UNITED STATES PATENT OFFICE.

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ALLOY.

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To all whom it may concern:

Be it known that I, FOSTER MILLIKEN, a citizen of the United States, and a resident of Lawrence, in the county of Nassau and State of New York have invented a new and Improved Alloy, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved alloy characterized by having a high acid-resisting quality, and increased density, an exceedingly close and fine grain, great tensile strength, increased elasticity, and electrical resistance.

The alloy is formed of copper, nickel, iron and zinc under the influence of a deoxidizing or purifying agent such as manganese titanium, or tungsten, or chromium.

In carrying out the invention, use is made of copper, 50 to 60 per cent.; nickel, 26 to 34 per cent.; iron, 4 to 8 per cent.; zinc, 7 to 11 per cent.; and a deoxidizing or purifying agent, .25 to 5 per cent.

The melt in each case consists of one hundred ounces of the four metals and the percentage of the deoxidizing agent is then added extra. A large percentage of the deoxidizing agent after the latter has done the work of purifying the alloy, passes off in the slag. Although the above-mentioned deoxidizing agents, namely, manganese titanium, or tungsten or chromium, have given very good results, other deoxidizing agents may be used such, for instance, as molybdenum, aluminum, bismuth, vanadium, cadmium, silicon and boron. It is understood that the addition of the deoxidizing agent has the double function of purifying the copper, nickel, iron and zinc and of adding a valuable ingredient to the alloy. It is further expressly understood that a portion of the deoxidizing agent used for the purification of the copper, nickel, iron and zinc remains as an integral part of the alloy. The alloy thus constituted is characterized by increased electrical resistance, increased elastic limit, increased tensile strength, increased density, a close and fine grain, and a high resistance to corrosion.

Adding the deoxidizing agent to the previously formed alloy of copper, nickel, iron and zinc permits of using a comparatively small amount of such deoxidizing agent for the purpose of purifying the alloy.

Specimens of the alloy tested for three months in an acid test show that with the alloy formed under the influence of manganese titanium there was a loss of .0052 grams per square inch of exposed surface, and the alloy under the influence of tungsten disclosed a loss of .0134 grams per square inch, and under the influence of chromium the loss was .0079 to .0117 per square inch, and hence it is manifest that an alloy of the character specified has high acid resisting properties. It has also been found that the alloy produced under the influence of manganese titanium has increased density and the grain is more close and finer and resistance to corrosion is increased.

It is expressly understood that the deoxidizing agent removes any oxidized portions that may have formed on any one of the metals forming the alloy and hence no cavities, fissures, recesses or the like and incident to oxidation are formed in the alloy. The alloy is thus compacted and its elastic limit and tensile strength are considerably increased relative to any alloy formed of the same metals without the influence of the deoxidizing agent. It is well known that when a metal is deoxidized and is free of cavities and the like its electrical resistance is increased and this is expressly the case in the present alloy.

Manganese titanium is the preferred deoxidizing agent of the ones mentioned above and is a commercial product formed of sixty per cent. manganese and forty per cent. titanium.

The use of tungsten and chromium as deoxidizing agents for the metals of the alloy will form the subject matter of separate applications, and hence specific claims for these deoxidizing agents are not made in this application.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An alloy containing copper, nickel, iron, zinc and a purifying agent, the copper, nickel, iron and zinc being in a purified state and in proportion substantially as specified, the said purifying agent being a portion of 0.25 to 5 per cent. of the purifying agent used as the medium for purifying the said copper, nickel, iron and zinc, and remaining as an integral part of the alloy after purification of the said copper, nickel, iron and

zinc, the said alloy being characterized by increased electrical resistance, increased elastic limit, increased tensile strength, increased density, a close and fine grain, and a high resistance to corrosion.

2. An alloy containing copper, nickel, iron and zinc in proportions substantially as specified, the alloy being in a purified state, and manganese and titanium.

3. An alloy formed of copper 50 to 60 per cent., nickel 26 to 34 per cent., iron 4 to 8 per cent., and zinc 7 to 11 per cent., and manganese and titanium.

4. An alloy composed of the following ingredients, in approximately the following proportions, copper 50 to 60 per cent., nickel 26 to 34 per cent., iron 4 to 8 per cent., zinc 7 to 11 per cent., the said ingredients being in a purified state, and manganese and titanium.

FOSTER MILLIKEN.