Patented Oct. 8, 1929

1,731,212

UNITED STATES PATENT OFFICE

VICTOR D. DAVIGNON, OF ATTLEBORO, MASSACHUSETTS, ASSIGNOR TO GENERAL PLATE COMPANY, OF ATTLEBORO, MASSACHUSETTS, A CORPORATION OF RHODE ISLAND

GOLD ALLOY

No Drawing. Original application filed June 10, 1926, Serial No. 115,115. Divided and this application filed June 23, 1928. Serial No. 287,891.

The invention relates to alloys of precious metals, and particularly to gold alloys containing metals of low specific gravity, and to the process of making the same.

The invention has among its objects the production of gold alloys of relatively low specific gravity and malleable and ductile to a degree permitting working by usual mill processes of alternate mechanical attenuation and annealing.

This application is a division of my copending application Serial No. 115,115, filed June 10, 1926.

The present invention is particularly concerned with gold alloys containing low specific gravity metals possessing the characteristics of silicon and titanium, which metals, probably on account of their strong affinity for oxygen, cannot be alloyed with gold by usual processes to produce homogeneous, malleable and ductile alloys. Although the metals mentioned belong to the group of metals which have as a distinguishing characteristic the ready alloying with iron it is to be understood that the invention is not limited to use of metals of this group, as other low specific gravity metals, for example aluminum, which does not readily alloy with iron but which has a strong affinity for oxygen, can be alloyed with gold by use of the process.

According to the practice of the invention the constituents of the alloy are melted in the presence of suitable fluxes to eliminate the oxides of the low specific gravity metals, with the result that a homogeneous alloy suitable for use in usual mill processes is produced. Preferably, but not necessarily, the constituents are melted with a metal which will facilitate the combining of the low specific gravity metal with the gold. In producing gold-copper alloys I have found small amounts of manganese, say in amounts equal to 1% of the weight of the alloy, will give satisfactory results, which I explain is due to the manganese causing the low specific gravity metal to combine with the copper, the latter readily combining with the gold.

As suitable for flux I may use potassium bifluoride, calcium chloride, cryolite, potassium chloride, sodium chloride, and sodium fluoride, a mixture consisting of 1 part calcium chloride and 2 parts potassium bifluoride being very satisfactory.

By practice of the improved method commercial gold alloys containing from 25 to 85% by weight of gold and silicon in amounts up to 1½% or titanium in amounts up to 1% may be readily produced, and with care the amounts of silicon and titanium may be raised to about 3% of the alloy. Small amounts of these low specific gravity metals, as for example 1% of silicon or even less, will have a marked effect upon the specific gravity of the resulting alloy.

As a desirable commercial 12 carat green gold alloy the same may contain by weight about 50% gold, 12% copper, 1½% silicon, 1% manganese, and the remainder silver, while as a desirable commercial 12 carat yellow gold alloy the same may contain by weight about 50% gold, 1½% silicon, 1% manganese, and the remainder copper. In the green gold alloy part of the silver may be replaced by aluminum, and in the yellow gold alloy part of the copper may be replaced by aluminum, say in amounts equal to about 3% of the alloy.

As an example of the practice of the method, but without limitation thereto, 1.5 troy ounces of silicon, 1 troy ounce of manganese, 12 troy ounces of copper, 35.5 troy ounces of silver, and 50 troy ounces of gold, all in small pieces, may be placed in a graphite crucible, say one about 4 inches in diameter at the top and about 8 inches high, the metals being arranged on top of each other in the order of their specific gravities, the silicon on the bottom and the gold on the top, while over the metals is placed about 1 ounce of a flux consisting of the mixture of calcium chloride and potassium bifluoride hereinbefore referred to. The crucible is now placed in a furnace and raised to a temperature of about 1700 degrees Fahrenheit, the molten metals being stirred with a carbon rod thoroughly to mix them, and if necessary additional flux being added to maintain on the molten metals a layer of flux about ¼ inch thick. After melting, the contents of the crucible, that is the molten metals together

with the slag and flux, are poured into a mold and allowed to cool, the mold conveniently being of iron and having a mold chamber about 10 inches long, which chamber in cross-section is a rectangle about ½x2 inches, the long axis of the chamber being at about 45 degrees to the horizontal, with the sides of greatest width in vertical planes.

Although I have described several examples of alloys and metals for use therein, one example of the improved method and several examples of fluxes for use therewith, it is to be understood that within the scope of my invention wide deviations may be made without departing from its spirit.

Claims:

1. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of metal of the group comprising silicon and titanium up to 3%, the remainder predominantly silver.

2. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of metal of the group comprising silicon and titanium up to 3%, small but substantial amounts of manganese, the remainder predominantly silver.

3. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of metal of the group comprising silicon and titanium up to 3%, substantial amounts of aluminum up to 3%, the remainder premdominantly silver.

4. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of metal of the group comprising silicon and titanium up to 3%, substantial amounts of aluminum up to 3%, small but substantial amounts of manganese, the remainder predominantly silver.

5. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of silicon up to 3%, the remainder predominantly silver.

6. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of silicon up to 3%, small but substantial amounts of manganese, the remainder predominantly silver.

7. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of silicon up to 3%, substantial amounts of aluminum up to 3%, the remainder predominantly silver.

8. Substantially homogeneous, malleable and ductile gold alloys having by weight from 25 to 85% gold, substantial amounts of silicon up to 3%, substantial amounts of aluminum up to 3%, small but substantial amounts of manganese, the remainder predominantly silver.

9. A gold alloy containing by weight about 50% gold, 12% copper, from 1 to 3% silicon, 1% manganese, and the remainder silver.

10. A gold alloy containing by weight about 50% gold, 12% copper, from 1 to 3% silicon, 3% aluminum, 1% manganese, and the remainder silver.

In testimony whereof, I have signed my name to this specification.

VICTOR D. DAVIGNON.