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Press-fit hinge and magnesium alloy enclosure for laptop cover attachment

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Press-fit hinge and magnesium alloy enclosure for laptop cover attachment

ABSTRACT

Computing devices such as laptops utilize hinges to connect the lid of the device to its base. This disclosure describes a press-fit hinge mechanism for use in conjunction with magnesium alloy based enclosures that are utilized to attach a computing device lid to its base. The press-fit hinge mechanism includes a knurled shaft designed to be inserted into a magnesium alloy based enclosure. The teeth and lead-in chamfer geometry of the knurled shaft are designed to control the interference between the knurls and enclosure opening. A straight knurl pattern is utilized for ease of manufacture, and provides for better material flow via ridges of the knurled shaft, a lower insertion force, and a higher torsional resistance. The press-fit hinge mechanism enables tighter assembly tolerances, smaller assembly gaps and improved appearance for the device.

KEYWORDS

- Magnesium alloy
- Press-fit hinge
- knurl
- chamfer
- A-case
- Laptop cover
- Lid enclosure
- Base enclosure

BACKGROUND

Computing devices such as laptops utilize hinges to connect the lid (cover) of the device to its base (chassis). Screws are commonly used to secure the hinges to the lid and base enclosures. Screws occupy space and limit the available design choices for the devices. In some device designs that utilize an aluminum lid enclosure, a knurled pin is utilized that is press-fitted into the enclosure. Magnesium alloy based enclosures provide superior strength-to-weight properties and are more economical. However, magnesium alloy enclosures are more brittle when compared with aluminum enclosures, thereby posing a challenge to their use in conjunction with press-fit hinges.

DESCRIPTION

This disclosure describes a press-fit hinge mechanism that can be used in conjunction with magnesium alloy based enclosures that are utilized to attach a computing device lid to its base. The press-fit hinge and magnesium enclosures are suitable for use in devices such as clamshell laptops, 360 degree laptops, tablet folios, etc.

Fig. 1 illustrates an example press-fit hinge mechanism per techniques of this disclosure.

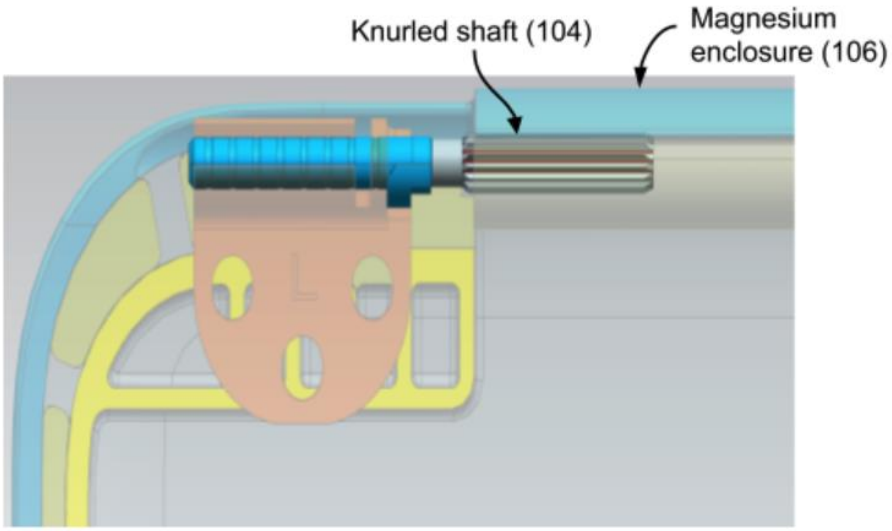

Fig. 1: A knurled shaft used in conjunction with a magnesium alloy enclosure

The press-fit hinge mechanism is designed to withstand the high torques required for the function of a laptop hinge. In the example illustrated in Fig. 1, the press-fit hinge mechanism includes a knurled shaft (104) that is designed to be inserted into a magnesium alloy based enclosure (106). The teeth and lead-in chamfer geometry of the knurled shaft are designed to control the interference between the knurls and the opening of the enclosure.

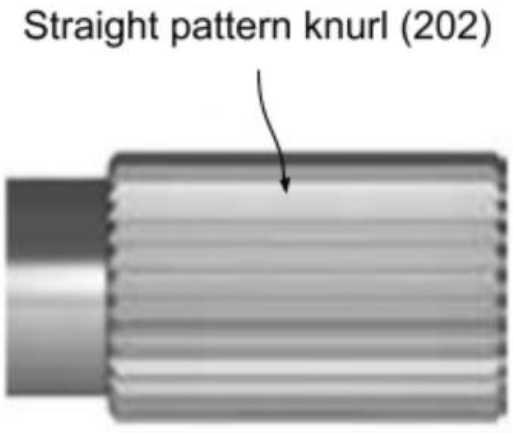

Fig. 2: Straight pattern knurled shaft

Fig. 2 depicts a view of an example knurled shaft that utilizes a straight knurl pattern (202). This facilitates ease of manufacture, and provides for better material flow via ridges of the knurled shaft, a lower insertion force, and a higher torsional resistance. Alternatively, a right hand diagonal pattern, left hand diagonal pattern, or male diamond pattern, etc. can be utilized for the knurled shaft.

The press-fit hinge as described herein enables tighter assembly tolerances, smaller assembly gaps and improved appearance for the device and can be used for devices with magnesium alloy based enclosures. A lubricant can be used during assembly of the press-fit hinge. An anaerobic adhesive can be utilized to prevent vibrational loosening, and for improved corrosion resistance and overall strength of the attachment.

CONCLUSION

Computing devices such as laptops utilize hinges to connect the lid of the device to its base. This disclosure describes a press-fit hinge mechanism for use in conjunction with magnesium alloy based enclosures that are utilized to attach a computing device lid to its base. The press-fit hinge mechanism includes a knurled shaft designed to be inserted into a magnesium alloy based enclosure. The teeth and lead-in chamfer geometry of the knurled shaft are designed to control the interference between the knurls and enclosure opening. A straight knurl pattern is utilized for ease of manufacture, and provides for better material flow via ridges of the knurled shaft, a lower insertion force, and a higher torsional resistance. The press-fit hinge mechanism enables tighter assembly tolerances, smaller assembly gaps and improved appearance for the device.