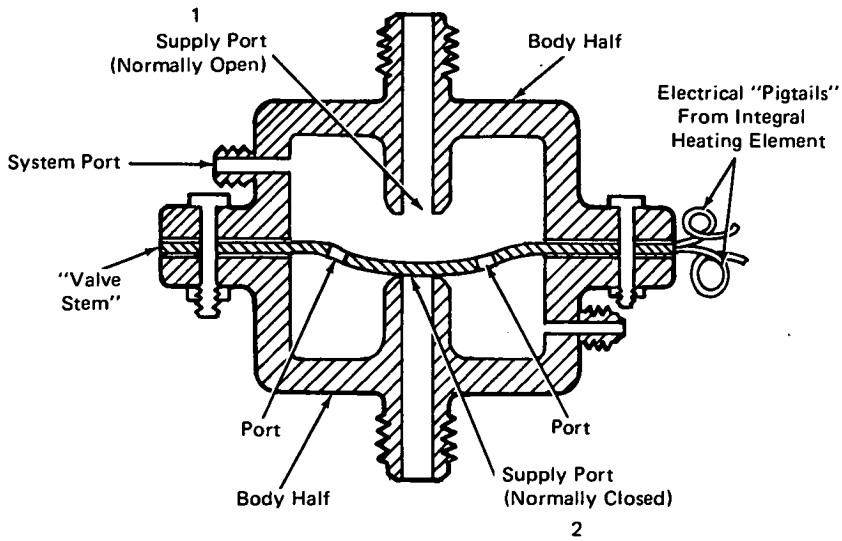
NASA TECH BRIEF

Marshall Space Flight Center

A Valve Concept for Remote Fluid Flow Control



The problem:

Remote fluid flow control has been provided by solenoid valves which are heavy, costly, not too reliable, and require frequent maintenance. In this case, fluid mixing requires at least two valves, which further reduces reliability and increases initial and maintenance costs.

The solution:

A valve concept has been devised which offers a simplified mechanism, light weight, and is capable of controlling a large number of ports.

How it's done:

The proposed valve, as shown in the figure, uses two body halves and the valve stem. System connection is provided by the body halves which are sufficiently light in weight to be supported directly by the plumbing. Valve control is achieved with the valve stem which is a bimetallic device activated by the heating coil to open or close the selected supply ports. The number of controlled ports allowed in this design is limited only by the desired physical size of the system.

In the de-energized state, or below a given temperature, the valve stem seals the body supply port (1). When the heating coil warms the valve stem above the given temperature, the valve stem raises to open port (1) and seal the supply port (2) of the opposite valve half. Fluid then flows from the open supply port (1). This valve stem may be cycled between supply ports (1) and (2) to produce a mixing operation.

Although limited in use, automatic control of the fluid flow may be achieved with the proper selection of bimetallic material in the valve stem. This material is chosen so that it is activated at a selected fluid temperature. Thus, when the fluid temperature reaches a particular value, it will activate the valve stem to open the supply port for cooling or to shut the source. In this capacity, the valve may be applied as a heat control to home furnaces which would be independent of external thermocouples or electrical power.

(continued overleaf)

Notes:

1. The selection of bimetallic material for the valve stem will depend on the temperature requirements of the system. Conservative estimates based on the standard materials and processes indicate a temperature range between -50 to 200°C.
2. Requests for further information may be directed to:
   Technology Utilization Officer
   Marshall Space Flight Center
   Code A&TS-TU
   Huntsville, Alabama 35812
   Reference: B72-10400

Patent status:

No patent action is contemplated by NASA.

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