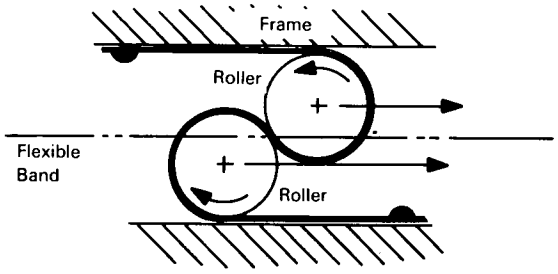
AEC-NASA TECH BRIEF

Rolamite: New Mechanical Design Concept



BASIC ROLAMITE CONFIGURATION

A project to explore reliable, easy-to-manufacture, microminiature mechanical devices has recently resulted in the discovery of a design principle of major significance to weapon component development and to technological progress as a whole. The design principle with its associated family of devices has been labeled "rolamite." The significance of rolamite derives from several things—most important, as a mechanical suspension system it has achieved substantial reductions in friction in the realm of extremely low bearing pressures. In addition, rolamite devices are easily microminiaturized, are tolerant of production variations and are inherently capable of many of the functions required to construct most electromechanical devices.

Basic Principle of Operation. A typical rolamite design consists of four main parts: a rectangular frame, two rollers, and a relatively long, flexible band. The ends of the band are attached to the frame so that the band is formed into an S-shape. The rollers are then inserted within the loops of the S and held in place by tightening the band.

This configuration allows the rollers to move freely along the band, with little friction because there is no sliding; the same surface areas of the roller and band always meet, resulting in rolling friction coefficients as low as about 1/10 of those for ball and roller bearings acting under comparably low pressures. In contrast to friction in conventional devices, friction in rolamites tends to decrease with usage because of the continued nearly perfect remating of all points between the rollers and band and the band and guide surfaces. In many cases, the need for lubricants is eliminated.

The performance of the roller cluster can be altered in several ways: by varying the size, shape, and weight of the rollers; by varying the configuration of the frame; by adding springs and other controls; and by tapering and perforating the band to introduce forces of the desired type.

Geometrical Capabilities. The basic geometry makes it possible for a rolamite to accept, without jamming, significant surface irregularities, roll over small foreign particles, and accept minor imperfections in its own geometry. However, if desired, the geometry can be rearranged to perform in a very stiff way. A rolamite suspension can, by choice of the designer, be very tolerant, moderately tolerant, or completely intolerant. These differences in "self-tolerance" represent gross changes in the geometrical configuration which do not require critical manufacturing controls.

Rolamite Versatility. One overall advantage of the rolamite geometry as a design element rests in the versatile way it can produce many mechanical and

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electromechanical functions in a wide variety of combinations. This versatility stems from the many types of motions directly obtainable from the rolamite cluster, the manufacturing tolerance and adjustability and the simple adaptable elements used (rollers, bands, and guide surfaces). A partial list of rolamite functions follows:

aligning
braking
clutching
cutting
detenting
disrupting
force amplifying
fusing
sequencing
solenoid action
speed changing
squeezing, rolling
gaging
inserting
latching
mechanical readout
metering
potentiometric action
pressure actuating
pressure sensing
pumping
regulating
relaying
thermostatic action
torque transmitting
valving
viscous restraining action

Combinations of these and other functions will produce a great number of electromechanical or mechanical devices. Most of these devices can be built around the rolamite geometry and will have less than 10 piece-parts, including multiple electrical contacts and electrical leads.

Note:

Inquiries concerning this innovation may be directed to:

Sandia Office of Industrial Cooperation
Sandia Laboratory
Post Office Box 5800
Albuquerque, New Mexico 87115
Reference: B67-10611

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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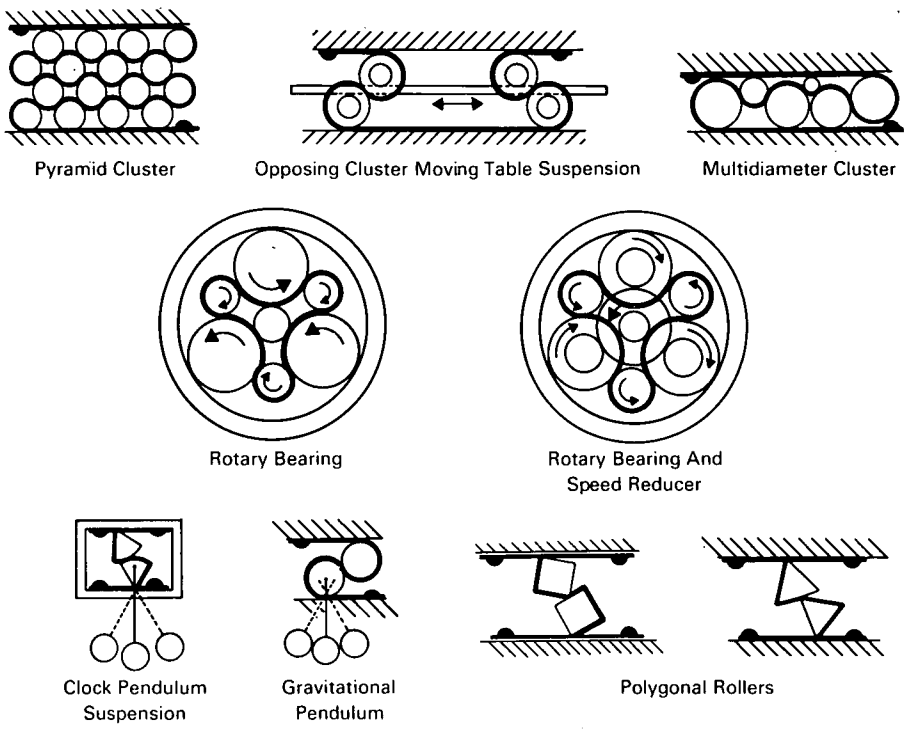

SOME UNUSUAL ROLAMITE SYSTEMS