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CORROSION RESISTANT TUBULAR ARTICLE

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6 Claims. (Cl. 138—47)

This invention relates to improvements in corrosion-resistant tubular articles, and more particularly, corrosion-resistant wrought-metal tubular articles formed of copper-base alloys containing phosphorus, aluminum and tin, with or without the addition of one or more other elements which do not seriously impair the properties of the alloy.

We have found that wrought-metal tubular articles, such, for example, as tubes, pipes, etc., made of copper-base alloys containing phosphorus from about ¼% to about 2%, aluminum from about ¼% to about 4%, tin from about ½% to about 3½%, and copper, the copper, phosphorus, aluminum and tin constituting about 90% or more of the alloy, with or without one or more additional elements in such substantial-innocuous amounts as do not seriously impair the properties of the alloy, have valuable corrosion-resistant properties, especially when in contact with saline liquid or dilute acid. The additional elements may range up to a total of about 10%, depending on what elements are added, some being more innocuous than others. While each of the elements iron, antimony and arsenic should not be present much in excess of about 0.1%, silver, which is comparatively innocuous, may be present to as high as about 10% provided not too much of other elements is present. Nickel may be present to as high as about 5%, and lead and silicon may each be present to as high as about 3%.

In order that our improved alloys may be wrought to make tubular articles such, for example, as tubes, pipes, etc., for conveying or holding or otherwise contacting corrosive liquids, the total of the phosphorus, aluminum and tin preferably should not be greater than about 7½%, with the phosphorus from about ¼% to about 2%, the aluminum from about ¼% to about 4%, and the tin from about ½% to about 3½%. Still better workability of the metal is had when the total of the phosphorus, aluminum and tin does not exceed about 5½%, with the phosphorus from about ¼% to about 1½%, the aluminum from about ¼% to about 3%, and the tin from about ½% to about 2%.

An advantageous alloy range consists in having the phosphorus from about ½% to about 1½%, the aluminum from about ½% to about 3% and the tin from about 1% to about 3%. And within this range three alloys may be advantageously made having nominal composition as follows: the first having about ¾% phosphorus, about ¾% aluminum and about 3% tin, the second having about 1% phosphorus, about 1% aluminum and about 2% tin, and the third having about 1% phosphorus, about 1½% aluminum and about 1½% tin.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are therefore to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

We claim:

1. A wrought-metal tubular article for use in contact with saline liquid or dilute acid and characterized by good corrosion resistance to saline liquid and dilute acid and formed from an alloy containing: phosphorus as an essential element from about ¼% to about 2%; aluminum from about ¼% to about 4%; tin from about ½% to about 3%; and the balance substantially of copper.

2. A wrought-metal tubular article for use in contact with saline liquid or dilute acid and characterized by good corrosion resistance to saline liquid and dilute acid and formed from an alloy containing: phosphorus as an essential element from about ¼% to about 2%; aluminum from about ¼% to about 4%; tin from about ½% to about 3½%; the sum of the phosphorus, aluminum and tin being not greater than 7.5%; and the balance substantially of copper.

3. A wrought-metal tubular article for use in contact with saline liquid or dilute acid and characterized by good corrosion resistance to saline liquid and dilute acid and formed from an alloy containing: phosphorus as an essential element from about ½% to about 1½%; aluminum from about ½% to about 3%; tin from about 1% to about 3%; and the balance substantially of copper.

4. A wrought-metal tubular article for use in contact with saline liquid or dilute acid and characterized by good corrosion resistance to saline liquid and dilute acid and formed from an alloy containing: phosphorus as an essential element about ¾%; aluminum about ¾%; tin about 3%; and the balance substantially of copper.

5. A wrought-metal tubular article for use in contact with saline liquid or dilute acid and characterized by good corrosion resistance to saline liquid and dilute acid and formed from an alloy containing: phosphorus as an essential element

about 1%; aluminum about 1%; tin about 2%; and the balance substantially of copper.

6. A wrought-metal tubular article for use in contact with saline liquid or dilute acid and characterized by good corrosion resistance to saline liquid and dilute acid and formed from an alloy containing: phosphorus as an essential element about 1%; aluminum about 1½%; tin about 1½%; and the balance substantially of copper.

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