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**F2B**

**G1S**

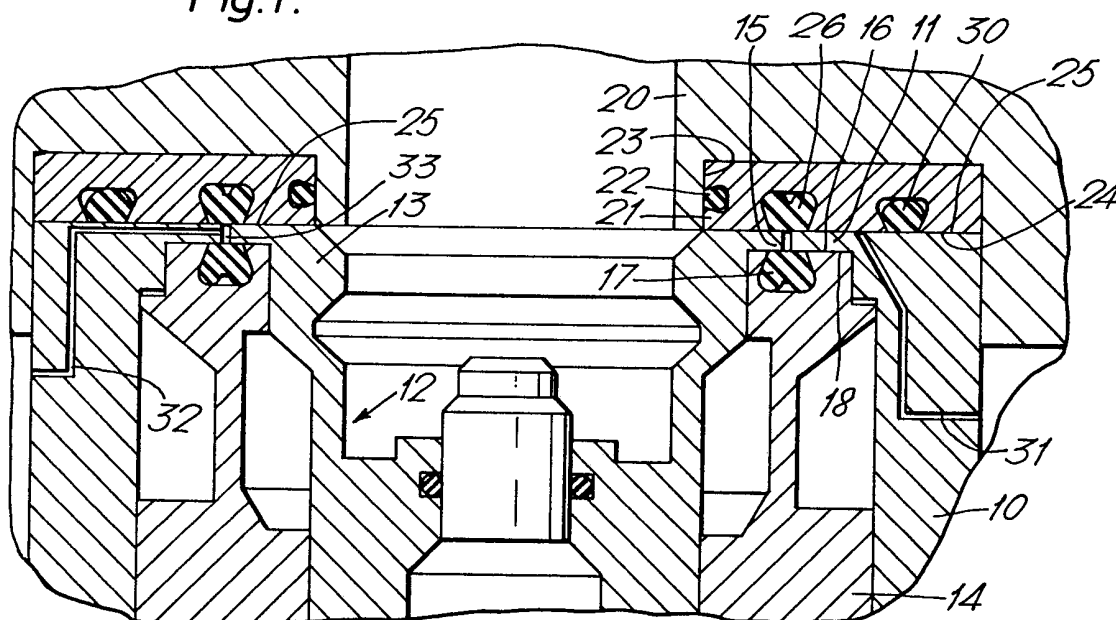
**Selected US specifications from IPC sub-classes F16J**

**G01M**

**(54) Improvements in or relating to seal testing**

(57) A test system for testing seals between a first member 10 and second and third members 20 and 12 movable towards and away from the first member 10 on opposite sides thereof comprises a first seal 26 between an outward flange 15 on member 12 and an inward flange on member 10, a second seal 17 between the third member and the opposite side of the flanges, a third seal 30 outward of seal 26 and between the first and second members. Passages 31, 32 in member 10 enable testing of the pressure in the spaces between seals 26, 30 and seals 17, 26 using pressure supply and monitoring apparatus.

*Fig.1.*



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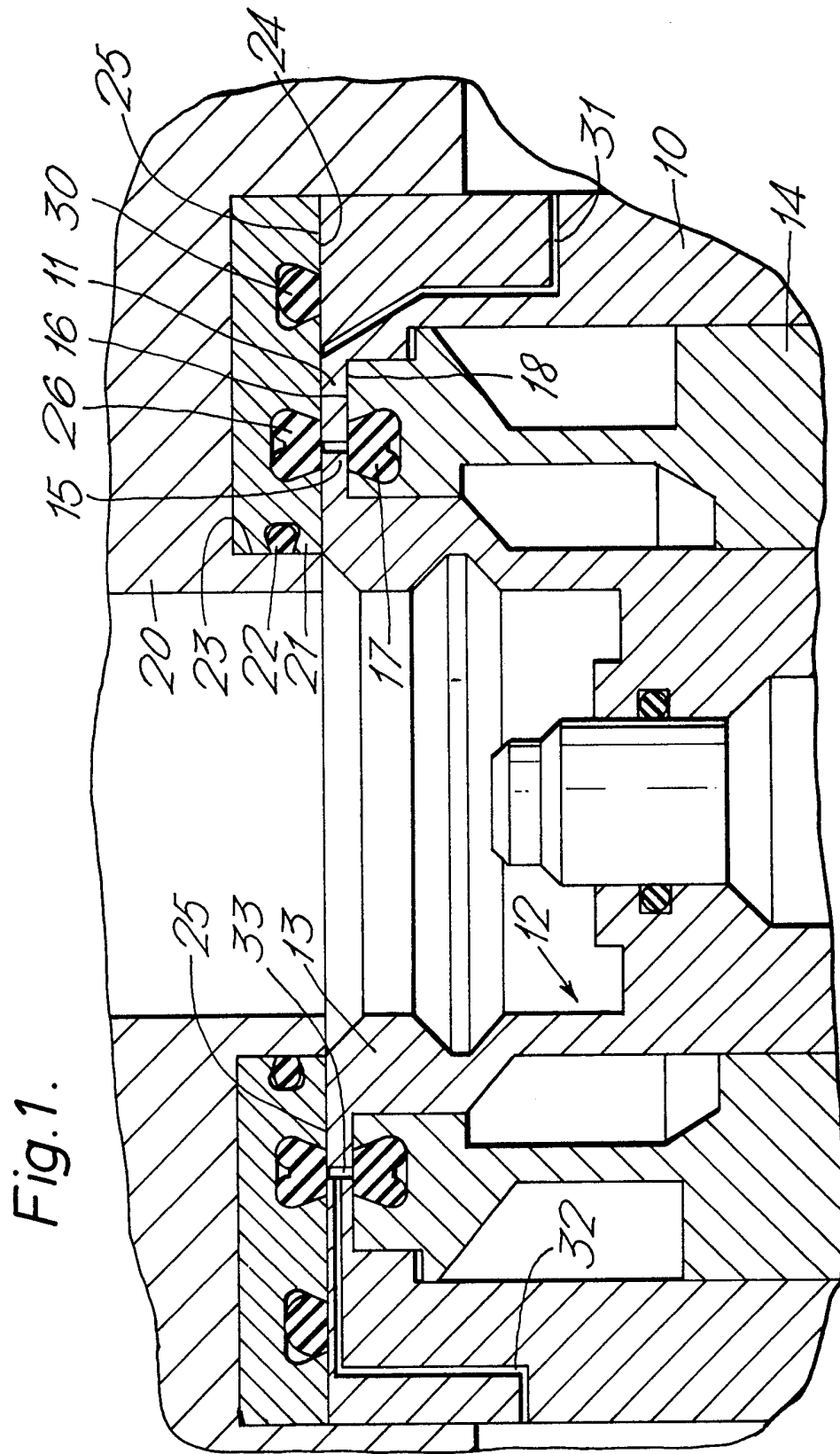


Fig. 1.

Fig. 2.

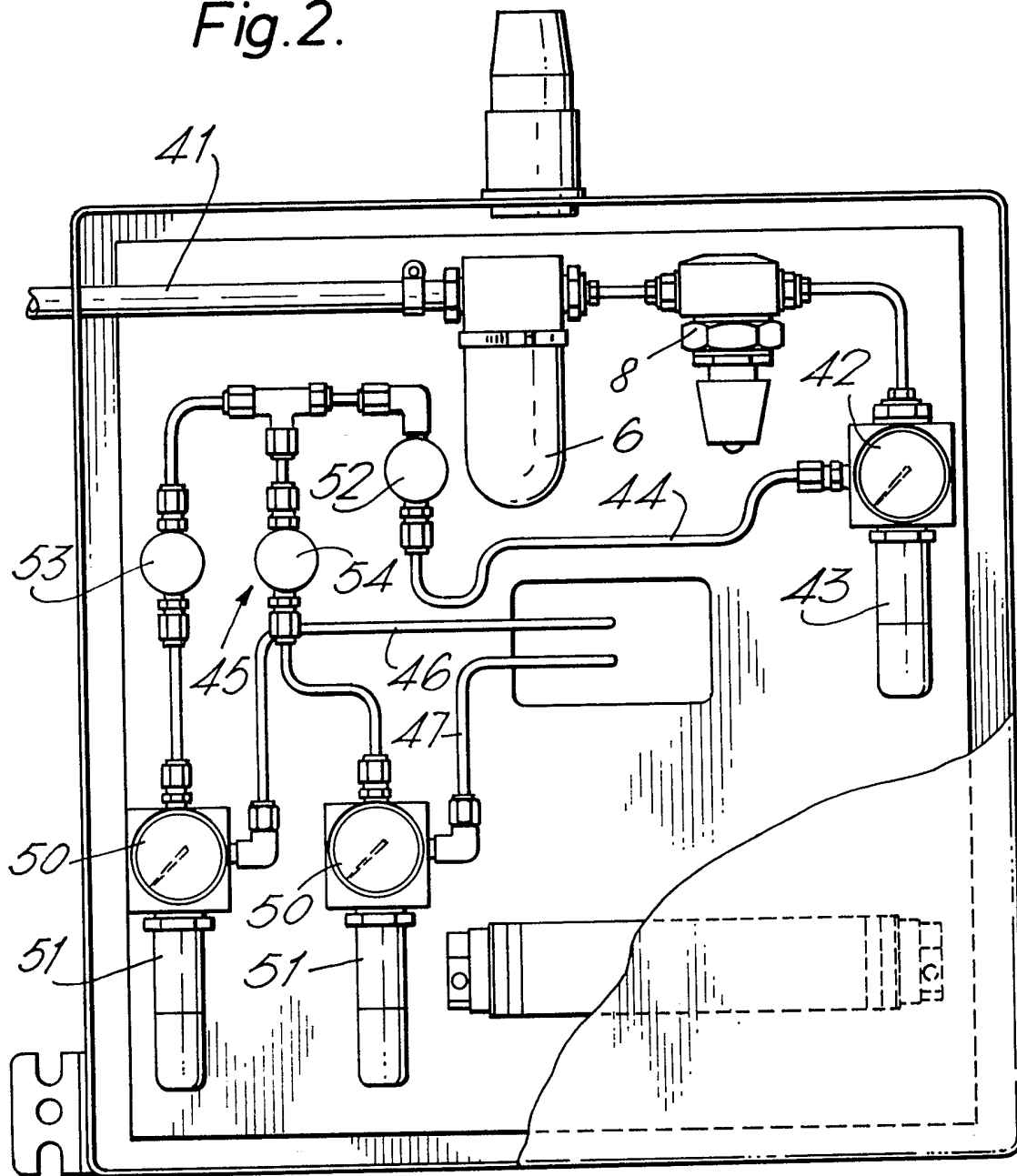
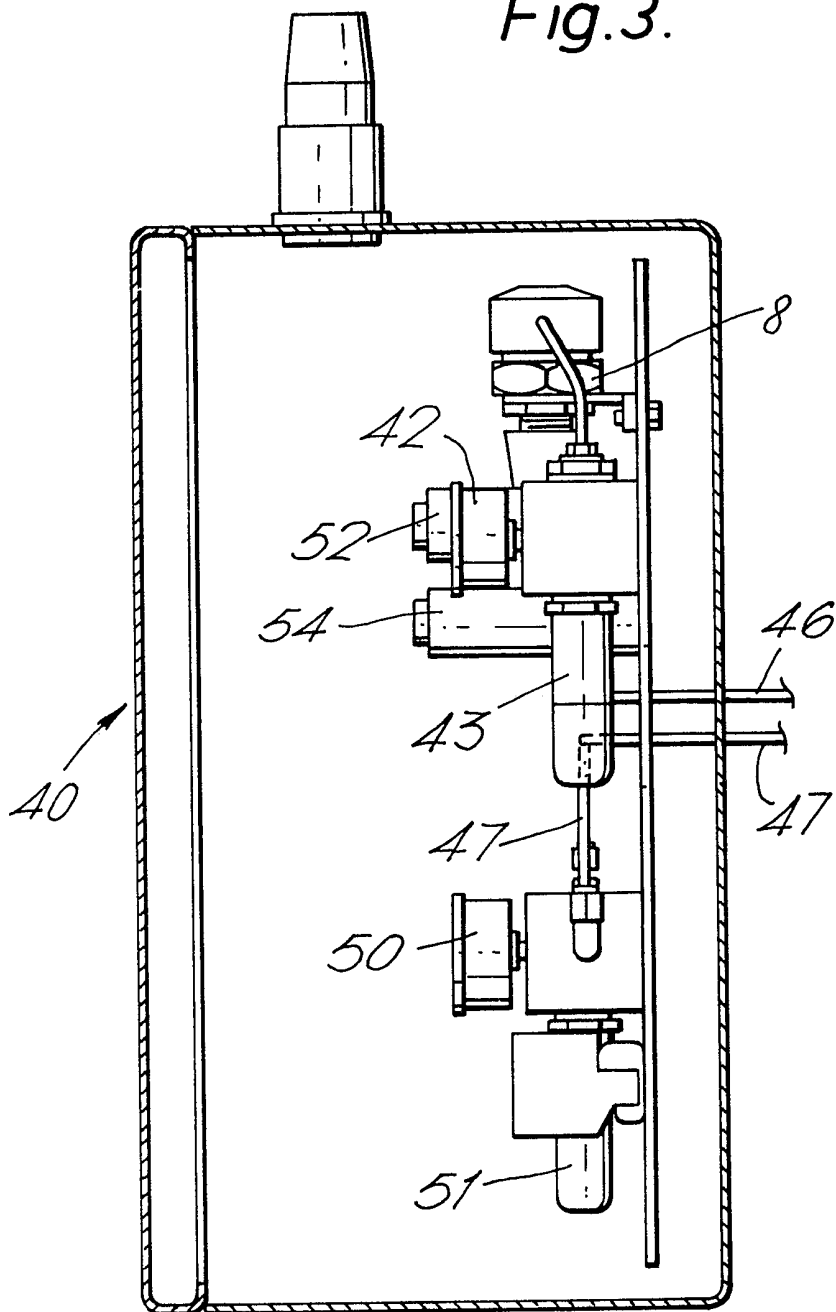


Fig. 3.



## SPECIFICATION

### Improvements in or relating to seal testing

- 5 This invention relates to the testing of seals.  
According to this invention a test system for testing seals between a first member and second and third members movable towards and away from the first member on opposite  
10 sides thereof, comprising first and second seal means which respectively engage between the first member and the second and third members in predetermined relative positions, a further seal between the first member and the  
15 second member laterally outwardly of the first seal means, a first passage in the first member communicating between the exterior of the first member and a surface thereof inwardly of the further seal and outwardly of  
20 the first seal means, and a second passage in the first member communicating between the exterior of the first member and a space between the first and second seal means and the first and second member in the predetermined relative position.

The first and second seal means may respectively be carried by the second and third members and the further seal be carried by the first member.

- 30 The invention may be performed in various ways and one specific embodiment with possible modifications will now be described by way of example with reference to the accompanying drawings in which:

- 35 Figure 1 is a longitudinal section through seal testing apparatus;  
Figure 2 is a front view of a test panel; and  
Figure 3 is a side view of Fig. 2 on a larger scale.

- 40 Referring to Fig. 1 a fixed member 10 has an inward annular flange 11 at one end. A first movable member 12 includes inner and outer members 13, 14, the inner member having an annular outward flange 15 at one end,  
45 overlying part of an end face 16 of the member 14 and part of an annular dovetail seal 17 in a recess in the end face 16. The member 12 can reciprocate in or relative to the member 10 and in the closed position shown the seal 17 also seals against the face 18 of the  
50 flange 11.

- A second movable member 20 which can reciprocate relative to the member 10 has an end face in which is an annular insert 21 having an annular recess receiving an O-ring 22  
55 sealing against the inner wall 23 of the recess.

- The insert 21 includes an annular recess in its end face 24 confronting the end face 25  
60 of member 10 with a dovetail seal 26 in the recess which seal, in the position shown, engages the end face 25 of flange 11 and the end face 25 of flange 15.

- In order to check the effectiveness of the  
65 seal 26 between surfaces 24 and 25, the in-

sert 21 is provided with a further annular recess radially outwards of seal 26 and receiving an O-ring 30 engaging, as shown, the face 25 and a passage 31 is formed in the member 10 between surface 25 and the exterior. If  
70 there is any leakage past seal 26 this can be detected by a suitable sensor connected to the outlet of passage 31.

- In order to test the effectiveness of the seal  
75 17 between the flange 15 of the member 12 and the flange 11, and of the seal 26 against flange 15 and flange 11, a passage 32 is formed in the member 10 and communicating at one end with the annular space 33 between the seals 17, 26. Again, leakage may  
80 be detected by a sensor at the outlet of the passage 32.

- The seal test arrangement may for example be used in a transfer system such as is described in European patent 8 specification  
85 93609 with the member 20 being a transfer arm, member 12 a carrier lid, member 14 a carrier, and member 10 a chamber base.

- A suitable sensor is indicated in Figs. 2 and  
90 3.

- Compressed air at up to 120 psig enters the unit 40 at the top 41. It is then filtered at 6 and regulated at 8 to the required pressure. The regulated pressure is shown by pressure  
95 gauge 42 and monitored by the pressure switch 43. The air line 44 then passes to a set of normally closed solenoid valves 45. At this point the line divides into two test lines 46, 47 leading to the two interspaces 31, 32  
100 to be tested. In each test line there is another pressure gauge 50 and pressure switch 51.

- When it is required to do a seal interspace test the main 52 and relevant branch solenoid valves 53 or 54 are opened to allow the regulated air supply to pressurise the seal test  
105 line. The air should be prevented from escaping by the seals under test. When the line is pressurised, the solenoid valve close. After a set period of time the pressure in the test line is monitored using the test line pressure  
110 switch 51. If the pressure has dropped below the set pressure of the switch then the seals are deemed defective. If the pressure is still above the set pressure then the seals are  
115 deemed good.

- Regulated pressures above the required level are detected by the high pressure switch 43. Regulated pressures below the required level are detected by failing to trip the relevant test  
120 line switch 51 when the solenoid valves are open. Two solenoid valves are used between the regulated supply line and the test line to ensure better isolation of the line under test from the pressure supply. Pressure gauges are  
125 used to provide visual confirmation of the pressures used.

## CLAIMS

1. A test system for testing seals between  
130 a first member and second and third members

movable towards and away from the first member on opposite sides thereof comprising first and second seal means which respectively engage between the first member and the second and third members in predetermined relative positions, a further seal between the first member and the second member laterally outwardly of the first seal means, a first passage in the first member communicating between the exterior of the first member and a surface thereof inwardly of the further seal and outwardly of the first seal means, and a second passage in the first member communicating between the exterior of the first member and a space between the first and second seal means and the first and second member in the predetermined relative position.

2. A test system as claimed in Claim 1, in which the first and second seal means are respectively carried by the second and third members and the further seal is carried by the second member.

3. A test system as claimed in Claim 1 or Claim 2, in which the first and second seal means in said predetermined positions engage an inward flange on the first member and on outward flange on the third member.

4. A test system as claimed in any preceding claim, comprising means for testing the effectiveness of the first and second seal means and of the further seal.

5. A test system as claimed in Claim 4, in which the testing means comprises pressure sensors responsive to pressure in said first and second passages.

6. A test system for testing seals between a first member and second and third members movable towards and away from the first member on opposite sides thereof substantially as hereinbefore described with reference to and as shown in Fig. 1 of the accompanying drawings.