

## UNITED STATES PATENT OFFICE

2,267,299

## ALLOY

Reginald S. Dean, Salt Lake City, Utah, assignor  
to Chicago Development Company, Chicago,  
Ill., a corporation of Illinois

No Drawing. Application June 12, 1940,  
Serial No. 340,135

4 Claims. (Cl. 75-178)

This invention relates to alloys of copper, zinc and manganese and, in particular, is concerned with such alloys for die casting purposes.

The alloys of the present invention contain relatively high proportions of zinc, of the order of 60% to 95% zinc, the balance comprising from about 2% to about 30% copper, and from about 5% to about 38% manganese. Small proportions of other alloying constituents may, in certain cases, be utilized where special characteristics are desired, but, in general, the alloys contain substantially only zinc, copper and manganese, such other elements as are present being introduced only as impurities. It should be pointed out at the outset, however, that, for best results, the manganese employed should be electrolytic manganese or other highly pure manganese containing, preferably, not more than 0.1% of other metals as impurities, and the copper and zinc should also be of highly pure grade, preferably electrolytic.

Although many of the alloys of the present invention have little or substantially no ductility, nevertheless they possess sufficient strength to make them of marked value for die casting or other castings for parts which are not subjected to great mechanical stress. In general, the alloys of the present invention possess the advantage, over the zinc-copper-manganese alloys heretofore suggested for die casting purposes, in that they are more fluid and can be cast into more intricate shapes while maintaining accuracy of dimensions. Furthermore, they possess an excellent finish, as cast, are readily machinable and are highly resistant to corrosion.

The alloys of the present invention may be produced in accordance with various procedures, but one suitable and dependable method comprises preparing an alloy of zinc and copper and subsequently adding the manganese in the form of a fairly fine powder. It has been found that if the substantially molten mixture is stirred at a temperature slightly below the boiling point of zinc, a homogeneous alloy is produced. An alternative, and also satisfactory method, comprises initially melting the manganese, preferably in a high frequency induction furnace, alloying the same with the copper, and then adding the zinc at a temperature slightly above the melting point of the manganese-copper alloy. Although, in this latter method, there is a slight volatilization of the zinc, the amount volatilized is so small as to be disregarded.

While, as previously stated, any manganese of high purity, that is, containing not more than

about 0.1% of metallic impurities, may be used in the production of the alloys in accordance with the present invention, for the best results, as previously noted, electrolytic manganese should be used, both because of the relative readiness with which the alloys are made in accordance with the present invention and also because of the especially satisfactory properties of the resulting alloys.

The following are illustrative examples of alloys which may be made in accordance with the present invention. It will be understood that the proportions of the alloying constituents may vary, within the range set forth hereinabove, and other changes may be made without departing from the spirit of the invention as pointed out in the appended claims:

## Example 1

	Parts
Electrolytic zinc.....	85
Electrolytic manganese.....	10
Electrolytic copper.....	5

## Example 2

	Parts
Electrolytic zinc.....	80
Electrolytic manganese.....	10
Electrolytic copper.....	10

## Example 3

	Parts
Electrolytic zinc.....	86
Electrolytic manganese.....	9
Electrolytic copper.....	5

A particularly preferred range of the alloying constituents, falling within the broader range set forth hereinabove, is from 75% to 85% zinc, from 5% to 15% copper, and from 8% to 20% manganese, the total of the alloying constituents comprising substantially 100%.

What I claim as new and desire to protect by Letters Patent of the United States is:

1. An alloy suitable for the preparation of die castings having good finish, resistance to atmospheric corrosion, and ease of machinability, said alloy containing from in excess of 75% up to about 95% zinc, 2% to 30% copper, and 5% to 38% manganese, the total of said alloying constituents amounting to substantially 100%.

2. An alloy suitable for the preparation of die castings having good finish, resistance to atmospheric corrosion, and ease of machinability, said alloy containing from in excess of 75% up to about 95% electrolytic zinc, from 2% to 30% electrolytic copper, and from 5% to 38% elec-

trolytic manganese having a purity of at least 99.9%, the total of said alloying constituents amounting to substantially 100%.

3. A die casting consisting of an alloy containing from in excess of 75% up to about 85% zinc, from 5% to 15% copper, and from 8% to 20% of a substantially pure manganese, the to-

tal of said alloying constituents amounting to substantially 100%.

4. A casting alloy containing about 85% zinc, about 5% copper, and about 10% substantially pure manganese.

REGINALD S. DEAN.