

W. VON BOLTON.

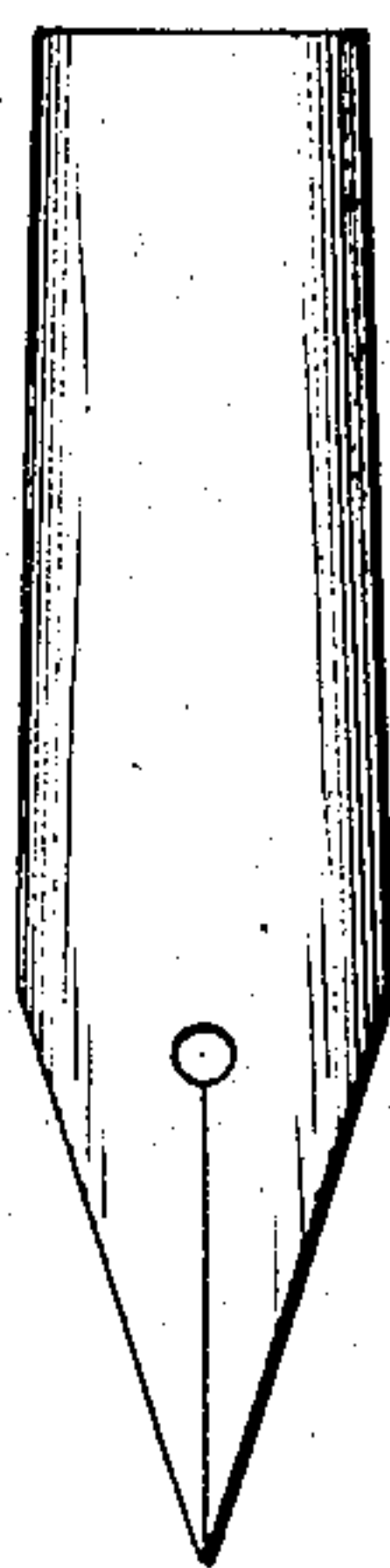
PEN.

APPLICATION FILED JUNE 8, 1907.

930,932.

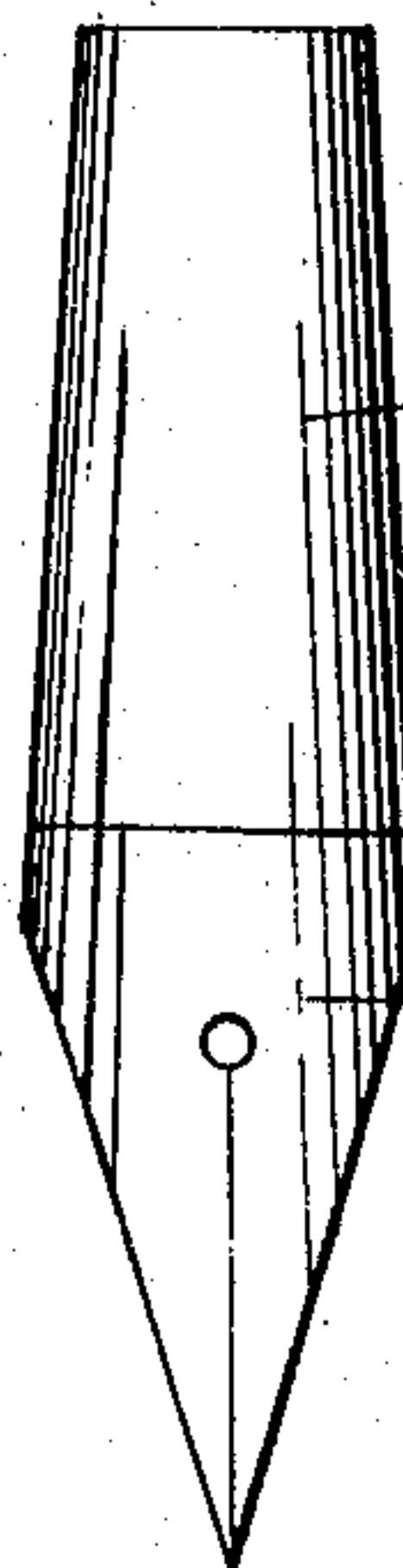
Patented Aug. 10, 1909.

Fig. 1.



*Tantalum
and Iron*

Fig. 2.



Steel.

*Tantalum
and Iron.*

Witnesses:

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UNITED STATES PATENT OFFICE.

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PEN.

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To all whom it may concern:

Be it known that I, WERNER VON BOLTON, a subject of the Czar of Russia, and resident of Charlottenburg, near Berlin, Germany, have invented a certain new and useful Improvement in Pens, of which the following is a specification.

My present application constitutes divisional application "F" of my original application, filed February 17, 1905, serially numbered 246,189.

My invention relates to pens, by which I mean to indicate instruments adapted for writing, drawing or analogous uses.

More particularly, the invention comprises a pen in which the nib or flexible portion contains or is composed of tantalum combined with an element of the iron group, the shank being formed of any suitable material such as steel or of course also of the same material as the nib. Heretofore such instruments have been made of other materials such as steel, gold or other metals, or of glass, stone or the like. They should be very hard to enable them to resist the tendency to wearing out, but at the same time they should have considerable resilience or flexibility, and also be able to resist the attack of the writing fluids or other detrimental agencies.

According to my present invention, I employ in place of the heretofore used materials, a substance which has the advantages of all the heretofore used substances, but lacks their disadvantages. Furthermore it has advantages which none of the materials heretofore employed for similar purposes possess. This material is tantalum combined with an element of the iron group.

Tantalum possesses like steel the property of being easily worked and hardened, and also offers great resistance to fracture, and has great flexibility or resilience. Its hardness can be increased to such a degree as to greatly exceed that of the best kinds of steel and even that of the usually employed stones. With regard to the greatest degree of hardness which it can attain, it is almost equal to the diamond. It has the further advantage over steel in being one of the precious metals which is not affected by the atmosphere, and which at ordinary temperatures completely resists the action of most acids. Although being harder than steel it is still more elastic than steel. All of these prop-

erties are of course of great importance in the article forming the subject matter of my invention.

In the accompanying drawing, I have shown by way of example two forms of pens constructed in accordance with my invention.

Figure 1 is a top plan view of a pen constructed entirely of tantalum and iron, whereas, Fig. 2 is a top plan view of a pen having its nib portion composed of tantalum and iron, while its shank is composed of steel.

In order to be able to work the metal properly it must previously be well fused. By the fusing process the tantalum is freed from impurities and rendered homogeneous. The fusing is best accomplished by means of the electric current in a vacuum. After the metal has been thus melted it can be easily worked mechanically in any known manner. It can be hammered, rolled, drawn, filed and the like, and thereby brought into every desired form. When being mechanically worked, especially if it contains a small quantity of a hardening medium, the metal readily assumes so great a degree of hardness that further working is rendered impossible, and it must then be carefully reheated or annealed in order to be rendered soft again. In this annealing process care must be taken that the temperature does not rise too high, as otherwise the metal is more easily attacked by the oxygen of the atmosphere. The metal will, however, even in the form of the finest drawn wires or thinnest rolled bands stand a heating in the air up to a dark red heat temperature without being appreciably affected. When so heated the metal shows a coloration similar to tempered steel. In order to prevent too great a heating, especially of fine parts of metallic tantalum, it is preferable to effect the heating indirectly by bringing large plates or drums to the temperature to which the parts to be heated are required to be brought, and then to bring the objects of tantalum into contact with these plates or drums. If, on the other hand, it is desired to raise the objects of tantalum to higher temperatures without being materially affected on their surfaces, it is advantageous to effect the heating in a vacuum, as at very high temperatures metallic tantalum combines with almost all known substances. The heating

in the vacuum is preferably carried out by electrical means, such as by electrical resistance, or directly by passing the electric current through the objects to be heated.

5 According to my invention other substances are added to the pure tantalum, in order to impart even greater hardness to the metal. This other substance is an element of the iron group. Small quantities of the
10 added substances are sufficient to produce great hardness. If the admixture of such substances is increased materially beyond a small percentage, the metal generally becomes so brittle that no further working of
15 it is possible. With the proper proportion of added substances however, the metal, in spite of its increased hardness, is still more resilient than steel.

A subsequent hardening of the already
20 worked article of pure tantalum can be effected by heating the metal to redness in the presence of the hardening medium, in a similar manner to the treatment of steel.

As metallic tantalum is at present very
25 expensive, only those parts need be made of tantalum and an element of the iron group that are directly subject to wear and exposure, for instance, the writing point or nib of the pens.

30 The most serviceable alloys of iron and

tantalum are on the one hand those which consist of iron containing only small quantities up to a small percentage of tantalum, or on the other hand, those which consist of tantalum having only a small percentage of
35 iron. The property of these alloys can be varied to a very great extent by changing the proportions of the constituents.

In my present application, I claim specifically pens composed of tantalum and
40 iron, the other parts of my invention being protected in applications divided from my original application, filed February 17, 1905, serially numbered 246,189, of which this application is also a division. 45

I claim:

1. A pen having a nib portion containing tantalum and an element of the iron group.

2. A pen having a nib portion containing tantalum and iron. 50

3. A pen having a nib portion composed of tantalum and an element of the iron group.

4. A pen having a nib portion composed of tantalum and iron.

WERNER VON BOLTON.

Witnesses:

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HENRY HASPER.