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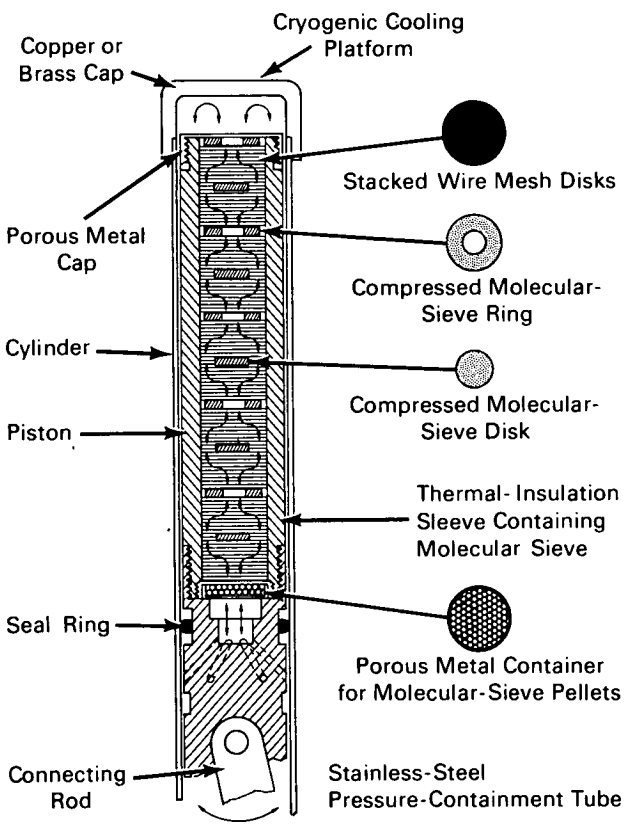
NASA TECH BRIEF

Molecular Sieves Control Contamination and Insulate in Thermal Regenerators: A Concept

Incorporation of zeolitic molecular sieves prolongs the lives of cryogenic engines (for development of cryogenic temperatures) by preventing contamination



Ambient-Temperature Crankcase

of the thermal regenerators on the cold ends of closed-cycle engines. Regenerators are composed of stacks of disks of fine wire mesh, usually of copper; contaminants reaching the disks condense and form thermally insulating films. Sieves also serve as thermal insulators by preventing conduction of heat along regenerators through contiguous disks of mesh.

The figure shows a thermal regenerator with the piston of a cold-displacer to produce cryogenic temperatures. The piston reciprocates in relation to the pressure-containment tube which is stationary relative to the engine. At each end of the regenerator a porous metal filter prevents particulate contaminants from entering and molecular-sieve material from leaving it.

In the event that some contaminants pass the molecular sieve and condense on the regenerator's heat-transfer surface, the engine can be stopped and brought to ambient temperature so that the contaminants reevaporate and are absorbed by the sieve. Bypassing around the heat-transfer surface is reduced by the method of fabrication. An imperfect seal between the pressure casing and the piston permits gas containing contaminants to reach the cold end without passing through the regenerator; the molecular sieve at the cold end collects these contaminants, and the porous metal cap keeps out particulate contaminants.

Such sieves may be incorporated in a sterling type cryogenic engine.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: TSP70-10424

(continued overleaf)

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: M. G. Gasser
Goddard Space Flight Center
(GSC-10910)