

# UNITED STATES PATENT OFFICE.

JAMES WEBSTER, OF EDGBASTON, GREAT BRITAIN.

## PRODUCING ALUMINIUM-BRONZE.

SPECIFICATION forming part of Letters Patent No. 233,900, dated November 2, 1880.

Application filed May 6, 1880. (No specimens.) Patented in England October 31, 1879.

*To all whom it may concern:*

Be it known that I, JAMES WEBSTER, of Edgbaston, in the county of Warwick, Great Britain, engineer, have invented a new and  
5 useful Composition or Alloy of Metals for the Production of an Improved Aluminium-Bronze, (for which I have obtained a patent in Great Britain, No. 4,436, bearing date October 31, 1879,) and of which the following is a specification.

My composition or bronze consists of the following metals, combined in the proportions stated, viz: I first take the required quantity of sheet-copper and thoroughly cleanse it by  
15 the aid of acids, alkalies, or other suitable and efficient means, and when so cleansed I deposit on such copper, by electric battery or other known means, a coating of aluminium to the extent of from one to ten per cent., by  
20 weight, of the copper, according to the quality and hardness of bronze required. This coated copper is then melted in a crucible or suitable furnace, adding thereto one per cent. (more or less, as may be required) of the alloy No. 2,  
25 hereinafter described, and the whole well mixed and combined. This molten metal is then cast into ingots or other convenient or required forms, and constitutes my improved aluminium-bronze, which I designate "alloy No. 1."

30 This improved bronze, when containing one per cent. of alloy No. 2, is suitable for all kinds of ships' sheathing; also, for ordinary castings where strength and toughness are required.

35 This bronze may be varied in its relative constituents for different purposes, when still greater strength and hardness are required, by adding thereto from two to six per cent. of the alloy No. 2.

40 Granulated copper or any other form thereof, or a mixture of copper and zinc, may be used instead of sheet-copper for receiving the said coating of aluminium; or, instead of coating the copper with aluminium, such copper  
45 may be melted alone, and the alloy No. 2 then added in such proportions as may be required for different qualities of bronze, and with the extra portion of aluminium as required for coating the copper added thereto, but I prefer the process first described.

The said alloy No. 2 consists of nickel,

twenty parts by weight; copper, twenty parts, by weight; tin, fifty-three parts, by weight; aluminium, seven parts, by weight—total, one hundred parts. These metals I melt and well  
55 mix in a crucible or suitable furnace, first fusing the twenty parts of nickel, with two parts of the copper added thereto, for the purpose of melting easier and in less time, the surface of the metals being kept carefully covered with  
60 charcoal or other carbonaceous matter, free from sulphur, during the process of fusion and mixing. When the metals are melted I add to the charcoal an equal weight, or thereabout, of chloride of sodium and of oxide of alumina,  
65 mixed together, so as to well cover the molten metal. To this metallic mixture the remaining eighteen parts of the copper are added, by degrees, stirring such metals well together until they are thoroughly united. Iron being in-  
70 jurious to this alloy, the stirring-rod used must not be of iron, but of wood, earthenware, or the like. To the said mixture of nickel and copper I now add, by degrees, the fifty-three parts of tin, well stirring the whole until thoroughly mixed  
75 and united, which can be ascertained by casting a small ingot of the mixture, and when cold breaking it. The broken faces of the metal will clearly show whether it is thoroughly mixed or not. If found to be clear in  
80 grain the process is completed, and the broken ingot may be returned into the crucible or furnace and be remelted with the metal therein; but should the broken ingot show that the mixture of the metals is imperfect, the pro-  
85 cess must be continued until the combination thereof is complete and satisfactory. When this is attained the temperature of the alloy may be lowered, and the seven parts of aluminium added thereto, by degrees, taking care  
90 not to add too much of the aluminium at a time, and to stir the whole continuously with a wood or earthenware stirrer. When this mixture is supposed to be well and intimately united I try a test-ingot, and proceed as here-  
95 in before described, and raise the temperature of the molten metal until it becomes thin and will run out of the crucible or furnace, as in the ordinary way of casting brass or the like, when it is cast into ingots or other forms, as  
100 required; or I make the said alloy, No. 2, as follows:



I melt and mix the nickel and copper, as before described; then add thereto five parts of tin, and well stir and mix these three metals together, and then cast the alloy into ingots or other forms, as desired. This alloy I designate "No. 2<sup>a</sup>." I then melt the seven parts of aluminium, by preference in a crucible, carefully covering the metal with a mixture of charcoal, chloride of sodium, and oxide of alumina, and when the metal is melted I add, by small degrees, the remaining forty-eight parts of tin, well stirring the metals with, by preference, a wood stirrer, until the two metals are thoroughly united, when the alloy may be cast as before described. This alloy I designate "No. 2<sup>b</sup>." I do not claim that there is any novelty in this step of my process.

It will be seen that when the two alloys, Nos. 2<sup>a</sup> and 2<sup>b</sup>, are mixed together they will give the same proportions of the several metals composing alloy No. 2, and can be used in making my improved bronze by adding the proper relative proportions of each to the said coated copper.

Making the alloy No. 2 in two separate alloys, as described, will be found preferable to fusing the aluminium with the nickel, copper, and tin, as first herein described. In this case

I prefer, first, to add to the melted coated copper the proper proportion of alloy No. 2<sup>a</sup>, and to thoroughly mix and unite them, and then add thereto the proper proportion of alloy No. 2<sup>b</sup>, thus forming, by the two mixings, the alloy No. 1, or my improved bronze, as hereinbefore described.

The relative proportions herein specified of the several metals employed admit of some variation without departing from the main characteristics of the invention; but

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The process of making aluminium bronze, consisting in the following steps: first, coating copper with aluminium, and then melting it with an alloy consisting of nickel, copper, tin, and aluminium, substantially as set forth.

2. An alloy consisting of a mixture of aluminium-coated copper, with the composition described as alloy No. 2, consisting of copper, nickel, aluminium, and tin, in the proportions stated.

JAMES WEBSTER.

Witnesses:

WILLIAM COOKE,  
HENRY LIDINGTON.