April 1971

Brief 71-10067

NASA TECH BRIEF

Manned Spacecraft Center

Chatter-Free Check Valve: A Concept

The problem:

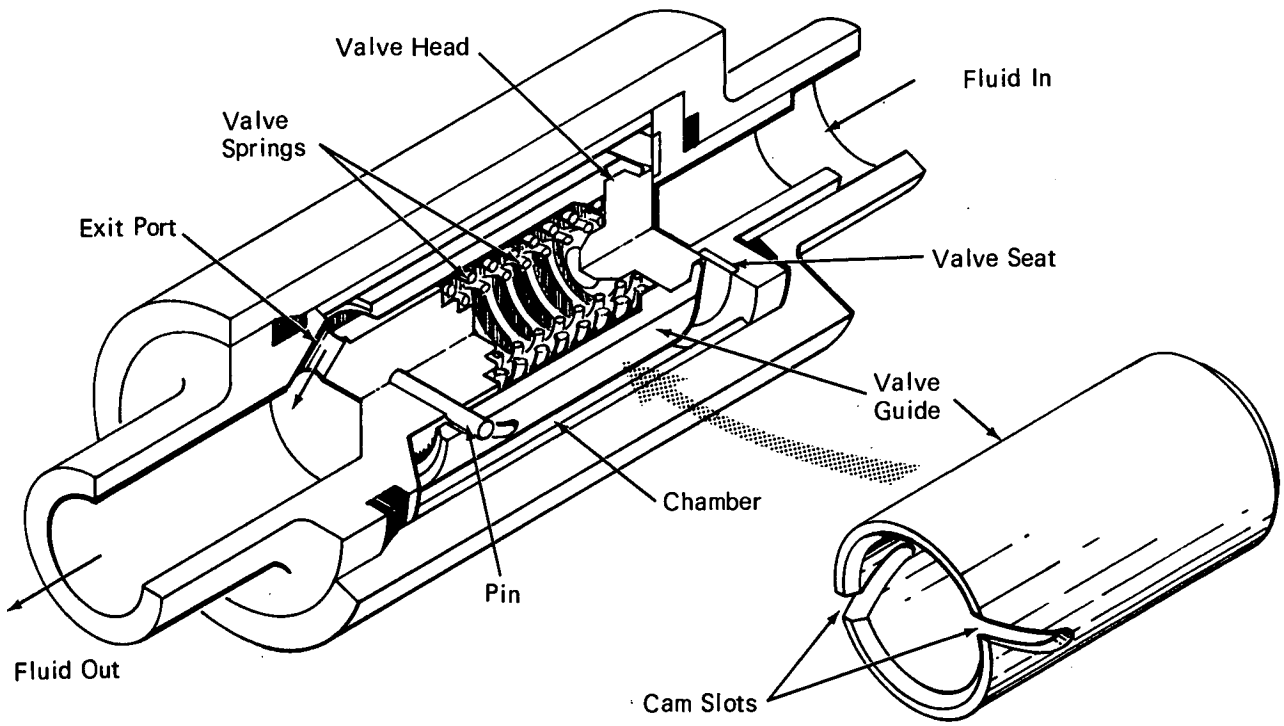
To eliminate the violent chatter that can occur in conventional check valves having precision, hardened seats. Such chatter occurs at certain resonant conditions of fluid flow or pressure differential, and can cause erratic operation and excessive wear on the sealing surfaces, leading to premature valve failure.

The solution:

A check valve with a valve head that moves in a spiral motion away from the seat. The motion is controlled by the travel of a pin along a spiral groove in the valve guide. Clearances between the pin and the groove permit free motion of the valve, but effectively dampen vibration and chattering.

How it's done:

The operating fluid passes across the valve seat and through the valve at an opening pressure determined by the effective area of the seat and the force of the valve springs. After the operating fluid passes the valve seat, it enters a chamber and exits through ports. In the check direction, the fluid is blocked at the valve-to-valve-seat interface.



The unique feature of the check valve is the action of the pin in the cam slot, causing the valve to

(continued overleaf)

rotate as it opens from the seat. As the valve travels in the axial direction, a force opposing such motion is produced by the resistance of the cam slot and pin, and any tendency for the valve to chatter is thus damped. The concentric arrangement of the springs, each of which has a different force coefficient, also reduces chattering by a "snubbing" action.

Notes:

1. This design is in the conceptual stage only and as of the date of publication of this document no model or prototype has been constructed.
2. No additional documentation is available.

Patent status:

No patent action is contemplated by NASA.

Source: J. E. Dunbar of
Instruments and Life Support Div.
Bendix Corp.
under contract to
Manned Spacecraft Center
(MSC-13262)