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(54) AN ASSEMBLY OF ANODES FOR USE IN AN ELECTRO-OSMOTIC DAMP PROOFING SYSTEM

(71) I, EVELINE MAY NEWBERY, a British subject of 1 Berrister Place, Raunds, Wellingborough, Northamptonshire, NN9 6JN, do hereby declare the invention for which we pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:–

The invention is concerned with an assembly of anodes for use in an electro-osmotic damp proofing system.

It is known that an interaction of capillary, electrical and osmotic forces is involved where rising damp occurs in a structure and that an electrical potential exists between the structure and the earth. It is also known that it is possible either by "shorting out" this potential by inserting a series of metal rods into the structure and connecting them to an earth or earth rods, or by applying a small voltage, usually positive with respect to earth, to the structure, to inhibit the action of any rising damp.

The use of an electrical current in a building structure has been found to be a highly successful method in the prevention and curing of rising damp. This voltage is usually positive with respect to earth and, therefore, there are certain stringent requirements on the type of material needed. As the material carries a positive voltage it can be conveniently called an anode and the metal rod or rods connected into the ground then may be termed as cathodes.

Anodes in electro damp proofing systems are expected to operate in the presence of an electrolyte having a composition of natural waters contaminated with soluble salts from brick and/or stone work. With stagnant or near stagnant conditions around the anodes acidity will develop due to the decomposition of water even though the surrounding material is basically alkaline.

In practice hydrochloric acid is most likely to be generated. However, there is also a possibility of the formation of sylphuric acid due to some redox reaction with liberated oxygen.

However, irrespective of the type of acid generated the anodic material will be subject to dissolution.

Any electrically conducting material can be used for the anodes. However, in the majority of cases the anode life would be short due to dissolution or anodic depletion. The material which suffers least from depletion in a powered electro-osmotic damp proofing system is platinum. However, the use of platinum is unacceptable due to its extremely high cost. Therefore, the combination of platinum and an inert substrate material has been found to give the ideal material. This can be achieved by coating titanium, which acts as the inert substrate material, with platinum which becomes the active part of the anode.

Platinum titanium anodes are commonly used in powered electro-osmotic damp proofing systems. However, the method by which these anodes are normally interconnected can result in severe inter-joint corrosion and may be considered fragile in a building environment.

The anodes for powered electro-osmotic damp proofing systems usually consist of a few centimetres of platinized titanium of about 3mm in diameter, spaced apart by approximately one metre, although this naturally being dependent on the requirements of the structure to be damp proofed. The anodes are connected together in a harness and are inserted and cemented into the structure that is to be damp-proofed. The platinized titanium anodes are normally interconnected using insulated copper wire, and at each connection point the joint so made is encapsulated with an epoxide or similar material. It is, therefore, obvious that if damage occurs to the connecting wire or if the encapsulation of the joint is faulty, moisture will penetrate into the connecting wire or encapsulated joint and anodic depletion of the connecting wire and/or joint will occur.

The object of the invention is to devise an anode arrangement in which the risk of such depletion is minimized and is of a robust nature in a building environment.

In accordance with this invention, there is provided an assembly of anodes for use in an electro-osmotic damp-proofing system, comprising at least one length of malleable titanium wire, the or each said length having a platinum or platinum-containing coating provided on portions thereof spaced-apart therealong, the or each said length being bent into elongate loops in the region of each coated portion, said loops projecting laterally from, and all to one side of, the respective said length of titanum wire.

Also in accordance with this invention, there is provided a method of making an assembly of anodes for use in an electro-osmotic damp-proofing system, comprising the steps of forming at least one length of malleable titanium wire provided with a platinum or platinum-containing coating on portions thereof spaced-apart therealong, bending the or each said length of wire in the region of each coated portion thereof into an elongated loop so that the loop of coated wire so formed projects laterally from and all to one side of, the respective said length of titanum wire.

Conveniently the platinum or platinum-containing coating may be applied by a plating technique, which for example may be of the kind known as "skip-plating". Alternatively, short pieces of platinized titanium wire may be welded to and between longer pieces of titanium wire to achieve the same result.

Advantageously lengths of malleable titanium wire coated according to the invention may be joined together by electrical spot welding, or by crimping abutting or overlapping end portions of one of more titanium sleeves.

In use within the invention, metallic titanium will suffer virtually no depletion. After initial exposure to the supplied positive potential, the surface of the titanium will quickly oxidise and produce a non-conducting oxide layer. Therefore, if titanium is used, depletion will not occur due to a damaged interconnecting wire.

Titanium is a far tougher metal than copper and will withstand considerably more physical abuse. Hence, it can be considered to be more robust in a building environment. It is however important to be able to bend the titanium wire readily and, therefore, the minimum cross sectional area of titanium wire which is capable of passing sufficient current without substantial voltage drop on an electro-osmotic damp-proofing system must be chosen with care. Coupled with this problem is a physical characteristic of titanium which on the generally available commercial grades, is the lack of malleability, leading to difficulty in bending the titanium around obstacles when fitting an electro-osmotic damp-proofing system. Therefore, only the purest titanium sponge with the lowest possible oxygen content should be used in the manufacture of the wire, such as titanium metal identified as IMI Type 115. This material will give sufficient malleability to allow for sharp bending when fitting an electro-osmotic damp-proofing system.

Bearing in mind the electrical requirements of such a system, the cost of the material and the physical characteristics of titanium, a titanium wire some 2mm in diameter or thereabouts of material IMI Type 115 or similar is preferred.

There follows a detailed description of an anode assembly according to the invention. It will be understood that the description, which is to be read with reference to the drawings accompanying the provisional specification, is given by way of example only, and not by way of limitation.

In the drawings:

Figure 1 shows two fragmentary lengths of titanium wire having platinized portions;

Figure 2 shows the wire of Figure 1 formed into anodes for use;

Figure 3 shows a wall into which a plurality of anodes have been inserted; and

Figures 4 and 5 show two examples of how the wire may be joined.

Figure 1 shows a length 2 of titanium wire, 2mm in diameter which, in the present example, has been skip-plated with platinum at intervals to provide spaced apart coated portions 4. Plating is achieved by winding a number of turns of wire onto a drum in a single layer and merely dipping a narrow longitudinal portion of the drum surface into an electrolytic bath. The distance between the coated portion is determined by the circumference of the drum. It will be appreciated that other methods may be used, for example, short pieces of platinized titanium wire may be welded to and between longer pieces of titanium wire to achieve a similar product.

The wire 2 is shown in Figure 2 in a bent condition to form anodes, indicated at 6, formed by an elongate loop of the wire 2 in the region of each coated portion 4.

Figure 3 diagrammatically illustrates a wall 8 into which a number of anodes 6 have been inserted at 1 metre intervals, the uncoated wire 2 acting as a harness connecting the anodes. It will be understood that the distance between the anode sites will be selected according to requirements, as will the thickness of the platinum coating at 4.

Due to the relatively inert nature, chemically and electrically, of the titanium oxide which forms on the surface of the titanium wire, joining of the wires may present difficulty. Where electric power is available, a satisfactory joint may be formed by electrical spot welding but where this is not possible, mechanical joints may be made in either of the two ways shown in Figures 4 and 5.

In Figure 4, two end portions of wire 2 are pushed into a sleeve 10 of titanium metal of suitable length, in the present example 60mm. The sleeve is then compressed or crimped onto the wire using a suitable crimping tool. The Figure shows two compression points 12 on each end portion of wire, but more may be formed if required.

Whereas the wire ends abut each other in Figure 4, it may be necessary to overlap the wires 2 in certain circumstances. This is shown in Figure 5, where a number of short sleeves 14, each 5mm long, are used. The internal diameter of these sleeves 14 permits access of the wire ends to be joined and each sleeve is individually crimped at 16.

To give added protection any of the joints described above may be covered with a sleeve of plastics material, for example of the shrinkable type in common use.

Preferably the coated portions of the or each length of titanium wire are coated with platinum or a platinum-containing coating around substantially their entire surfaces. Preferably also, each looped portion projects approximately at right angles to the length of titanium wire, with end portions of the looped portion spaced outwardly from the locality of the right-angle bend.

WHAT I CLAIM IS:

1. An assembly of anodes for use in an electro-osmotic damp-proofing system, comprising at least one length of malleable titanium wire, the or each said length having a platinum or platinum-containing coating provided on portions thereof spaced-apart therealong, the or each said length being bent into elongate loops in the region of each coated portion, said loops projecting laterally from, and all to one side of the respective said length of titanium wire.

2. An anode assembly as claimed in claim 1, wherein the coated portions of the or each length of titanium wire are coated with platinum or a platinum-containing coating around substantially their entire surfaces.

3. An anode assembly as claimed in either one of claims 1 and 2 wherein each looped portion of the or each length of titanium wire projects approximately at right angles to the respective said length of wire, end portions of the looped portion being spaced outwardly from the locality of the right-angle bend.

4. An anode assembly as claimed in any one of the preceding claims, comprising a plurality of said lengths of titanium wire joined together by welding or crimping.

5. An anode assembly as claimed in claim 4 wherein joints formed between said lengths of titanium wire are protected by a sleeve of plastics material.

6. A method of making an assembly of andes for use in an electro-osmotic damp-proofing system, comprising the steps of forming at least one length of malleable titanium wire provided with a platinum or platinum-containing coating on portions thereof spaced-apart therealong, bending the or each said length of wire in the region of each coated portion thereof into an elongate loop so that the loop of coated wire so formed projects laterally from, and all to one side of, the respective said length of titanium wire.

7. A method as claimed in claim 6, wherein the platinum or platinum-containing coating is applied by plating.

8. A method as claimed in claim 7, wherein the coating is applied by skip-plating.

9. A method as claimed in claim 6 wherein the or each said length of titanium wire is formed by welding short pieces of coated titanium wire to and between relaively longer lengths of titanium wire.

10. An assembly of anodes for use in an electro-osmotic damp-proofing system constructed substantially as hereinbefore described with reference to and as shown in the drawings accompanying the provisional specification.

11. A method of making an assembly of anodes for use in an electro-osmotic damp-proofing system substantially as hereinbefore described with reference to and as shown in the drawings accompanying the provisional specification.

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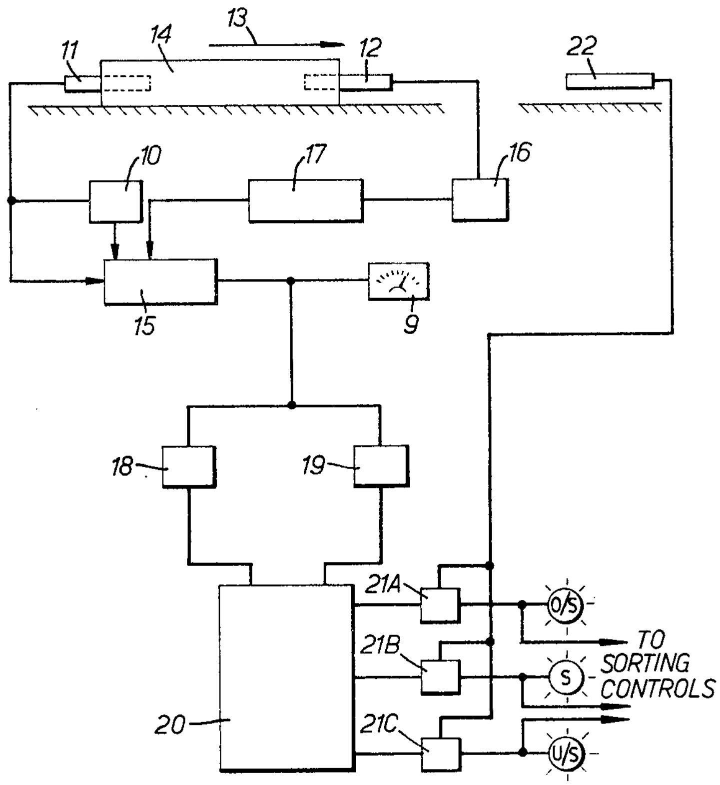
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