

UNITED STATES PATENT OFFICE.

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ALLOY.

No Drawing.

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To all whom it may concern:

Be it known that I, CHARLES DIETZ, a citizen of the United States, and resident of York, county of York, State of Pennsylvania, have invented an Improvement in Alloys, of which the following is a specification.

The object of my invention is to provide a new alloy composed essentially of the precious metals platinum, palladium and gold, and more particularly for the purpose of providing a workable alloy having all of the appearance and advantages as to hardness of an iridium-platinum alloy and which improved workable qualities make it superior for purposes of jewelry and the other fine arts, and also for hypodermic needles and other articles of manufacture in commerce.

Pure platinum is not suitable for use in jewelry and those articles where it would be subjected to considerable wear and consequently it has been the practice to alloy the platinum with iridium to the extent of ten per cent (10%) or more of the whole. The very high cost of iridium necessarily makes the iridium-platinum alloy an expensive one and, therefore, it is one of the objects of my invention to provide an alloy which may not only have the advantageous qualities of the iridium-platinum alloy, but be superior to it in other particulars. It is known that platinum-iridium alloys have a tendency to scale in use when made of castings, whereas in my improved alloy this tendency is entirely eliminated.

In the production of my new and precious metal alloy, I employ platinum, palladium and gold in such proportions that the combined percentages of gold and palladium are greatly less than the percentage of platinum, the total quantity of the gold and palladium together not exceeding thirty per cent (30%) of the whole alloy, the proportions being such that the alloy combines hardness and ductility. In the preferred proportions constituting the alloy of my invention, the gold and palladium content together approximately equals fifteen per cent (15%) of the whole, thus providing approximately eighty-five per cent (85%) of platinum. I have also found that the specific alloy comprising eighty-four and one-half per cent (84½%) of platinum, eight per cent (8%) of palladium, and seven and one-half per cent (7½%) of gold provides very fine workable

alloy equivalent in hardness to the fifteen per cent (15%) iridium-platinum alloy, and considering the high cost of iridium (which is many times that of gold and platinum) it is manifest that the cost of my improved alloy is low, as compared to the iridium-platinum alloy.

As a substitute for iridium-platinum alloys, it has been proposed to provide an alloy of platinum and gold alone, but I have found that when ten per cent (10%) of gold is alloyed with ninety per cent (90%) of platinum, the resulting alloy having increased hardness over platinum alone is, nevertheless, brittle and consequently becomes non-workable for uses in the industrial arts; in fact, I have found that the increase of gold above five per cent (5%) with platinum alone always produces brittleness as well as hardness and for that reason only a limited use of gold is possible in an alloy with platinum where these two metals alone are employed to provide a sufficient hardening of platinum to make it suitable for industrial arts. I have also found that when palladium is employed in association with the gold in the alloy with platinum, that the brittleness above referred to may be eliminated, thus an alloy containing seven (7) per cent of gold, seven (7) to eight (8) per cent of palladium, and approximately eight-five (85) per cent of platinum will produce a relatively hard homogeneous alloy having ductile qualities, the hardness being more pronounced than a ten per cent (10%) iridium-platinum alloy. As the cost of palladium and platinum are approximately the same, it is manifest that the substitution of part of the platinum by the palladium has not increased the cost over the platinum-gold alloy, but has provided a greatly improved quality of alloy. The presence of the palladium largely governs the degree of ductility and operates to enable relatively large percentages of gold to be employed without danger of producing brittleness in the resulting alloy. Thus, I have found that as high as twenty (20) per cent of gold may be employed with the platinum, provided a corresponding percentage of palladium be added to prevent the brittleness which otherwise would occur and as this large per cent of gold at a cost greatly less than the cost of the corresponding amount of platinum or palladium materially lowers the

cost of the alloy over what has heretofore been necessary for a suitable workable platinum alloy having the necessary hard qualities. As a further advantage in the employ-
 5 ing of palladium as a substitute for a portion of the platinum in my improved alloy, I would point out that palladium has a very much larger bulk for weight than platinum or gold and consequently it provides a
 10 greater bulk to the alloy than what would be found in a gold-platinum or iridium-platinum alloy. This increased bulk will reduce the cost of articles of manufacture in that a lesser weight of the alloy will enable
 15 the making of any particular article, in which bulk governs a material part of the cost. Furthermore, the use of palladium which is a white metal in place of a part of the gold gives to the alloy a color quality
 20 which more nearly resembles pure platinum or iridium-platinum. These metals employed in the alloy insure a non-tarnishing quality and moreover the alloy is of a composition that, aside from making it more work-
 25 able either under heat or cold, is more easily soldered than platinum or iridium-platinum. It is also possible to form better castings from my improved alloy than is possible with either gold-platinum or iridium-plati-
 30 num alloys.

It will be understood that my invention constitutes an alloy of the three metals platinum, gold and palladium, forming a homogeneous alloy having hardness coupled with
 35 ductility and in which the gold may vary from seven per cent (7%) to approximately twenty per cent (20%) of the whole, and the palladium vary approximately from seven per cent (7%) to ten per cent (10%) of the

whole, so that the platinum is always greatly
 in excess of the combined gold and palladium.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A metal alloy combining hardness and ductility, composed of platinum, gold and palladium, in which the gold content is seven per cent (7%) to approximately
 45 twenty per cent (20%) of the whole, and the palladium content is seven and one-half per cent (7.5%) to approximately ten per cent (10%) of the whole.

2. A metal alloy combining hardness and ductility composed of platinum, gold and
 55 palladium, in which the platinum is approximately eight-five per cent (85%), the palladium approximately eight per cent (8%), and the gold approximately seven per cent (7%) respectively of the whole.

3. A metal alloy combining hardness and ductility, composed of platinum, gold and palladium, in which the platinum equals approximately from eighty (80) to eighty-five
 65 (85) per cent of the whole, and the palladium and gold are present in approximately equal proportions.

4. A metal alloy combining hardness and ductility, composed of platinum, gold and
 70 palladium, in which the gold is approximately seven and one-half per cent (7½%) of the whole, the palladium is in excess of the gold, and the platinum is in excess of approximately eighty per cent (80%) of
 75 the whole.

In testimony of which invention, I hereunto set my hand.

CHARLES DIETZ.