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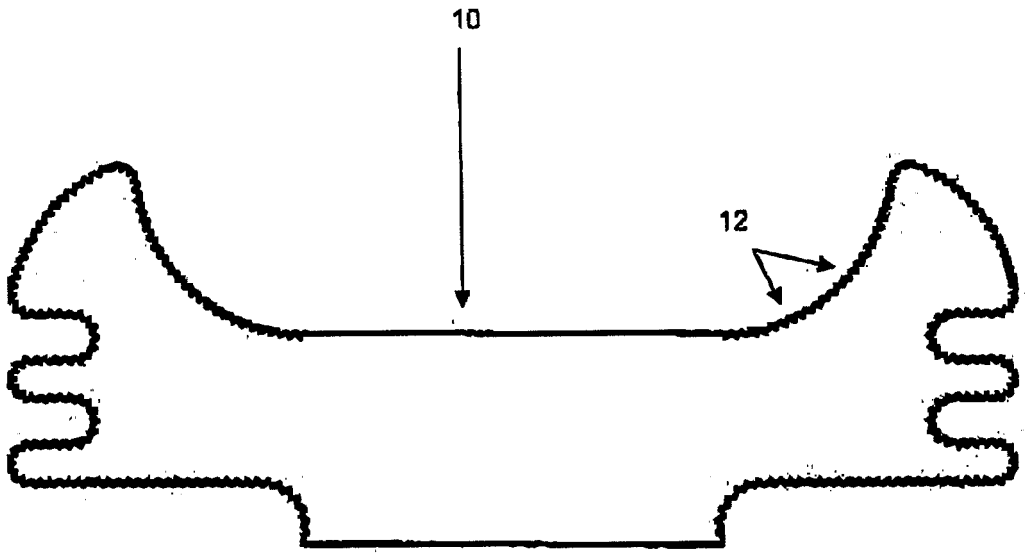
(54) **Alloy for use in galvanic protection**

(57) The invention relates to an aluminium alloy and anode made therefrom containing silicon, iron, copper, manganese, magnesium, chromium, zinc and titanium. The anode is used as a sacrificial anode in water vessels with non-metallic hulls.

FIGURE 1



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Description

FIELD OF THE INVENTION

[0001] The present invention relates to an alloy used in the galvanic protection of non metallic water vessels.

BACKGROUND TO THE INVENTION

[0002] In the marine industry the prevention of corrosion of components, such as metal fasteners, shaft and propeller components, constructed from stainless steel and bronze alloys is a primary concern. In aerated marine environments these materials are susceptible to crevice and pitting corrosion. Sacrificial anodes are commonly employed to provide cathodic protection to these components. Application of these sacrificial anodes on wooden and fibreglass vessels can result in an over protection, which may result in a reduced life of coatings and an enhanced level of marine growth and wood rot.

[0003] The present invention seeks, therefore, among other things, to provide an alloy which overcomes some of the above mentioned disadvantages.

SUMMARY OF THE INVENTION

[0004] An alloy which comprises from 0.30 to 0.6 per cent silicon plus or minus 5 per cent, 0.1 to 0.30 per cent iron plus or minus 5 per cent, 0.10 copper plus or minus 5 per cent, 0.10 per cent manganese plus or minus 5 per cent, 0.35 to 0.6 per cent magnesium plus or minus 5 per cent, 0.05 per cent chromium plus or minus 5 per cent, 0.15 per cent zinc plus or minus 5 per cent, 0.10 per cent titanium plus or minus 5 per cent, 0.05 maximum individual trace metals plus or minus 5 per cent, 0.15 per cent total trace metals plus or minus 5 per cent and the balance aluminium.

BRIEF DESCRIPTION OF THE DRAWING

[0005] In the drawing there is shown Figure 1 which is a schematic side elevation of an anode formed of the alloy of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0006] In a preferred embodiment of the present invention the metallic components of a water vessel with a non-metallic hull are protected by connecting the alloy of the present invention and the metallic components of the water vessel to form an electrochemical cell. This electrochemical cell is created through the electrical connection of an anode formed of the alloy the present invention to a cathode which are the metallic components of a vessel. The cathode and the anode are both located in a bridging medium. The connection of the anode and the cathode in this way allows for the passage of electrons from the anode to the cathode. These electrons are generated through oxidation of species at the anode and reduction of species at the cathode.

[0007] In a galvanic protection system the physical integrity of the anode is sacrificed in order to maintain the physical integrity of the cathode. The physical integrity of the anode is sacrificed through the dissolution of the anode into the bridging medium. The suitability of the anode for galvanic protection is determined by the electrochemical potential of the anode compared to the cathode and the capacity of the anode to protect the cathode.

[0008] The alloy forming the anode has a chemical composition comprising 0.30 to 0.6 per cent silicon plus or minus 5 per cent, 0.1 to 0.30 per cent iron plus or minus 5 per cent, 0.10 copper plus or minus 5 per cent, 0.10 per cent manganese plus or minus 5 per cent, 0.35 to 0.6 per cent magnesium plus or minus 5 per cent, 0.05 per cent chromium plus or minus 5 per cent, 0.15 per cent zinc plus or minus 5 per cent, 0.10 per cent titanium plus or minus 5 per cent, 0.05 maximum individual trace metals plus or minus 5 per cent, 0.15 per cent total trace metals plus or minus 5 per cent with the balance being aluminium.

[0009] The anode formed of the alloy of the present invention has an electrochemical potential more negative than that of the cathode, preferably with an electrochemical potential in the range of -500 to -1200 mV, more preferably with an electrochemical potential in the range of -500 to -1100 mV,

[0010] The capacity of the anode to protect the cathode may be in the range of 1000 to 2000 Ah/kg, preferably in the range of 1400 to 1700 Ah/kg.

[0011] The surface area of the anode 10 shown in Figure 1 is increased through the incorporation of ridges 12 on the surface of the anode. The surface area ratio of the anode to the cathode may be in the range of 1:1 to 1:20, preferably in the range of 1:2 to 1:20.

[0012] The electrical connection provides a passage for the flow of electrons between the cathode and the anode. The electrical connection is preferably a metallic wire, more preferably a copper wire.

[0013] The bridging medium provides a passage for the flow of electrons between the anode and the cathode. The bridging medium is preferably an aqueous solution, more preferably saltwater, particularly sea water.

[0014] By applying an excess negative electrochemical potential applied across the cell the accumulation of excess calcium deposits, wood rot and paint disbondment may be prevented. This excess negative electrochemical potential is applied across the cell due to the differences in the electrochemical potential of the anode and the cathode.

[0015] In an alternative embodiment of the invention, seawater as a bridging medium may be replaced with another suitable aqueous liquid, preferably brackish water or fresh water.

[0016] The anode may be connected to the metallic components of the vessel using known techniques such

as connecting the anode to the shaft gland/ seal and, or shaft support bracket and, or the rudder and, or the trimtabs through a bonding buss bar/ system via bonding wire.

[0017] The anode of the present invention is particularly envisaged for use with water vessels with fibreglass or wooden hulls,

[0018] Modifications or variations as would be apparent to a skilled addressee are deemed to be within the scope of the present invention.

Claims

1. An alloy which comprises from 0.30 to 0.6 per cent silicon plus or minus 5 per cent, 0.1 to 0.30 per cent iron plus or minus 5 per cent, 0.10 copper plus or minus 5 per cent, 0.10 per cent manganese plus or minus 5 per cent, 0.35 to 0.6 per cent magnesium plus or minus 5 per cent, 0.05 per cent chromium plus or minus 5 per cent, 0.15 per cent zinc plus or minus 5 per cent, 0.10 per cent titanium plus or minus 5 per cent, 0.05 maximum individual trace metals plus or minus 5 per cent, 0.15 per cent total trace metals plus or minus 5 per cent and the balance aluminium.

2. An anode formed of an alloy according to claim 1.

3. An anode as according to claim 2, wherein the electrochemical potential of the anode is more negative than that of the cathode.

4. An anode as according to claim 3, wherein the electrochemical potential of the anode is in the range of-500 to -1200 mV.

5. An anode as according to claim 4, wherein the electrochemical potential of the anode is in the range of -500 to -1100 mV,

6. An anode as according to any of the claims 2 to 5, wherein the capacity of the anode to protect the physical integrity of the cathode is in the range of 1000 to 2000 Ah/kg.

7. An alloy as according to claim 6, wherein the capacity of the anode to protect the physical integrity of the cathode is in the range of 1400 to 1700 Ah/kg.

8. An anode as according to any of the claims 2 to 7, for use in the galvanic protection of water vessels with non-metallic hulls.

9. An anode as according to claim 8, wherein the vessel is designed for use in seawater.

10. An anode as according to any of the claims 2 to 9, wherein the surface area ratio of the anode to the cathode in the electrochemical cell is in the range of 1:1 to 1:20.

11. An anode as according to claim 10, wherein the surface area ratio of the anode to the cathode is in the range of 1:2 to 1:20.

12. An anode as according to any of the claims 2 to 11, **characterised in that** an excess negative electrochemical potential is applied across the electrochemical cell.

FIGURE 1