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Brief 69-10388

NASA TECH BRIEF

Quick-Release Hook-and-Loop Fastener

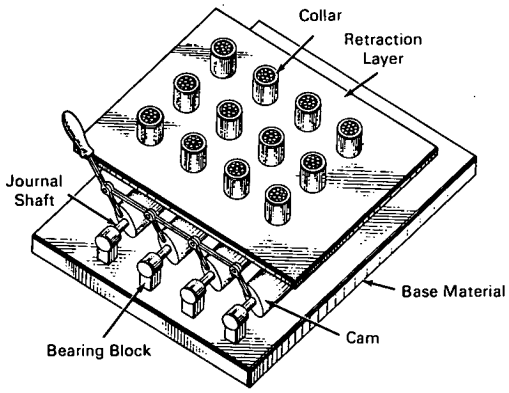

FIGURE 1

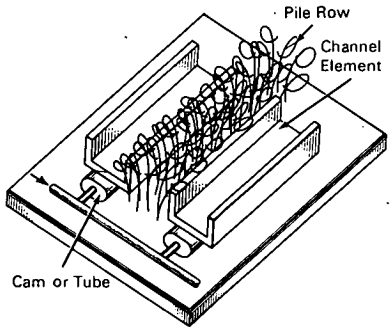

FIGURE 3

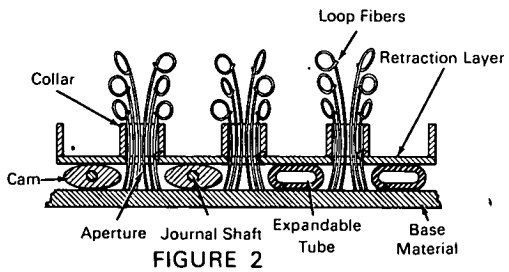

FIGURE 2

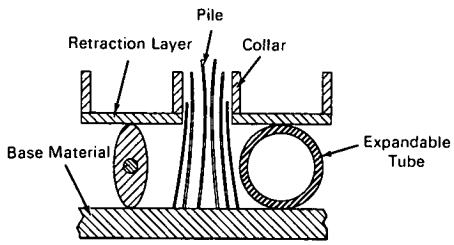

FIGURE 4

Figs. 1 and 2. The cam method of separation. A loop-pile fabric adheres to a rigid base material. Groups of fibers protrude through apertures in a retraction layer; each aperture is ringed by a collar. The retraction mechanism consists of either strip cams rotatable about journal shafts mounted in bearing blocks, or expandable tubes. The cams are linked by cranks and thrust links, and rotated by a lever. When the lever lies parallel with the fabric, the cams lie flat, the plate is lowered, and the looped pile projects freely through the collars and engages applied hooks (fig. 2). When the lever is raised, the layer rises, the loops in the fibers are straightened by the collars, and the opposing hooks are released. A variation of this method uses expandable pneumatic tubes (fig. 2; right half) or perforated expandable mats instead of cams. Figs. 3 and 4. For still another method the pile groups are confined in rows by channel elements (fig. 3). Under the channel elements are either cams or expandable tubes (fig. 4). When the channel elements are raised, the loops are straightened (fig. 4). The perpendicularly parallel displacement of the elements, relative to the rigid base material, may be ensured by provision of guide means (not illustrated).

The problem:

Velcro fasteners incorporate two types of fabric: a "hook" fabric attached to one base material and a "loop" fabric attached to the other. Normally one of the two fabrics is applied to a flexible material that flexes as force is applied to the material's edge in order to break the joint progressively. If neither material is flexible the joint can be broken only by application of force that is excessive relative to the joint's area—between 5 and 40 lb/inch^2, depending

(continued overleaf)

on the material in hooks and loops (stainless steel, nylon, and polyester have been used successfully).

The solution:

Joints between two rigid materials can now be broken with ease by use of any of various methods. Three such methods (figs. 1–4) are applicable to either the hook or the loop fabric. The essence of each method is that all the hooks or all the loops are straightened simultaneously; the need for "peeling" is eliminated.

Many modifications of this idea are possible. The surfaces of the rigid materials need not be flat or parallel planar.

Note:

Documentation is available from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Price: $3.00
Reference: TSP69-10388

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

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