Feb. 28, 1961 R. STRAUMANN 2,973,291

MANUFACTURE OF POINT BEARINGS IN INSTRUMENTS

Filed Jan. 22, 1957

Fig.1

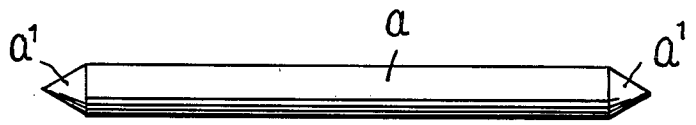


Fig.2

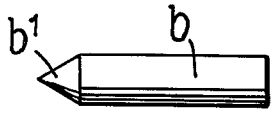
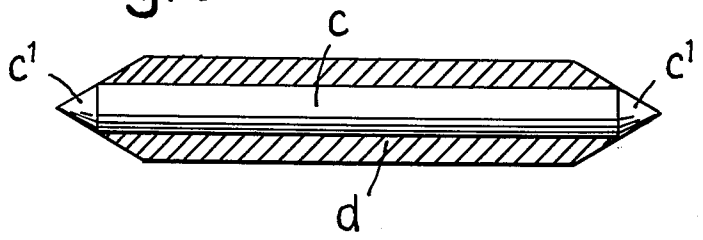


Fig.3



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MANUFACTURE OF POINT BEARINGS IN INSTRUMENTS

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The present invention relates to improvements in the manufacture of bearing parts in the form of pointed pivots and arbors or spindles for point bearings in apparatus and instruments of all kinds.

As known, point bearings are used in various apparatus and instruments, in particular in cheap watches, for the bearing arrangement of arbors or spindles. For this purpose, the latter are pointed at their ends and supported in conical indentations or recesses of bearing stones or metallic bearings. Such arbors or spindles are made of steel which is martensitically hardened by hardening processes known per se. A great disadvantage of these spindles is that their quality in serious production is non-uniform so that they have to be graded in order to admit only those for final use which possess points satisfying the specific requirements.

It has been found, as disclosed in the present invention, that arbors or spindles with uniformly hard bearing points may be made of an alloy which is not martensitically hardened when it is quenched but can be heated to more than 800° C, and then quenched to the unhardened condition, the quench being down to room temperature or higher temperature according to the alloy used. These alloys are those which can be hardened by a precipitation hardening treatment. The alloy thus is homogenised by annealing at more than 800° C., and is not hardened in quenching but is quenched to the unhardened condition. The wire so treated subsequently is drawn down cold to strengths of more than 200 kilograms per square millimeter and to hardnesses of more than 600 Vickers. From the cold-deformed wire then are worked out the bearing parts, for example ground out, as desired in the form of pivots pointed at one end or in the form of arbors pointed at both ends. In order to still further improve the mechanical strength of the bearing parts, either the wire prior to the working-out operation or the worked-out bearing parts are yet subjected to a precipitation hardening between 200 and 600° C.

The following examples serve to elucidate the method or process disclosed by the present invention.

Example 1

As basic material for the pointed bearing parts is used an iron-carbon alloy of the following composition: 0.93–0.97% carbon, 0.2–0.4% Mn, 0.2–0.4% Si, and the remainder iron.

This basic material is annealed in wire form at about 900° C. and then quenched in a salt or metal bath to a sorbitic state at about 500° C. The wire so treated, which also is known as patented wire, then is drawn down cold to a tensile strength of more than 200 kg./mm.^{2} and to a hardness of more than 600 Vickers. From this cold-deformed wire are worked out the bearing parts which are then precipitation hardened by being heat-treated at about 250° C. Thus are obtained bearing parts of which the pivot points have a strength of more than 200 kg./mm.^{2} and a hardness of more than 600 Vickers.

Instead of undertaking the heat treatment on the worked-out bearing parts, it may be applied on the cold-drawn wire.

As proved by tests, the pointed arbors or spindles so made are of better quality than martensitically hardened arbors and, moreover, are of a regularity as regards quality hitherto not attained in series production.

Example 2

The pointed bearing parts made according to Example 1 are very good as regards breaking strength, but are susceptible to rust and magnetic. It is possible, however, to make arbors of this kind after the same method or process, which are non-magnetic and rustproof, if the basic material is a precipitation hardenable alloy which is non-corrosive, only slightly magnetic or outright non-magnetic. A suitable alloy is: 40–50% Co, 10–20% Cr, about 5% Mo, about 5% W, 0.2–0.4% Be, 0.8–1.2% Ti, about 2% Mn+Si, 0–10% Fe, and the remainder Ni.

However, other break- and rustproof and slightly magnetic alloys may be used.

The alloy set out in Example 2 is annealed in wire form at about 1100° C. and quenched to the soft condition at room temperature. The wire so treated is cold-deformed to a strength of at least 200 kg./mm.^{2}. From this wire are worked out the pointed pivots, arbors or spindles which then are precipitation hardened by being heat-treated at 400–500° C. during a period of one hour to four hours. The bearing parts so made have a strength of more than 200 kg./mm.^{2} and a hardness of more than 650 Vickers. Here also, the heat treatment at 400–500° C. may be carried out on the wire itself instead of an the worked-out bearing parts.

Sleeves made of a softer material such as brass, argentan or German silver, beryllium bronze and the like may be mounted on wires which have been treated according to the examples set out above. From this compound wire, which comprises a core and a sleeve, arbors or spindles provided with bearing points may be worked out. In such arbors or spindles, therefore, only the pointed wire core has the high degree of hardening and the high mechanical strength mentioned above, which is of advantage insofar as these arbors or spindles may be machined more easily.

A few embodiments or bearing parts made in accordance with the present invention are shown in the accompanying drawing, in which—

Fig. 1 shows an arbor or spindle *a* having bearing points a^1 at both ends; Fig. 2 shows a pivot *b* provided with a bearing point b^1; and Fig. 3 again shows an arbor or spindle which, as mentioned above, consists of a compound wire in which *c* is the wire core with pointed bearings c^1 and both ends, and *d* is the sleeve mounted on core *c* and consisting of a softer metal.

I claim:

1. A process for the production of bearings from a wire of a heat hardenable cobalt-chromium-nickel alloy having a composition:

Co	40–50%.
Cr	10–20%.
Mo	About 5%.
W	About 5%.
Be	0.2–0.4%.
Ti	0.8–1.2%.
Mn+Si	About 2%.
Fe	0–10%.
Ni	Remainder.

comprising the steps of homogenizing the wire at a temperature of 1100° C., quenching the wire to atmospheric temperature to the unhardened condition, cold drawing the quenched wire to a strength of at least 200 kg./mm.^{2} and a hardness of 600 Vickers, and heat hardening the drawn wire at a temperature of from 400

to 500° C. and cutting it into short lengths in the form of bearings having pointed ends.

2. A process as claimed in claim 1 in which the step of heat hardening is carried out preceding the step of cutting the wire into bearings.

3. A process as claimed in claim 1 in which the step of heat hardening is carried out after the step of cutting the wire into bearings.

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