July 1966 Brief 66-10343

NASA TECH BRIEF

Concept for Passive System to Control Gas Flow Independently of Temperature

The problem:

To devise a passive system (that is, one without moving parts, such as in electromechanical devices) that will maintain the volumetric flow rate of a gas at a constant value over a range of temperatures.

The solution:

Pass the gas through a parallel or series combination of turbulent flow and laminar flow restrictors having opposing volumetric flow rate vs temperature functions.

How it's done:

For a constant pressure differential, the volumetric flow rate through a restrictor in which the flow is laminar will decrease with increasing gas temperature, whereas the flow rate through a restrictor in which the flow is turbulent will increase as the temperature rises. Thus the two types of flow restrictors may be arranged in parallel or series combinations to obtain a nearly constant volumetric flow rate as the temperature varies.

Notes:

1. By proper combination of restrictors having known characteristics, the flow rate may be automatically made to vary as an increasing or decreasing function of temperature.
2. Restrictors consisting of sintered plugs have been found to exhibit the desired flow characteristics.
3. This system has been in the conceptual stage and is presently under development.

Patent status:

No patent action is contemplated by NASA.

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under contract to
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(M-FS-982)

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