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Remote Operation High Pressure Valve Protects Test Personnel

The problem:
In testing certain spacecraft systems, pressures of more than 20,000 psi may be used. Where pressures of this magnitude are involved, there is always a possibility that some component in the high pressure system may rupture, exposing anyone in the area to possible severe injury. It is desirable to isolate test personnel from the high pressure system. Previous methods for manually controlling and adjusting high pressure valves were inconvenient, difficult, and uncertain. Electrically operated valves were undesirable because of the ever-present danger of sparks.

The solution:
A valve designed for use in high pressure systems that can easily be opened and closed by an operator stationed at a position remote from the high pressure system, assuring the operator's safety in the event (continued overleaf)
that the valve or other component within the high
pressure system fails.

How it's done:
Fluid under high pressure is admitted to the valve
trough the inlet, but is blocked by the position of the
spool valve which is biased to a closed position by the
force of the spring. Since the force of the spring is
greater than the incoming pressure the spool valve will
not move.

To open the valve, a low pressure fluid is admitted
through the operating port to act on the side of the
spool valve opposite the side being acted upon by the
spring. This low pressure supplements the force of the
high pressure fluid to develop a force greater than
that of the spring. This causes the spool valve to move
within the body to align the passageway within the
valve with outlet ports in the body.

To close the valve, the low pressure is decreased in
the body so that the pressure of the spring once again
becomes greater than the incoming pressure, and the
spool valve is moved back to its original position to
close off the high pressure fluid.

Notes:
1. Test personnel operating this valve are exposed
only to the low pressure source necessary for open-
ing and closing the high pressure valve, and be-
cause of their remote location are at no time
exposed to the extreme high pressure being con-
trolled by the valve.

2. This valve also serves as a self-regulating valve
in that if the incoming pressure drops below a
desired value the valve will automatically close,
warning the operator that the testing pressure has
dropped to an undesired level.

3. Inquiries concerning this invention may be di-
rected to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas 77058
   Reference: B67-10291

Patent status:
Inquiries about obtaining rights for the commer-
cial use of this invention may be made to NASA,

   Source: Benjamin T. Howland
   of North American Aviation, Inc.
   under contract to
   Manned Spacecraft Center
   (MSC-11010)