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BEARING ALLOY

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The invention relates to alloys of the type in which aluminum constitutes the major constituent and is more especially concerned with alloys having properties rendering the alloy suitable for use in bearings.

Aluminum and most of the alloys having a high aluminum content are not at all suitable for use in bearings for machine parts of iron or steel for the reason that aluminum tends to adhere to or combine with the ferrous metal, thereby causing scoring or seizing. I have found, however, that by a suitable combination of alloying constituents this difficulty may be overcome and an alloy produced having not only high antifriction properties but other properties especially desirable in a bearing metal.

This novel bearing alloy comprises chiefly aluminum but with the addition of silicon preferably within the approximate range of 2–10% by weight of the completed alloy and a relatively small addition of cadmium.

It has been generally recognized that the addition of cadmium to aluminum causes brittleness (Patent 1,785,774 Hybinette). In the presence of silicon, however, I find that cadmium may be present in amounts up to about 5% without causing brittleness. In fact, the resulting alloy is remarkably resistant to disintegration under impact or "pounding" such as occurs in severe bearing service. For most desirable antifriction properties the cadmium content should be within the approximate range of 1½-5%.

Very satisfactory results have been obtained with an alloy containing constituents by weight as follows:

	Percent
Silicon	4
Cadmium	4
Remainder	Substantially aluminum

This alloy has shown under test excellent antifriction properties so that it did not score or gall in contact with a steel shaft and neither the bearing nor the shaft showed any appreciable wear after long and severe use. The resistance to cracking or crumbling was also extraordinary.

In order to obtain the high degree of resistance to pounding such as is encountered in a bearing, it is desirable that the alloy have a physical structure typified by absence of continuous networks of metallic elements. The desired structure may be obtained by casting the alloy from a higher temperature than the melting point. For example, I may fuse the constituents at approximately 1200° F., then raise the temperature to approximately 1400° F. or slightly higher and then cast. The casting may be advantageously carried out in metal molds. The suitable temperature for casting may be readily determined by the fact that the cadmium just begins to vaporize or "smoke" at that point and it is obviously desirable, in order to avoid loss of cadmium, not to raise the temperature higher. The alloy may either be cast in the desired form for use in bearings or it may be cast in ingots, rolled down to strip or sheet material of the desired thickness and bearing liners or other bearing elements formed from the rolled stock.

Cast articles in which the structure shows a considerable continuous network of segregated metal compounds may be improved as to fatigue resistance by suitable heat treatment. For example, I have found effective a heat treatment at 950° F. for a period of seventeen hours.

The specific gravity of the alloy is about one-third that of a tin-bronze bearing alloy, and its much greater resistance to fatigue or to cracking under the pounding action of bearings, such as connecting rod bearings, renders it particularly suitable for use under extreme conditions, especially in view of the remarkable absence of wear, either of the bearing or the shaft, exhibited in bearings made of the alloy. In addition, the alloy appears to be highly resistant to corrosion by acid constituents of lubricating oils which attack some other bearing metal compositions.

I claim:

1. A bearing formed of an alloy capable of being rolled into sheet form from cast ingots and having high antifriction properties and fatigue resistance, said alloy consisting of aluminum 85–96½%, silicon not over approximately 10%, and cadmium not over approximately 5%.

2. A bearing formed of an alloy comprising silicon and cadmium together amounting to not over approximately 15% and the remainder substantially aluminum, the physical structure of the alloy characterized by a discontinuous network of segregated metallic elements.

3. A bearing formed of an alloy principally aluminum and containing lesser amounts of cadmium and silicon, said alloy characterized by high antifriction qualities and fatigue resistance and having a physical structure free from continuous networks of segregated metallic constituents.

4. The process of making a bearing comprising fusing a material composed of silicon 2–10%, cadmium 1½-5% and the remainder substantially aluminum, raising the temperature of the fused

mass to approximately 1400° F. and then casting into the form of a bearing.

5. A bearing characterized by high anti-friction properties and high resistance to disintegration under impact and to attack by acids developed in lubricating oils, said bearing formed of an alloy consisting of silicon 2–10%, cadmium 1½-5%, and the remainder substantially aluminum.

6. A bearing adapted for severe service, as in connecting rod bearings for engines, said bearing consisting substantially of aluminum 92%, silicon 4% and cadmium 4%, and characterized by high antifriction properties, high resistance to disintegration under impact and to attack by acids developed in lubricating oils.

7. A bearing characterized by high anti-friction properties and high resistance to disintegration under impact and to attack by acids developed in lubricating oils, said bearing consisting essentially of silicon 2–10%, cadmium 1½–5%, and the balance aluminum and having the physical structure resulting from casting at a temperature higher than the melting point but not above approximately 1400° F., and subsequent heat treatment at approximately 950° F. for a period of approximately seventeen hours.

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