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ALLOY

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This invention relates to alloys and certain products made therefrom. The invention relates more particularly to alloys of the so-called brass type and certain articles of manufacture made therefrom.

Brass is one of the best known alloys and has been put to a great variety of uses. It consists of copper and zinc compounded in various proportions. A common brass is the so-called "Muntz" metal consisting of about 60% copper and 40% zinc.

Conditions arising in the use of brass products make it highly desirable to obtain an alloy capable of being worked up into a final product having a fine grained smooth finish on which a bright polish may be produced. In the working up of many brass products where drawing operations are employed, it is frequently found that those portions of the fabricated article where the draw has been most severe, present a so-called "orange peel" surface. A surface of this kind is ill adapted to take on a smooth polished surface, as is desired on that sort of article to be chromium plated and the like. The brasses heretofore on the market are therefore not completely satisfactory in this respect.

As a result of our investigations, we have determined that the common brass alloys may be materially improved in this respect by the addition thereto of at least one more alloying constituent, so that products made therefrom may have a smooth finish which is adapted to take on a high polish. Platings of various kinds, such as chromium, nickel and the like may be easily applied while providing an exceedingly smooth finish.

The present invention contemplates the addition of aluminum in amount not to exceed about 1.0% to the copper and zinc going into the brass. In the present preferred practice of the invention the amount of aluminum added does not exceed about 0.5%. Desirable effects are obtained when using as little as 0.1% aluminum, but in the present practice of the invention, we are employing approximately 0.25% aluminum.

The proportions of copper and zinc employ in the alloy vary according to the use to which the final product is to be put. In the case of Muntz metal, we employ the stated amount of aluminum, and the remainder of the alloy constitutes a combination of approximately 60% copper and 40% zinc. The amount of zinc, or the amount of copper, or both, may be suitably reduced to offset the particular amount of aluminum employed in order to determine the relative proportions of metals going into the alloy.

In accordance with the invention, aluminum in amount not exceeding about 1.0% in combination with copper 50 to 95% and zinc 5.0 to 49% is employed. While improved results are obtainable when the aluminum in stated amounts is employed with brass alloys containing from 95 to 64% copper, a very marked improvement is obtained when the brass alloy contains from 64 to 50% copper.

An alloy compounded in accordance with the present invention possesses peculliar advantages in the following respects, although it is to be understood that we are not to be restricted to the explanation that at the present time appears tenable to us:

A small quantity of aluminum used as specified in the alloy of copper and zinc appears to produce a material possessing a greater plasticity than is possessed by corresponding alloys without the addition of aluminum. It has been observed that in annealing a base alloy containing the stipulated limits of aluminum it is not necessary to exercise the same control of temperature or time of anneal as is the case when the aluminum is not present.

It seems probable that the advantages gained by the use of aluminum in brass alloys are due primarily to the greater plasticity of the alloy either above or below the recrystallization temperature. The combination of these effects renders it possible to produce alloys suitable for deep drawing operations where high surface polishes are desired. It is also apparent that the greater plasticity attained due to the utilization of aluminum renders alloys of this type more suitable for purposes of hot extrusion than the corresponding alloys without the aluminum.

In the range of alpha brass the addition of the indicated percentages of aluminum yields an ultimate product that is more ductile and soft than the corresponding alloys without the aluminum, and without substantial loss of tensile strength. In the range of alloys containing normal mixtures of alpha and beta brass, as typified by Muntz metal, the addition of aluminum appears to cause the beta phase, or a modification of the beta phase, to absorb the alpha phase; and it is possible to obtain specimens of the Muntz metal type with the addition of aluminum that appear to have a single phase at room temperature. This phase probably represents a solid solution of copper, aluminum and zinc and it not to be confused with retained beta obtained by quenching. It is possible that the benefits observed to accrue from the use of aluminum as indicated are largely due to the properties of this new phase which takes the place of alpha and beta mixtures ordinarily observed in alloys containing less than 64% copper.

It will therefore be apparent that the practice of the present invention makes possible the production of so-called brass alloys that are highly useful in the manufacture of various metal products. This is particularly true when the alloys of the invention are employed to produce mechanically-worked articles of manufacture.

We claim:

1. An alloy consisting of copper 50 to 95%, zinc 5 to 49%, and aluminum 0.1 to 0.25%.

2. An alloy consisting of copper 50 to 95%, zinc 5 to 49%, and aluminum 0.25%.

3. An alloy consisting of copper 50 to 64%, zinc 36 to 49%, and aluminum 0.1 to 0.25%.

4. An alloy consisting of copper 50 to 64%, zinc 36 to 49%, and aluminum 0.25%.

In testimony whereof we affix our signatures.

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