REUSABLE, LOW-SHOCK HOLD AND RELEASE DEVICE

Technological advantages

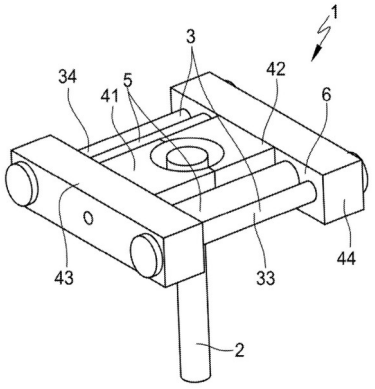
- Low-shock release: Avoids shocks associated with pyrotechnic or elastic release mechanisms.
- Reusable without manual dismantling (elastic or superelastic shape memory materials).
- Compact size: Addresses the need for smaller devices, particularly for nanosatellites.
- Reduced preload capability: decrease internal stresses and frictional torques, extending lifespan.
- Reversible (hold/release alternation).

Invention synthesis

This invention presents a reusable device for holding and releasing a transmission bar which effectively secures or releases an ancillary object to a main object (like a solar panel to a satellite). To release, a loosening component made of a single-acting shape memory material is heated beyond a transition temperature. The heating causes expansion in the loosening component and exerts a loosening pressure that counteracts and deforms the tightening component, allowing the segments to separate and release the bar. A key innovation is the use of elastic or superelastic shape memory materials for the tightening component, enabling the device to return to its holding configuration automatically upon cooling, making it resettable. This design eliminates release shocks, allowing for reusability and compactness.

Potential applications

- Satellite deployment: Releasing solar panels or other appendices on spacecraft.
- Space vehicle components: Securing and releasing parts during different mission phases.
- Vibration management: Maintaining high preload during launch and reducing it afterward.
- Cluster launches: Linking and releasing multiple satellites.



Schematic view of the set-up
1) device
2) transmission bar
3) tightening component
5) loosening component
33,34) longitudinal elements
41,42,43,44) plurality of segments

Commercial benefits

- Reduced operational risks: Eliminates shock, protecting delicate components.
- Lower long-term costs: Reusability reduces the need for replacement parts and manual resetting.
- Wider applicability: Compact size opens up new possibilities, especially for small satellites.
- Enhanced component lifespan: Ability to reduce preloads extends the life of critical bearing systems.

Patented invention - under license.

For more information :

Valo-TT@cnes.fr