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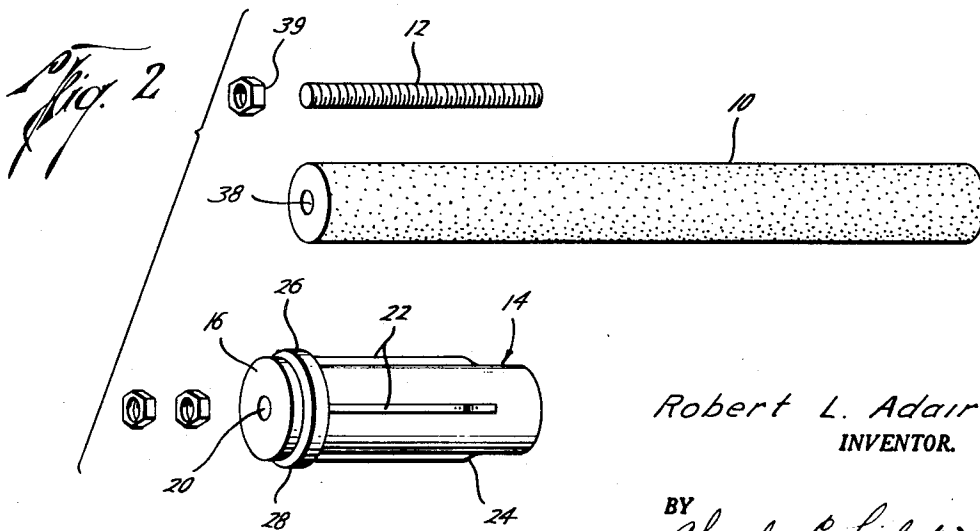
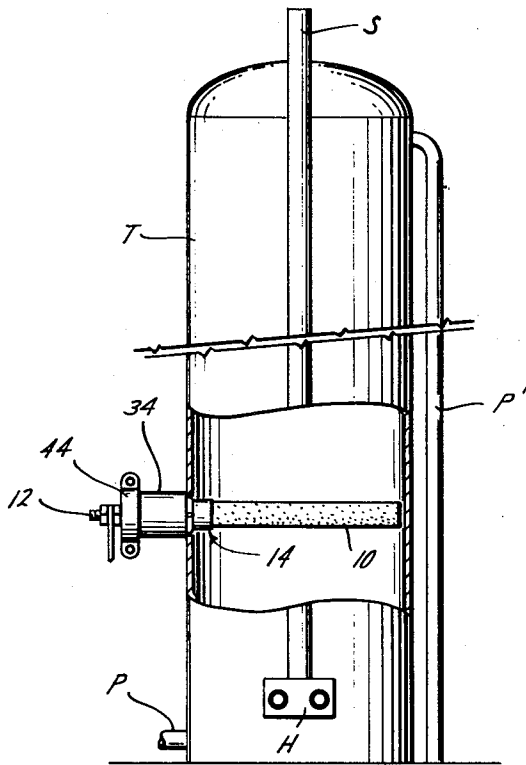
R. L. ADAIR

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ANODE SUPPORTING ASSEMBLY FOR CATHODIC PROTECTION

Filed April 9, 1962

2 Sheets-Sheet 1



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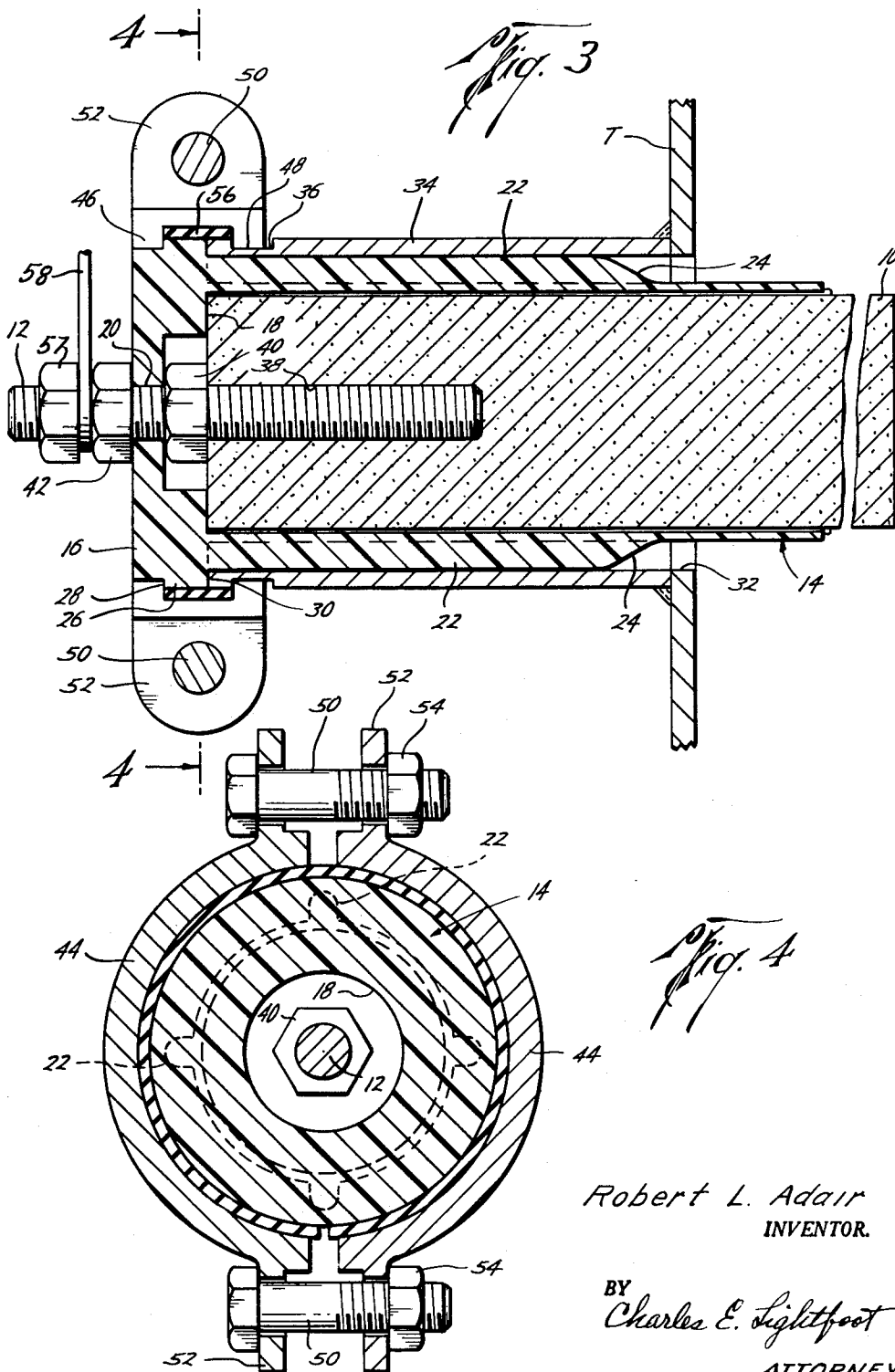
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3,138,549 ANODE SUPPORTING ASSEMBLY FOR CATHODIC PROTECTION

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This invention relates to cathodic protection equipment and more particularly to an anode supporting assembly by which an anode may be supported in a tank or other metallic structure in contact with an electrolyte to protect such a structure against electrolytic action.

In the cathodic protection of metallic structures, and especially in the protection of vessels of iron and steel which are exposed to the action of electrolytes, it is customary to make use of anodes suitably supported in such vessels and which are usually formed of a metal or alloy which is electro positive to the metal of the structure to be protected. When the vessel to be protected is constructed of iron or steel, electrodes for this purpose are frequently formed of magnesium or some suitable alloy, which is electro-positive to iron, or the electrodes are at times formed of graphite or other forms of carbon. Electrodes for this purpose extend into the vessel in contact with the electrolyte therein and are insulated from the metal of the vessel. By so supporting the anode in the vessel and connecting the anode and vessel into a circuit including a source of direct electrical current, the vessel being connected into the circuit as a cathode, wasting away of the metal of the vessel by electrolytic action is prevented.

Cathodic protection by this method frequently requires the use of relatively large anodes, since the anodes are gradually used up in the process, so that provision must be made for securely supporting the anodes in the vessel and for the frequent renewal of the anodes.

The present invention has for an important object the provision of an anode supporting assembly which is of strong and rugged construction, easily assembled, and in which the anode may be easily and quickly replaced.

Another object of the invention is to provide an anode assembly for cathodic protection in which the anode is adequately insulated from the vessel when in operating position therein.

A further object of the invention is the provision of an anode assembly embodying a mounting collar attached externally to a vessel in surrounding relation to an anode opening therein and an anode insertable into the vessel through the collar and opening and including means for guiding the anode into and holding the same in a centered position in the collar.

Another object of the invention is to provide an anode assembly of the kind referred to in which the parts are constructed to guide the anode into and support the same in a centered position in the assembly during the replacement of the anode.

A further object of the invention is the provision of an anode assembly of the type mentioned, which embodies improved seal forming means.

The above and other important objects and advantages of the invention may best be understood from the following detailed description, constituting a specification of the same, when considered in conjunction with the annexed drawings, wherein—

FIGURE 1 is a side elevational view, partly broken away and partly in cross-section, and on a reduced scale, showing the anode assembly of the invention applied to a vessel which is to be cathodically protected;

FIGURE 2 is a perspective view, on a somewhat enlarged scale, showing parts of the anode assembly of the invention in disassembled relation;

FIGURE 3 is a central, longitudinal cross-sectional view, on a greatly enlarged scale, of the anode assembly, showing the same in assembled condition and applied to a vessel which is to be cathodically protected; and

FIGURE 4 is a cross-sectional view, taken along the line 4—4 of FIGURE 3, looking in the direction of the arrows.

Referring now to the drawings in greater detail, the invention is illustrated herein in connection with its use for the cathodic protection of a vessel, such as a heat treater, commonly employed in the treatment of oil from oil wells, and which includes a steel tank, such as that indicated at T having the usual piping connections P and P', one of which may be a supply line from an oil well, or other source of fluid to be treated, while the other is a discharge line. The heat treater is of conventional construction, equipped with the usual heating mechanism generally indicated at H provided with a vent pipe or stack S leading to the atmosphere.

The anode assembly of the invention comprises a body 10 formed of suitable electrode material, such as metallic magnesium, alloys of the same, graphite or other form of carbon, or other electrically conductive material having physical properties requisite for the purpose. The body 10, in the present illustration is of elongated, cylindrical shape and is provided with a screw threaded shaft 12 embedded therein and extending longitudinally centrally of the body and beyond one end thereof. The shaft 12 is of metal and serves as a conductor through which electrical current is supplied to the body of the electrode.

A centering and supporting sleeve 14 is fitted over the end portion of the body 10 from which the conductor 12 extends, which sleeve is formed of dielectric material, such as molded plastic having a thickened end or cap portion 16, forming an internal annular shoulder 18 against which the end of the body may be seated. The end portion 16 also has an internal central recess 18 into which a central opening 20 in this end portion opens.

The sleeve 14 is formed with external protrusions in the form of peripherally spaced, radially outwardly extending, longitudinal ribs 22, which taper inwardly at one end, as shown at 24 and which are integrally connected at their other ends to the cap portion 16. An external, annular projection 26 is provided on the cap portion 16 to provide oppositely facing, external, annular shoulders 28 and 30 for a purpose to be hereinafter explained.

The tank or other vessel T which is to be cathodically protected has an opening 32, about which an outwardly extending tubular fitting 34 is attached at one end, as by means of welding, as best seen in FIGURE 3, which fitting is provided near its outer end with an external annular groove 36.

The externally threaded shaft 12 may be inserted in a central bore 38 in the anode body 10 and secured thereto by cementing, threading, or otherwise, or the shaft may be embedded in the anode body by casting the body on the shaft. An inner nut 40 is screwed onto the shaft 12 against the adjacent end of the body 10. With the shaft and body thus connected together, the interior of the sleeve 14 may be coated with a suitable adhesive, such as an epoxy ether resin containing a curing agent, such adhesive being also allowed to enter the recess 18 and the opening 20, after which the body 10 is inserted in the sleeve to extend the shaft 12 through the opening 20 until the inner end of the body is seated on the shoulder 18.

It will be apparent that as the body is pressed into the sleeve the adhesive will be smoothed out along the adjacent surfaces of the body and sleeve and any excess of the adhesive material will be pushed ahead of the body into the recess 18 and out through the opening 20 to

thoroughly distribute the adhesive and form a strong, durable, fluid tight seal between the body and sleeve.

When the body has been thus attached to the sleeve, a nut 42 is screwed onto the shaft 12 and tightened against the external face of the cap portion 16 about the opening 20 to further secure the sleeve and shaft together.

In applying the anode assembled in this manner to the vessel to be protected, the body 10 and sleeve 14 are inserted through the fitting 34 to extend the anode into the vessel, the external ribs 22 being engageable with the surrounding internal surface of the fitting to guide and center the anode in the fitting and to hold the anode in a substantially concentric position relative to the fitting and prevent tilting of the anode while the same is being secured in place.

The sleeve is extended into the fitting until the outer end of the fitting seats against the external shoulder 30 of the sleeve, whereupon a suitable, generally annular, clamp, formed in two substantially semi-circular parts 44, is applied to the sleeve and fitting in surrounding relation thereto. The clamp is preferably of the type commonly known as a "vitaulic" coupling, in which the parts 44 have radially inwardly projecting flanges 46 and 48 positioned for engagement with the shoulder 30 of the sleeve and with the outermost side wall of the groove 36 of the fitting to securely clamp the sleeve and fitting together. The parts 44 of the clamp are releasably secured together in clamping relation to the sleeve and fitting by bolts 50, passing through perforated external ears 52 on the parts and provided with nuts 54 in the usual manner. The parts 44 are shaped to form an internal annular recess between the flanges 46 and 48 within which an annular seal forming element 56 is disposed in surrounding seal forming contact with the cap portion 16 and the adjacent end portion of the fitting 34 and which will be clamped into such sealing contact when the parts are applied to the sleeve and fitting and clamped thereon. An outer nut 57 is threaded onto the shaft 12 by which a conductor 58 from any suitable source of direct electrical current may be connected to the anode.

It is to be noted that because of the guiding and centering fit of the external ribs or protrusions 22 of the sleeve 14 in the fitting 34, the anode will be securely held in a centered position and prevented from tilting out of such position when the anode has been inserted in the vessel. This construction and arrangement of the assembly is especially important when the anode is relatively long and of large diameter, since it then would be otherwise difficult to hold the anode centered in the opening of the vessel while applying the clamping means by which the anode is held in place.

With the anode thus applied to the vessel, it will be apparent that the sleeve 14 provides adequate electrical insulation for the anode and the parts of the assembly are effectively sealed against leakage.

It will thus be seen that the invention, constructed and assembled as described above provides an anode assembly which is strong and durable, economical in manufacture and which may be easily and quickly removed and replaced.

The invention is disclosed herein in connection with a certain specific embodiment of the same, but it will be understood that this is intended by way of example only, and that various changes can be made in the construction and arrangement of the parts within the spirit of the invention and the scope of the appended claims.

Having thus clearly shown and described the invention, what is claimed as new and desired to secure by Letters Patent is:

1. In an anode supporting assembly the combination with a vessel having an opening in a wall thereof, of a tubular fitting attached to said wall in surrounding relation to and extending outwardly from the opening, an anode in the fitting of smaller diameter than the diameter of and extending through the opening, a tubular sleeve formed of insulating material in the fitting surrounding the anode in sealing relation thereto and having an inner end portion of smaller external diameter than the diameter of and extending through the opening, said sleeve being formed with longitudinally extending external ribs located entirely externally of the vessel in engagement with the surrounding wall of the fitting to hold the sleeve out of contact with said wall at the opening, said sleeve extending outwardly beyond the outer end of the fitting and means clampingly engageable with the fitting and with the sleeve outwardly of the outer end of the fitting to hold the sleeve in the fitting.

2. In an anode supporting assembly the combination with a vessel having an opening in a wall thereof, of a tubular fitting attached to said wall in surrounding relation to and extending outwardly from the opening, an anode in the fitting of smaller diameter than the diameter of and extending through the opening, a tubular sleeve formed of insulating material in the fitting of smaller external diameter than the diameter of and extending through the opening in surrounding relation to the anode, said sleeve being formed with external projections located entirely exteriorly of the vessel in engagement with the surrounding wall of the fitting to hold the sleeve out of contact with the wall at the opening and having an outer end portion positioned in abutment with the outer end of the fitting, and means clampingly engageable with said fitting and said outer end portion to hold the sleeve in the fitting.

3. In an anode supporting assembly the combination with a vessel having an opening in a wall thereof, of a tubular fitting attached to said wall in surrounding, outwardly extending relation to said opening and having an external annular groove near its outer end, an anode in the fitting of smaller diameter than the diameter of and extending through the opening, a tubular sleeve in the fitting of smaller external diameter than the diameter of and extending through the opening surrounding the anode and having external, longitudinally extending ribs located in the fitting entirely exteriorly of the opening in engagement with the inner surface of the fitting to hold the sleeve in radially inwardly spaced relation to the surrounding periphery of the opening, said sleeve having an externally enlarged portion positioned outwardly beyond and in abutment with the outer end of the fitting and means clampingly engageable with the fitting in said groove and with said enlargement to hold the sleeve in the fitting.

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