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Brief 71-10474

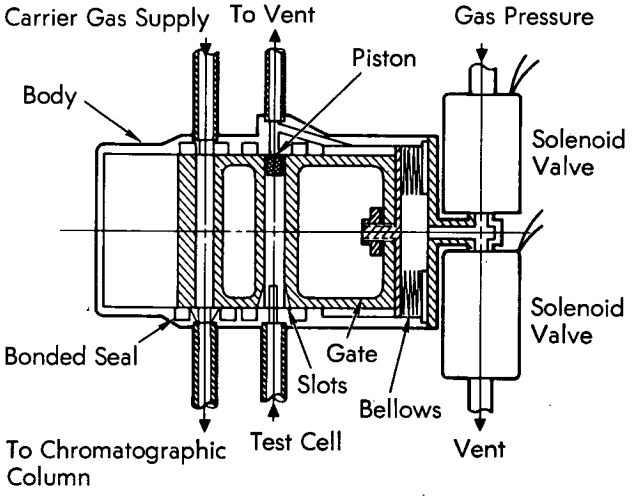
NASA TECH BRIEF

Ames Research Center

Gas Chromatograph Sample-Transfer Valve

The problem:

To provide a means of transferring a metered quantity of gas from a pressurized test cell to a gas chromatograph.



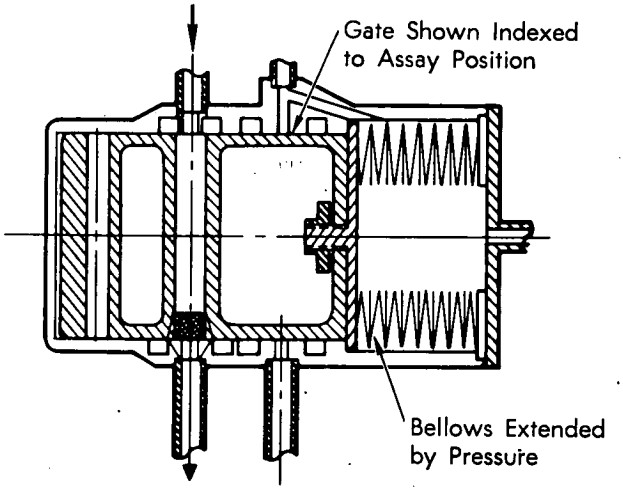
Gas Sampling Valve in Position prior to Gas Sample Delivery

The solution:

A slide-type gate valve that incorporates the sampling volume and a transfer passageway. The gate is moved by a pneumatic bellows-type actuator.

How it's done:

The sliding member of the gate valve is a rectangular slab of metal with two drilled ports aligned with inlet and outlet taps (see Fig. 1). Gaskets prevent leakage between the sliding surfaces and the ports. The right-hand drilled port is equipped with a free piston consisting of a snugly fitting rubber pledget. The lower part of this port is slightly enlarged and grooved so that gas can bypass the free piston when it is at the lower end of its travel. When the piston is at the upper end of its travel, it blocks flow and thus defines the volume of gas which is to be transferred to the chromatograph column.



Gas Sampling Valve in Position after Gas Sample Delivery

The gate is connected to a bellows which may be coupled to a source of gas pressure or to a vent by solenoid valves. Figure 1 indicates the position of the gate prior to the delivery of a gas sample to the chromatograph column. Since the test cell is at a considerably higher pressure than the vent, the free piston is driven to the end of its bore. The gas volume defined by the sealed bore at test-cell pressure is sized to ensure proper operation of the chromatograph column. The left-hand bore provides a path for the supply of carrier gas to the chromatograph column.

When the gas sample is to be transferred to the chromatograph column, the solenoid valve for the

(continued overleaf)

vent is closed and carrier gas pressure is used to drive the slide into the position shown in Figure 2. The carrier gas drives the free piston down the length of the bore, injecting the sample into the line leading to the chromatograph column. Once the piston reaches the grooved section of the bore, carrier gas flow into the chromatograph column resumes. The momentary interruption of the carrier gas flow to the chromatograph creates no problems.

When the slide is returned to the right-hand position, carrier gas pressure in the bore containing the free piston is vented and, since the test cell pressure is in excess of vent backpressure, the free piston is driven towards the vent aperture until it stops. The bore is thus filled with a new sample of gas from the test cell and the apparatus is ready for the next sample transfer to the gas chromatograph. Transfer of carrier gas into the test cell is limited to the annular cavity between the free piston and the bore at essentially test-cell pressure, and would only be about 1/100 of the sample size.

Note:

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

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
Reference: B71-10474

Patent status:

No patent action is contemplated by NASA.

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