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READILY-FUSIBLE ALLOY.

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To all whom it may concern:

Be it known that I, ARTHUR DE WOLF MULLIGAN, a subject of the King of Great Britain and Ireland, residing at 12 New Court, Lincoln's Inn, London, England, have invented Improvements in Readily-Fusible Alloys, of which the following is a specification.

This invention relates to improvements in readily fusible alloys having a melting or fusing temperature ranging between about 155° F. and 320° F. In previously known alloys of this kind, usually comprising tin, lead, and bismuth, and sometimes with the addition of cadmium it has been found, particularly in the case of those having the lower melting points, that their physical characteristics render them totally unfit for certain purposes in which their low melting points should render them eminently useful, for instance as fuse rods or blocks in temperature bearing indicators, for such purposes the existing fusible alloys are either so soft as to be almost plastic so preventing a relatively small section being successfully employed or else are so friable as to quickly disintegrate under constant vibration and the object of the present invention is to produce a range of low melting point alloys which have none of the above disadvantages and are eminently suitable for use in connection with temperature bearing indicators and for other useful purposes in which a relatively hard and tough alloy with a low melting point is advantageous.

The present invention comprises essentially a series of alloys possessing strength, ductility, unaffected by weak acids or alkalies and melting between 155° F. and 320° F. and consisting of antimony, tin, lead, cadmium and bismuth, melted or alloyed together in the manner and in or about the proportions hereafter specified.

The relative proportions of the metals in the final alloy vary widely according to the temperature at which the alloy is required to melt, but it is found after a series of experiments that an alloy to give the desired result must contain between 0.8% and 2.5% of antimony, between 12% and 29.8% of tin, between 12% and 61% of lead, between 6.6% and 18% of cadmium and between 3% and 50% of bismuth.

It has also been found that in any one alloy the antimony content relative to the tin content should not much exceed the proportion of 1 part of antimony to 12 parts of tin.

For instance an alloy having a melting temperature of about 180° F. and possessing remarkable strength, ductility and unaffected by vibration or weak acids or alkalies comprises 2.4% of antimony, 29.6% of tin, 12.0% of lead, 12.0% of cadmium and 44.0% of bismuth.

In making these alloys the antimony is first melted with a tin and the resultant pewter alloy is allowed to cool. Then the pewter alloy is melted and the lead added, the temperature then being raised to about 700° F. at which heat the cadmium is added, the mixture is then allowed to cool to about 500° F. and the bismuth is added.

It is essential in order to produce a reliable alloy that all of the metals are chemically pure and that the melted alloys at each stage of the process be efficiently skimmed to remove all traces of dross and oxides.

The melting is preferably done in a crucible heated electrically or in a gas fired furnace, a coal or coke furnace must not be used since bismuth is highly susceptible to sulphur fumes.

These alloys are particularly adapted for use as fuse rods or blocks in temperature bearing indicators, particularly the bearing indicator forming the subject matter of my application for Letters Patent filed concurrently with this application and for which purpose they are cast into rods of the requisite finished length and thickness.

It is not permissible to cut or reduce such fuse rods as it is found in practice that by so doing the melting point is altered so rendering it unreliable for the temperature which it should indicate, further it has been found that if the finished cast rods are allowed to rub together, for instance when being transported, the melting point is raised.

I claim:—

Fusible alloys melting between about 155° F. and 320° F. possessing strength, ductility and unaffected by weak acids or alkalies, comprising a mixture of between 0.8% and 2.5% of antimony, between 12% and 29.6% of tin, between 12% and 61% of lead, between 6.6% and 18% of cadmium and between 3% and 50% of bismuth.

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