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(56) Documents Cited  
GB 2177472 A GB 1324280 A EP 0532242 A2  
US 5542713 A US 5374084 A US 5161830 A  
US 5005878 A US 4929002 A US 4802697 A  
US 4778203 A

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(54) Fastener for connecting fluid carrying bodies

(57) The fastener 100, 130 has a body 102, 132 and at least one resilient retaining member 104, 106 protruding therefrom. The body has a seat for locating a first pipe 40, 120, and the retaining member(s) is/are adapted to engage a gas control valve body 12 so that in use the pipes and body are urged together to give a fluid tight seal. A first fastener 100 has its seat as an aperture engaging a first pipe rib 42, the retaining members 104, 106 being spring arms with retaining tabs 108, 110 engaging shoulders of the valve body 12. A second fastener 130 has its seat as a curved base partially surrounding a gas rail 120, its retaining members otherwise like the first fastener 100.

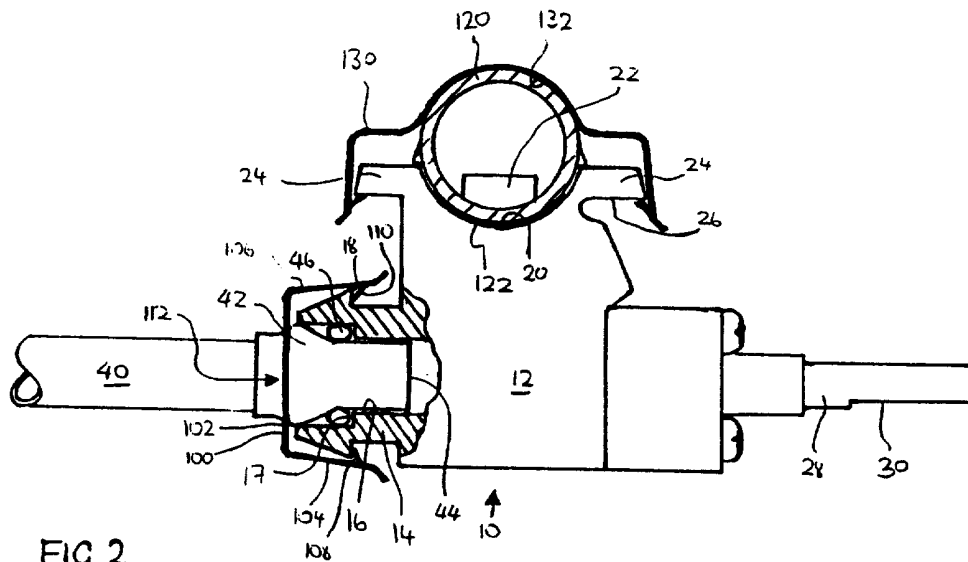
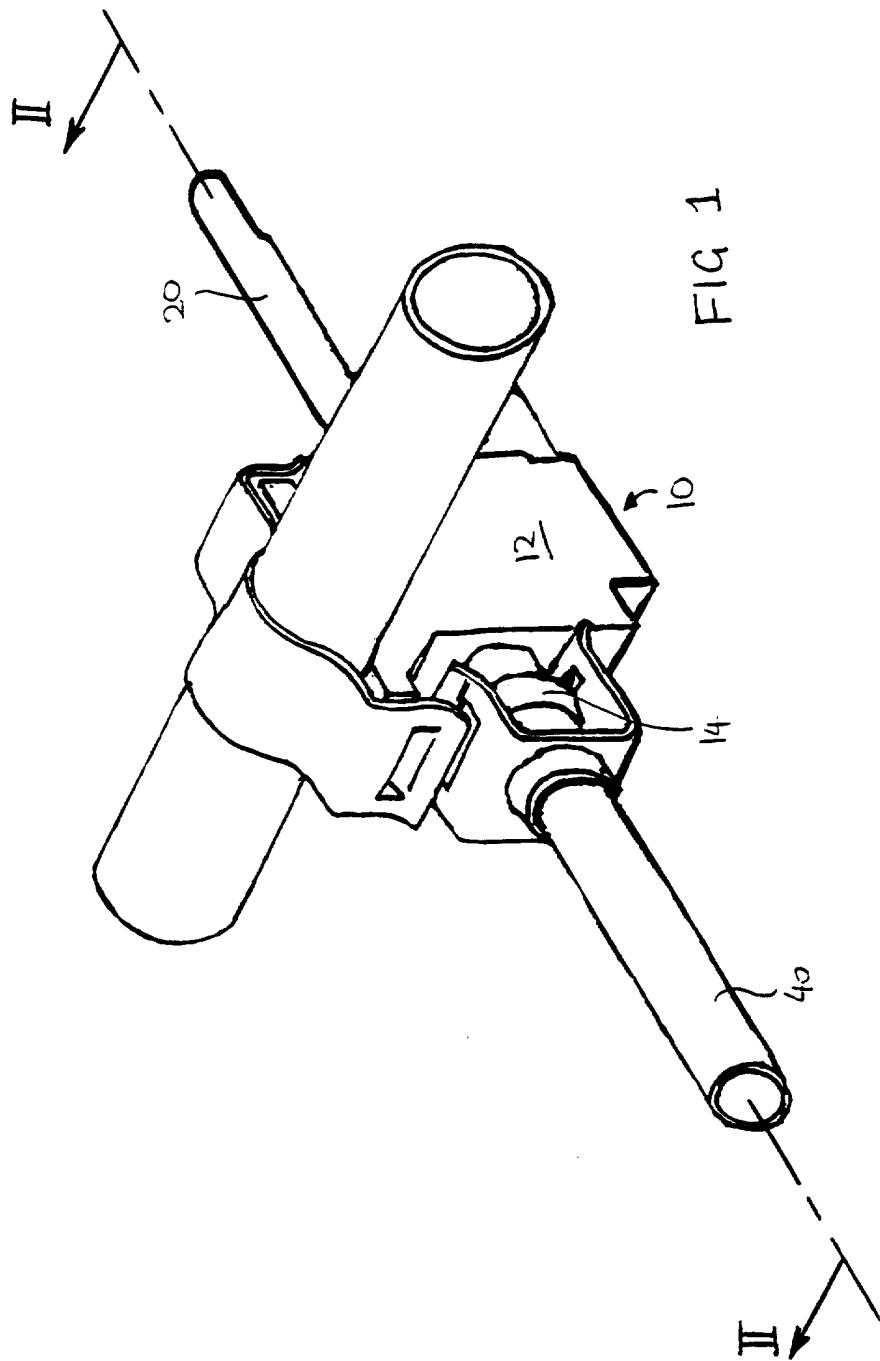


FIG 2

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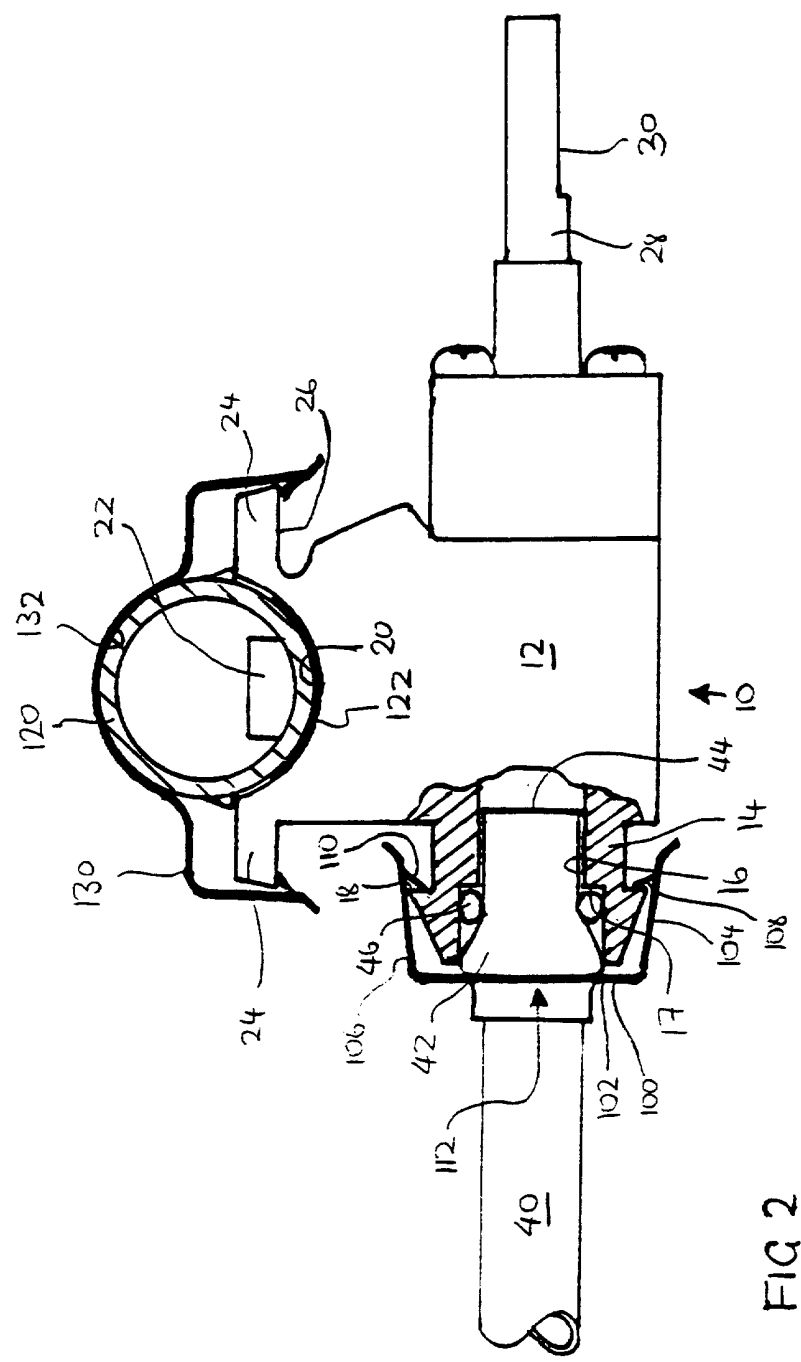


FIG 2

IMPROVEMENTS IN CONNECTIONS BETWEEN FLUID CARRYING COMPONENTS

The present invention is concerned with improvements in connections between fluid carrying components, and particularly between gas carrying components in domestic appliances.

Domestic gas appliances usually include several gas carrying components which must be connected together in a gas tight manner. For example, a gas cooker with an oven normally includes a gas supply pipe, a gas control valve and a gas rail for distributing gas to the burners. Screw-threaded connections are generally used to connect such components. A gasket or other seal of resilient material such as rubber is often interposed between the two screw-threaded components. Assembly of such connection is time consuming, and accordingly labour costs are high. Furthermore, since the assembly is safety critical, production workers must be given adequate training, be conscientious and reliable. All such assemblies require the gas seal to be tested but nevertheless there may be an inevitable variation in the tightening torque of the connection.

Accordingly, it is an object of the present invention to provide a fitting which can be used to assemble connections with reduced assembly costs and greater efficiency.

According to the invention there is provided a fastener for fastening first and second fluid carriers

together, wherein the fastener has a body and a resilient retaining member protruding therefrom, the body having defined therein a seat for locating a first fluid carrier and said retaining member being adapted to resiliently engage the second fluid carrier in use, such that the first and second fluid carriers are urged together by the fastener to give a fluid tight seal.

In this way, a gas-tight sealing connection may be formed and maintained between first and second fluid carriers by the action of the fastener.

A fastener according to the present invention can be manufactured in quantity with great precision yet requires minimal assembly skills. Variations due to manual assembly of screw-threaded connections are avoided, and the fastener is suitable for machine assembled components.

Preferably, the retaining member comprises a resilient projection which is arranged to clip behind an abutment of the second fluid carrier in use.

In the preferred embodiment, the retaining member extends from the body adjacent the seat. Preferably, the fastener comprises first and second retaining members, one each extending from opposite sides of the seat. In the preferred embodiment, each retaining member comprises a resilient projection. In an alternative embodiment, the first retaining member comprises a resilient projection and the second retaining member is adapted to locate on the second fluid carrier in use. In that way, the second

retaining member may be located on the second fluid carrier; subsequently the first retaining member may be moved to resiliently engage the second fluid carrier.

5 The retaining members may be parallel. The fastener may be symmetrical about the seat. In one preferred embodiment, the seat comprises a channel, such that a tubular fluid carrier may be laid therein. The channel may be uniform, and may be of part-circular cross-section. In an alternative preferred embodiment, the body includes a throughbore defined therein, the seat being defined by a rim of the throughbore; in that way an outwardly extending abutment, such as a circumferential rib, of a tubular carrier may locate in the seat allowing the carrier to pass through the throughbore.

10 The fastener may be a one piece component of spring steel. Alternatively, the fastener may be moulded of plastics material.

15 Two specific and preferred embodiments of the invention will now be described by way of example only and with reference to the accompanying drawings in which:

20 Figure 1 shows a view of a general arrangement of two fasteners according to the invention installed on a gas control valve, and

25 Figure 2 shows a partial cross-sectional view of the arrangement of Figure 1 in the direction of arrows

## II - II.

A gas control valve 10 is illustrated. The valve 10 comprises a body 12 extending from which is a tubular inlet 14. The bore 16 of the inlet is stepped radially inwardly, as illustrated, to define a seat 17 facing the open end thereof.

The outer surface of the inlet is conical and is undercut to define an annular shoulder 18 which is spaced from the body sufficient to accommodate a fastener 100, to be described.

A channel 20 of substantially uniform part circular cross-section extends along one side of the body 12 orthogonal to the inlet 14. Located centrally in the channel 20 is a tubular outlet 22.

Opposite flanges 24 extend on either side of the channel 20. The outer ends of the flanges taper downwardly (as illustrated) to define engagement surfaces 26 on the underside thereof.

A control shaft 28 extends from the body 12. Rotation of the shaft 28 controls the extent to which fluid communication is possible through the valve 10 from inlet to outlet. The shaft 28 includes a flat 30 to receive a conventional control knob.

A gas supply pipe 40 fits within the bore 16 and has an external circumferential rib 42 spaced from the end 44 thereof. The rib 42 tapers towards the end of the pipe and

has an external diameter approximately the same as the mouth of the bore 16. A resilient O-ring 46 is fitted around the pipe 40 between the rib 42 and the end 44. As illustrated the rib 42 engages the mouth of the bore 16, and the O-ring 46 forms a fluid tight seal between the pipe 40 and the body 10.

A pipe fastener 100 is formed of spring steel and has a substantially rectangular base 102 and two side arms 104,106 which extend at approximately at right angles to the base 102 and in the same direction. The side arms 104,106 diverge slightly, and the ends thereof are further divergent to present a ramped engagement surface. A U-shaped slot is cut in each side arm 104,106 to define a tab 108,110 which is directed inwardly to project towards the base at an acute angle relative to the respective arm 104,106.

A through aperture 112 is defined in the centre of the base 102. The diameter of the through aperture 112 is greater than the external diameter of the pipe 40 but smaller than the external diameter of the rib 42 to permit the fastener to be freely fitted on the pipe.

In use the fastener is placed on the pipe behind the rib 42, and the pipe is pushed into the inlet 14. The diverging ends of the side portions 104 and 106 engage the conical end of the inlet, and spread the arms 104,106 thereby permitting the tabs 108,110 to ride over the shoulder 18. The tabs engage the shoulder resiliently and urge the rib 42 into the open end of bore 16, thereby



ensuring a secure fixing of the pipe and valve.

A gas rail 120 is generally tubular and has an external diameter generally the same as the diameter of the part circular channel 20. The rail 120 has an opening  
5 therein (not shown) which locates on the outlet 22. An annular gasket 122 is placed around the outlet to ensure a gas tight seal.

A rail fastener 130 is constructed similarly to the pipe fastener 100 described above, except that instead of a  
10 throughbore the base comprises a seat 132, of channel shape and having part circular profile. The rail 120 locates in the seat 132. The rail fastener 130 is fitted over the tapered ends of the flanges 24 and the tabs thereof spring back and abut against the engagement surfaces 26 behind the  
15 flanges 24.

Accordingly, by use of such fasteners 100,130, pipes and rails may be fitted with valves in a gas tight manner and in a repeatable and secure manner. Partial or incomplete engagement of the fasteners is practicably not  
20 possible, and accordingly incorrect fastening will be immediately apparent on visual inspection of the assembly. It will be understood that many other fluid conducting members may be connected in the same way. The fasteners can be installed in one movement, either manually or by use of  
25 automatic equipment. The fastener of the invention permits the fluid connection to be disassembled, if required, and re-assembled for service purposes.

In practice, the fastener of the invention can be constructed by pressing techniques from a strip of steel of suitable composition, which is subsequently heat treated to produce spring steel.

CLAIMS:

1. A fastener for fastening first and second fluid carriers together, wherein the fastener has a body and a resilient retaining member protruding therefrom, the body having defined therein a seat for locating a first fluid carrier and said retaining member being adapted to resiliently engage the second fluid carrier in use, such that the first and second fluid carriers are urged together by the fastener to give a fluid tight seal.

2. A fastener according to any preceding claim, the retaining member comprises a projection which is arranged to engage an abutment of the second fluid carrier in use.

3. A fastener according to claim 1 or claim 2 wherein the retaining member extends from the body adjacent the seat.

4. A fastener according to claim 3 wherein the fastener comprises first and second retaining members, one each extending from opposite sides of the seat.

5. A fastener according to claim 4 wherein each retaining member comprises a resilient projection.

6. A fastener according to claim 4 wherein the first retaining member comprises a resilient projection and the second retaining member is adapted to locate on the second fluid carrier in use.

7. A fastener according to any of claims 4-6 wherein the retaining members are parallel.

8. A fastener according to any preceding claim wherein the fastener is symmetrical about the seat.

9. A fastener according to any preceding claim wherein the seat comprises a channel, adapted to receive a tubular fluid carrier therein.

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10. A fastener according to any of claims 1-8 wherein the body has a throughbore defined therein and said seat is defined by a rim of the throughbore.

11. A fastener according to any preceding claim being a one piece component of spring steel.

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12. A fastener of any of claims 1-10 and being moulded of plastics material.

13. A fastener substantially as described herein with reference to the accompanying drawings.



Application No: GB 9607876.1  
Claims searched: 1-13

Examiner: Roger Binding  
Date of search: 4 June 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK CI (Ed.O): F2G (G7, G9A, G9K, G9X, G9Y, G9Z, G10A, G10B); E2A (AGKFA, AGKFC, AGUA)  
Int CI (Ed.6): F16L 21/00, 21/02, 21/08, 25/00, 31/00, 37/00, 37/08, 37/084, 41/00, 41/08, 41/12, 47/00, 47/06; F16B 2/20, 2/22, 2/24  
Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2177472 A (RASMUSSEN)	1-8, 10, 12
X	GB 1324280 A (IND. ONDERNEMING WAVIN), see Figs 5,6 and page 2, lines 81 to 103.	1-9, 12
X	EP 0532242 A2 (HURON PRODUCTS), see Figs 1 to 3, column 3, line 14, to column 4, line 32, and column 6, lines 7, 8.	1-6, 8, 10, 11
X	US 5542713 A (MIYAZAKI), see Figs 8 to 12 and column 8, line 60, onwards.	1-9
X	US 5374084 A (POTOKAR)	1-8, 10
X	US 5161830 A (ABE), see Figs 1a, 4 and 5.	1-8, 10, 11
X	US 5005878 A (SMITH)	1-9, 12
X	US 4929002 A (SAUER)	1-8, 10, 12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



# Patent Office

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**Claims searched:** 1-13

**Examiner:** Roger Binding  
**Date of search:** 4 June 1997

Category	Identity of document and relevant passage	Relevant to claims
X	US 4802697 A (BARTHOLOMEW)	1-8, 10
X	US 4778203 A (BARTHOLOMEW), see especially Figs 1 and 2.	1-6, 8, 10, 11

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.