

UNITED STATES PATENT OFFICE.

BERTRAND S. SUMMERS, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE
WESTERN ELECTRIC CO., OF SAME PLACE.

COPPER ALLOY.

SPECIFICATION forming part of Letters Patent No. 680,819, dated August 20, 1901.

Application filed January 4, 1899. Serial No. 701,125. (No specimens.)

To all whom it may concern:

Be it known that I, BERTRAND S. SUMMERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Copper Alloys, (Case No. 3,) of which the following is a full, clear, concise, and exact description.

My invention relates to an improved copper alloy which is designed, primarily, for use in the electrical art and which has the properties of high electrical conductivity and of being readily cast.

The object of my said invention is to produce a metal combining these obvious advantages.

Heretofore it has been found impossible to obtain satisfactory commercial castings of copper except when that metal is combined with a relatively large percentage of an alloying metal—as, for example, bronze or brass. It is well known that such alloys may be readily cast; but for electrical uses these metals are greatly inferior to copper, inasmuch as the electrical conductivity of an alloy is very much less than that of copper and cannot therefore be used for many purposes. I have, however, discovered a copper alloy which by reason of the properties imparted by the addition of a small percentage of magnesium is nearly equal to pure copper for electrical purposes, while being capable of being readily cast to form any desired article of commerce.

The alloy of my invention, whose preparation I will now describe, consists of commercially-pure copper, to which has been added a very small percentage of magnesium.

The method which I preferably practice in preparing the alloy is as follows: Commercially-pure copper in any convenient form is placed in a graphite pot, the metal then being covered with charcoal and the lid placed upon the pot. The graphite pots as thus prepared are placed in a furnace, where they are allowed to remain and be heated until the copper is perfectly fluid. At intervals during the heating more charcoal is added to the pots in order to maintain the metal at all times beneath a layer of that material. When the pots and contents have been sufficiently

heated, the lids are successively removed and magnesium is introduced in the following manner: Magnesium provided with an external protective wrapper, for which I preferably use paper and sheet-asbestos, is tied upon a copper rod and forced beneath the surface of the heated metal, the molten mass being thoroughly stirred to secure an intimate mixture of the two metals. I have found that the proportions ranging between one-half and two ounces of magnesium to each one hundred pounds of copper are ordinarily the most advantageous in producing my alloy, although I have experimented with various other proportions of the two metals and secured satisfactory results, the quantity of magnesium used depending somewhat upon the nature of the copper and the use for which the alloy is intended. Immediately after securing the thorough alloying of the metals the pot is removed from the furnace and the molten metal is cast, care being taken to skim off the floating charcoal and any slight surface impurities that may be present by means of copper or carbon skimmers. It will be found that the copper alloy as thus prepared is capable of being satisfactorily cast and that such castings are solid and free from porous or defective portions so commonly found when the casting of copper is attempted. I have analyzed a number of castings of my alloy as thus prepared and have found that the average amount of magnesium therein ranges from .02 to .09 per cent. On the other hand, my improved alloy has an electrical conductivity of about ninety per cent. that of pure copper, its physical properties being practically identical with those of copper. For electrical purposes my alloy is very much superior to any other copper alloy with which I am conversant, since its casting properties are equal to any, while its conductivity remains very much higher than is found in other alloys. From my observations I have concluded that the magnesium serves to purge the copper from gaseous and other impurities, thus imparting to it the conditions required for casting the metal in a state approximating commercial purity. It will be understood that the resulting product or alloy may vary consider-

ably without departing from the principles or spirit of my invention, the same contemplating an alloy having substantially the properties of pure copper and which in addition may readily be cast.

I therefore claim, and desire to secure by these Letters Patent, the following:

The herein-described alloy having substantially the properties of pure copper and being capable of being readily cast, the said alloy

consisting of approximately one-tenth of one per cent. of magnesium and commercially-pure copper.

In witness whereof I hereunto subscribe my name this 21st day of December, A. D. 1898.

BERTRAND S. SUMMERS.

Witnesses:

MINA L. SWORTWOUT,
A. L. LAWRENCE.