

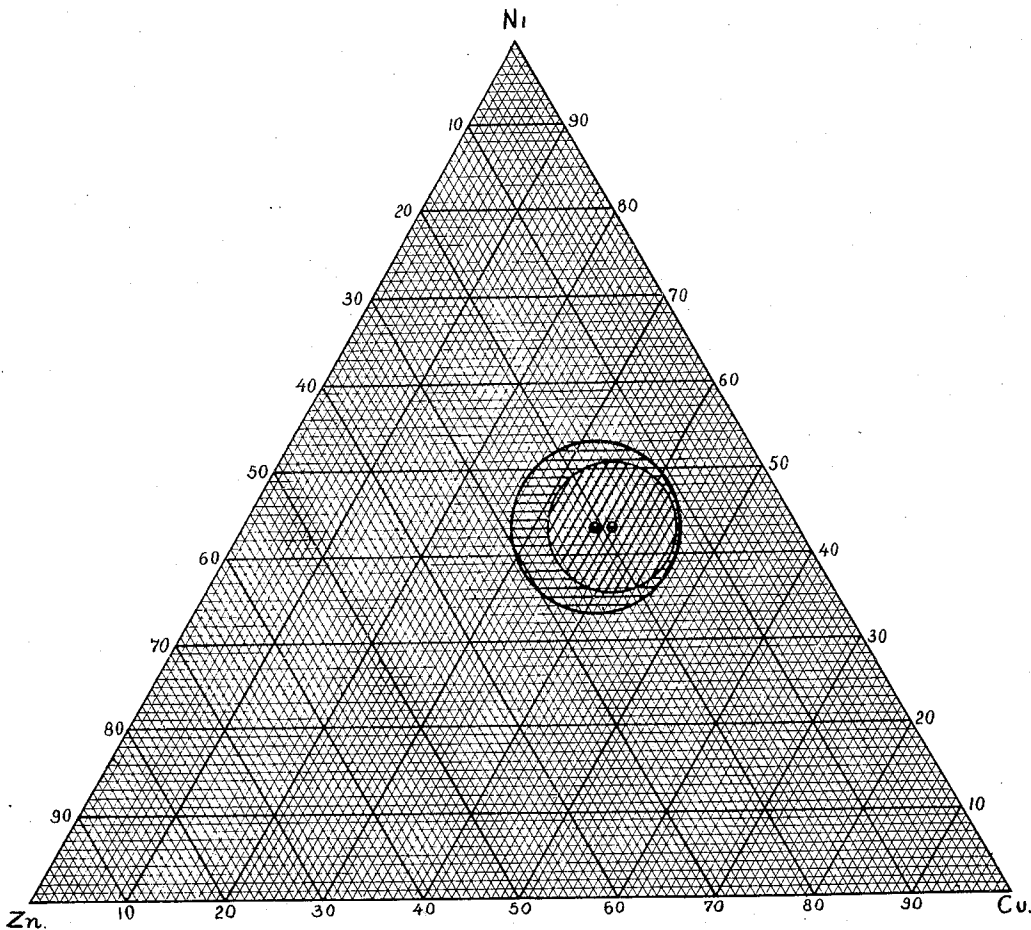
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E. M. WISE

WHITE GOLD ALLOY

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UNITED STATES PATENT OFFICE.

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WHITE-GOLD ALLOY.

Application filed October 28, 1925. Serial No. 65,503.

To all whom it may concern:

Be it known that I, EDMUND MERRIMAN WISE, a citizen of the United States, residing at 601 4th St., Dayton, in the county of Campbell, State of Kentucky, have invented certain new and useful Improvements in White-Gold Alloys; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to alloys of the character now commonly known to the jewelry trade as "white gold."

This application is a continuation in part of my application Serial No. 567,545, filed June 12, 1922.

It is the object of the present invention to produce a white gold alloy having an appearance comparable to that of platinum and having such good wearing qualities, resistance to corrosion and hardness as to be fully adapted for use in the production of watch cases and jewelry, and having such ductility and tensile strength as to readily admit of factory manipulation in the production of ornamented or complex shapes.

In its preferred embodiment, the alloy of the present invention is about 14 carat gold, that is to say, it comprises approximately 58.30 to 58.35% gold. While the preferred embodiment of my invention is approximately a 14 carat gold alloy, yet the percentage of gold in the final product may vary throughout a wide range. The gold content may be as high as 80% or as low as 30% without sacrificing many of the advantages derived from the preferred embodiment of the invention.

The other elements of the alloy are nickel, copper and zinc in varying proportions and with or without a fractional percentage of an easily reactive metallic element or elements (metals or metalloids) such as cerium, calcium, boron, manganese, aluminum, vanadium, titanium, magnesium, and silicon.

The accompanying drawing is a ternary diagram of the major alloying constituents in 14 carat white gold as compounded in accordance with the present invention. The larger shaded area indicates the permissible

variations in the relative proportions of nickel, copper and zinc, when alloys are made in conformity with the present invention. The smaller shaded area indicates the permissible variations in the relative proportions of nickel, copper and zinc when alloys are made in conformity with the preferred embodiment of the present invention.

An alloy suitable for use in the manufacture of watch cases by metal working operations now commonly used in the watchcase makers' art consists of 58.30% gold, 17% nickel, 16% copper and 8.70% zinc. The alloy may be made up by mixing these metals in the proper proportions and then fusing the entire mass in a suitable furnace, or some of the ingredients may be compounded into alloys before the final mixture is made, as will be well understood by those skilled in this art.

An alloy having the proportions above indicated has a color entirely suitable to the demands of the watch making and jewelry trade and approximating that of platinum. The alloy has a Brinell hardness of 171, can be readily rolled, drawn and otherwise worked, is free from gas bubbles, flaws and cracks and has been used by me with success in the production of watch cases marketable to the trade as 14 carat white gold cases.

The alloy of the present invention can also be compounded in the proportions by weight of 58.35 parts gold, 17.5 parts nickel, 17.95 parts copper, 6 parts zinc and 0.30 parts manganese. This alloy has a Brinell hardness of 168 and is slightly darker than the alloy discussed above but it has good ductility and is marketable as white gold.

The alloy can also be compounded in the proportions by weight of 58.35 parts gold, 17.6 parts nickel, 16.95 parts copper, 7 parts zinc and .15 parts manganese. This alloy has a Brinell hardness of 169 and is satisfactory in color and likewise in ductility.

The three sets of proportions given above are but illustrative of the permissible variations in the relative percentages of nickel, copper, zinc and manganese without departing from the spirit of the present invention.

Other changes in these relative proportions can be made without serious detriment,

either to the color, the hardness, the ductility, or the marketability of the ultimate product, and in the accompanying drawing, the larger shaded area covers such variations in the nickel, copper and zinc content as come within the present invention, as defined by the appended claims.

When the gold content of the alloy is approximately 58.3% of the total and the easily reactive metallic element or elements, if present, constitute less than 1% of the total, the other three constituents necessary to make up the total percentage may vary among themselves as indicated in the larger shaded area of the ternary diagram in the relation of 13.75 to 22.12 parts nickel, 11.00 to 19.37 parts copper and 4.42 to 12.79 parts zinc.

The center of this larger shaded area indicates 43.00 parts nickel, 36.50 parts copper and 20.50 parts zinc.

The variations thus indicated by the larger shaded area of the ternary diagram change somewhat the hardness of the metal, its color, and likewise its ductility and tensile strength, but without impairing its marketability as white gold, and, of course, without changing the metal from what properly can be designated as 14 carat gold. Relative proportions lying outside this larger shaded area are, so far as I have found, lacking in some desirable characteristics. Either the 14 carat gold alloy made therewith is too brittle for factory manipulation, or it departs too much from the desired bluish white color, or it has flaws or blow-holes, or in some respects is inferior to those proportions lying within the circle.

In the preferred embodiment of the present invention, the relative proportions of nickel, copper and zinc lie within the smaller shaded area; that is to say, the nickel varies from 14.70 to 21.08, the copper from 12.70 to 19.08 and the zinc from 4.66 to 11.04.

The center of this smaller circle represents 43.00 nickel, 38.10 copper and 18.90 zinc and consequently, the 14 carat gold corresponding with the center of the smaller shaded area (and disregarding the fraction of a percentage of easily reactive metals or metalloids), has a composition of 58.33% gold, 17.90% nickel, 15.90% copper and 7.87% zinc.

The above description and discussion of the relative proportions of the nickel, copper and zinc have been made with reference to an alloy which is about 14 carat gold. It is to be understood, however, that the nickel, copper and zinc can be used in any of the proportions mentioned above, together with gold in amounts other than the percentage which will produce a substantially 14 carat gold product. For example, alloys containing from 30% up to 80% gold can be worked

satisfactorily and the color is reasonably white up to 75% gold. Below the 30% gold, the alloy is attacked considerably by nitric acid which makes it of comparatively little use in the manufacture of jewelry.

The alloy can be compounded of such proportions that in the finished product the amount of gold is between 50% and 60% and the relative proportions of the nickel, copper and zinc are 33.0 to 53.1 parts nickel, 26.4 to 46.5 parts copper, and 10.6 to 30.7 parts zinc. The gold content may vary between the limits of 40% and 70% of the finished product or in fact the gold may vary from 30% to 80%. In any case, the relative proportions of the nickel, copper and zinc may be as given above in the examples of the 14 carat product. For example, the alloy can be compounded in such proportions that the gold constitutes 35% to 75% of the finished product and relative proportions of the nickel, copper and zinc are 35.3 to 50.6 parts nickel, 30.5 to 45.8 parts copper and 11.2 to 26.5 parts zinc.

The metals above indicated need not be chemically pure and the good results of the present invention are not destroyed by the presence of fractional percentages of other chemical elements commonly found as impurities in nickel, copper and zinc, but, the present invention does not contemplate the intentional addition or presence in the alloy of any metals other than those indicated above, excepting that it is permissible to incorporate in the alloy a fraction of 1% of an easily reactive metallic element or elements of the general class above indicated.

I claim:

1. A gold alloy containing from 30% to 80% gold and containing nickel, copper and zinc in the relative proportions of 33.0 to 53.1 parts nickel, 26.4 to 46.5 parts copper and 10.6 to 30.7 parts zinc.

2. A gold alloy containing from 40% to 70% gold and containing nickel, copper and zinc in the relative proportions of 33.0 to 53.1 parts nickel, 26.4 to 46.5 parts copper and 10.6 to 30.7 parts zinc.

3. A gold alloy containing from 45% to 65% gold and containing nickel, copper and zinc in the relative proportions of 33.0 to 53.1 parts nickel, 26.4 to 46.5 parts copper and 10.6 to 30.7 parts zinc.

4. A gold alloy containing from 50% to 60% gold and containing nickel, copper and zinc in the relative proportions of 33.0 to 53.1 parts nickel, 26.4 to 46.5 parts copper and 10.6 to 30.7 parts zinc.

5. A white gold alloy containing from 50% to 60% gold and containing nickel, copper and zinc in the relative proportions of 35.3 to 50.6 parts nickel, 30.5 to 45.8 parts copper, and 11.2 to 26.5 parts zinc.

6. A white gold alloy of approximately 14 carat, containing 13.75 to 22.12 parts

nickel, 11 to 19.37 parts copper and 4.42 to 12.79 parts zinc.

7. A white gold alloy of approximately 14 carat, comprising 14.70 to 21.08 parts nickel, 12.70 to 19.08 parts copper, 4.66 to 11.04 parts zinc.

8. A white gold alloy consisting essen-

tially of about 58.33 parts gold, 17.90 parts nickel, 15.90 parts copper, 7.87 parts zinc and 0 to 1 parts easily reactive metallic elements, substantially as described. 10

In testimony whereof I affix my signature.

EDMUND MERRIMAN WISE.