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## 16. Innovative contact for circuit breaker and magnetic starter

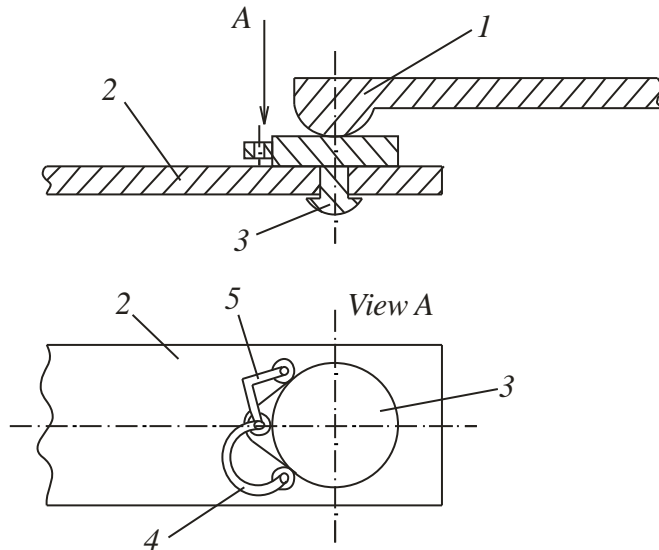
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**Introduction.** Contacts that are based on materials with shape memory effect (SME) allow to exclude silver from the construction of electrical apparatuses.

**Materials and methods.** Physical and mathematical modeling of working processes of high current contacts that are made from SME material in contact system of an electrical apparatus was used.

**Results.** In switching equipment, both high voltage and up to 1 kV, one of the main elements is contact system. Contact surface consists of separate points through which an electrical current flows. During operation, contact surface is covered with a film of oxides, which increases contact resistance. This causes the temperature to rise. If this process is not stopped, contact may fail and power delivering will be interrupted.

The high current contact can have a contact pad 3 (fig.1) made of any type of conductive material (e.g. copper).



**Fig.1. High current contact.**

The pad is mounted on a fixed contact holder 2 in such a way that it can rotate around its axis. Contact heating causes a bent plate 4 that is made of SME material to straighten. While the plate is straightening, it is creating force up to  $600 \text{ N/mm}^2$ . The plate 3 rotates around its axis. This motion removes oxide films from contact surfaces. This motion also compresses a flat steel spring 5. The decrease in contact's temperature leads to loss of SME material its elastic properties, and the plate 4 becomes plastic. Under the action of the spring 5, the contact pad 3 returns to its original state, deforming the plate 4 to its original shape. This further cleans the contact surfaces.

**Conclusions.** The results of this research can be applied to optimize power systems.