Technology Offer:

Conductor Device for Superconducting Applications

Ref.-No.: 0206-6425-BC

The conductor device is designed for low-temperature, particularly superconducting applications, featuring multiple superconducting wires arranged along the length of the device and encapsulated in an electrically insulating material. The device's design includes self-supporting wire sections between longitudinal end sections, facilitating stable and efficient connections in superconducting environments. This technology is suitable for applications requiring high-precision signal processing and cryogenic techniques.

Advantages

- **Space Efficiency**: Compact design minimizes space requirements in experimental setups.
- **Enhanced Stability**: Self-supporting wires and encapsulation material ensure mechanical robustness.
- **Reduced Crosstalk**: Fixed wire positions and shielding layer minimize interference.
- **Ease of Connection**: Flattened end sections facilitate quick and reliable hardware connections.
- **Customizable**: Adaptable manufacturing process for different wire numbers and lengths.

Applications

- **Cryogenic Sensors**: Ideal for connecting superconducting sensors to data recorders in cryogenic environments.
- **Quantum Computing**: Suitable for low-temperature quantum computing setups requiring stable, superconducting connections.
- **High-Precision Measurements**: Used in scientific experiments needing accurate signal transmission at cryogenic temperatures.
- **Medical Imaging**: Applicable in magnetic resonance imaging (MRI) systems that operate at very low temperatures.
- **Space Exploration**: Supports instrumentation in spacecraft designed for deep space missions where extreme temperatures are encountered.

Background

Superconducting applications require numerous superconducting connections between devices operating at cryogenic temperatures. Conventional NbTi superconducting wires face challenges due to their bulk, complex assembly, and are susceptible to crosstalk and mechanical instability. There is a need for a conductor device that is space-efficient, reduces electromagnetic interference, and ensures reliable and reproducible connections in cryogenic environments.

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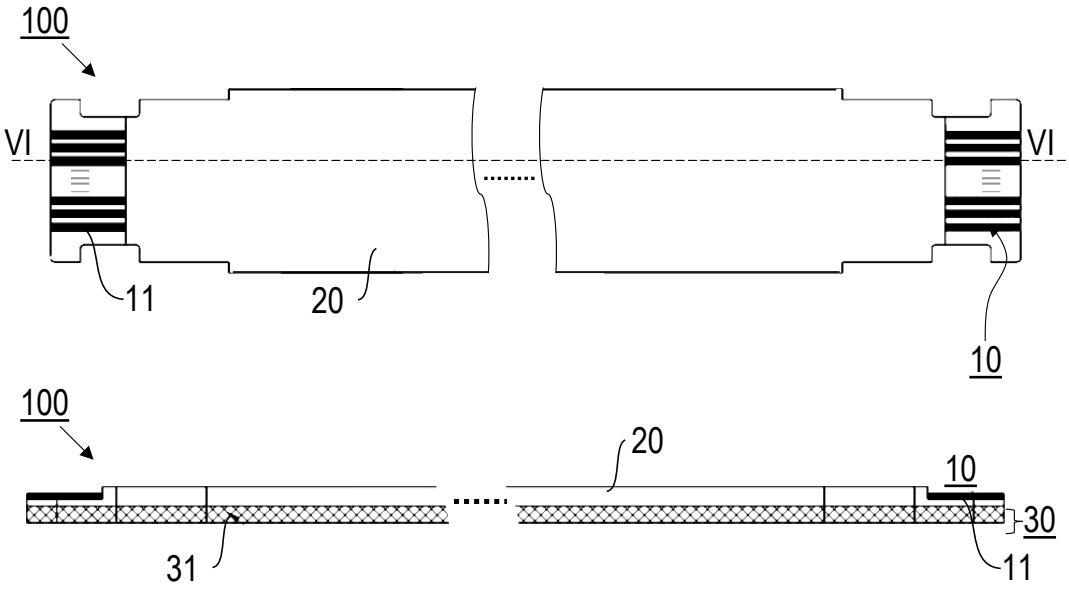
Technology

A schematic of the novel conductor device (100) is shown in the below figures. The conductor device comprises multiple superconducting wires (10) encapsulated in a polymer material (20), forming a flat, self-supporting cable. The encapsulation material provides electrical insulation, maintains the relative positions of the wires and enhances mechanical stability. The conductor device is manufactured using an extrusion process, which simplifies production and allows for customization in wire number and length. The design includes flattened end sections (11) for easier connections and a shielding layer (31) to protect against electromagnetic interference, ensuring reliable performance in low-temperature conditions.



For this technology a European patent application has been filed on July 28, 2023. The technology is available for licensing.

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