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E. W. ENGLE ET AL

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TANTALUM ALLOY PEN

Filed May 27, 1927

Fig. 1

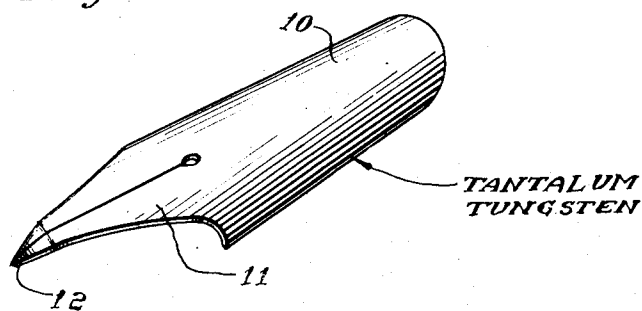
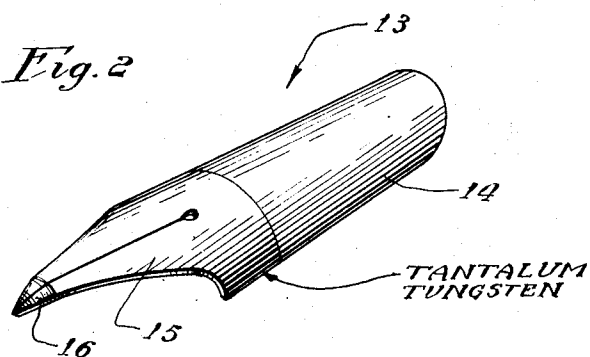


Fig. 2



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UNITED STATES PATENT OFFICE.

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TANTALUM-ALLOY PEN.

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This invention relates to pens and instru-
ments adapted for writing, drawing and the
like. More particularly our invention re-
lates to an alloy of tantalum and a metal of
5 the chromium group. We have found that
this alloy is especially suitable for this pur-
pose in that the alloy, hereafter defined, re-
tains the hardness, toughness and non-cor-
rosive properties of tantalum, with the in-
10 creased elasticity, flexibility and resiliency
imparted to the tantalum by the addition of
the element of the chromium group which is
preferably tungsten.

Tantalum has been suggested as a suitable
15 metal for making pens, drawing instruments
and the like, and considerable experimenta-
tion and commercial use has been made of this
idea.

To render the tantalum harder, it has been
20 treated with iron, oxygen, hydrogen, silicon,
boron, aluminum, titanium, tin, carbon, etc.,
but none of the proposed treatments has been
successful as is evidenced by the fact that
tantalum pens are not employed extensively
25 or manufactured on a commercial scale. The
hardening substances heretofore used have
had a tendency to make the metal so brittle
that it could not be successfully worked, and
the permissible quantities of these added ele-
30 ments had to be carefully chosen and the addi-
tions regulated to a very fine degree.

The object of this invention is to provide a
tantalum-alloy pen which will combine the
non-corrosive properties, the hardness and
35 toughness of tantalum with pronounced elas-
ticity, flexibility and resiliency by the addi-
tion of a metal of the chromium group.

A further object of the invention is to pro-
vide a tantalum-tungsten pen with a hard-
40 ened tip.

Other objects will be apparent as the de-
scription of our invention proceeds.

In the accompanying drawings which rep-
resent preferred embodiments of our inven-
45 tion,

Fig. 1 represents a conventional pen made
entirely of our tantalum-tungsten alloy, and

Fig. 2 represents an embodiment wherein
the shank may be of steel, the nib portion of
50 the tantalum-tungsten alloy, and the point of
iridosmium.

Heretofore alloys of tantalum and tung-
sten have been very difficult to obtain—espe-

cially alloys in which the tungsten content ex-
ceeded two or three percent. By an exten- 55
sive research on this subject a method for pre-
paring such an alloy has been developed by
intimately mixing powdered tungsten with
powdered tantalum, compressing the powder
into a rod and sintering this rod by an elec- 60
tric current in a substantial vacuum. This
process, however, forms no part of the present
invention, and further description of it is
deemed unnecessary.

We have found that an alloy, containing 65
92½% of tantalum and 7½% of tungsten, is
harder and stiffer than pure tantalum and at
the same time provides the necessary qualities
of resilience and elasticity. Alloys have
been successfully used which contain as high 70
as 10% of tungsten.

The sintered rod of the tungsten-tantalum
alloy may be worked mechanically in any
known manner; that is, it may be hammered,
rolled, drawn, stamped and pressed in any de- 75
sired form.

A pen may be prepared, as shown in Fig. 1,
with the shank 10, the nib portion 11 and the
point 12 all of the tantalum-tungsten alloy.

Although tantalum is not nearly so expen- 80
sive as gold, it costs more than steel, and our
invention may be applied to a modification,
as illustrated in Fig. 2, where a shank 14 is
of steel and is welded to the tantalum-tung-
sten nib 15 preferably by electrical resistance 85
or spot welding.

In the same way the pen may be pointed
with iridium, iridosmium or other tip 16 by
spot welding said tip to the point of the pen.
Another method of providing a hardened tip 90
is to merely heat the tip of the pen to a tem-
perature above a dull red in the presence of
air, hydrogen or other suitable gas. The
alloy has the property of tantalum whereby
this treatment makes the tip extremely hard, 95
and if care is used, the tip may thus be hard-
ened without affecting the physical properties
of the nib portion. A more practical and
preferred method of hardening the point
would be to dip the point in white hot 100
NaCO₃, treat the heated tip with NaCN, or
carbonize the tip in some other conventional
method.

The pen prepared by using this alloy has
a high degree of springiness and hardness, is 105
one of the most resistant known to the cor-

rosive action of chemicals and the elements, may be manufactured as cheaply as an ordinary steel pen and will be equally as serviceable and satisfactory as the gold pen points now used on fountain pens. Also by the use of the alloy defined above, a uniform product can be produced whose properties can be easily regulated to a fine degree.

While we have described particular alloys, it is understood that the percentages may be varied and additional substances added to the alloy without departing from the spirit of our invention. We are not limited to the

details shown except as defined by the following claims.

We claim:

1. A pen having a nib comprising about 90% tantalum and 10% tungsten.
2. A pen having a nib comprising about ninety per cent tantalum and ten per cent tungsten and having a hardened point.

In witness whereof, we hereunto subscribe our names this 20th day of May, 1927.

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