

UNITED STATES PATENT OFFICE

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PIVOT FOR INDICATING INSTRUMENTS

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The present invention relates to pivots for indicating devices and more particularly to pivots which are suitable for use in aircraft compass indicators.

5 Prior to the present invention, pivots generally employed in air compass indicators have been characterized by a lack of sensitivity due to friction between the pivot and jewel bearing. These pivots are relatively small and have a bearing
10 point with a radius of only about 3 mils. It has been difficult to produce a pivot of this character which is hard enough to withstand shock and wear and yet not so brittle that the point will break off.

15 It is one of the objects of the present invention to provide an instrument pivot which has a low coefficient of friction, which is non-corrosive, non-magnetic and which is hard and tough and has a relatively long life. Other objects will
20 appear hereinafter.

The pivot material employed is made by drawing substantially pure tantalum or a tantalum alloy wire to the desired thickness. The wire is cut into suitable lengths and then shaped and the
25 surface hardened by nitriding. The nitriding may be accomplished by means of atomic nitrogen as in ordinary nitriding processes employing dissociated ammonia gas. However, I prefer to nitride the pivots by means of molecular nitrogen since the action of molecular nitrogen is
30 slower than that of atomic nitrogen and therefore permits better control of the process.

The pivots to be nitrided are placed in an open boat which may be made of any suitable material
35 such as nickel and then inserted in a furnace heated to a temperature, preferably in the neighborhood of 500° C. Nitrogen which has been purified to a high degree is then supplied to the furnace so that the pivots are substantially surrounded by a molecular nitrogen atmosphere.
40 The pivots are maintained in the furnace for a period of time varying from about 20 to 30 minutes. The time employed in the nitriding process however may be shorter or longer than that indicated depending upon whether the nitriding
45 temperature is higher or lower than 500° C. The

product thus obtained has such a low coefficient of friction that the wear on the pivot is very slight. It is also non-corrosive and non-magnetic, hard and tough.

Although the pivot to be nitrided may consist
5 substantially entirely of tantalum I prefer to employ a tantalum alloy containing an appreciable amount up to about 7½% tungsten. The addition of the tungsten to the tantalum provides a
10 product of increased hardness and toughness which may be hardened in the same manner as the tantalum pivot. It is also more easily shaped and polished.

Although I have described the present invention particularly in connection with aircraft compass indicators, it is obvious that its use is not
15 limited to such indicators but that it may be employed as a pivot or jewel bearing in any type of indicating instruments. It is also obvious that my invention may be employed wherever a metal
20 having the qualities herein specified is required.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A pivot for indicating devices consisting
25 mainly of tantalum and having a nitrided surface thereon.

2. A pivot for aircraft compass indicators, said pivot consisting mainly of tantalum and having a nitrided surface thereon.

3. A pivot for indicating instruments comprising an alloy containing an appreciable quantity
30 and up to 7½% tungsten with the remainder tantalum, said alloy having a nitrided surface thereon.

4. A pivot for aircraft indicating compasses, said pivot comprising an alloy containing an appreciable quantity up to about 7½% tungsten
35 with the remainder tantalum, said alloy having a nitrided surface thereon.

5. In an indicating device, a pivot member and a cooperating bearing member therefor, said members each consisting mainly of tantalum and
40 having a nitrided surface thereon.

6. A bearing consisting mainly of tantalum and
45 having a nitrided surface thereon.

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