

UNITED STATES PATENT OFFICE.

LUDWIG MACH, OF JENA, GERMANY.

MANUFACTURE OF ALLOYS OF ALUMINIUM AND MAGNESIUM.

SPECIFICATION forming part of Letters Patent No. 662,951, dated December 4, 1900.

Application filed July 12, 1899. Serial No. 723,559. (No specimens.)

To all whom it may concern:

Be it known that I, LUDWIG MACH, a subject of the Emperor of Austria-Hungary, residing at Jena, Empire of Germany, have invented a new and useful Process of Making Aluminium-Magnesium Alloys, of which the following is a specification.

This invention relates to an improvement in aluminium-magnesium alloys differing somewhat from those described in United States Letters Patent of February 25, 1899, Serial No. 706,848. In that specification I described how magnesium exerts its influence on aluminium and affects its susceptibility to the action of cutting-tools. It was there stated that magnesium added in ten to thirty parts to one hundred parts of aluminium improves the susceptibility of the latter to the action of cutting-tools. By such an addition aluminium acquires many qualities which pure aluminium does not possess, and this without increasing but rather decreasing its specific gravity.

This invention is another process by which the susceptibility of aluminium to the action of cutting-tools is obtained by the use of less magnesium than heretofore possible and without reducing the ductility of pure aluminium to any considerable degree. For this purpose the components are melted together in such proportions that one hundred parts of the aluminium alloy will contain two to ten parts of magnesium. This alloy of aluminium and magnesium in its mechanical properties, and in particular in its workability, scarcely differs from pure aluminium, and while it may be rolled and drawn it has the same objections as pure aluminium, for it is not capable of being satisfactorily worked by cutting-tools, and, for example, it clogs up files, &c. If now this alloy of only two to ten parts magnesium and one hundred parts of aluminium is subjected to a strong compressing process by rolling, drawing, pressing, &c., the properties of the material become quite different as contrasted with pure aluminium. The compressed new material possesses very much the same qualities which can only otherwise be obtained by essentially higher additions of magnesium—i. e., the compressed alloy with the smaller proportion

of magnesium can be excellently worked on by cutting-tools; &c.

In carrying out the rolling process in practice the course to be adopted is as follows: The pieces of material are first run one, twice, or any requisite number of times through the rolling-mill cold. They are then heated to from 400° to 500° centigrade, then again rolled cold once or several times, and so on, this treatment by alternately heating and rolling the blanks being repeated over and over again until the material has the density and the thickness desired. The expediency of heating the alloy is accounted for by the fact that the material without being thus heated or annealed at intervals becomes brittle, whereas the heating restores its original tenacity.

These compressed alloys that contain from three to five parts of magnesium to one hundred parts of aluminium give the best results and both as regards its cohesion and its workability may be said to be equivalent to brass, while in regard to certain other properties—such as tenacity, for example—it is even superior to brass.

An aluminium and magnesium alloy containing less than two parts of magnesium to one hundred parts of aluminium cannot be suitably hardened by rolling. The condensed alloy of aluminium and magnesium herein described retains these good qualities even though other metals, such as antimony and arsenic, are contained in it.

Having now described my invention, what I claim as new, and desire to protect by Letters Patent, is the following:

1. The art of producing a workable aluminium-magnesium alloy which consists in alloying the two metals in the proportion of one hundred parts of aluminium to not less than two nor more than ten parts of magnesium and then modifying the resultant alloy by mechanical compression, substantially as set forth.

2. The art of producing a workable aluminium-magnesium alloy which consists in alloying the two metals in the proportion of one hundred parts of aluminium to not less than two nor more than ten parts of magnesium and then modifying the resultant alloy

by compressing it and alternately heating and cooling it, substantially as set forth.

3. The art of producing a workable aluminium-magnesium alloy which consists in
5 alloying the two metals in the proportion of less than ten (10) per cent. and more than two (2) per cent. of magnesium to one hundred (100) per cent. of aluminium and sub-

sequently compressing the alloy, substantially as set forth.

Signed this 21st day of June, 1899, at Berlin, Germany.

LUDWIG MACH.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.