UNITED STATES PATENT OFFICE.

FREDERIC W. MOFFETT, OF BLOOMFIELD, NEW JERSEY, ASSIGNOR OF ONE-HALF TO HOWARD M. THOMAS, OF BLOOMFIELD, NEW JERSEY.

ANTIFRICTION-BEARING METAL.

No. 803,920. Specification of Letters Patent. Patented Nov. 7, 1905.

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To all whom it may concern:

Be it known that I, FREDERIC W. MOFFETT, a citizen of the United States, residing at Bloomfield, county of Essex, State of New Jersey, have invented and discovered certain new and useful Improvements in Antifriction-Bearing Metals, of which the following is a full, clear, and concise description.

The invention relates to the production of an antifriction-bearing metal for general use which combines the desirable features of the so-called high-grade "Babbitt" metals and bronzes in the respect of their strength and durability with the advantages of comparatively low fusion and increased antifriction qualities, the object of the invention being the production of an alloy of this character which is easy of manufacture and cheap of cost.

The new alloy is prepared as follows: A quantity of lead is melted in a suitable receptacle, and the metal magnesium is added thereto in amounts constituting from one-half of one per cent. to five per cent. of the whole. I prefer to introduce the magnesium directly into the melted lead, keeping both metals excluded from the oxygen of the air by means of an efficient heavy flux—such, for example, as fluor-spar—the magnesium being quickly plunged through the flux into the molten lead, and I then raise the lead to the melting-point of the magnesium or to a point at which the two metals will coalesce, which coalescence will be hastened by vigorously stirring or agitating the lead at the time of introduction of the magnesium. When the two metals have thus coalesced or alloyed, the molten product is poured into suitable molds or other receptacles and when cooled is ready for shipment or use.

The proportions of magnesium may vary within the limits above given to adapt the alloy for certain particular uses. As a matter of fact the lead is capable of absorbing more than five per cent. of magnesium; but with proportions of over five per cent. the product alloy is apt to be crumbly, brittle, and generally unserviceable for practical purposes. An alloy of two per cent. of magnesium is quite hard and excellently adapted for certain uses requiring greater elasticity or strength; but for journal-bearings in general, whether the requirements be for heavy loads or high speeds indifferently, I have discovered that from one to one and one-half per cent. of magnesium is most satisfactory, and I prefer to use 1.25 per cent. magnesium to 98.75 per cent. of lead. In physical properties the product alloy will be found to resemble lead in appearance; but save for the fact that it retains the slippery quality of the lead substantially unimpaired it is otherwise remarkably different, being harder, of higher melting-point, and it has sufficient elasticity to give an appreciable metallic ring.

It is a matter of general knowledge that the melting-point of a bearing metal most conveniently should be less than such temperature as would require a special crucible to melt it or as would injure the casting of a journal-seat if poured into it, but yet not be so low as to be likely to be fused or at all softened by the frictional heat of a journal-bearing. Within rough limits the melting-point should be above 500° and below 750° Fahrenheit approximately, and a practical medium is any degree approaching the higher of these extremes. The bearing metal of this invention having the proportions which I have stated as being preferred for general purposes melts approximately at 660° Fahrenheit, and at this temperature or such higher temperature as is required to keep the alloy molten it may be poured into cast-iron journal-seats with perfect safety to the latter and it may be melted in any ordinary manner. I have observed that a greater proportion of magnesium increases the melting-point, and vice versa. The new alloy is noticeably tough and strong as compared even with the alloys of higher melting-points hitherto produced, and its coefficient of expansion is as low, if not lower, than any of the bearing metals which can be satisfactorily poured into journal-seats. This fact is of special importance in that it obviates the necessity of the usual "second pouring" which occurs where shrinkage of the metal upon cooling leaves cracks which must be refilled with molten alloy. Furthermore, the improved alloy is capable of repeated remeltings without becoming brittle or deteriorating, and the necessary loss by oxidation is no geater than in any other metal of equal melting-point.

I am fully aware that heretofore the properties of magnesium when used with other metals or compositions of metals have been investigated to some extent, and I am also aware

that magnesium has been used in various preparations for preventing blow-holes in cobalt, nickel, &c., and also as a tempering agent for aluminium and certain compositions of metals; but I consider myself to be the first to have discovered and produced an antifriction alloy of the said metal containing a percentage of ninety per cent. or over of lead, thereby securing a bearing metal embodying not only the special advantages of low fusion and hardness, as stated, but also the maximum of antifriction qualities, which latter occurs by reason of the presence of lead in larger proportions than has hitherto to my knowledge been employed.

While the essentials of my invention consist, as above described, in combining lead with magnesium in the above proportions, yet it may be considered by some persons to be desirable to introduce certain other metals. This, however, will manifestly result in a reduction of the percentage of lead, (98.75 per cent. in the preferred form,) and therefore a consequent reduction of antifriction qualities, inasmuch as lead is the best metal now known for this purpose. The efficiency of the alloy as a bearing metal for general purposes will not be improved by the addition of other metals, and it would be impaired by the addition, even in small amounts, of antimony, bismuth, or other hardening ingredients, which in anything except minute proportions are known to cause flaking, increased friction, and brittleness of the alloy. Aluminium does not seriously affect the metal except in the respect of facility in pouring and in slipperiness. The addition of tin up to about nine per cent. of the whole is not injurious or, in fact, noticeable except for the lighter color and weight of the product and a certain sluggishness in pouring. More than nine per cent., however, would be undesirable and would cause the alloy to break down under repeated meltings and also to become crumbly. The use of any additional harmless metal, such as tin or aluminium, as an extra ingredient would of course complicate the manufacture and increase the loss by oxidation; but all of such and similar modifications which do not seriously impair the alloy by causing flaking, increased friction, or brittleness and in which lead in excess of ninety per cent. and magnesium from one-half of one per cent. to five per cent. are contained are manifestly to be considered within the scope of this invention.

Having described my invention, what I claim, and desire to secure by United States Letters Patent, is as follows:

1. As an antifriction-bearing metal, an alloy containing lead in the proportion of ninety per cent. or over of the whole combined with one-half of one per cent. to five per cent. of magnesium, substantially as described.

2. As an antifriction-bearing metal, an alloy of one-half of one per cent. to five per cent. of magnesium and the remainder of lead, substantially as described.

3. As an antifriction-bearing metal, a magnesium-lead alloy comprising lead 98.75 per cent. and magnesium 1.25 per cent., substantially as described.

In testimony whereof I have signed my name to the specification in the presence of two subscribing witnesses.

FREDERIC W. MOFFETT.

Witnesses:
H. G. KIMBALL,
JOHN J. MCELHINNY.