patent:

1. An auxiliary ground electrode adapted to be inserted in the earth to the proper depth for testing ground resistance and then removed after the test is completed, said electrode comprising a shank having a lower portion adapted to be inserted in the earth and having an upper portion adapted to protrude above the surface of the earth, anvils spaced along the upper portion of the shank and fixed in position thereon, said anvils having opposed substantially radially disposed impact receiving surfaces extending around the shank for transmitting a substantially axial thrust thereto when impacted, and an annular hammer disposed about the shank between said anvils for selectively impacting the latter.

2. An auxiliary ground electrode adapted to be inserted in the earth to the proper depth for testing ground resistance and then removed after the test is completed, said electrode comprising a shank having a lower portion adapted to be inserted in the earth and having an upper portion adapted to protrude above the surface of the earth, anvils spaced along the upper portion of the shank and fixed in position thereon, one of said anvils being integral with the shank and the other of said anvils being removably secured on the shank, said anvils having opposed substantially radially disposed impact receiving surfaces extending around the shank for transmitting a substantially axial thrust thereto when impacted, and an annular hammer disposed about the shank between said anvils for selectively impacting the latter.

3. An auxiliary ground electrode adapted to be inserted in the earth to the proper depth for testing ground resistance and then removed after the test is completed, said electrode comprising a shank having a lower portion adapted to be inserted in the earth and having an upper portion adapted to protrude above the surface of the earth, the upper end of the shank having a threaded substantially axial bore, a contact screw having threaded engagement in said bore for securing an electrical connection to the upper end of the shank, anvils spaced along the upper portion of the shank and fixed in position thereon, said anvils having opposed substantially radially disposed impact receiving surfaces extending around the shank for transmitting a substantially axial thrust thereto when impacted, and an annular hammer disposed about the shank between said anvils for selectively impacting the latter.

NORRIS WHITNEY MATTHEWS.