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DENTAL GOLD ALLOY

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ABSTRACT OF THE DISCLOSURE

A high temperature deformation resistant gold alloy is disclosed having the following proportions: 0.1 to 1.1% by weight nickel, 0.10 to 1.00 by weight aluminum, 80 to 90% by weight gold, 1 to 10% by weight platinum, 1 to 10% by weight palladium, and 0.5 to 4% silver. The grain size of the alloy is from about 150 to 350 microns. The nickel and aluminum form a refractory nickel aluminide which precipitates out within the coarse grains to provide the deformation resistance.

This invention relates to gold alloys for the base of dental crowns and bridges and more particularly to dental gold alloys. Such alloys are known in the art of dentistry as porcelain-golds because the external surface of the crown or bridge is covered with and concealed by a film or thin layer of porcelain to simulate the appearance of natural teeth.

Porcelain golds must be heated to porcelain baking temperatures in order to build up and bond porcelain material to the gold alloy base. The baking temperature is in the range of 1650° F. to 1925° F., with most dental porcelains requiring about 1850° F. At these temperatures, the gold alloys are subject to creep due to the stresses induced by the alloy weight. In other words, a gold alloy cannot support its own weight in the 1850° F. region.

This is also a problem for high temperature application in other alloy systems; for example, tool steels, stainless steels, nickel base alloys, SAP (sintered aluminum powder, etc.) The customary solution for these systems is to use the alloy in coarse grain form and to introduce a high melting constituent as a dispersion hardening agent. For tool steels and ferrous alloy heat resistance, the refractory carbides, such as tungsten, chromium and molybdenum carbides, are used. For aluminum, aluminum oxide is the hardening agent.

The primary object of our present invention is to provide a porcelain gold which is capable of withstanding high temperatures without creep or sag, namely, a gold alloy which is free of the above mentioned disadvantage of known porcelain golds. This object is accomplished according to the present invention in the manner presently described.

In the case of gold alloys for porcelain golds, a small amount of nickel is desirable. If a small amount of aluminum is added, the refractory nickel aluminide compound is formed with a melting point of 3,000° F. We have found that 0.1 to 1.1% nickel and 0.10 to 1.00 aluminum by weight, preferably 0.25% nickel and 0.10% aluminum by weight in the gold alloy produces this compound. When a coarse grain alloy is produced containing these additions, the NiAl constituents precipitates on cooling slowly

from 1850° F. More specifically, the grain size of this alloy is from about 150 microns to about 350 microns. Apparently the NiAl constituents precipitates out within the coarse grains to provide the deformation resistance. The high melting point of the compound renders it effective as a hardening agent even at high temperatures.

The gold alloy in which the above mentioned nickel and aluminum ingredients are incorporated is preferably of the following composition in the proportions indicated in parts by weight:

Gold	80 to 90
Platinum	1 to 10
Palladium	1 to 10
Silver	.5 to 4

The precious metal content of the alloy consisting of gold, platinum and palladium constitutes from 94% to 99% by weight of said alloy. The following is a non-limitation example, the ingredients being in the following proportions by weight:

	Percent
Gold	85.00
Platinum	6.00
Palladium	5.00
Silver	3.65
Nickel	0.25
Aluminum	0.10

The alloy is prepared by mixing the ingredients together in the proportions indicated and heated to a temperature of about 1850° F. in a magnetic induction furnace of a well known type during which the molten ingredients are automatically and thoroughly mixed together during the heating process. The mix is then allowed to cool to room temperature.

It will be understood that the invention is not to be limited to the above description except to the extent required by the scope of the appendix claims.

What is claimed is:

1. A coarse grain porcelain-gold dental alloy consisting essentially of between 0.1–1.1% nickel, 0.10–1.00% aluminum, 0.5–4% silver, 1–10% platinum, 1–10% palladium and the balance gold, said gold being present in the range of 80–90% by weight of the alloy and the combined gold, platinum and palladium contents constituting from 94–99% by weight of the alloy.

2. The alloy of claim 1 wherein the nickel content is 0.25% and the aluminum content is 0.10%.

3. A coarse grain gold dental alloy consisting essentially of the following ingredients: 85.00% by weight gold, 6.00% by weight platinum, 5.00% by weight palladium, 3.65% by weight silver, 0.25% nickel, and 0.10 by weight aluminum.

4. A coarse grain gold alloy according to claim 1, the grain size of said gold alloy being between 150 microns and 300 microns.

References Cited

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