

NASA TECH BRIEF



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Novel Shock Absorber Features Varying Yield Strengths



FIGURE 1

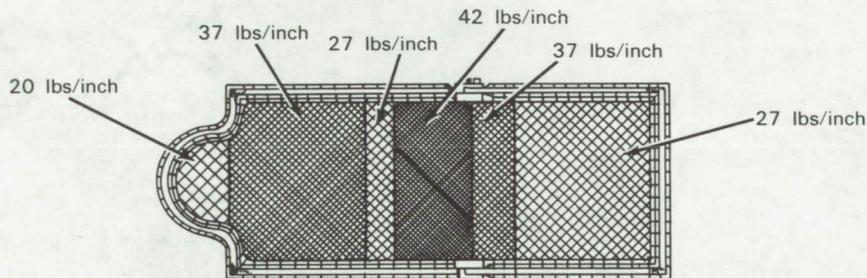


FIGURE 2

The problem: In the presence of large acceleration or deceleration forces, the human body requires varying amounts of support related to the body's mass at the point of contact.

The solution: A shock-absorbent webbing of partially-drawn synthetic strands is arranged in sections of varying density related to the varying mass of the human body. Form-fitting webbing for legs and torso is attached to the base structure to absorb shock occasioned by excessive lateral or longitudinal forces.

How it's done: The base webbing is fabricated in separate transverse sectional areas. Each area has a uniform yield strength, measured in pounds per linear

inch, of a magnitude corresponding to the mass of the body portion resting on the particular area. The yield strengths for the various sections are selected so that some sections will give less than others when predetermined loads are exceeded. In this way, the attitude and contour of the human body is maintained and supported against injury. The sections are attached to a rigid frame to extend transversely rather than longitudinally, since a longitudinal attachment would not maintain the body contour. Because human tolerance to acceleration forces is approximately 20g, the yield strengths in a particular device are appropriately limited to permit permanent elongation of the webbing with absorption of energy before the applied

(continued overleaf)

acceleration forces reach the tolerance limit. Attenuation by elongation of the webbing prevents the acceleration forces from exceeding the tolerance limit.

The leg and torso webbing is fabricated of the same material as the base webbing and functions to provide shock-absorbing support for the body in the presence of large longitudinal or lateral forces.

Notes:

1. The device illustrated proved by drop tests and tests made with a centrifuge to provide adequate support for individuals from five feet seven inches to six feet four inches in height and weighing from 150 to 240 pounds.
2. The webbing will elongate and effectively absorb energy in the approximate order of 75 g.
3. Any deformation of the webbing is permanent so that reuse possibilities for the webbing depend

upon the amount of nonresilient stretch remaining.

4. For further information about this invention inquiries may be directed to:

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P.O. Box 1537
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Reference: B64-10138

Patent status: NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA Headquarters, Washington, D.C., 20546.

Source: Douglas J. Geier et al
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