United States Patent [19]

Ikeda et al.

[11] **3,791,438**

[45] **Feb. 12, 1974**

[54] **PROCESS FOR MANUFACTURING A WEAR-RESISTANT CAST METAL PRODUCT**

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[22] Filed: **Mar. 27, 1972**

[21] Appl. No.: **238,614**

[30] **Foreign Application Priority Data**

Mar. 27, 1971 Japan 46-17606

[52] **U.S. Cl.** **164/55,** 164/113

[51] **Int. Cl.** **B22d 27/20**

[58] **Field of Search** 164/55, 97, 113

[56] **References Cited**

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[57] **ABSTRACT**

A cast metal product, such as a bearing, having improved wear resistance and lubricating properties is obtained using the die casting process, wherein a molten metal, such as aluminum, is supplied under pressure into a mold cavity through a conduit by the pushing action of a plunger, by adding to the molten metal in the conduit a thermoplastic resin, such as polyethylene, or a mixture of such resin with a powdered lubricant, such as graphite or a powdered wear-resistant material, such as silicon.

9 Claims, No Drawings

PROCESS FOR MANUFACTURING A WEAR-RESISTANT CAST METAL PRODUCT

BACKGROUND OF THE INVENTION

This invention relates to an improved process for manufacturing, by die casting, a cast metal product such as a bearing, a cylinder sleeve for an internal combustion engine or the like having a friction surface of excellent wear resistance and lubricating properties.

SUMMARY OF THE INVENTION

The process of the invention is characterized in that, when a molten metal suitable for casting, such as aluminum, aluminum alloy or the like is supplied under pressure into a mold cavity through a conduit by the pushing action of a plunger, a mass of thermoplastic resin alone or a thermoplastic resin in combination with a powdered lubricant or wear-resistant material, such as graphite, molybdenum disulfide, lead, a thermosetting resin or the like, is added to the molten metal in the conduit so that the addition may be contained in a uniformly dispersed form in the molten metal.

The cast metal product obtained according to the invention has improved wear resistance and lubricating properties.

DESCRIPTION OF PREFERRED EMBODIMENTS

According to the invention, when any member such as a bearing or the like requiring excellent wear-resistant and lubricating properties is to be produced by casting using, for example, aluminum alloy as a raw material, an irregularly shaped mass of thermoplastic resin such as polypropylene, polyethylene, polystyrene or the like is prepared in the conduit of a mold of a high pressure, high speed casting machine, whereby in the course of the casting process the resin mass is melted by being in contact with the molten metal and is carried into the cavity along with the molten metal. In this case, owing to the high pressure and high speed, the molten metal is well agitated by producing jet flow and turbulent flow at a gate portion and at the same time the molten resin is dispersed into a fine spherical or particle form by the surface tension thereof and is mixed in the molten metal. The resin to be added is desirably such that, after being melted by the increase in temperature, it is low in viscosity and is dispersed in a fine spherical form. Therefore a resin of low molecular weight is suitable. The cast product of aluminum or the like exhibits excellent wear-resistant and lubricating properties when it contains the thermoplastic resin. But if this resin is mixed with a powdered lubricant such as graphite, molybdenum disulfide, lead, tin, copper, thermosetting resin such as polytetrafluoroethylene, phenolic resin, epoxy resin or the like, or with a powdered wear-resistant material such as silicon or the like, the powdered material is uniformly dispersed in the molten metal in such a manner that the same is coated by the thermoplastic resin, whereby the wear-resistant and/or lubricating properties of the product can be improved to an even greater extent.

Thus, according to this invention, by merely supplying the thermoplastic resin into the conduit for a molten metal such as aluminum, aluminum alloy or the like, the resin can be uniformly dispersed and contained in a fine particle form in the molten metal by a very simple operation and thus the cast product can be

given excellent wear-resistant and lubricating properties by the characteristic properties of the thermoplastic resin. If the thermoplastic resin is mixed with the proper amount of any desired material in powdered form, for example, a powdered lubricant such as graphite, molybdenum disulfide, tin, lead, copper, thermosetting resin or the like or a powdered wear-resistant material such as silicon or the like, the added material is uniformly dispersed in the cast product along with the thermoplastic resin, whereby the wear-resistant and/or lubricating properties thereof can be improved even more. Embodying examples of this invention are set forth below.

EXAMPLE 1

A small mass of low molecular weight polyethylene resin was added to molten aluminum in the conduit of a casting machine so that the resin was contained in the amount of about 3 percent, by weight, in the aluminum cast product. Thus, a product having excellent properties as a bearing member was obtained.

EXAMPLE 2

Low molecular weight polyethylene — 70 parts by weight

Teflon powder (polytetrafluoroethylene) — 30 parts by weight

A small mass of the above mixture was added to molten aluminum in the conduit of a casting machine, so that the mixture was contained in the amount of about 3 percent, by weight, in the aluminum cast product. This product was excellent as a bearing member.

EXAMPLE 3

Low molecular weight polyethylene resin — 20 parts by weight

Graphite powder — 5 parts by weight

Silicon powder — 70 parts by weight

Oil — 5 parts by weight

A small mass of the above mixture was added to molten aluminum iron alloy in the conduit of a casting machine, so that the mixture was contained in the amount of about 5 percent, by weight, in the aluminum cast iron. This product was excellent as a bearing member.

We claim

1. In a die casting process for manufacturing a cast metal product by supplying a molten metal under pressure into a mold cavity through a conduit by the pushing action of a plunger, the improvement which comprises adding to the molten metal in the conduit, an additive comprising a thermoplastic material selected from the group consisting of thermoplastic resins, thermoplastic resins mixed with a powdered lubricant, and thermoplastic resins mixed with a powdered wear-resistant material, whereby the additive becomes uniformly dispersed in the molten metal.

2. A process according to claim **1** wherein the metal is selected from the group consisting of aluminum and aluminum alloys.

3. A process according to claim **2** wherein the additive is present in an amount of about 3 to 5 percent by weight based on the weight of the metal.

4. A process according to claim **2** wherein the thermoplastic resin is selected from the group consisting of polyethylene, polypropylene and polystyrene.

5. A process according to claim 4 wherein the thermoplastic resin is present in an amount of about 3 percent by weight based on the weight of the metal.

6. A process according to claim 4 wherein the powdered lubricant is selected from the group consisting of graphite, molybdenum disulfide, lead, tin, copper, polytetrafluoroethylene resin, phenolic resins and epoxy resins.

7. A process according to claim 4 wherein the wear-resistant material is silicon.

8. A process according to claim 6 wherein the additive consists essentially of a mixture of low molecular weight polyethylene resin and polytetrafluoroethylene resin in a weight raio of 70/30.

9. A process according to claim 7 wherein the additive consists essentially of a mixture of by weight 20 parts of low molecular weight polyethylene resin, 5 parts of graphite powder, 70 parts of silicon powder and 5 parts of oil.

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