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(11) **EP 1 109 188 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.06.2001 Bulletin 2001/25

(51) Int Cl.7: **H01H 50/16**

(21) Application number: **00311157.2**

(22) Date of filing: **12.12.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**
Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **14.12.1999 ES 9902729**

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(54) **A treatment for lengthening the life of electromagnetic relays**

(57) A treatment for lengthening the life of electromagnetic relays is characterized by the determining

magnetic elements of the contacts in the relay being surface-hardened by means of the incorporation of a fine TiN (titanium nitride) base covering coat.

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Description

[0001] Electromagnetic relays use a mechanically soft material as magnetic circuit, which, because of the friction caused by normal operations of the relay, gives rise to damage to the contact surfaces, so that the magnetic properties of the material are destroyed.

[0002] This results in a short duration of said relays, which are normally good for some 4,000 operations, it being of the utmost importance to increase said duration, because of the cost savings and reliability of application functions that can be achieved.

[0003] In order to solve the problem, two possibilities exist:

- One consists of improving the mechanical system in order to reduce friction during normal operations, for which purpose various solutions have been developed, like, for example, that encompassed by EP 94401276.4.

- And the other consists of increasing the hardness of the contact surfaces, without affecting the magnetic properties of the device. For this purpose, coatings with different materials and different methods have been tested, geometric solutions also having been tried, changing the dimensions of the poles, rounding of edges, etc., with results that have not entailed major advances in solution of the problem, but have, however, had a high impact on costs.

[0004] Thus a treatment is proposed, based on the method of increasing the hardness of the contacts, thereby achieving some very advantageous characteristics for purposes of the function indicated.

[0005] According to the invention, this treatment comprises hardening the surface of the determining magnetic elements of the contacts in the relay with a very fine coat of TiN (titanium nitride).

[0006] In one embodiment, the coating is made by electron deposition, a technique that makes it possible to obtain thin homogeneous layers of coating material on the base elements.

[0007] In this way, a covering coat of approximately 0.125 μm to 1 μm is applied, thereby obtaining the surface hardness necessary to avoid wear, without the magnetic properties of the elements determining the functional behavior of the application relay being affected.

[0008] A very considerable prolongation of the duration of electromagnetic relays is thereby obtained, since, with the corresponding magnetic elements coated in the form indicated, up to 50,000 operations of said relays are achieved under good operating conditions, compared to the 4,000 operations made possible on the average by the conventional relays of the same type without the coating recommended.

[0009] Therefore, said improvement, object of the invention, is clearly a result of some very advantageous features, their application acquiring a life of their own and a preferential character in the relays mentioned.

vention, is clearly a result of some very advantageous features, their application acquiring a life of their own and a preferential character in the relays mentioned.

Claims

1. A treatment for lengthening the life of electromagnetic relays, characterized in that the determining magnetic elements of the contacts in the relay are surface-hardened by means of the incorporation of a fine TiN (titanium nitride) base covering coat.
2. A treatment as claimed in claim 1, characterized in that the covering coat is applied on the corresponding magnetic elements by electron deposition.
3. A treatment as claimed in claim 1 or 2, characterized in that the covering coat on the magnetic elements is applied with a thickness in the order of 0.125 μm to 1 μm .