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ALLOY BEARING

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1 Claim. (Cl. 148—6)

This invention relates to hard metal alloy bearings and more particularly to a method of treating hard metal alloy bearings to render the same resistant to corrosion by lubricating oils which in service normally tend to corrode hard metal alloys.

My invention has particular application to hard metal alloy bearings of the type now extensively used in internal combustion engines. In order to obtain increased acceleration and increased speed in automobiles provided with present internal combustion engines it has become necessary to increase both the thermal and mechanical stresses of the engine. In many cases this increase in the thermal and mechanical stresses has reached a point where the soft low melting alloys such as Babbitt metal are no longer sufficiently durable for bearing duty under such conditions. To overcome this, hard metal alloy bearings such as copper-lead alloys, cadmium-silver alloys, cadmium-nickel alloys, and the like have to a large extent replaced the Babbitt metal bearings. While mechanically these hard metal alloy bearings have been satisfactory, their use has created corrosion problems, particularly in connection with highly refined lubricating oils, some of which may be very corrosive to bearings of the hard metal type. Corrosion may also be caused by products formed from lubricating oils by oxidation and other changes during service and even to some extent may be caused by fuel oxidation and decomposition products which become dissolved or suspended in the lubricating oil.

Although the hard metal alloy bearings are susceptible to corrosion in general, the corrosion problem is more serious when highly refined lubricating oils are used. By "highly refined" lubricating oils I mean viscous lubricating oils which have a viscosity in the range of S. A. E. No. 10 oils and higher, and which have been subjected to such refining processes that the paraffinicity of the oil is markedly increased. It has been found that these highly refined lubricating oils cause corrosion to alloy bearings of the cadmium-silver type to the extent of about 5 mg./sq. cm. and even greater when such bearings are submerged for about 25 hours or less in an air agitated oil which has been preoxidized at about 341° F. for 25 to 50 hours.

It is the primary object of the present invention to provide hard metal alloy bearings which are resistant to corrosion generally and more specifically which are resistant to corrosion by mineral lubricating oils. I have discovered that this object can be attained by depositing on such hard metal alloy bearings a protective film of a phosphate of one of the metals of the alloy. This may be done by immersing the hard metal alloy bearing into a dilute solution of phosphoric acid containing an oxidizing agent such as manganese dioxide. It is important that the solution of acid used be diluted to prevent too rapid action on the metal. For most purposes a one-half to one per cent solution of phosphoric acid is to be preferred, but weaker or stronger acids may be employed if the time of contact is correspondingly increased or decreased.

Illustrative of my invention but not a limitation thereof the following example is descriptive of a preferred method of treating hard metal alloy bearings: Cadmium-silver alloy bearings, thoroughly cleaned, are immersed in a 0.75% solution (by volume) of phosphoric acid containing about one ounce of manganese dioxide per gallon of solution. During the period of immersion the solution should be heated to and maintained at a temperature of about 200° F., and the bearings kept immersed until they have received the desired cadmium phosphate coating. Generally speaking, the bearings should be immersed until substantially no more hydrogen is evolved from the solution. The bearing is then removed from the solution, washed with water, and dried.

When other alloys are employed the phosphate of the principal metal will be deposited. For example, when using copper-lead alloy bearings a coating of copper phosphate will be deposited.

Although I prefer to coat the bearings with a layer of phosphate substantially equally as good results are obtained when a coating of a borate is deposited upon the bearings. This may be done by immersing the bearings in a 1% to 5% solution of boric acid or borax to which has been added a small amount of manganese dioxide until the desired borate coating is obtained.

Instead of depositing a coating of an alloy metal phosphate on the hard metal alloy bearings I may deposit a coating of iron phosphate on the bearing. This may be accomplished by immersing the hard metal alloy bearing in a weak solution of phosphoric acid to which are added small amounts of powdered iron or iron filings and a small quantity of manganese dioxide. Alternatively, the hard metal alloy bearings may be treated in the manner described in U. S. Patents Nos. 1,719,463 and 1,719,464.

Hard metal alloy bearings such as cadmium-silver, cadmium-nickel, copper-lead bearings when coated with a phosphate or a borate are

highly resistant to corrosion by lubricating oils and particularly highly refined lubricating oils, and may be used in high speed internal combustion engines lubricated with such oils without resulting in bearing failure.

I claim:

A corrosion-resistant cadmium-silver alloy bearing having a coating of iron phosphate thereon, said coating having been produced in situ by immersing said cadmium-silver alloy bearing in a dilute phosphoric acid solution containing elemental iron and a small amount of manganese dioxide.

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