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**Provisional Specifications**

**Index at Acceptance—129N [XXXV]**

# IMPROVEMENTS IN OR RELATING TO SOLDERING OF ALLOYS OF MAGNESIUM AND ALLIED METALS

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAFI MARG, NEW DELHI-1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860).

*The following specification describes the nature of this Invention* :—

This is an invention by Dr. Prem Behari Mathur, Kanakarajan Dakshinamurthi, Ramasamy Balasubramanian and Panamattath Narayanan Narayanan Namboodri, all the four of the Central Electrochemical Research Institute, Karaikudi, India, all Indian citizens.

This invention relates to improvements in or relating to the soldering of Magnesium alloys and aluminium metal.

Magnesium alloys consisting of aluminium, zinc and other metals are being used in Magnesium—acrivated and primary batteries. Because of the high inflammability of magnesium alloys, usual methods of welding and soldering are not applicable to solder magnesium alloys to other metals for providing the leads to the anodes in magnesium cells. The soldering of pure magnesium has been done by pure tin metal solder with flux. The above method fails to solder magnesium alloys containing metals like aluminium and likewise. The use of commercial solder alloy also fails to solder the magnesium alloys, aluminium and the like metals.

The object of this invention is to describe a process of soldering the magnesium alloys and allied metals.

The process of the soldering of magnesium alloys, aluminium and allied metals to other metals broadly consists in using a special solder alloy consisting of tin and lead in specific ratio and using a flux consisting of ammonium chloride and oleic acid.

The following typical examples are given to illustrate the invention:

**Example 1**

A magnesium—aluminium—zinc alloy sheet is taken and a hole is drilled at one end. A copper wire lead is placed over the drilled hole and a small pellet of tin lead alloy of specific composition (other than the usual solder alloy) is placed over the hole and the end is heated steadily over a bunsen flame. A drop of flux containing ammonium chloride and oleic acid is placed over the point to be soldered. As soon as the alloy melts and spreads over the lead the whole plate along with the lead is carefully quenched in a water bath. The lead is thus attached to the magnesium alloy.

**Example 2**

All the conditions as described in example I kept same excepting that aluminium plate is used in place of magnesium alloy sheet. Similar results are obtained as that in example 1.

The following are among the main advantages of the invention:

A process of soldering of difficulty solderable metals such as magnesium alloys, aluminium and the like to provide electrical contact to other metals.

Dated this 20th day of December, 1967.

Sd/-

*Patents Officer,*

Council of Scientific and Industrial Research.

## COMPLETE SPECIFICATION

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAFI MARG, NEW DELHI-1, INDIA AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT (ACT XXI OF 1860)

*The following specification particularly describes and ascertains the nature of this invention and the manner in which it is to be performed:*—

This is an invention by Dr. Prem Behari Mathur, Kanakarajan Dakshinamurthi, Ramasamy Balasubramanian and Panamattath Narayanan Narayanan Namboodri, all of the Central Electrochemical Research Insititute, Karaikudi, India all Indian citizens.

This invention relates to improvements in or relating to the soldering of Magnesium allogs and aluminium metal.

Magnesium alloys consisting of aluminium, zinc and other metals are being used in Magnesium—activated and primary batteries. Because of the high infiamammability of magnesium alloys usual methods of welding and soldering are not applicable, to solder magnesium alloys to other metals for providing the leads to the anodes in magnesium cells. The soldering of pure magnesium has been done by pure tin metal solder with flux. The above method fails to solder magnesium alloys containing metals like aluminium and likewise. The use of commercial solder alloy also fails to solder the magnesium alloys, aluminium and the like metals.

The object of this invention is to describe a process of soldering the magnesium alloys and allied metals.

According to the present invention, the process for soldering magnesium alloys and allied metals like

aluminium consists in applaying a lead-tin solder alloy of low (between 2 and 20% of lead) lead content and 80 to 98% tin in conjunction with a flux comprising a high carbon content organic fatty acid (such as oleic acid, palmitic acid or steric acid) and ammonium chloride on the surface or over a cavity drilled out on the magnesium alloy or allied alloy specimen and heating the spot till the solder alloy melts and covers the surface are cavity and then quenching the joint in water.

Thus, the steps are as follows:

(a) preparation of the special solder alloy.

(b) drilling of a shallow or deep cavity in the magnesium alloy specimen.

(c) placing the flux and solder alloy over the specimen, heating and quenching the specimen in water.

The invention includes within its scope solder alloy used for soldering magnesium alloy specimens to other metals comprising tin and lead metals in the ranges 80 to 98% tin and 20 to 2% lead.

Thus, the process of the soldering of magnesium alloys, aluminium and allied metals to other metals broadly consists in using a special solder alloy consisting of tin and lead in specific ratio and using a flux consisting of ammonium chloride and oleic acid.

The following typical examples are given to illustrate the invention:

**Example 1**

A magnesium—aluminium—zinc alloy sheet is taken and a hole is drilled at one end. A copper wire lead is placed over the drilled hole and a small pellet of tin lead alloy of specific composition (other than the usual solder alloy) is placed over the hole and the end is heated steadily over a bunsen flame. A drop of flux containing ammonium chloride and oleic acid is placed over the point to be soldered. As soon as the alloy melts and the spreads over the lead the whole plate along with the lead is carefully quenched in a water bath. The lead is thus attached to the magnesium alloy.

**Example 2**

All the conditions as described in example 1 kept same excepting that aluminium plate is used in place of magnesium alloy sheet. Similar results are obtained as that in example 1.

The following are among the main advantages of the invention:

A process of soldering of difficulty solderable metals such as magnesium alloys, aluminium and the like to provide electrical contact to other metals.

*We claim:—*

1. A process for soldering magnesium alloys and allied metals like aluminium which consists in applying a lead-tin solder alloy of low (between 2 and 20% of lead) lead content and 80 to 98% tin in conjunction with a flux comprising a high carbon content organic fatty acid (such as oleic acid, palmitic acid or stearic acid) and ammonium chloride on the surface or over a cavity drilled out on the magnesium alloy or allied alloy specimen and heating the spot till the solder alloy melts and covers the surface or cavity and then quenching the joint in water.

2. A process as claimed in claim 1 wherein the steps are as follows:

(a) preparation of the special solder alloy.

(b) drilling af a shallow or deep cavity in the magnesium alloy specimen.

(c) placing the flux and solder alloy over the specimen, heating and quenching the specimen in water.

3. A solder alloy used for soldering magnesium alloy specimens to other metals as claimed in claim 1 comprising tin and lead metals in the ranges 80 to 98% tin and 20 to 2% lead.

4. A process for soldering magnesium alloys and allied metals like aluminium substantially as hereinbefore described.

5. A solder alloy used for soldering magnesium alloy specimens to other metals substantially as hereinbefore described.

Dated this 27th day of August, 1968.

Sd/

*Patents Officer*

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

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