

May 7, 1974

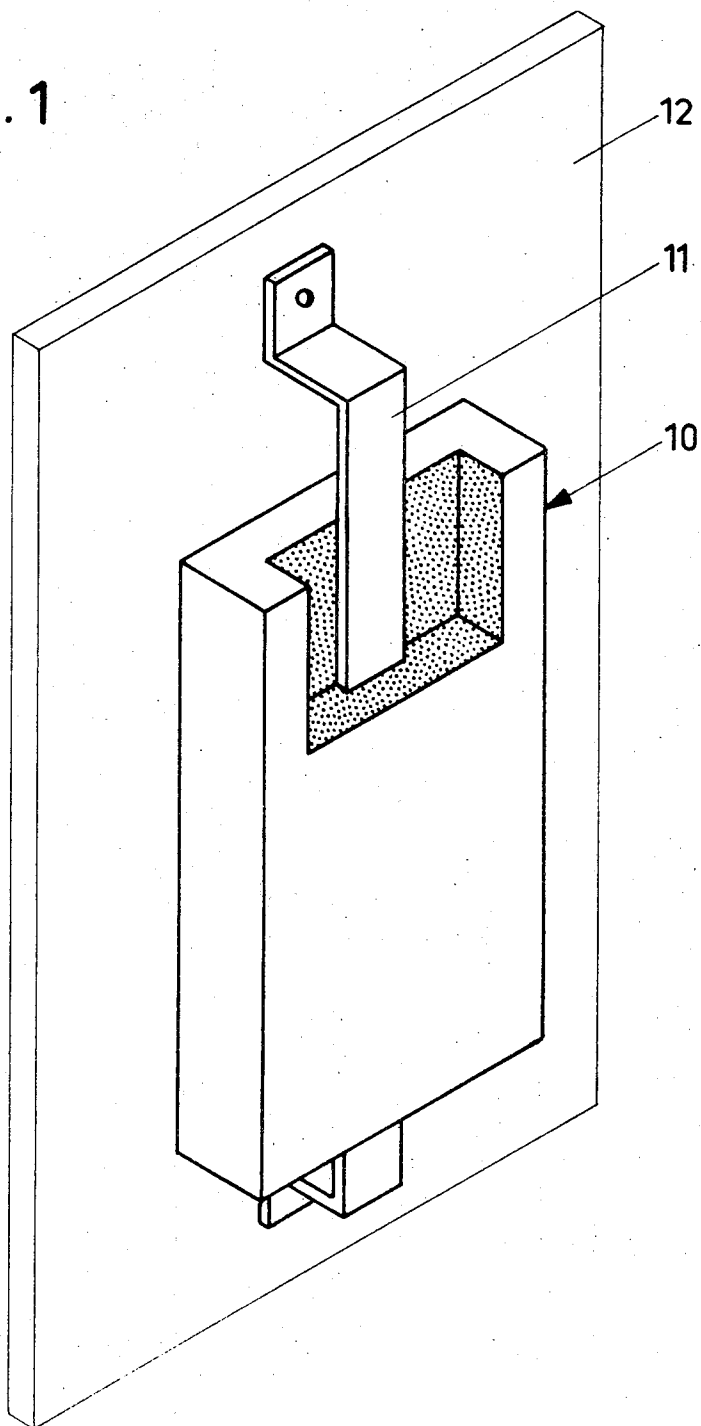
G. JACOB
SACRIFICIAL ANODE

3,809,640

Filed April 26, 1972

2 Sheets-Sheet 1

Fig. 1



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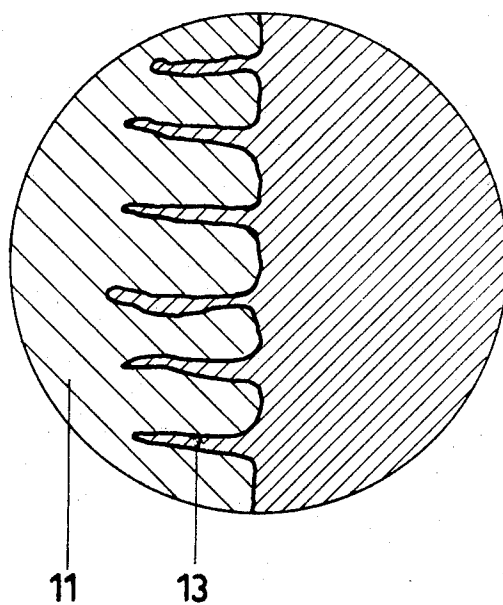
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Filed April 26, 1972

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Fig. 2



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SACRIFICIAL ANODE

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Filed Apr. 26, 1972, Ser. No. 247,860

Claims priority, application Switzerland, Apr. 27, 1971, 6,141/71

Int. Cl. C23f 13/00

U.S. Cl. 204—197

1 Claim

ABSTRACT OF THE DISCLOSURE

The invention concerns a sacrificial anode, consisting of a finely porous aluminium casting as an anode and an anode carrier of steel attached thereto whereby between the anode carrier and the casting is provided a diffusion zone of anode or similar material in order to maintain a constant internal resistance of said structure during its operational life.

The invention relates to sacrificial anodes and the fixing thereof to anode carriers.

Sacrificial anodes are known consisting of a body cast from aluminum or alloys thereof, with anode carriers consisting of steel cast into the body. Such anodes are used for production of a corrosion-resisting coating on an object cathodically connected to the sacrificial anode, when the body and the object are received in an electrolyte.

Constructions of this kind initially fulfill their intended purpose satisfactorily. It has however appeared that during a prolonged period of operation the protective action of the anode slackens. The reduction of protective action depends on a progressively declining electron current flowing from the anode through the anode carrier to the cathodically connected object. This arises from the increasing internal resistance of the anode with increasing period of operation and from the progressively deteriorated repulsion of the oxidation products.

It is present practice to cast the anode carriers into the sacrificial anode. During this the cast body shrinks onto the carriers, but no diffusion connection is produced by means of the shrinking. In the course of the period of operation, liquid, for example electrolyte in the form of seawater or, with oil-water ballast tanks which are to be cathodically protected, crude oil, enters into splits or hair cracks, which have been formed between the cast body and anode carriers during their union. By the operation of the electrolyte on the anode material, a hydroxide layer is formed from the latter, which significantly increases the transfer resistance. An increase of the transfer resistance arises further through oil entering into the crack.

Against this the invention provides a remedy. According to this invention a sacrificial anode consists of a finely porous cast body of aluminum or an alloy thereof, and an anode carrier of steel connected with the cast body by a

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diffusion zone. The invention also includes anodes in which instead of aluminum the cast body is of finely porous magnesium, zinc or alloys thereof.

A build-up of potential without delay is achieved by the finely porous cast structure. The diffusion zone provides an internal split-free connection of the anode and anode carriers, whereby the formation of hydroxide layers with or without mixtures of oil is avoided. Sacrificial anodes constructed according to the invention do not show the ageing phenomena of the known constructions which are characterized by falling output of cathodic current.

The invention will be explained in more detail with reference to the accompanying drawings. In these drawings:

FIG. 1 is a perspective view of a sacrificial anode with cast-in anode carriers; and

FIG. 2 is a detail of FIG. 1.

FIG. 1 shows a sacrificial anode 10 which is fastened by means of anode carriers 11 to an object to be cathodically protected, for example a wall part 12 of an oil-water ballast tank, as used on tank ships. The sacrificial anode 10 consists of a finely porous casting, whereby "finely porous" such a size of opening of the pores is to be understood, that, by the effect of the capillary forces on the water brought into being by the pores, entry of the oil into the latter is hindered.

FIG. 2 shows as a detail the connection of the sacrificial anode 10 with the anode carrier 11. It is of significance for the invention that between the anode carrier 11 constructed of steel and the sacrificial anode 10 there exists a diffusion zone 13, i.e. a zone consisting of aluminum introduced into the surface of the anode carrier 11. It is suitable to provide the anode carrier 11 with an aluminum layer, which is connected by means of a diffusion zone 13 with the anode carrier 11. If the anode carrier 11 is wetted by the liquid anode material then the anode material and the anode carrier layer unite into an internal connection free of splits and hair cracks.

What is claimed is:

1. A sacrificial anode consisting of
 - a cast body wherein said cast body is composed of a member of the group consisting of aluminum, magnesium, zinc or alloys thereof, said cast body being finely porous with pores of such fineness that by capillary action water may enter into the pores, but the entry of oil will be restrained;
 - an anode carrier composed of steel; and
 - a diffusion zone formed between said cast anode body and said steel carrier, fusing said carrier to said cast anode body.

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