

UNITED STATES PATENT OFFICE.

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WHITE-METAL CASTING AND THE METHOD OF MAKING SAME.

1,156,093.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, CHARLES PACK, a citizen of the United States, residing at the borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in White-Metal Castings and the Method of Making Same, of which the following is a specification.

10 The invention relates to a white metal casting and the method by which said casting is made, and more particularly to a casting made from an aluminum alloy.

15 Heretofore in the art of making castings of aluminum alloys by what is known as the pressure die casting process, great difficulty has been encountered due in part to the high fusing point of aluminum and of the ordinary commercial aluminum alloys; in part
20 to the difficulties in producing a machine capable of casting such alloys, and in part due to the high shrinkage of the alloy in the molds which resulted in the formation of superficial or deep-seated cracks in the finished castings.

25 I have discovered that a tough, sound casting of an aluminum alloy may be made in metal molds by bringing the solidifying point nearer the eutectic point of the alloy
30 through an increase in the percentage of copper over that which is generally recognized as being the highest percentage which can be successfully used in commercial castings, and by maintaining conditions
35 throughout the casting process which will result in the chilling of the casting. I have discovered that a casting made in accordance with my improved process or method has sufficiently high tensile strength; is free
40 from cracks, and has a hard chilled superficial stratum imparting to the casting good wearing properties.

The invention consists primarily in a method of making finished white metal castings consisting in alloying from 80 to 91 per cent. of aluminum with from 20 to 9 per cent. of copper and delivering the molten alloy to a metallic mold maintained at a temperature below the fusing point of the alloy; and in the casting produced by this process; all as hereinafter set forth and described and more particularly pointed out in the claims hereto appended.

45 In the practice of my invention, I form an alloy of aluminum and copper, the propor-

tions of these metals varying according to the size and character of the casting to be made therefrom. I have found that for small simple castings, the aluminum and the copper may be alloyed in a proportion of 91 parts of aluminum to 9 parts of copper, but that it is desirable and necessary to increase the percentage of copper with castings larger in dimensions and more complicated in their configuration. The alloy containing the highest percentage of copper which I have been able to use successfully has been composed of 20 parts of copper and 80 parts of aluminum.

The metal alloys which I employ are therefore richer in copper than the alloy which is ordinarily recognized as being the most desirable for commercial castings, and while theoretically an aluminum alloy containing from 20 to 9 per cent. of copper would be too brittle for commercial castings, nevertheless, I have found that if this alloy is cast under certain conditions, the commercial castings not only are lacking in that brittleness which would make them undesirable, if cast in sand, but the quality of the castings is much superior to castings of aluminum alloys containing a lower percentage of copper. This I attribute to the fact that the solidifying point of the alloy is brought nearer the eutectic point by the use of a higher percentage of copper thus permitting casting at lower temperatures and reducing the shrinkage of the casting in the mold. Furthermore, by casting alloys composed of copper and aluminum, in which the percentage of the aluminum will range from 80 to 91 per cent. in metal molds maintained at a temperature below the eutectic point of the alloy, a chilled casting is secured and by reason of the reduced shrinkage of the metal, this casting is sound or without cracks. Furthermore, a rapid chilling of the casting will have the effect of producing a tough outer stratum or surface, to the casting which will have the effect of imparting strength thereto and in large measure neutralizing the tendency of the alloy to have that brittleness usually found in aluminum alloys in which the percentage of copper in excess of 8 per cent. By the pressure die casting method, this surface chilling is secured through the rapidity with which the casting is made and the drawing of the casting immediately following the

solidification shrinkage so as to avoid excessive contraction of the metal while in the mold.

I have found that the alloys which I use in my method are readily handled in charging the mold, and that they flow readily in pouring. These conditions practically adapt an alloy of this character to the production of finished castings or castings made to a fixed dimension or size. As I have heretofore stated in larger and more complicated castings, I increase the proportion of copper.

Inasmuch as by my experiments I have determined that the percentage of copper may be varied from 9 to 20 per cent., it is not my intention to limit the invention of any specific percentage of copper, except that no less than 9 per cent. of copper shall be used and no more than 20 per cent., my invention contemplating the use of copper in proportions between these two limits.

Having described the invention what I claim as new and desire to have protected by Letters Patent is:—

1. The herein described method of producing finished white metal castings consisting in alloying from 80 to 91 parts of aluminum with from 20 to 9 parts of copper, and pouring the molten alloy in a metallic mold maintained at a temperature below the fus-

ing point of the alloy, whereby the surface of the casting is chilled, and drawing the casting from the mold immediately following the solidification shrinkage whereby excessive contraction of the casting in the mold is avoided.

2. The herein described method of producing finished white metal castings consisting in alloying from 80 to 91 parts of aluminum with from 20 to 9 parts of copper, and pouring the molten metal under pressure in a metallic mold maintained at a temperature below the fusing point of the alloy, whereby the surface of the casting is chilled, and drawing the casting from the mold immediately following the solidification shrinkage whereby excessive contraction of the casting in the mold is avoided.

3. A finished, pressure die cast white metal casting composed of an alloy of from 80 to 91 parts of aluminum and from 20 to 9 parts of copper having a chilled outer stratum or surface.

In witness whereof I hereunto affix my signature in the presence of two subscribing witnesses this 10th day of June, 1914.

CHARLES PACK.

Witnesses:

C. CLARISE FRANCK,
JUDITH PARDEE.