

STINGER



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PATENT STATUS: GRANTED

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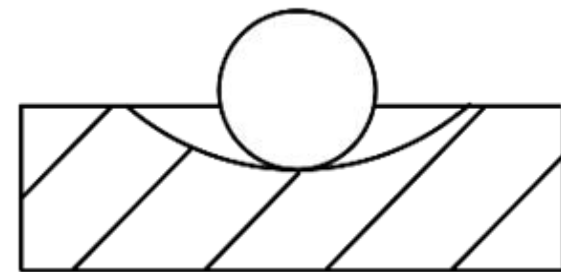
GRANT DATE: 29/01/2020

Invention

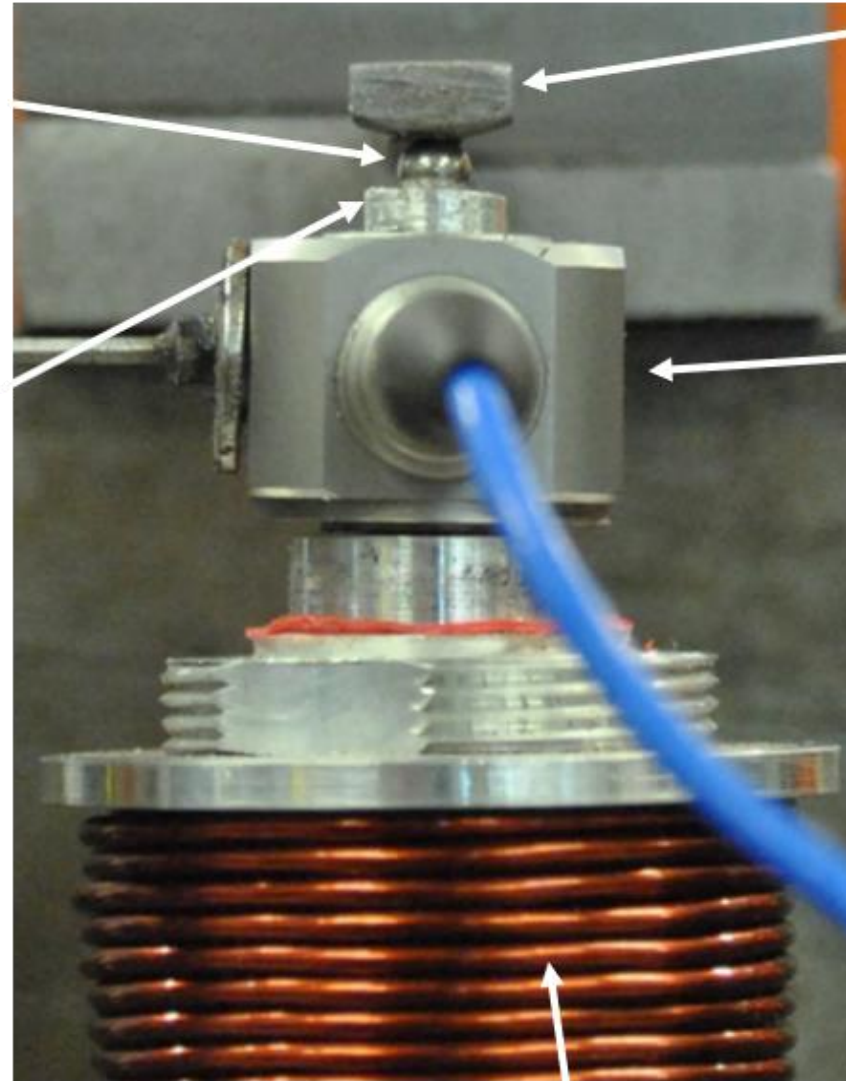


Dynamic analysis of mechanical structures generally involves the application of a load over a small area with a single force component. The **subject of this invention is a Stinger, structurally simple and inexpensive, for filtering out unwanted load components by point contact at both ends, providing a double hinge configuration.** The proposed stinger with respect to the design filters out unwanted spurious components by introducing **additional degrees of freedom**, and not relying on the difference in stiffness in the various directions. This is accomplished using a stinger that provides a point contact at each ends, and the placement is ensured by a compressive preload. The point contact results in a constraint system for the double-hinged stinger, causing that only the force along its axis can be transmitted. Two variants of the stinger are proposed: **Ball Stinger** (ball supported by a disc with a spherical groove) and **Strut Stinger** (with both ends with a conical tip, housed in a conical housing).

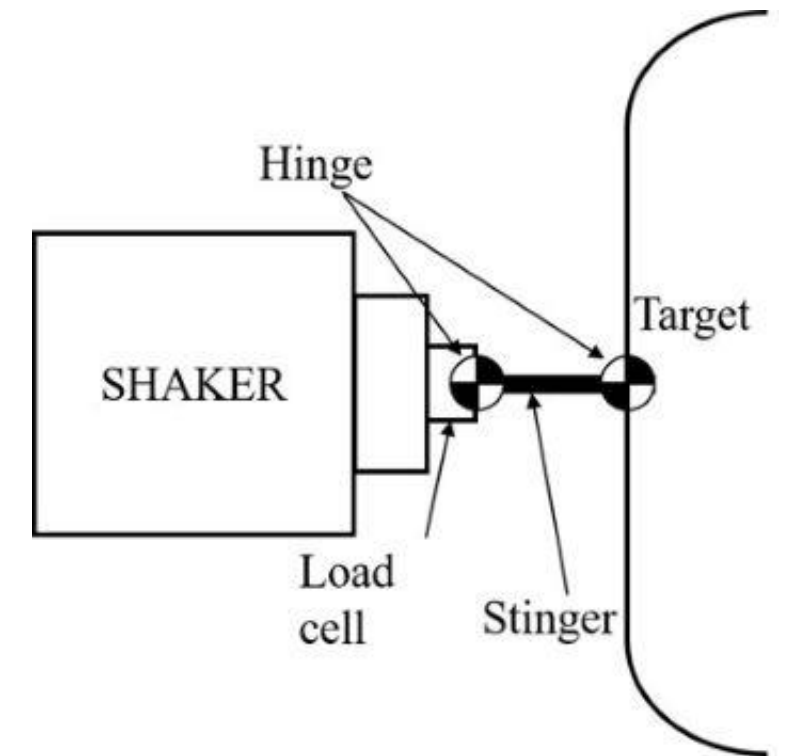
Drawings
& pictures



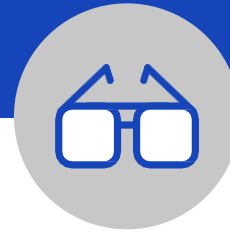
Ball Stinger
Support: Spherical slot



Target
Load Cell
Shaker



Industrial applications



Dynamic characterization of mechanical structures is a crucial issue in industry.

The invention is applicable to the entire **engineering field**, particularly in the area of dynamic analysis of mechanical structures in response to vibration; it can be used in experimental modal analysis, experimental harmonic response analysis, and dynamic testing employing shakers.

The industrial sector of turbomachinery may absolutely be an area of focus. The invention, however, is not relegated to this specific field, but can **be transversally used in many other sectors**, for example: **automotive** (research in the field of noise reduction and increase of comfort), **freight transport** (dynamic optimization of suspension systems), **power generation** (optimization of turbomachines and wind turbines) and **aircraft design** (study of rotor blades of helicopters and airplanes).

Benefits in the use of proposed stingers are:

- the **greater ability to filter unwanted loads** than that of known stingers. The higher axial stiffness allows the use of higher maximum test frequencies; the axial stiffness of the link unrelated to the transverse/flexural stiffness allows greater flexibility in design;
- **better performance** in terms of mechanical filtering, limiting the risk of having to repeat tests;
- the **simplicity of construction and low cost**.

Possible developments



This invention is proposed to implement the machinery used in industries nowadays and to solve and improve the traditional analytical and production processes related to mechanical processing requiring analysis of dynamic behavior.

We will explore how stingers can be used for:

- analysis of dynamic behavior in response to vibration;
- experimental modal analysis;
- experimental harmonic response analysis;
- dynamic tests using shakers.

The patented invention has technical-scientific and economic potential. The **simple geometry and ease of production** of the proposed Stinger make the device extremely economical and realizable from common suppliers, while providing **better performance** than the standard solution, which requires more accurate manufacturing. Furthermore, the innovation is also relevant from a scientific point of view, as its main application area concerns experimental modal analysis. From the economic point of view, the patented device offers the possibility to **reduce the production costs**, as previously mentioned. Experimental dynamic tests are often commissioned by companies to third parties, so the use of the innovative technology can be an advantage for the providers of such measurement services. Several manufacturers provide the standard device, based on the double interlocking, demonstrating the existence of possible commercial outlets for the invention.

For more information:



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