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Technology Offer

Advanced magnetic zipper for industrial and consumer applications

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Background

Conventional mechanical zippers find manifold applications for luggage, clothing or even industrial applications. However, their design features significant disadvantages. In particular, they require the use of both hands by the user to align the ends of the garment and lock the insertion pin into the slider. This mechanism can be prone to jamming and failure and more generally requires the user to free his or her hands. The user must further use one or both hands to move the slider along the length of the zipper to join it together.

Novel approaches solve this problem by replacing mechanical teeth elements with permanent magnetic elements (see Figure 1 a). Mediated by magnetic forces, opposing pairs from both rows establish a strong connection that is detachable with a peeling motion familiar to traditional zippers and thereby intuitive to the user.

Furthermore, magnetic zippers feature intrinsically an automatic closing mechanism. When two opposing elements come into contact, neighboring elements follow and the zipper closes along its entire length with enormous speed and accuracy. The user may initiate this motion by simply touching one magnetic element to another.

However, conventional designs for magnetic zippers fail to compensate for misaligned starting pairs and do not hinder undesired automatic closings resulting from chance contacts between both sides of the zipper.

Technology

Scientists from the Max Planck Institute for Dynamics and Self-Organization have developed an advanced magnetic zipper for industrial and consumer applications that is immune against misaligned closing of both rows.

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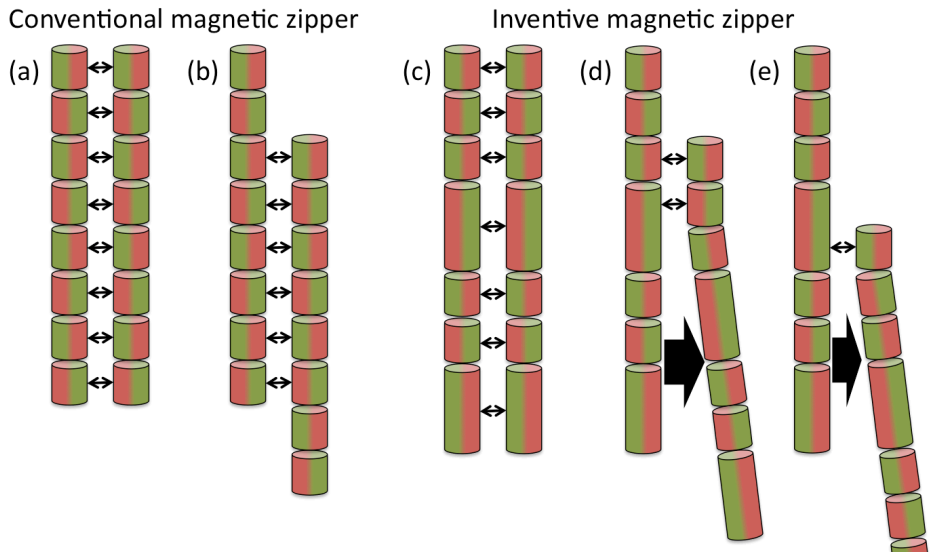

FIG. 1: Conventional magnetic zippers fail to compensate for positioning offsets: The automatic closing mechanism connects the entire length of both rows even when two starting pairs are misaligned (a, b). The inventive magnetic zipper features two rows of magnetic elements with varying length and polarization (c). Here, a positioning offset fails to induce an automatic closing mechanism (d, e). Although all figures exemplify magnetic zippers with diametrically magnetized elements, longitudinally magnetized elements are also possible.

The design is based on permanent magnetic elements of different lengths as illustrated in Figure 1 (c,d). The pattern formed by the different lengths is such that in the case of positioning offsets, neighboring elements are generally repelled from the opposing rows. Thus, the automatic closing mechanism is only triggered when two matching pairs of magnetic elements are brought into contact by the user.

This simple but effective improvement increases the usability of magnetic zippers. Further it is a key technology establishing magnetic zippers for applications that demand user-friendly and reliable zippers, such as outdoor clothing, adventure backpacks or industrial applications.

Advantages

Advanced magnetic zipper design feature

- **strong connection** between permanent magnetic elements.
- **robust, high speed** automatic closing mechanism.
- **reliability** no slider or teeth to damage or jam
- **one-touch operation** that does not require manual alignment by the user

Patent Information

- EP priority patent pending