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NONSEIZING ARTICLE OF ALUMINUM AND METHOD OF PRODUCING THE SAME

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Fig. 1

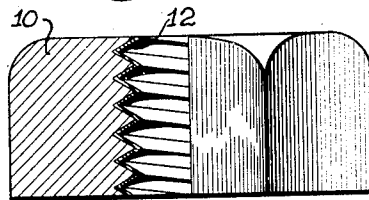


Fig. 2

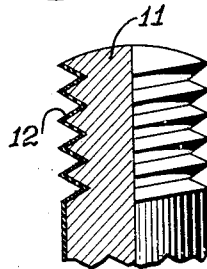
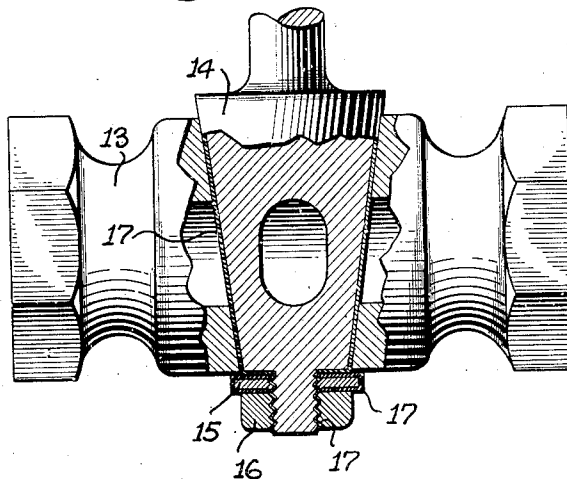


Fig. 3



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UNITED STATES PATENT OFFICE.

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NONSEIZING ARTICLE OF ALUMINUM AND METHOD OF PRODUCING THE SAME.

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As is well known, the use of two relatively movable parts composed of aluminum has not, in general, been practicable when the two parts are in contact under pressure, because of the fact that the aluminum contacting or bearing surfaces "seize" each other and thereby prevent subsequent movement. For example, if an aluminum or aluminum alloy nut is set up firmly on a bolt of similar metal the two seize and as a result neither can be removed from the other without damage. Similarly, aluminum valves cannot be used successfully with aluminum seats. In short, this tendency to seize or stick has prevented the use of aluminum and aluminum alloys in many situations where other characteristics of such metal would make the same highly advantageous.

I have accordingly been led to devise my present invention, which has for its chief object to provide a simple and effective way of preventing seizure of aluminum parts, and to this and other ends the invention consists in the novel features hereinafter described.

The invention is based on the discovery that oxidation of one or both of the aluminum bearing or contacting surfaces, thereby covering such surface or surfaces with a dense adherent coating comprising or containing aluminum in an oxidized form, will prevent the contacting surfaces from seizing. This coating may be applied in any convenient and suitable manner, as for example, by treatment with a suitable alkali.

The alkali treatment may be carried out by a simple immersion process, which gives excellent results, particularly in the case of alloys of aluminum, as for example, aluminum-silicon or aluminum-copper alloys. In carrying out my invention by this method the object is immersed in a solution of ammonia, preferably hot and containing about 1 part of concentrated aqua ammonia to 9 parts of water by volume. The temperature is preferably maintained between 50° C. and 100° C. for most rapid action; in which case it may require ½ to 1 hour or even longer. If the same solution is used cold a satisfactory coating may be secured after an immersion of 12 hours or more. The hot solution appears, however, to give the better

coating on substantially pure aluminum, although it is frequently more satisfactory in many ways to use the cold solution with aluminum alloys.

Aluminum bolts and nuts with the threads of one or the other or both coated with aluminum oxid by either of the above methods could not be forced to seize even though lock nuts were used and set up to the limit of the strength of the material.

The invention is not confined to bolts, nuts, and stop-cocks, but may be employed with advantage wherever aluminum parts movable in contact with each other are used, and hence it is only as specific examples that the devices named are illustrated in the accompanying drawings, in which

Fig. 1 shows partly in section a nut, and Fig. 2 a bolt, having their threads covered with a coating comprising aluminum oxid;

Fig. 3 is a side view, partly in section, of a stop-cock of the common type, having a tapered plug covered with a coating comprising aluminum oxid.

In Figs. 1 and 2, the nut 10 and the bolt 11 are made of aluminum or aluminum alloy, but their threads are coated with a hard, dense, adherent coating of aluminum in oxidized form which is capable of preventing seizure. If the bolt and nut shown are to be used together only one need have the non-seizing coating. In Fig. 3, the valve body, 13, the plug 14, washer 15, and nut 16, are all made of aluminum or aluminum alloy but the plug and washer have non-seizing coatings 17.

The non-seizing layer may suffer wear in time, but in some cases at least I have observed that the wear may be so extensive as to leave large areas bare without developing any sensible tendency to seize.

In the appended claims the word aluminum is used in a generic sense, to include aluminum alloys. By "bearing" surfaces I mean any surfaces in contact with each other, whether plane or curved.

I am aware that it has been proposed to oxidize the surface of electrical conductors of aluminum in the form of wires and the like, for the purpose of insulating the same when wound in a coil, but such wires or bands never have any relative movement

when so wound and so far as I am aware unoxidized wires or bands have never been known to "seize" when coiled with their turns in contact with each other. My invention relates to rigid articles or parts and makes relatively sliding or rubbing motion thereof easy even after they have been firmly pressed together for long periods of time.

It is to be understood that the invention is not limited to the features herein specifically illustrated and described but can be carried out in other ways without departing from its spirit.

I claim—

1. A rigid article of aluminum having a bearing surface comprising aluminum in an oxidized form, adapted to prevent seizure

when the article is used with its bearing surface in contact with aluminum.

2. A rigid article of aluminum having a bearing surface provided with a dense, adherent coating comprising aluminum in an oxidized form adapted to prevent seizure when the article is used with its bearing surface in contact with aluminum.

3. A device having rigid parts made of aluminum in contact with each other, of which at least one of the contacting surfaces is provided with a dense, adherent coating comprising aluminum in oxidized form, capable of preventing seizure of such surfaces.

In testimony whereof I hereto affix my signature.

CYRIL S. TAYLOR.