

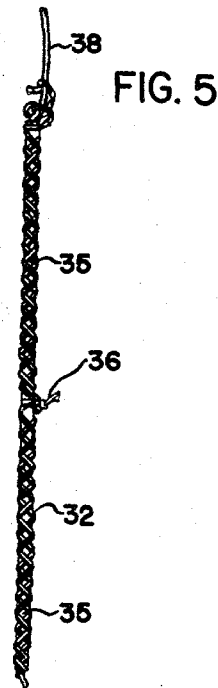
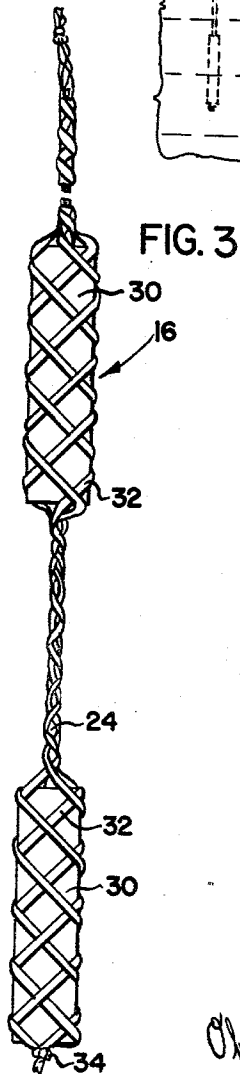
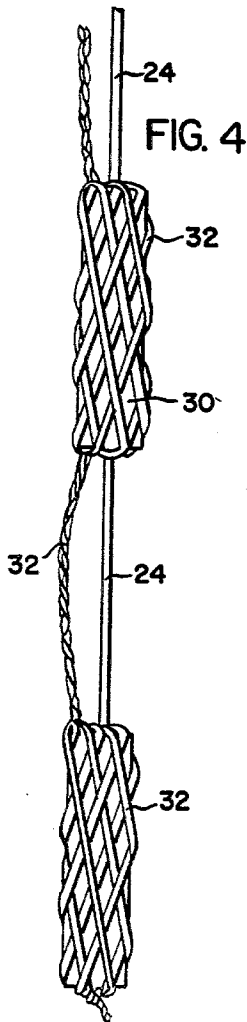
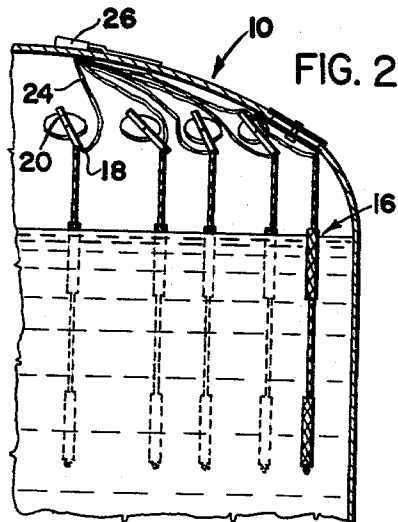
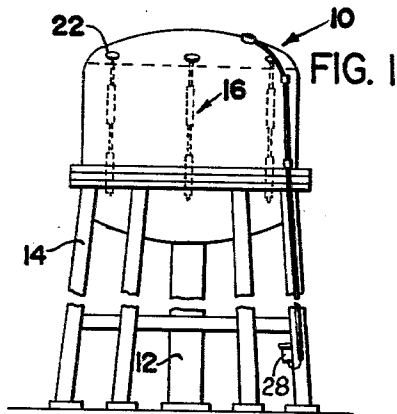
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ANODE SUPPORT FOR CATHODIC PROTECTION SYSTEM

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ANODE SUPPORT FOR CATHODIC
PROTECTION SYSTEM
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This invention relates in general to cathodic protection systems and more specifically to novel means for supporting anodes for the same.

Cathode protection systems for water tanks are well known and generally include elongated anodes of aluminum or graphite, for example, which are suspended in the large steel water tanks to prevent corrosion of the tanks. A proper voltage is maintained between the anodes and the tank to prevent solution of the iron. The anodes are generally in the form of long rods or bars and are suspended in any suitable manner from the roof of the tank, the anodes of course being out of contact with the walls of the tank. Since the elongated anodes are preferably of sufficient diameter to provide long life and suitable current conducting properties, they are relatively heavy and in the case of graphite relatively fragile.

The anodes, of course, corrode and gradually disintegrate during use in performing the intended object of preventing solution of the steel tank walls. This corrosion and disintegration of the anodes not only necessitates periodic inspection and the eventual withdrawal and replacement of the disintegrated anodes but also often-times adversely affects the withdrawal of water from the tanks. The disintegration of the anodes results in pieces of the anodes dropping to the bottom of the tank, whereupon such fragments have a tendency to clog the water pipes which effect the withdrawal of the water from the tank.

It is accordingly desirable to prevent to the extent possible, commensurate with maintaining adequate contact area of the anode surface, the disintegration of the anode and the resultant dropping of the disintegrated pieces to the tank bottom. Various means have been employed without particular success, however, to achieve such result, such means generally not satisfactorily inhibiting the undesirable disintegration.

With the above in mind, it is a primary object of the invention to inhibit or deter disintegration of the anodes by providing a novel anode support for partially enclosing and/or supporting the anodes in suspended manner in the tank.

It is a further object of the invention to provide an anode support that does not materially reduce the water contact area of the anode surface.

Still another object is to provide an anode support that tightly contacts the anode and which is flexible for maintaining such tight contact upon change in shape of the anode.

Other objects and advantages of the present invention will become apparent as the following description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features herein-after fully described and particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a side elevational view of a steel water tank having associated therewith the anode support means of the invention;

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FIG. 2 is an enlarged fragmentary vertical cross-sectional view of such tank showing a plurality of elongated anodes and support means therefor suspended from the tank roof;

FIG. 3 is an enlarged detail view of the anodes and anode supports illustrated in FIGS. 1 and 2;

FIG. 4 is an enlarged detail view showing an alternative method of employing the anode support comprising the invention; and

FIG. 5 is an enlarged detail view showing an anode support associated with a constant diameter anode assembly.

Referring now more particularly to the drawings, wherein like reference numerals are used to indicate like parts, and particularly to FIGS. 1 and 2, a conventional water tank or tower is generally indicated at 10. Communicating with the bottom of the tank 10 is a riser 12 for conducting water from or to the tank. The tank is supported in the usual manner by legs 14.

In order to prevent corrosion of the tank 10, anode assemblies generally indicated at 16 are suspended from the roof of the tank 10 by means of eye bolts 18, the latter being mounted on transverse bars 20 which are in turn mounted on the interior sides of covers 22, the covers 22 serving to close corresponding access openings in the top of the tank. The anode assemblies, which will be more specifically described below, include electric submarine cables 24 which lead to a common junction box 26 on the roof of the tank. The junction box 26 is electrically communicative with a rectifier housing 28, the rectifier disposed therein providing a pulsating direct current to the cables 24. In a well-known manner that forms no part of the present invention, a proper voltage is maintained in a circuit including the anodes, the rectifier, tank and water to prevent solution of the iron of the tank.

With the exception of the specific construction of the anode assemblies 16 which form the present invention, the above described subject matter is well known and forms no part of the present invention, such matter being described only in sufficient detail to provide a proper understanding of the present invention. For more specific details of the above subject matter, reference is made to my prior U.S. Letters Patent No. 2,700,649.

Referring now to FIG. 3, the anode assembly 16 comprises in the form shown therein a plurality of vertically spaced anodes 30 which are in electrical contact with the cable 24 above referred to whereby a positive charge is maintained on the anodes. The anodes are secured to the cable 24, preferably by telescopically mounting the anodes thereover, by any suitable means forming no part of the invention.

The anodes 30 and cable 24 are encased by a stranded plastic rope or mesh 32 which tightly contacts the surfaces of the anode and the cable whereby the cable and anode are supported as well as encased by the plastic rope. To enhance the contact between the rope and the anodes and cable, the rope is preferably under tension. This can be accomplished by entirely or partially suspending the anode assembly by the plastic rope, although it will be apparent that such tensioning could also be provided merely by tying the upper end of the rope to a fixed point and letting the weight of the anodes effect a tightening of the rope around the anode and cable. The rope is knotted as shown at 34 beneath the bottom anode in order to maintain the rope in its encasing position.

The rope 32 is highly flexible, both in a vertical and in a horizontal direction, and is adapted tightly to engage the anodes and cable encased thereby, being in the form of a tubular net sleeve which is contractible upon application of tension longitudinally thereof. Thus, in that portion of the rope encasing the anodes 30, the woven

rope strands are relatively far apart whereas the rope strands encasing the cable 24 are relatively close together. The flexibility of the rope and the stranding method employed enable such a strand spacing to be achieved. It will be noted that due to the relatively distant spacing of the rope strands encasing the anodes 30 the surface area of the anodes in contact with the water is not materially decreased.

Although any plastic rope possessing the required characteristics will be suitable for the use intended, highly satisfactory results have been obtained through the use of polyethylene and polypropylene.

It will thus be seen that due to the flexibility of the rope 32 as above described and the ability of the same to contract and tightly to contact the surfaces of the anodes, the encasement of the anodes by the stranded rope will have a strong tendency to retain the pieces of the disintegrating anodes as well as to prevent premature separation thereof into such pieces. As previously mentioned, such rope may support the anodes or share such supporting function with the cable, and this may be of considerable benefit when an extra load is imposed thereon due to ice formation in the tank.

An alternative rope arrangement is shown in FIG. 4, the rope 32 encasing only the anodes 30 and not the cables 24, as shown in FIG. 3. In the FIG. 4 form, the anode assembly is preferably suspended by means of the cable 24 and the upper end of the rope is tied to any suitable means (not shown).

In FIG. 5 there is shown a further embodiment of the novel anode casing and support comprising the invention. The anode assembly of FIG. 5 comprises a pair of hollow anode sections 35 which are secured together at their adjacently disposed ends preferably by means of a threaded bolt connection. Rope 32 is encased in strand form around each section with the adjacent rope ends tied together in a knot 36 adjacent the joint of the anode sections 35. An insulated submarine cable 38 is electrically connected to the upper end of the upper anode section 35 for providing current to the anode sections. The upper end of the stranded rope may be tied as shown to the cable 38. In this form the entire anode assembly is suspended by means of the cable 38 in the same manner as described above.

The anode supporting ropes of FIGS. 4 and 5 function similarly to the FIG. 3 form in that they tightly contact the anodes to inhibit premature disintegration and prevent the undesirable dropping of pieces to the bottom of the tank.

It will thus be seen that the present invention provides a novel, highly effective means for eliminating the undesirable dropping of pieces of disintegrated anodes to the tank bottom. The flexibility of the plastic rope anode support enables the same to encase and tightly contact a variety of anode shapes and diameters.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a metal water tank having a plurality of elongated anodes vertically suspended in said tank and disposed on

a common vertical axis, and a source of direct electric current for maintaining a positive charge on said vertically spaced anodes and a negative charge on said tank; stranded flexible plastic rope means encasing said vertically spaced anodes, said plastic rope means being vertically and horizontally extensible and tightly contacting said anodes whereby said rope means serves to inhibit dropping of pieces of such anodes upon disintegration of the latter.

2. The combination of claim 1 wherein said anodes are vertically spaced and separated by an electric cable, said stranded plastic rope encasing both said anodes and said cable.

3. The combination of claim 2 wherein said anodes are partially suspended by said stranded plastic rope and partially suspended by said electric cable.

4. The combination of claim 1 wherein said anodes are vertically spaced and are mounted on an electric submarine cable, and wherein said plastic rope encases only said anodes.

5. The combination of claim 1 wherein said anodes are hollow and directly connected at their opposed ends.

6. In a cathodic protection system including an anode suspended in a body of liquid, a flexible, vertically and horizontally extensible woven plastic net closely fitting and encasing said anode whereby said plastic net serves to inhibit dropping of pieces of such anode upon disintegration of the latter.

7. The system of claim 6, including means for applying tension to said net longitudinally of said anode to contract said net tightly about said anode.

8. In a cathodic protection system for preventing tank corrosion comprising an anode connected to a current source, supporting means for suspending said anode in said tank, a supporting container of vertically extensible and horizontally contractible, electrically non-conductive material around said anode, means separate from said first recited supporting means for suspending said container in said tank tightly contacting said anode, said container being extensively apertured for readily permitting passage therethrough of the liquid within the tank for contact with the surface of the anode, said container being contractibly movable relative to said anode thus actively initially and continually gripping and holding said anode to inhibit dropping of fragments thereof upon progressive disintegration of the latter.

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