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ARTICLE MADE FROM STEEL AND CAST IRON WITH REDUCED TENDENCY TO CORRODE

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1 Claim. (Cl. 75—125)

The invention relates to articles made from steel and cast iron with reduced tendency to corrode, especially when subjected to the action of water and more especially sea water and moist soil.

The present invention is an improvement of the steel and cast iron described and claimed by the applicant in his prior, copending application Serial Number 450,878, which matured into Patent No. 2,013,600 on Sept. 3, 1935, which is also resistant against sea water and moist soil. The prior process is based upon special electrolytic actions which are caused thereby, that the steel or cast iron is alloyed with copper, antimony, arsenic or tin and in combination with one or several of these additions with magnesium, nickel or aluminum. Said elements are used in the prior process in the following amounts: antimony, arsenic, tin in amounts between 0.05 and 5%, singly or together, copper in amounts up to 1%, magnesium between 0.1 and 5%, nickel between 0.2 and 0.5%, aluminum between 0.05 and 5%.

Further researches have shown that the titanium and vanadium elements act in a similar way as the magnesium, nickel and aluminum elements used secondly according to the main patent, and they are not only equivalent to these elements, especially aluminum, but even superior thereto. Since this has been found out, it is possible to replace the aluminum as well as magnesium and nickel by titanium or vanadium. The favourable influence of these two elements could not be foreseen either on account of their electrochemical or their chemical behaviour.

A further economically and advantageously acting influence of titanium and vanadium, owing to which steels alloyed with these elements will excel compared with aluminum containing steels, is that the capacity of steels alloyed with titanium or vanadium of offering increased resistance to the attacks of water will find expression already a short time after the beginning of corrosion in a considerable reduction of corroding speed. For example, the corroding speed in sea water will be reduced already after 14 days approximately 20% and in river water about 40% compared with that of copper-nickel steels alloyed with aluminum. Steels according to the invention are further distinguished by a perfectly uniform rusting of their surface exposed to the corroding agent. Local corrosions attacks in the form of dents or holes or notch-like depressions, which cause a reduction of the mechanical qualities of a steel, do not happen. From the point of view of foundry technics and metallurgy too, the possibility of substituting titanium or vanadium for aluminum affords an advantage in so far as steels mixed with titanium and vanadium can be worked better than those having an addition of aluminum.

The two elements will have the effect described already at very slight amounts thereof, namely, if one of the metals or both metals together are present in a quantity of 0.1%. Upwardly, the amount of metals with respect to their corrosion-stopping influence is unlimited. However, it is advisable when adding titanium not to exceed 1% and in case of vanadium 0.5%, as a greater addition would not afford any extra advantages.

Thus the invention comprises articles with a reduced tendency to corrode under the action of a corroding agent, more particularly the moisture contained in water, sea-water and moist soil; said articles being made from a ferrometal alloy containing 0.2 to 1% copper, and tin in amounts between about 0.05 and 5%, titanium between about 0.1 and 1%, vanadium between about 0.1 and 0.5% and in addition an element selected from the group consisting of arsenic and antimony in amounts between about 0.05 and 5% and the balance substantially all iron, the alloying elements copper, arsenic, antimony and tin forming together with titanium and vanadium a firmly adhering skin on the articles, due to the corroding attack by said corroding agent.

It may be mentioned that the further composition of the alloys besides the elements above specified is the usual one. Thus the alloy may be alloyed for some other reasons with the usual amounts of elements such as for example manganese, silicon, phosphorus, chromium, tungsten, molybdenum, cobalt, boron, zirconium, beryllium, as has been stated in my prior patent and in the case of steels the accompanying elements may be present in approximately the following amounts:

Carbon	traces up to 1%
Silicon	traces up to 0.5%
Manganese	0.1 to 1%
Sulphur	traces up to 0.12%
Phosphorus	traces up to 0.2%

and in the case of iron in approximately the following amounts:

Carbon	2 to 3.6%
Silicon	0.3 to 3%
Manganese	0.3 to 1.2%
Sulphur	traces up to 0.12%
Phosphorus	traces up to 1.0%

What we claim and desire to secure by Letters Patent in the United States is:

Articles with a reduced tendency to corrode under the action of a corroding agent, more particularly the moisture contained in water, seawater and moist soil; said article being made from a ferrometal alloy containing 0.2% to 1% copper, and tin in amounts between about 0.05 and 5%, titanium between about 0.1 and 1%, vanadium between about 0.1 and 0.5% and in addition an element selected from the group consisting of arsenic and antimony in amounts between about 0.05 and 5% and the balance substantially all iron, the alloying elements copper, arsenic, antimony and tin forming together with titanium and vanadium a firmly adhering skin on the articles, due to the corroding attack by said corroding agent.

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