The invention accordingly, comprises a composition of matter possessing the characteristics, properties, and the relation of components which will be exemplified in the composition hereinafter described, and the scope of the invention will be indicated in the claims.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

TiN has a hardness of Hv 1950, a specific gravity of 5.44 g./ml, a melting point of 2950° C. and excellent corrosion-resistance. The appearance of the compound is somewhat similar to that of gold. The sintering temperature can be lowered substantially and the appearance of the material can be brought closer to that of gold by the use of Ti in combination with Al, Cr and Fe as a binder. The use of such a binder results in a substantial improvement in the sinterability and by adjustment of the quantity of binder and the composition thereof, the hardness and color tone can be adjusted as desired.

To produce articles in accordance with the present invention, powdered TiN together with the binder to be employed are weighed, and mixed for 24 hours in a wet ball-mill using ultra hard balls and a liquid such as benzene, at the end of which period the particles will have been reduced sufficiently in size. The resulting material is then dried in an inert gas such as nitrogen, a quantity of paraffin amounting to about 1% by weight of the material is added, and the material is pressed to produce a compact or preform. The pressure used during the production of the compact is about 4 tons/cm². Where test specimens are being made, a convenient size is 10 mm. in width, 30 mm. in length, and 6 mm. in thickness.

The compacts are heated gradually in a nonoxidizing atmosphere, such as nitrogen gas, until the paraffin is vaporized, after which the compacts are sintered for 60 minutes at a temperature lying between about 1620° C. and 1700° C., depending on the particular combination used. During the sintering, the pressure within the furnace is maintained at about 5x10⁻³ mm. of Hg.

Following sintering and cooling, the compacts, whether specimens or articles, are polished by means of a diamond grindingstone. Specimens may then be tested for mechanical properties such as hardness, strength and corrosion resistance, and for appearance factors such as surface condition and color tone. Corrosion resistance was tested by examining the extent to which rust formed when the samples were soaked in 5% hydrochloric acid, in 7% nitric acid, and in 10% sulfuric acid, each test lasting for about 5 days. In all cases, it was found that the corrosion resistance was excellent, the strength and hardness proved to be satisfactory, and the appearance closely simulated that of gold.

Following are examples of the results achieved with compositions in accordance with the present invention:

EXAMPLE 1

| Percent |  
|---------|---
| TiN     | 88  
| Ti      | 4   
| Al      | 5   
| Cr      | 2   
| Fe      | 1   

Sintering condition, 1640° C X 60 min.

Specimens made in accordance with Example 1 proved to have a hardness of Hv 1080, a tensile strength of 90
A specimen prepared in accordance with Example 2 had a hardness of Hv 1120, a tensile strength of 103 kg./mm.², and a lustrous golden appearance subsequent to polishing with a diamond wheel. The corrosion resistance was excellent.

It was found that where the binder content ranges from 3 to 30% of the total weight of the alloy, sinterability, high hardness and tensile strength and excellent appearance are achieved. Also, resistance to corrosion is excellent. Where the binder content exceeds 30%, sinterability, tensile strength and color tone change to an extent such that the resultant alloy is unsatisfactory with respect to color and hardness. Similarly, if less than 3% of binder is incorporated, sinterability, hardness and color tone are also unsatisfactory.

For the most part, titanium is the principal component in the binder used, so that in the various compositions encompassed by the present invention, the titanium content may lie between 2.5 and 23% by weight where the total weight is 100 parts. Similarly, the total weight of aluminum, chromium and iron is preferably between 1.33 and 10% by weight where the total weight is 100 parts. Further, it has been found that Al, Cr and Fe are preferably but not necessarily in the ratio of 5:2:1 by weight. The quantity of binder used and the ratio of the components in the binder are varied in accordance with the color tone desired, and the hardness and tensile strength desired. Within the bounds set forth above, alloys having the appearance of gold when highly polished, having high hardness and high corrosion resistance have been achieved. These may be used in costume jewelry, for the manufacture of cigarette lighter cases and for use in watch cases, the last being a use in which particularly severe conditions of abrasion and corrosion must be withstood.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above composition of matter without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed is:

1. A hard, sintered gold-colored alloy comprising 70–97% by weight of TiN and 3–30% by weight of a binder consisting essentially of Ti, Al, Cr and Fe.

2. The hard, sintered gold-colored alloy as defined in claim 1 wherein said Ti is present in from 2.5 to 23% by weight.

3. The hard, sintered gold-colored alloy as defined in claim 1 wherein said Al, Cr and Fe are present in the ratio of 5:2:1 parts by weight.

4. The hard, sintered gold-colored alloy as defined in claim 1 wherein said Al, Cr and Fe total from 1.33 to 10 parts by weight.

5. The hard, sintered gold-colored alloy as defined in claim 1, comprising 88 parts of TiN, 4 parts of Ti, 5 parts of Al, 2 parts of Cr, and 1 part of Fe by weight.

6. The hard, sintered gold-colored alloy as defined in claim 1, comprising 88 parts of TiN, 10.67 parts of Ti, 0.83 parts of Al, 0.33 parts of Cr, and 0.17 parts of Fe, by weight.

References Cited

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