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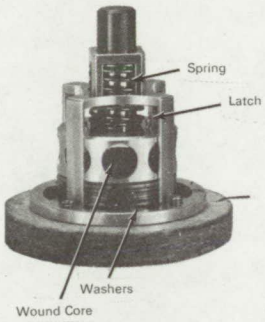
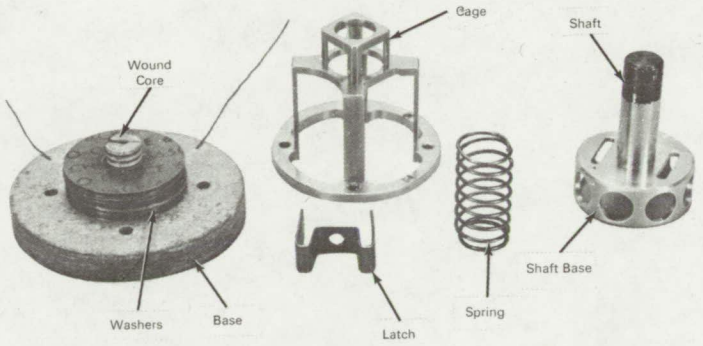
NASA TECH BRIEF

Electrothermal Linear Actuator



Assembled Actuator



Components of Actuator

The problem:

Development of a device for converting electric power into powerful linear thrust without generation of magnetic fields.

The solution:

An actuator in which, when heated by an energized filament, a stack of bimetallic washers expands and drives upward the end of a shaft. The shaft does not move before it is freed by expansion of a heated bimetallic latch.

How it's done:

A cylindrical core of nonconductive material, wound with a heating filament of tungsten wire, is screwed to a base of similar material through which the leads to the filament are threaded. The bottom of a cage also is screwed to the base, concentrically with the core. Through a reduced bore atop the cage fits a metallic shaft having an expanded base; the base sits on a stack of bimetallic washers that is concentric with the core.

Compressed between the reduced bore of the cage and the expanded base of the shaft is a coil spring that keeps the shaft in contact with the washers; also between this bore and the expanded base is a bimetallic latch that, when cold and contracted, prevents upward movement of the shaft.

When the energized filament heats the washers they tend to force the shaft upward, but cannot do so before the latch (also heated) expands radially until its two legs slip through slots in the expanded base of the shaft.

The actuator withstands vibration, creates no appreciable magnetic field, is compatible with vacuum, and exerts substantial force that is proportional to the height of the stack of washers. It has many potential applications, especially for switching; it may interest electrical, mechanical, or chemical engineers.

(continued overleaf)

Note:

Documentation is available from:

Clearinghouse for Federal Scientific and Technical Information
Springfield, Virginia 22151
Price $3.00
Reference: TSP69-10296

Patent status:

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