UNITED STATES PATENT OFFICE.

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ALLOY.

No. 824,103. Specification of Letters Patent. Patented June 26, 1906.

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To all whom it may concern:

Be it known that I, WILBUR B. DRIVER, a citizen of the United States, and a resident of East Orange, New Jersey, have invented a new and useful Improvement in Alloys, which is fully set forth in the following specification.

My invention consists of a new and useful improvement in alloys or compounds of copper, nickel, and manganese which are designed primarily for use as electrical resistance to take the place of materials heretofore used for that purpose, especially German silver, which has for many years been regarded as the standard material for the purpose, but which possesses many disadvantages that are eliminated by using the alloy of my invention.

The object is to produce an alloy that shall not only have a high and practically constant resistance, but one that is permanent and stable in its physical and electrical properties.

The particular disadvantage of German silver is that after repeated heatings and coolings in service it crystallizes and breaks. This is due to the presence of zinc and is not an infrequent occurrence in any alloy of which zinc forms a considerable part, and for this reason I have omitted zinc in my new alloy. "Eighteen per cent. German silver," the grade most frequently used, is composed of eighteen to twenty parts nickel, ten to twenty-five parts zinc, and fifty-five to seventy-two parts copper. In my improved alloy I have about the same proportion of copper and of nickel, but have replaced the zinc with about five parts of manganese. This makes an alloy consisting of about seventy-five parts copper, twenty parts nickel, and five parts manganese. Nickel and manganese each have the effect of increasing the resistance of the alloy, the manganese, however, to a much greater extent than the nickel; but manganese has a tendency to make the alloy unstable, and therefore a considerable amount of nickel—ten per cent. or more—is used for the purpose of "fixing" the electrical qualities of the resultant alloy.

Alloys have been heretofore suggested consisting of copper and nickel with manganese; but the manganese entering into the composition was usually in the form of ferromanganese, and the result was the production of an alloy which would rust and rapidly deteriorate upon exposure even to the atmosphere. By the use of pure manganese iron does not enter into my composition, and therefore the possibility and probability of deterioration from rust is eliminated. Moreover, such copper-nickel-manganese alloys as have been attempted were found to be brittle or otherwise unworkable in addition to their want of stability and liability to rust. This brittleness is possibly due to the proportions used.

In the manufacture of my alloy I employ the ordinary method of making alloys—that is, take the three ingredients in the proportions, by weight, indicated and place them in a crucible and then apply heat to fuse the mixture, or they may be melted separately and then mixed—any ordinary method of making alloys. In this manufacture great care must be taken lest an appreciable amount of iron, silicon, carbon, or other foreign substances be present in the finished article; but if these substances are present in small quantities only they will have very little influence on the value of the commercial alloy.

The proportions named above can be varied considerably without materially changing the effectiveness of the alloy; but for the reasons stated I prefer the ingredients to be of practically the percentage specified.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is the following:

1. A new composition of matter containing copper and nickel with from five per cent. to ten per cent. (5%–10%) of manganese and being essentially free from iron or other foreign substances.

2. A new composition of matter consisting of an alloy containing copper and manganese with twenty per cent. of nickel.

3. A new composition of matter consisting of an alloy containing copper and nickel with five per cent. of manganese.

4. A new composition of matter consisting of an alloy containing manganese and nickel with seventy-five per cent. of copper.

5. An electrical resistance consisting of an alloy containing seventy-five parts of copper

and twenty parts of nickel with five parts of manganese.

6. A new composition of matter consisting of an alloy containing copper and manganese with from ten per cent. to thirty per cent. (10%–30%) of nickel.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILBUR B. DRIVER.

Witnesses:
R. L. SCOTT,
W. H. HARTING.