

UNITED STATES PATENT OFFICE.

JOHN HOLLAND, OF CINCINNATI, OHIO, ASSIGNOR TO THE AMERICAN
IRIDIUM COMPANY, OF SAME PLACE.

ALLOYING IRIDIUM.

SPECIFICATION forming part of Letters Patent No. 285,895, dated October 2, 1893.

Application filed October 3, 1892. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN HOLLAND, a citizen of the United States, residing at Cincinnati, county of Hamilton, State of Ohio, have
5 invented certain new and useful Improvements in Alloying Iridium, of which the following is a specification.

In the ensuing specification is described the alloying of various well-known metals with
10 the metal resulting from the process described and claimed in Patent No. 241,216, granted to me May 10, 1881. This last-named metal is generally termed by chemists a "low phosphuret" or "phosphide of iridium," though in
15 commerce it is, and probably always will be, known as "iridium;" and I have, therefore, designated it by both names in this specification.

The object of my invention is to alloy iridium with the other metals for the purpose of
20 imparting the properties of hardness and non-corrosiveness of iridium, and to reduce the hardness of iridium or iridium-phosphide, and thus produce alloys that may be used for
25 many purposes for which iridium or iridium-phosphide is too hard or too brittle.

I have discovered that alloys of iridium and iron can be made in any desired proportions,
30 and used for many purposes for which highly-hardened steel is now used, and in all of these alloys in which the iridium forms not less than one-fourth, by weight, of the alloy, it possesses the non-corrosive properties of the iridium, and is not softened or annealed by heat.

My process of alloying iron and iridium is
35 as follows: I first put the iridium, either pure or as found with its native alloys, in a crucible, and subject it to a high heat in a furnace. I then add to it about one-fourth its weight of phosphorus, as described in Patent No. 241,216,
40 granted to me May 10, 1881. When the iridium is thoroughly fused, I add the desired proportion of iron, depending upon the use for which the alloy is intended. I prefer to use
45 cast-iron, which, in the shape of filings or turnings, I drop into the molten iridium and stir until thoroughly combined, when it may be poured into molds of any desired shape. In order to make the iron combine more readily
50 with the iridium, I first melt the iron with a small proportion of sulphur, cast it in thin

sheets, which are then broken into small pieces and dropped into the fused iridium. This is not, however, essential.

A good alloy for draw-plates, tools for turning and cutting hard substances—such as steel, 55
pearl, ivory, hard rubber, &c.—and drills for various uses is made by combining the metals in the proportions of from seventy-five to
60 ninety parts of iridium to from twenty-five to ten parts of iron. Watch-jewels and fine bearings may be made of this metal also; for these purposes I prefer to use an alloy of seventy-five to eighty-five per cent. of iridium. For
65 journal-bearings, and cutting-edges for surgical and other instruments I use an alloy of equal parts of iridium and iron; but these proportions may be varied, and a much smaller proportion of iridium used. Even one-fourth
70 of iridium to three-fourths of iron make an alloy which is very hard and non-corrosive. I have alloyed iron and iridium in all proportions or nearly all proportions from one per cent. up to ninety-nine per cent. of iridium, and find that my process makes a perfect alloy
75 of iron and iridium in any proportion desired. The proportions given in all the above formula are by weight, of course. I have also used the same process to alloy gold, silver, copper,
80 nickel, and many other metals, with iridium or phosphuret of iridium, with complete success. One per cent. of iridium added to silver makes it much harder, more elastic, and less effected by acids than the pure silver. I have also alloyed gold with iridium, and
85 find that one per cent. of iridium renders it much harder without affecting the color.

An excellent alloy for draw-plates is made
90 of ninety-five parts of iridium with five parts of platinum. This alloy is harder than the ruby, and is very tough, and has a fine, close grain, and five per cent. of platinum or of silver with the iridium and iron improves the quality of the alloy used for surgical and other
95 cutting instruments.

In all of these alloys the same process is used, only changing the metal or porportion
100 of the metal or metals to be added to the iridium and phosphorus while they are in the fused state, and after they or either of them have combined with the iridium, molding the same in any shape desired.

I have in the foregoing specification referred to iridium, incorporated with other well-known metals by my process, as an alloy; and while the resulting article possesses the characteristics of a true alloy, it is deemed advisable to designate it in the claims as an alloy or compound.

What I claim as new, and desire to secure by Letters Patent, is—

10 1. The above-described process of alloying or compounding iridium with other metals, which consists in first raising the iridium to a

high heat, then adding to it phosphorus, in about the proportion specified, and, when fusion of the iridium takes place, then adding 15 one or more of the other metals, in the desired proportion.

2. As a new article of manufacture, a metallic alloy or compound of which iridium-phosphide is a component part.

JOHN HOLLAND.

Witnesses:

ALFRED B. BENEDICT,
GEO. J. MURRAY.