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Method and Apparatus for Hard Machining

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Intellectual Property Status:

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Background

Mechanisms using linear springs have been widely known and researched to give increased force outputs with greater input displacements. In many applications, however, the output force may be desired to be constant regardless of input displacement. Such situations arise in applications such as robotic grasping, biomedical applications, haptic devices, and micro-grasps.

Invention Description

Researchers at Arizona State University have developed a constant-force mechanism ('CFM') suitable for use at all scales from macro to micro. Additionally, the level of constant force supplied by the mechanism can be actively adjusted.

Potential Applications

- Robotic grasping.
- Mechanical connection and assembly of electrical components.
- Positioning. The mechanism can be placed on machine tools or end-effectors to prevent damage to parts due to unforeseen position errors.
- Micrograsps.
- Haptic devices. Interfaces for tactile human-machine interaction can be facilitated by constant-force mechanisms.
- Biomedical implants and MEMS.

Benefits and Advantages

- The CFM can be embodied across a wide scale of sizes, including micro-sized units suitable for use in micro-electro-mechanical systems (MEMS).
- The level of constant force supplied can be adjusted.
- The CFM does not require a power source. The need for a power source makes practical micro-scale hydraulic, pneumatic, and electrical CF devices less feasible.
- The CFM can apply a constant force even if there are small deflections, which are difficult to determine and control at the micro level.
- The materials for the micro-CFM are compliant and will naturally behave like springs.