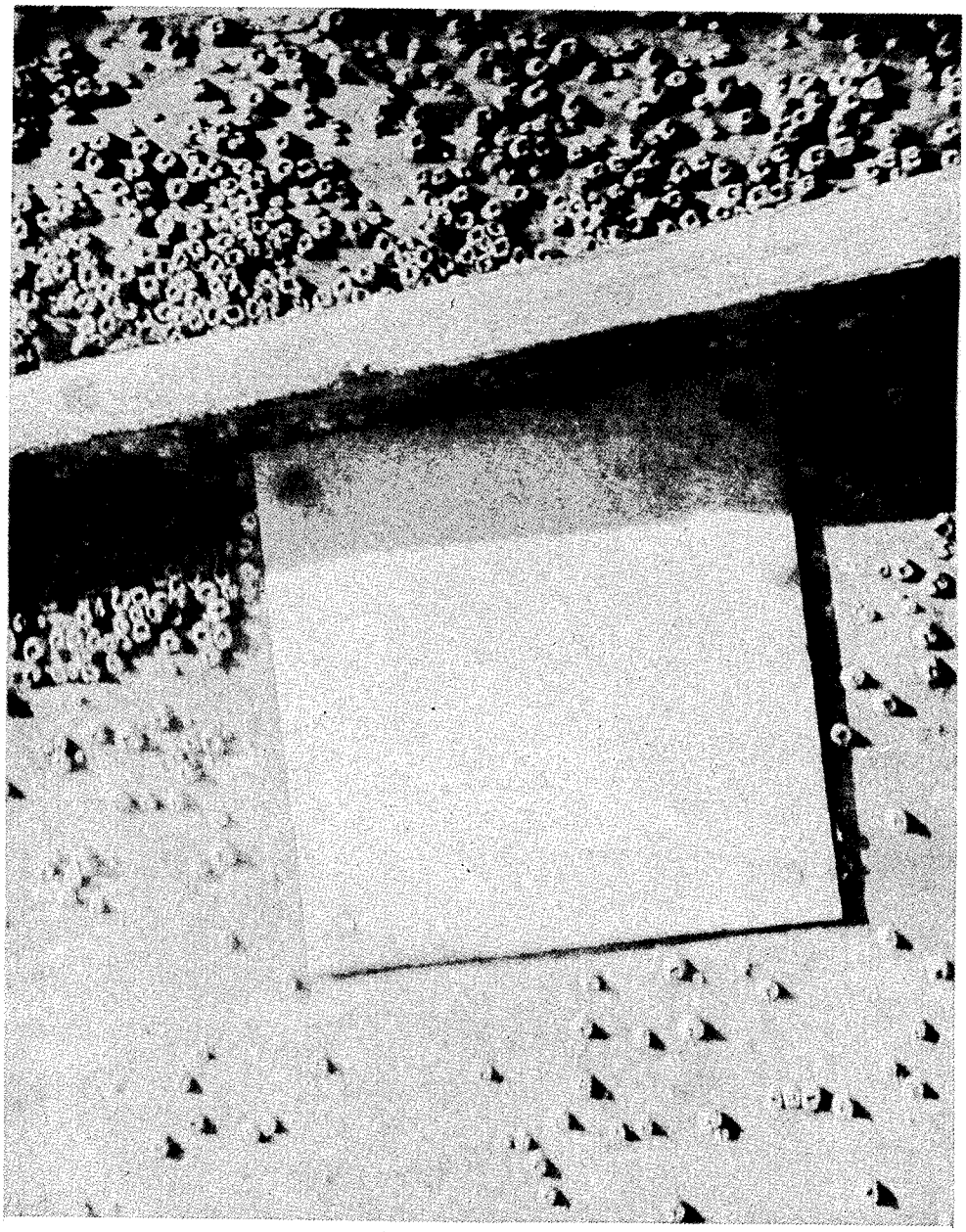
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METHOD FOR PREVENTING ADHESION
AND GROWTH OF BARNACLES
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# METHOD FOR PREVENTING ADHESION AND GROWTH OF BARNACLES

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1 Claim. (Cl. 21—2)

This invention relates to inhibiting the growth of barnacles on marine structures.

Heretofore it has been known that polytetrafluoroethylene adheres very poorly, or not at all, to other surfaces. Coating compositions containing polytetrafluoroethylene in colloidal form have, however, been developed, and these coating compositions adhere well to various surfaces. For example, such coating compositions have been applied to marine structures with excellent protective effects. However, it has been observed that the coatings thus produced do not suppress adherence and growth of barnacles on the structures thus coated. Experiments performed at the Mare Island Naval Shipyard, Vallejo, California (reported in Department of Navy, Bureau of Ships publication entitled "Protective Coatings for Shipbottoms," NS–061–002, August 15, 1955) led to the conclusion that polytetrafluoroethylene coatings (applied in the form of dispersions) exhibited no antifouling (antibarnacle) property. Marine growth accumulated rapidly and abundantly on the surface thus treated, just as it did on other non-toxic surfaces such as glass, wood, mild steel, and porcelain.

The present invention is based upon the discovery that, in sharp contrasts with the results heretofore reported, suppression of barnacle growth does occur if the polytetrafluoroethylene is applied to the surface in the form of a substantially impervious sheet or film, as distinguished from a coating obtained by applying a polytetrafluoroethylene dispersion or other coating composition containing colloidal polytetrafluoroethylene (Ikeda, U. S. P. 2,592,147, issued April 2, 1952, and Berry U. S. P. 2,478,229, issued August 9, 1949).

Polytetrafluoroethylene sheets which are substantially impervious to fluids can be made by methods now well known in the art (Llewellyn, U. S. P. 2,586,357), issued February 19, 1952. They can be obtained in any desired thickness. In specific embodiments, the sheets are relatively thicker than ordinary coatings, and suitably have a thickness of about 2 to 60 mils.

Ships having hulls clad with polytetrafluoroethylene sheets have numerous incidental advantages, apart from freedom from barnacle growth. The friction between such polytetrafluoroethylene-clad surface and water is at a low minimum, and such surfaces are relatively age-resistant.

In preparing the structures used in the practice of the present invention, any method for bonding the polytetrafluoroethylene to the base surface may be employed. An outstanding method for producing adhesion of polytetrafluoroethylene is that described in Chemical Week, 78, 90, February 11, 1956.



The invention is illustrated further by means of the following examples.

*Example 1*

A smooth polytetrafluoroethylene impermeable sheet (60 mils thick) was attached to a steel plate which was nailed to the bottom of a boat, and the resulting structure, which was initially clean, was maintained for six weeks under barnacle-growth conditions near other bottom surfaces in the Sassafras River in Maryland. Barnacle growth was rapid on the rest of the boat bottom and on the other surfaces, but there was a complete absence of such growth on the polytetrafluoroethylene surface. The drawing attached hereto is based on a photograph of the boat bottom after the test was completed.

*Example 2*

A sheet of impermeable polytetrafluoroethylene, 10 mils thick, was cemented to the bottom of a wooden boat by means of the above-mentioned process, namely by roughening both surfaces of the sheet with a sodium-ammonia solution, followed by adhesively bonding the sheet to the boat bottom by means of a commercial epoxy resin adhesive. The adhesive bond was cured by overlaying the polytetrafluoroethylene sheet with an aluminum foil and applying a hot iron to the aluminum overlay. The latter was then removed. One half of the exposed cementable surface was subjected to abrasion to remove the cementable skin produced by the sodium-ammonia. The other half of the exposed cementable surface was not subjected to abrasion. The resulting structure was maintained for four months under barnacle-growth conditions. Barnacle growth was prolific on the surface outside of the patch and along the edges of the patch. Within the patch itself, growth was only about one-tenth as dense as on the unabraded cementable half, and about one-thirtieth as great on the half from which the cementable skin had been removed by abrasion.

These examples are illustrative only, and it is to be understood that numerous other illustrations could be given without departing from the spirit and scope of the invention. Example 2 is of special interest in that it shows that when the exposed surface had been rendered cementable, it did not completely protect against barnacle growth (cf. the complete protection provided in Example 1), and that the surface from which the cementable coating had been removed by abrasion also did not completely protect against growth, although in each instance growth was considerably inhibited. Smoothness of exterior surface, coupled with absence of cementability, are therefore helpful, but in any event the most critical feature from the standpoint of operability of the invention, is the use of a preformed impermeable sheet, as distinguished from coatings formed by applying coating compositions.

What is claimed is the following:

The method which comprises protecting against barnacle-forming conditions a marine structure by cladding same with polytetrafluoroethylene in pre-formed impermeable sheet form, said sheet having a smooth exterior surface and having a thickness of 2 to 60 mils, whereby adherence of barnacle growth to the thus clad marine structure is inhibited.

No references cited.