W. N. NAYLOR & S. P. HUTTON.

ALUMINIUM ALLOYS.

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1,175,655. Patented Mar. 14, 1916.

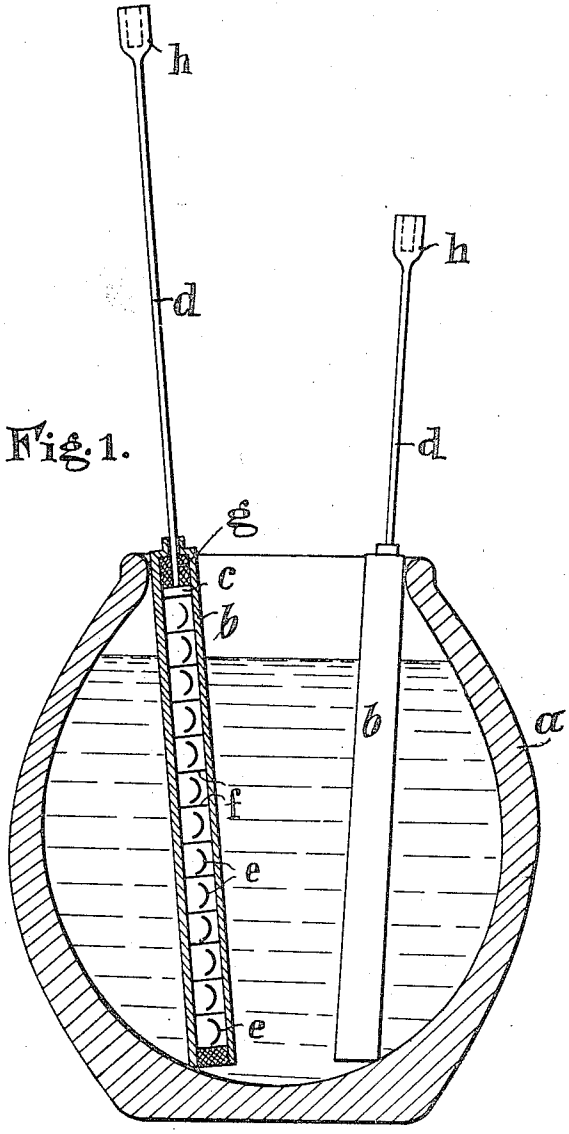


Fig. 1.

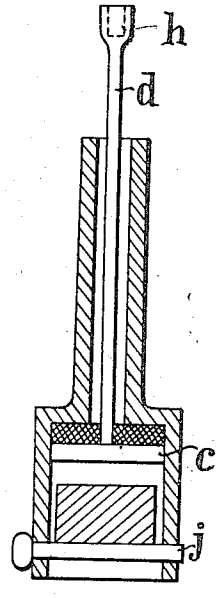


Fig. 2.

WITNESSES

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ALUMINIUM ALLOYS.

1,175,655. Specification of Letters Patent. Patented Mar. 14, 1916.

Application filed November 22, 1912. Serial No. 732,972.

To all whom it may concern:

Be it known that we, WALTER NORTHCOTE NAYLOR and STANLEY PAGE HUTTON, citizens of the United Kingdom of Great Britain and Ireland, and residents of 169 Stanstead road, Forest Hill, in the county of London, England, and 30 Manor road, Beckenham, in the county of Kent, England, respectively, have invented certain new and useful Improvements in and Relating to Aluminium Alloys, of which the following is a specification, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to aluminium alloys and has for its object to provide an improved alloy or alloys and a process or processes for making same.

In another sense the invention may be considered as a treatment of aluminium, whereby the metal is increased in strength and whereby the wasting or aging which occurs in aluminium is prevented and the metal rendered non-corrosive when submitted to the action of salt water.

According to this invention I add to aluminium a certain percentage of magnesium and phosphor tin, some phosphorus may be added in addition if required and for certain purposes a percentage of phosphor copper may be added to the mixture to increase the tensile strength. The percentage of magnesium generally exceeds that of the tin and the percentage of magnesium is varied according to the purpose for which the alloy is required. For example, the magnesium is reduced when the metal is to be rolled or drawn. For other purposes, as for example, dental purposes, a small quantity of metallic sodium may be added.

One alloy made in accordance with this invention and adapted for use in sea-water is made in the following proportions by weight: 1½ lbs. aluminium, 1¼ ozs. magnesium, 3 grms. phosphor tin, 2 grms. phosphorus. This may be varied for a drawing mixture as follows: 4 lbs. aluminium, ½ oz. magnesium, 2 grms. phosphor tin. For increased tensile strength the alloy may be varied as follows: 1½ lbs. aluminium, 1¼ ozs. magnesium, 1¼ ozs. phosphate copper, 3 grms. phosphor tin. For dental purposes it may be varied as follows: 4 lbs. aluminium, ½ oz. magnesium, 1 grm. phosphor tin, 2 grms. metallic sodium.

An alloy such as above referred to may be prepared by the following process and by apparatus.

Figure 1 of the accompanying drawings shows the apparatus together with a crucible. A quantity of aluminium is melted in a crucible *a* and to this is added at a temperature of about 600° C. or thereabout a percentage of magnesium and phosphor tin. The magnesium and phosphorated tin are incorporated with the aluminium by means of a special device in the form of a tube or casing *b* through which the magnesium is made to enter the molten aluminium at the bottom of the crucible, this method being adopted owing to the low melting point and specific gravity of the magnesium. The tube or casing *b* is cylindrical and open at its lower end and it is fitted with a plunger or piston *c* and sliding rod *d* of which passes up through the tube and extends for a considerable distance beyond same.

In use the tube *b* is charged with pieces or blocks of magnesium *e* with pieces of phosphorated tin *f* placed in between. The sliding rod is drawn out as shown to the left of the figure for the purpose of charging the tube and a suitable wad of paper or other fabric *g* is placed between the end of the piston and the hole through which the rod slides. The open end of the tube is now blocked with a wad so as to keep it in place. At the required time the tube charged as described is thrust with its open end downward into the molten aluminium. The contained magnesium and phosphor tin are quickly melted out and flow into and mix with the aluminium in the crucible, the weight of the plunger or sliding rod *d* assists in forcing out the contents of the tube as it descends, and the position of the said rod serves to indicate when the metal has been properly melted out and diffused. The molten metal thus mixed may be suitably stirred with a carbon stick or in other suitable manner to insure a thorough incorporation of the magnesium with the alumini-

um. The upper end of the sliding rod *d* may be fitted with a smaller bell-shaped cavity or cup *h* whereby any further addition of small quantities of phosphorus may be made by wrapping a piece of phosphorus in tin foil and inserting it in the said cup, the cup being then plunged into the molten metal. The small cup *h* may if required be made as a separate tool at the end of a rod.

Fig. 2 of the drawings shows a modified form of the improved device wherein a shallow bell-shaped casing *b* is provided and fitted with a piston *c* having an extended rod as before described. With this construction a substantially large block of metal may be dealt with as indicated instead of small pieces as in Fig. 1. A removable cross-bar *j* is provided for keeping the blocks of metal in place until melted.

What we claim and desire to secure by Letters Patent is:—

1. An alloy made by mixing aluminium, magnesium and phosphor tin in the following proportions: 4 lbs. aluminium, ½ oz. magnesium, 2 grms. phosphor tin.

2. An alloy made by mixing aluminium, magnesium and phosphor tin in the following proportions: 1½ to 4 lbs. aluminium, ½ to 1½ ozs. magnesium, 2 to 3 grms. phosphor tin.

In witness whereof we have hereunto set our hands in presence of two witnesses.

W. N. NAYLOR.
STANLEY P. HUTTON.

Witnesses:
WALTER I. SKERTEN,
JOHN W. PATCHING.