UNITED STATES PATENT OFFICE.

ALFRED H. COWLES AND EUGENE H. COWLES, OF CLEVELAND, OHIO.

MANGANESE BRONZE AND ALLOY OF COMMERCE.

SPECIFICATION forming part of Letters Patent No. 415,832, dated November 26, 1889.

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To all whom it may concern:

Be it known that we, ALFRED H. COWLES and EUGENE H. COWLES, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Manganese Bronzes and Alloys of Commerce; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

What we term the "manganese alloys" of commerce are alloys of manganese, copper, tin, zinc, and iron, as follows: manganese and copper; manganese, copper, and iron; manganese, copper, and zinc; manganese, copper, zinc, and iron; manganese and tin; manganese, tin, and iron; manganese, tin, zinc, and iron.

Great difficulty is experienced in casting these manganese alloys, the metal coming from the sand spongy and full of blow-holes, similar to those that occur in steel. The castings are thereby weakened and are rendered less valuable for use in the arts. They are also found to contain metallic oxides, which have been dissolved in the molten metals and remain, as a constituent of them, after their solidification in the molds, thereby rendering the castings of less tenacity and toughness and of lower electrical and heat conductivity. Thus great skill is required to mix and satisfactorily make these alloys.

Our invention consists in the addition of from one-thirtieth to five per centum of aluminium to any and all of these alloys prior to casting thereof. It requires but a fraction of a per centum of aluminium added or melted with the other constituents to free the metal from blow-holes and to reduce the metallic oxides that otherwise go into solution in the metal. From one to five per centum of aluminium added to these alloys in every case increases their tensile strength and in many cases their toughness. On an average, test-bars containing from one to five per centum of aluminium will show fifty per centum greater strength than the duplicates with the aluminium omitted. The elastic limits are elevated and rendered more distinct and similar in their nature to the well-marked elastic limit in steel. The resilience is increased. If aluminium is present, these metals when cast come from the sand with a clean bright surface, no sand-scale adhering to the casting to be removed. This is due to the aluminium preventing the oxidation of the base metals when the alloy is molten. These metallic oxides on the surface tend to flux the sand and cause it to adhere to the casting. The aluminium further renders these alloys more fluid and sharper castings are secured, and the metals with the aluminium present are more permanent and silver-like in their luster and less subject to corrosion, will take a higher polish, and are much whiter than without the aluminium. Again, aluminium aids these alloys when iron is present, as in the case of the bronzes made from ferro-manganese—the cheapest source of manganese—to absorb and incorporate the iron in the alloy, so that larger percentages of iron may be used to cheapen the alloy.

In adding the aluminium to these alloys the requisite amount of pure aluminium may be added; or, first, any alloy of manganese and aluminium, or of copper and aluminium, or of tin and aluminium, or of zinc and aluminium, or of iron and aluminium, or a mixture of these metals prepared with the proper amount of aluminium, and any one of these prepared alloys added to the other ingredients in the proper proportions to give the desired alloy.

What we claim is—

1. The process which consists in forming alloys of manganese and adding a small percentage of aluminium to such alloys, as herein described, prior to casting, as set forth.

2. The process which consists in forming alloys of manganese and adding from a trace to five per centum of aluminium to such alloys to increase their strength, elasticity, and facility of casting and diminish their tendency to corrosion and to add to their silver-like luster and whiteness, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

ALFRED H. COWLES.
EUGENE H. COWLES.

Witnesses to the signature of Alfred H. Cowles:

HIRAM A. TUCKER,
THEODORE STEVENS.

Witnesses to the signature of Eugene H. Cowles:

E. T. LOUGHBOROUGH,
H. M. SHAW.