

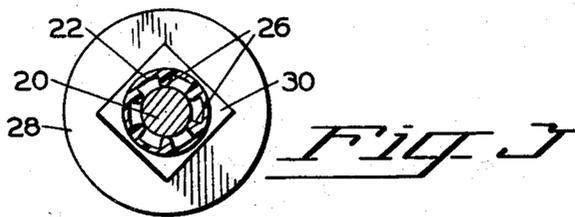
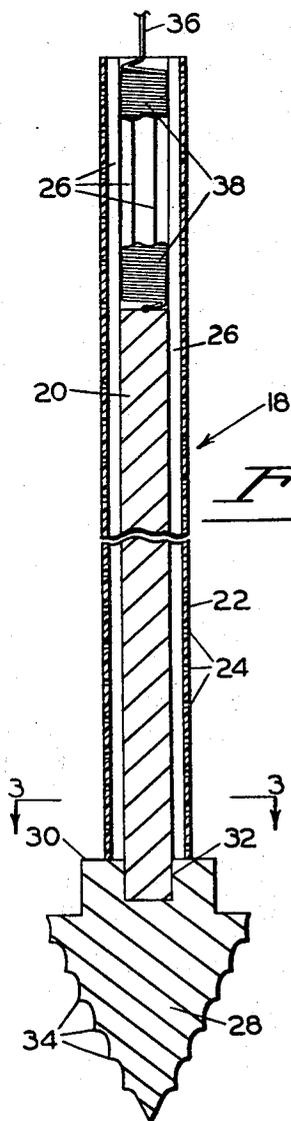
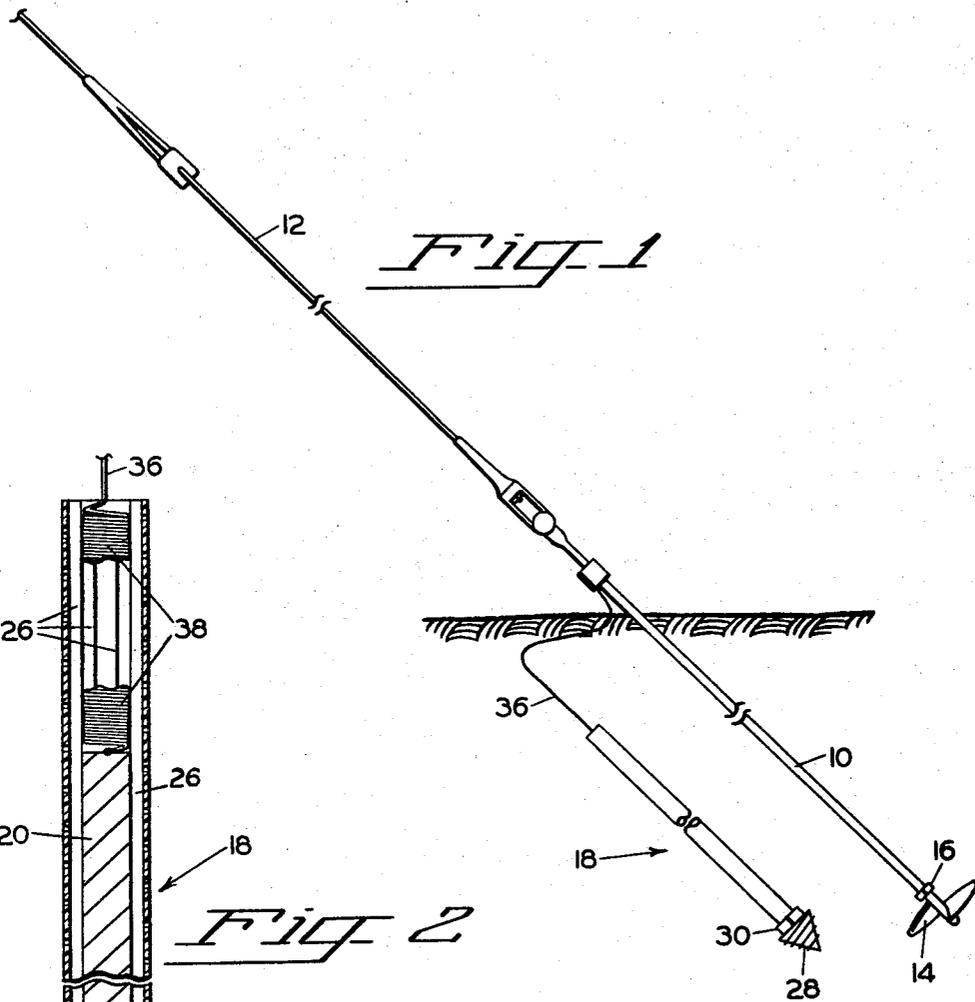
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ANODE FOR CATHODIC PROTECTION

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ANODE FOR CATHODIC PROTECTION

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ABSTRACT OF THE DISCLOSURE

An elongated, electrically conductive, nonmetallic, porous sleeve surrounds an electrically conductive anode rod to the rear end of which is secured an elongated lead conductor. At the front end of the sleeve and rod is a driving member having an earth boring tip provided with spiral threads and a noncircular shank adapted to be engaged by the noncircular connector of an elongated, hollow rotary drive tool, by which the assembly of driving member, rod and sleeve is driven into the earth.

This invention relates to anodes for providing cathodic protection against galvanic corrosion of earth anchors, towering footings, well casings, buried metal conduits, tanks, poles and the like. The invention relates particularly to an improved anode construction by which the following objectives and advantages are achieved:

The anode is capable of being installed in the ground with speed and facility by means of commercially available manual or power driven tools.

The anode may be installed in the ground over a wide range of depths and angles, thus rendering it economically feasible to provide adequate cathodic protection for buried tanks and other structure heretofore neglected because of expense.

The anode is installed in the ground without requiring back fill.

The anode may be installed in the ground in multiples as axial extensions of each other, thereby providing an anode of variable length from a single standard size of anode.

The anode is of simplified construction for economical manufacture.

The foregoing and other objects and advantages of this invention will appear from the following detailed description, taken in connection with the accompanying drawing in which:

FIG. 1 is a foreshortened elevation of a conventional earth anchor having connected thereto an anode embodying the features of the present invention;

FIG. 2 is a foreshortened longitudinal section showing details of construction of an anode embodying the features of this invention; and

FIG. 3 is a sectional view taken on the line 3-3 of FIG. 2.

For purposes of illustration, FIG. 1 shows an elongated earth anchor rod 10 installed in the ground and serving to anchor the lower end of a cable assembly 12 which may, for example, serve to stabilize a power pole. The lower end of the rod supports a boring screw 14 which functions, upon rotation of the rod, to bore downward into the ground. For purposes of rotating the rod and the boring screw, there is secured to the rod adjacent the screw a square or other noncircular coupling element 16 adapted to be engaged by a rotary drive tool.

Typical of such tools is that manufactured by the Chance Co., Catalog No. PW-600 Series. The tool includes an elongated drive sleeve which freely surrounds the anchor rod and is provided at its lower end with a non-circular socket, matching the noncircular shape of the coupling 16 and adapted for connection at its opposite

end to a source of rotary power. Additional drive sleeve sections may be connected together to provide an extended drive sleeve when it is necessary that the anchor rod be installed in the ground to a substantial depth.

In accordance with the present invention, an anode 18 is provided for cathodic protection against galvanic corrosion of buried members such as the earth anchor rod 10 illustrated in FIG. 1. The preferred anode construction is illustrated in detail in FIGS. 2 and 3. Thus, an elongated electrically conductive rod 20 of magnesium, zinc, aluminum, or other suitable electrically conductive metal, is confined within an elongated hollow sleeve 22 of electrically conductive material which is characterized by resistance to corrosion and deterioration when installed in the ground. This material preferably is a synthetic thermoplastic resin, such as polyethylene, polyvinylchloride, and many others, incorporating as a filler such electrically conductive substances as carbon and various electrically conductive metal oxides, in sufficient quantity to render the sleeve at least semiconductive.

The sleeve also is rendered porous by such means as the provision of a multiplicity of openings 24 throughout its length and circumference to provide substantially uniform distribution of current drain over the entire surface of the elongated rod 20. To further enhance this uniform distribution, means is provided by which to space the surface of the rod from the internal surface of the sleeve. In the embodiment illustrated, this means is provided by a plurality of circumferentially spaced ribs 26 projecting inward from the inner surface of the sleeve.

A driving member also is provided to facilitate installation of the sleeve-covered rod into the ground. In the embodiment illustrated, this driving member includes an earth penetrating tip portion 28 which converges forwardly substantially to a point to facilitate its penetration through the soil. Extending rearwardly from the tip portion is a shank portion 30 provided with an internal socket 32 adapted to freely receive therein the forward end of the sleeve-surrounded rod. In the preferred embodiment illustrated, the outer surface of the shank section is of square or other noncircular cross section which matches the noncircular socket end of the drive tool described hereinbefore. By this means the same tool as is used to install the anchor rod (FIG. 1) also may be used to install the anode. For this purpose the tip portion of the driving member is provided with earth boring spiral threads 34 which function upon rotation of the driving member to bore downward into the ground, in manner similar to the boring screw 14 described hereinbefore.

The rearward end of the conductive rod 20 is connected electrically to an elongated lead conductor 36, the opposite end of which is adapted for connection, above ground, to the earth anchor rod 10 or other member for which cathodic protection is to be provided. In the preferred embodiment illustrated, the rearward end of the anode rod 20 terminates forwardly of the rearward end of the sleeve 22. A compartment 38 thus is provided in the rearward portion of the sleeve, wherein the lead conductor may be coiled for convenient storage during installation of the anode into the ground. Then, after the drive tool has been removed from about the sleeve, the rearwardly projecting end of the lead conductor may be drawn outwardly, simultaneously withdrawing the coil from the compartment.

Upon installation of the anode into the ground and withdrawal of the driving tool, the minimum circumferential volume of earth displaced by the driving sleeve of the tool may be compacted uniformly about the anode simply by the addition of water. This elimination of the usual requirement of back fill material, and the necessary time and labor to install it, represents a substantial savings in installation cost.

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In the event a particular installation requires an anode of greater length than one of the anodes 18 illustrated, the driving tool may be lengthened by the addition of one or more drive sleeve sections, as previously described, and two or more of the anodes 18 may be placed end to end within the extended drive sleeve of the tool, to provide the required length. The forwardmost anode only will be provided with the driving member 28, as will be apparent. Preliminary to the insertion of the succeeding lengths of anodes rearwardly of the forward anode, the lead conductor 36 for the forward anode is drawn from the compartment 38 and arranged adjacent the inner surface of the drive sleeve of the tool. The next succeeding length of anode then is inserted into the drive sleeve wherein it abuts at its forward end against the rearward end of the sleeve 22 of the forward anode. This procedure is repeated for each succeeding anode section, as will be understood. It may be necessary to splice additional lengths of lead conductors to those connected to the forward anode sections, in order to provide the length necessary for connection to the member to be protected.

By means of the foregoing arrangement, in which a plurality of anodes may be installed as axial extensions of each other, it is necessary merely to provide an inventory of one standard length of anode. This simplifies the specifications, reduces inventory and affords production economies incident to volume production and packaging of a single size.

It will be apparent to those skilled in the art that various changes may be made in the size, shape or number and arrangement of parts and other structural details described hereinbefore, without departing from the spirit of this invention and the scope of the appended claims.

It will also be apparent to those skilled in the art that this anode, just as is the case with presently available anodes, may be used as an earth electrode for a grounding terminal, in which usage all the advantages mentioned will also obtain.

Having now described my invention and the manner in which it may be used, what I claim as new and desire to secure by Letters Patent is:

- I. A cathodic protection anode, comprising
 - (a) an elongated rod of electrically conductive material,
 - (b) a porous sleeve of synthetic plastic having incorporated therewith an electrically conductive material, the sleeve surrounding the rod and characterized by resistance to corrosion and deterioration in the earth,
 - (c) a driving member engaging one end of the rod and having an earth penetrating end,
 - (d) drive tool engaging means on the driving member for driving engagement of a drive tool, and
 - (e) an elongated lead conductor connected at one end to the end of the rod opposite the driving member and adapted for connection at the opposite end to a structure to be provided with cathodic protection.

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2. The anode of claim 1 wherein the end of the sleeve opposite the driving member extends beyond the corresponding end of the enclosed rod and forms a compartment for the storage of a coil of the elongated lead conductor.

3. The anode of claim 1 including a plurality of projections on the inner surface of the sleeve spacing the rod therefrom and providing open spaces throughout the length an circumference of the rod.

4. A cathodic protection anode, comprising
 - (a) an elongated rod of electrically conductive material,
 - (b) a porous sleeve of electrically conductive, non-metallic material surrounding the rod and characterized by resistance to corrosion and deterioration in the earth,
 - (c) a driving member engaging one end of the rod and having an earth penetrating end including earth boring means on its surface,
 - (d) the driving member also including noncircular coupling means on the end engaging the rod, the coupling means having a periphery extending laterally outward from the plane of the sleeve for driving connection of a rotary drive tool surrounding the sleeve, for rotating the driving member and boring it into the earth, and
 - (e) an elongated lead conductor connected at one end to the end of the rod opposite the driving member and adapted for connection at the opposite end to a structure to be provided with cathodic protection.

5. The anode of claim 4 wherein the end of the sleeve opposite the driving member extends beyond the corresponding end of the enclosed rod and forms a compartment for the storage of a coil of the elongated lead conductor.

6. The anode of claim 4 including a plurality of projections on the inner surface of the sleeve spacing the rod therefrom and providing open spaces throughout the length and circumference of the rod.

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