

UNITED STATES PATENT OFFICE

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HARD METAL ALLOY

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4, 1933, Serial No. 692,219. Divided and
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6 Claims. (Cl. 75-172)

This application is a division of our copending
parent application Serial No. 692,219, filed Octo-
ber 4th, 1933, and is filed in response to a final
requirement of division therein. Said application
has matured into Patent No. 2,070,451, granted
Feb. 9, 1937.

This invention relates to the manufacture and
production of hard metal alloys especially useful
for tipping the points of gold nibs and the points
of compass needles. Such alloys in addition to
great hardness must be resistant to tarnishing
and to corrosion by dilute solutions of the com-
mon acids and alkali, must have a high resistance
to wear, must be capable of being readily soldered
onto gold and onto copper and iron base metal
alloys and must be sufficiently tough not to chip
or splinter when subjected to grinding, polishing
or slitting operations. At one time native grains
of osmiridium were solely used for these purposes
but the supplies of this natural product are not
sufficiently uniform in size and shape; hence
numerous alloys have been made for this purpose
by melting together some or all of the consti-
tuents of osmiridium with other metals of the
platinum group with or without the addition of
base metals to increase the hardness. Efforts to
convert native osmiridium into grains suitable
for tipping nibs by melting the alloy alone or
with the addition of other constituents have so
far not produced grains of a quality equal to
that of native grains.

We have now found that suitable alloys for
the said purposes may be made by melting native
or synthetic osmiridium (by which is meant
throughout the specification and claims an alloy
of 40 to 60 per cent of osmium; 60 to 40 per cent
of iridium and 0 to 20 per cent of ruthenium) or
of osmium and/or ruthenium together with an
element of the group consisting of cobalt and
nickel (3 to 25 per cent) and boron (0.1 to 5
per cent). The alloy should contain at least 75
per cent of osmiridium or of osmium and/or
ruthenium.

In making the alloys the constituents may be
mixed together in the form of powders or small
grains and the mixture melted in a suitable fur-
nace as, for example, an electric furnace of the
induction, resistance or arc type. We prefer
however to add the boron in the form of an alloy
with the element of the group consisting of cobalt
and nickel for example as cobalt boride.

The best alloys are those the proportions of the

components of which are within the following
ranges:—

	Per cent
Osmiridium or an equivalent amount of osmium and/or ruthenium.....	75 to 95
Cobalt and/or nickel.....	5 to 25
Boron.....	0.5 to 3

Example 1

	Per cent
Native osmiridium.....	80
Cobalt.....	19.5
Boron, the boron being added in the form of a cobalt boron alloy containing 10 per cent of boron.....	0.5

Example 2

	Per cent
Native osmiridium.....	90
Cobalt.....	9
Boron, the boron being added in the form of cobalt boride.....	1

We claim:

1. A hard metal alloy of the kind defined con-
sisting of 75 to 94.5% of at least one metal of the
group consisting of osmiridium, osmium and
ruthenium, 3 to 25% of at least one metal of the
group consisting of cobalt and nickel, and 0.1
to 5% boron.

2. A hard metal alloy of the kind defined
consisting of 75 to 94.5% of at least one metal of
the group consisting of osmiridium, osmium and
ruthenium, 3 to 25% cobalt, and 0.1 to 5% boron.

3. A hard metal alloy of the kind defined con-
sisting of 75 to 94.5% of at least one metal of the
group consisting of osmiridium, osmium and
ruthenium, 3 to 25% of a metal of the group
consisting of cobalt and nickel, and 0.1 to 5%
boron added as a boride of the said metal of the
group consisting of cobalt and nickel.

4. A hard metal alloy of the kind defined con-
sisting of 75 to 94.5% of osmiridium, 3 to 25%
of at least one metal of the group consisting of
cobalt and nickel, and 0.1 to 5% boron.

5. A hard metal alloy of the kind defined con-
sisting of 80 to 90% of osmiridium, 19.5% to 9%
of cobalt, and 0.5 to 1% of boron.

6. A hard metal alloy of the kind defined con-
sisting of 80% of osmiridium, 19.5% of cobalt and
0.5% boron.

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