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PIPE CONNECTOR

This invention relates to pipe connectors.

The connector concerned has particular but not exclusive application to the connection of a flexible gas pipe (attached to a gas appliance) with a rigid or static gas pipe forming part of a stationary installation for conveying gas in premises to the appliance.

According to the invention a pipe connector for connecting together first and second pipes so that fluid can pass from one pipe to the other through the connector comprises a first part provided with first passage means therethrough for fluid flow, said first part being attachable to the first pipe in a manner admitting communication between the interior of the first pipe and the first passage means, a second part provided with second passage means therethrough for fluid flow, said second part being attachable to the second pipe in a manner admitting communication between the interior of the second pipe and the second passage means, the first and second parts being detachably connectable together by means of a bayonet connection comprising slots in the first part to co-operate with bayonets on the second part, the first part including valve means operable to automatically close the first passage means when the parts are disconnected, said valve means being operable automatically to open the first passage means when the two parts are connected to allow fluid flow from one said passage means to the other, said first part comprising a first tube having said slots which are open at the exterior of the first tube, an interior of said first

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tube forming at least part of the first passage means, said second part comprising a second tube which is fittable into and removable from the first tube, an interior of the second tube forming at least part of the second passage means, the second part further comprising a sleeve surrounding the second tube, said sleeve being fittable over that first tube, and said bayonets being mounted on the sleeve and projecting interiorly of said sleeve. The sleeve may be rotatable relatively to the second tube about the axis of the second tube, this rotation permitting engagement and disengagement of the bayonet connection. Preferably the sleeve is held against substantial movement in the axial direction of the second tube.

The valve means may comprise a valve member urged by resilient means into the valve closed attitude. The arrangement may be such that insertion of the second tube into the first tube moves the valve member into a valve open attitude against the action of the resilient means. Preferably the valve member has a slide element guided on all its sides by inner surfaces of the first tube so that the element is positively guided by the first tube during sliding movement of the valve member between the valve opened and closed positions thus reducing the risk of the valve member becoming mis-aligned or displaced transversely to its sliding path.

The housing is connectable by any suitable means to a first pipe, for example a static gas supply pipe. The second tube is connectable by any suitable

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means to a second pipe, for example a flexible pipe connected to a gas consuming appliance. Normally the first and second parts of the connector are held together by the bayonet connection, with the second tube holding the valve means open. On disengaging the bayonet connection the second tube is removable from the first tube thus allowing the resilient means to move the valve member into the valve closed attitude to stop the flow of gas from the first part as the second part is separated therefrom. When it is desired to move the appliance it can thus be quickly disconnected from the gas supply without risk of a gas leak.

In a preferred embodiment the slots are grooves and comprise an annular or continuous first slot, which extends around the exterior of the first tube and second slots extending into the first slot to provide means whereby the bayonets have access to and exit from the first slot.

The first slot may be provided with notches or recesses for disengageable engagement by the bayonets. These notches or recesses are off-set from the second slots. Engagement of the bayonets with

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the notches or recesses can be by rotation of the bayonets along the first slot in either direction, and rotation of the bayonets in the first slot to the second slots may be ⁱⁿ either direction along the first slot from the notches or recesses.

If desired the bayonets and recesses can be of complementary shapes, for example the bayonets may be cylindrical and the notches or recess of arcuate or semi-circular section.

If desired the first or second part, for example the first part of the connector, may be mounted within a casing stationarily mounted on a support, the arrangement being such that a portion of one said part of the connector mounted in casing is or can be exposed so the other said part has access to the said part in the casing.

The invention will now be further described, by way of example, with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of the two parts of one embodiment of a connector, formed according to the invention, connected together;

Fig. 2 shows the two parts in Fig. 1 disconnected, the first part being shown in exploded view and partly in section;

Fig. 3 is a view of the first part in the direction of arrow A in Fig. 2;

Fig. 4 is a perspective view partly in section of the first part of the connector in Fig. 1;

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Fig. 5 is a perspective view partly in section of the second part of the connector in Fig. 1;

Fig. 6 is a perspective view of the two parts of a second embodiment of a connector, formed according to the invention, shown disconnected, and the view of the first part being an exploded view within a casing which ^{is} also shown in an exploded view;

Fig. 7 is a fragmentary side view, partly in section and on an enlarged scale, of the two parts in Fig. 6 connected together;

Fig. 8 is a partly exploded view, partly in section, of the second part in the direction of arrow B in Fig. 6;

Fig. 9 is a fragmentary, diagrammatic end view of the second part in Figs. 6 and 8;

Fig. 10 is a perspective view, on an enlarged scale of a fragment of the first part in Fig. 6 to show more detail of the slots;

Fig. 11 is a perspective view of another embodiment of the second part of the connector for use with first part in Fig. 6;

Fig. 12 is a cross-section of a fragment of a modification of a second part of a connector in Fig. 1 or Fig. 6; and

Fig. 13 is a cross-section of a modification of a first part of a connector in Fig. 1 or Fig. 6, the modified first part being shown mounted on a wall plate also illustrated in cross-section.

With reference to Figs. 1 to 5 of the drawings,
a pipe connector 2 has a first part 4 and a second
part 6. Connector part 4 comprises a metal housing
8 mounted on a securing bracket 10. The housing
5 has a through passage comprised by a cylindrical
chamber 12 extended by a narrower cylindrical bore 14
in a tubular extension 16 of outer cylindrical shape.

A valve member 18 comprises a hollow cylinder
20 open at one end 21 and mounted at its blind other
10 end on an enlarged collar 22 bearing a spigot 24,
the cylinder 20 having radial through holes 26. A
groove formed around cylinder 20 adjacent collar 22
contains a sealing O-ring 28. The cylinder 20 is a
sliding fit in the bore 14 of smaller diameter than
15 the ring 28.

A tubular adaptor 30 has a nut formation 32
between outer screw threads 34 and 36 of which thread
34 is screwed into the chamber 12 so that sealing
washer 38 is pressed between the nut 32 and the
20 housing 8. An internal annular rib 40 in the adaptor
provides an abutment for one end of compressed helical
spring 42 having its other end, which abuts collar
22, fitting about spigot 24. Thus the spring urges
the member 18 along the bore 14 into a valve closed
25 attitude in which the O-ring 28 braced by collar
22 is pressed into fluid tight sealing engagement
with conical valve seat 44 about the entrance into

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bore 14 from the chamber 12, the holes 26 being wholly within the bore 14.

The thread 36 provides means for coupling by any technique known per se a pipe, for example a static gas pipe, to the adaptor 30.

The connector part 6 comprises a cylindrical tube 46 adapted by any suitable means known per se for connection to one end of a pipe P, for example a flexible gas pipe connected at its other end to an appliance. Tube 46 has a shoulder 48 forming an abutment for an end wall 50 of cylindrical sleeve 52 mounted on the tube to rotate thereabout, the sleeve being further retained against substantial axial displacement by a C-clip 54 in a groove in the tube.

A further groove near end 56 of tube 46 retains a sealing O-ring 58. Adjacent its open end or mouth the sleeve is provided internally with radially projecting diametrically spaced bayonets 60 which may be pins riveted or otherwise force fitted to the sleeve.

The bayonets 60 mate with slots 62 in the exterior of extension 16. Each slot has a lead-in part 64, a rotation guide part 66 and a retaining part 68.

On fitting the part 6 to the part 4, the tube 46 fits in the bore 14 in which the ring 58 slides and seals against the bore wall. The sleeve 52 fits over extension 16 with the bayonets entering the lead-ins 64. By pushing the parts 4, 6 together end 56 of

5 tube 46 pushes back end 21 of valve member 18 causing the ring 28 to leave seat 44 and the holes 26 to enter chamber 12 against the force of spring 42. Thus the valve is open and remains open when the parts 4, 6 are locked together after a rotation of the sleeve 52 bringing the bayonets into alignment with the slot parts 68 enables force of spring 42 to urge the bayonets smartly into slot parts 68. Thus fluid can pass through the open valve into the tube 46.

10 As the parts 4, 6 are disconnected, the spring 42 pushes the valve member 18 back into closed attitude to block fluid flow through the connector part 4.

15 The connector described has a number of advantages. Firstly the forming of the grooves 62 in the exterior of extension 16 avoids the expensive and more complicated undercutting necessary had the groove been in the bore 14. Secondly the force fitting of the bayonets to the sleeve 52 avoids the need for undercutting. Thirdly the bore 14 has only a slightly greater diameter than the cylinder 20 so the valve member 18 is accurately and positively guided by the bore facilitating accurate centering of the sealing ring 28 on the seat 44.

25 In the embodiment shown in Figs. 6 to 10, a pipe connector 102 (Fig. 7) has a first part 104 and a second part 106. Connector part 104 comprises a metal housing 108 mounted on a securing bracket 109. The

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housing defines a passage comprised by a tube 111 and a cylindrical chamber 112 extended by a narrower cylindrical bore 114 in a tubular extension 116 of outer cylindrical shape, the tube 111 being integral with the housing proper and opening into a side of the chamber 112.

A valve member 118 comprises a hollow cylinder 120 open at one end 121 and mounted at its blind other end on an enlarged collar 122 bearing a spigot 124 (Fig. 7), the cylinder 120 having radial through holes 126. A groove formed around cylinder 120 adjacent collar 122 contains a sealing O-ring 128. The cylinder 120 is a sliding fit in the bore 114 of smaller diameter than the ring 128.

At the rear of housing 108 the chamber 112 is closed by a screwed-in end cap 129 comprising a head 131 closing one end of a hollow spigot 132 provided with screw thread 135. This thread engages screw thread 137 in the wall of the chamber 112. A sealing ring 138 surrounds spigot 133. With the cap 129 screwed into position, the head 131 is countersunk into a rear face of the bracket 109 and presses the ring 138 into fluid tight sealing contact with shoulder 141 in the chamber 112 to prevent escape of fluid therefrom passed the cap head. A spring 142 is inserted into spigot 133. The cap 129 provides an abutment for one end of compressed helical spring 142 having its other end, which abuts collar 122, fitting

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about spigot 124 on the member 118. Thus the spring urges the member 118 along the bore 114 into a valve closed attitude in which the O-ring 128 braced by collar 122 is pressed into fluid tight sealing engagement with conical valve seat 144 about the entrance into bore 114 from the chamber 112, the holes 126 being wholly within the bore 114.

External thread 139 on the tube 111 provides means for coupling by any technique known per se a pipe P1, for example a static gas pipe, to the part 104, in Fig. 6 the coupling being shown as a tubular insert 143 and a cooperating nut 145.

The connector part 106 comprises a tube 146 of circular cross-section, bent at substantially 90°, and adapted by any suitable means known per se for connection to one end of a pipe P2, for example a flexible gas pipe connected at its other end to an appliance. With particular reference to Fig. 8, tube 146 has a shoulder 148 forming an abutment for an end wall 150 of cylindrical sleeve 152 mounted on the tube to rotate thereabout, the sleeve being further retained against substantial axial displacement by a C-clip 154 in a groove in the tube. A further groove near end 156 of tube 146 retains a sealing O-ring 158. Adjacent its open end or mouth the sleeve is provided internally with radially projecting diametrically spaced bayonets 160 which

may be pins riveted or otherwise force fitted to the sleeve. The bayonets may be ^{of} cylindrical shape.

The bayonets 160 mate with a slot arrangement 163 in the exterior of extension 116. The arrangement 163 comprises a pair of diametrically spaced lead-in slots 165 substantially parallel with the axis of extension 116 and opening into an annular slot 167 surrounding that axis. A side wall 171 (Fig. 10) of slot 167 has notches 169 diametrically spaced and off-set by substantially 90° from the slots 165.

These notches may be of an arcuate or semi-circular cross-sectional shape to which the bayonets can be of complementary shape.

On fitting the part 106 to the part 104, the tube 146 fits in the bore 114 in which the ring 158 slides and seals against the bore wall. The sleeve 152 fits over extension 116 with the bayonets 160 entering the lead-ins 65. By pushing the parts 104 and 106 together the bayonets enter the groove 167 and end 156 of tube 146 pushes back end 121 of valve member 118, against the force of spring 142, causing the ring 128 to leave seat 144 and the holes 126 to enter the chamber 112. Thus the valve is open. It remains open when the sleeve 152 is rotated to move the bayonets along groove 167. Once the bayonets overlap groove side 171 manual force pushing the part 106 towards the part 104 can be relaxed thus allowing the force of spring 142 to hold the bayonets against wall 171. Continued rotation of the sleeve 152 to move the bayonets away from lead-ins

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165 results in the bayonets automatically snapping smartly, under the force of spring 142, into the notches 169 whereby the part 106 is locked to the part 104. Nevertheless the tube 146 still pushes the valve member 118 far enough back against spring 142 for the valve to remain open and fluid can pass through the open valve into the tube 146 from ^{pipe} P1 whilst the parts 104 and 106 are locked together.

To unlock the parts 104 and 106, manual pressure pushing the part 106 towards the part 104 moves the bayonets 160 from notches 169, and then rotation of the sleeve 152 moves the bayonets along groove 167 towards the lead-ins 165. If this rotation is carried out with the bayonets rubbing on wall 171 under the pressure of spring 142, this pressure compels the bayonets to move smartly along the lead-ins 165 when the bayonets have rotated into register therewith. Now the valve closes under the pressure of spring 142 to prevent fluid escape from the part 104, and the part 106 can be completely detached from the part 104.

The bracket 109 has holes 179 which enables the part 104 to be firmly attached, by screws 180 for example, to a wall or other support.

To enable the part 104 to be presented for use in a neat, tidy and clean manner, the part can be mounted in a casing on a suitable support. The casing may be of plastics and can comprise a box member 182 with

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holes 184 in its back to receive screws 180 passing through holes 179 in bracket 109 whereby the part 104 and box 182 are secured to the support (not shown).

5 A side of box member 182 has a notch 186 to receive the pipe P1 so that coupling parts 143 and 145 are wholly masked by casing lid 188 when the latter is detachably attached to the box member by screws 190 passing through holes 192 to engage bores 194 of the box. Lid 188 has an aperture 196 through which the
10 extension 116 protrudes sufficiently for the part 106 to be locked thereto as described previously.

The part 104 can be of a standard size suitable for a number of different applications. For example the same part 104 can be connected to pipes P1 of differing
15 diameters by providing different appropriately sized and shaped coupling components 143 and 145 provided the appropriate part 143 is compatible with the tube 111 and the appropriate nut 145 fits the thread 139. Also, by appropriate modification of part 106 (or
20 part 6) to provide a range of such parts to fit a range of pipes P2 of different diameters, these different parts 106 (or 6) can all be fitted to the same standard part 104 (or 4). As shown in Fig. 11, a modified part 106a is shown having a sleeve 152a
25 designed to fit on a tube 146a designed for connection to relatively wide diameter pipe P2a, for example for

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connection to a heavy duty or heavy consuming gas appliance which may be a gas stove. The open mouth end of sleeve 152a is essentially the same as in sleeve 152. Within sleeve 152a the end of tube 146a is essentially the same as the end of tube 146 in Figs. 6 to 9 so the tube 146a will fit in the bore 114 of the part 104 when the bayonets on sleeve 152a engage the slot arrangement 163.

The connector described with reference to Figs. 6 to 11 has a number of advantages. Firstly the forming of the slot arrangement 163 in the exterior of extension 116 avoids the expensive and more complicated undercutting necessary had the groove been in the bore 14. Secondly the force fitting of the bayonets to the sleeve 152, 152a avoids the need for undercutting. Thirdly the bore 114 has only a slightly greater diameter than the cylinder 120 so the valve member 118 is accurately and positively guided by the bore facilitating accurate centering of the sealing ring 128 on the seat 144. Fourthly the annular groove 165 and the notches 167 allow the sleeve 152, 152a to be rotated in either direction to bring about locking of the part 106, 106a to the part 104 and to bring about release of those parts, and thus avoid excessive twisting force being applied to the stationary part 104. Fifthly, a standard size part 104 can be used for a range of connections, thus reducing the expense of providing a variety of differently sized parts 104

for that range. Sixthly, the mounting of the part 104 in a casing 182, 188 means, particularly in the case of domestic gas connection applications, that the part 104 can be presented in a neat manner analogous to a conventional electric plug socket. It will be appreciated that other second parts, for example the second part 4 can also be mounted in a casing to provide neat presentation of that second part.

In the portion of the modified second part 206 shown in Fig. 12 comprising an end wall 250, a cylindrical sleeve 252 and bayonets 260 (only one shown), the end wall 250 is formed by a ring attached to the interior of the sleeve. It is intended when the second part 206 is fitted to a first part 6 or 106 and the resultant coupled connector is subjected to excessive heat, for example due to a fire, that the end wall 250 about the tube 46 or 146 gives way under the force of spring 42 or 142 acting to push the tube. This displaces the tube relatively to the sleeve 252 and consequently the valve member 18 or 118 closes the valve and cuts off the gas supply. The wall gives way because it may be formed of, or be attached to the sleeve, by material having a low melting or low softening point. This material may be thermoplastics material or a low melting point alloy or solder.

The first part 204 of a connector in Fig. 13 is adapted for mounting on a wall plate 271 formed with a flange arrangement 273 adapted to be secured to a wall

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(not shown). The flange arrangement bears a cylindrical pipe part 275 into which a tube part 277 opens. The tube part 277 is connected to a rigid or static gas pipe (not shown) forming part of a stationary installation in premises. The pipe part 275 is internally threaded and receives the external screw thread 278 on tube part 211 of housing 208 provided with an integral nut formation 279 from which projects a cylindrical extension 216 having in its exterior bayonet slot arrangement 263 which can be similar to arrangement 62 or 163. The housing defines a passage comprised by tube 211 and a cylindrical chamber 212 extended by a narrower cylindrical bore 214 in the extension 216. Valve member 218 is constructed and operates similarly to valve members 18 and 118 and bears a sealing ring 228 urged against valve seat 244 by a conical coil spring 242 having its narrow end fitted about a spigot 224 on the valve member and its wider end braced against annular shoulder 208a on the tube 208.

The wall plate 271 in Fig. 13 with the part 204 thereon may be mounted in a casing of the kind in Fig. 6.

CLAIMS:

1. A pipe connector for connecting together first and second pipes so that fluid can pass from one pipe to the other through the connector comprising a first part provided with first passage means there-
5 through for fluid flow, said first part being attachable to the first pipe in a manner admitting communication between the interior of the first pipe and the first passage means, a second part provided with second passage means therethrough for fluid flow, said second part being
10 attachable to the second pipe in a manner admitting communication between the interior of the second pipe and the second passage means, the first and second parts being detachably connectable together by means of a bayonet connection comprising slots in the first
15 part to cooperate with bayonets on the second part the first part including valve means operable to automatically close the first passage means when the parts are disconnected, said valve means being operable automatically to open the first passage means
20 when the two parts are connected to allow fluid flow from one said passage means to the other, said first part comprising a first tube having said slots which are open at the exterior of the first tube, an interior of said first tube forming at least part of the first
25 passage means, said second part comprising a second tube which is fittable into and removable from the first tube, an interior of the second tube forming at least part of the second passage means, the second part



further comprising a sleeve surrounding the second tube, said sleeve being fittable over that first tube, and said bayonets being mounted on the sleeve and projecting interiorly of said sleeve.

5 2. A pipe connector as claimed in claim 1, in which the sleeve is rotatable about the second tube.

 3. A pipe connector as claimed in claim 1, or claim 2, in which the valve means comprises a valve member arranged to be pushed in a first direction into a valve open attitude by pressure exerted by the second part when
10 the latter is connected to the first part, and said valve member is resiliently urged in an opposite or second direction into a valve closed attitude when the pressure exerted by the second part is removed
15 by disconnection of the second part from the first part.

 4. A pipe connector as claimed in any one of claims 1 to 3, in which the valve means comprises a valve member disposed inside the first tube, the second tube is arranged to push the valve member into
20 a valve open attitude against the action of the resilient means during movement of the second tube into the first tube and connection of the first and second parts together by the bayonet connection, and resilient means urges the valve member into a valve
25 closed attitude upon disconnection of the bayonet connection and movement of the second tube out of the first tube.

 5. A pipe connector as claimed in claim 3, or claim



4, in which the valve member comprises a slide element positively guided by inner surfaces of the first tube during sliding movement of the valve member between valve open and closed positions.

5 6. A pipe connector as claimed in claim 4, or claim 5 in which the valve member comprises a slide element guided on all its sides by inner surfaces of the first tube such that the element is positively guided by the first tube during sliding movement of the valve member between valve open and closed positions.

10 7. A pipe connector as claimed in claim 6, in which said inner surfaces constitute a cylindrical passage, and the sliding element has an outer cylindrical shape which is a sliding fit in the passage.

15 8. A pipe connector as claimed in any one preceding claim, in which the slots are grooves in the exterior of the first tube.

20 9. A pipe connector as claimed in claim 8, in which the slots comprise an annular or continuous first slot and second slots by which the bayonets can enter and leave the first slot.

 10. A pipe connector as claimed in claim 9, in which the first slot is provided with notches engageable by aforesaid bayonets.

25 11. A pipe connector as claimed in claim 8, in which the slots comprise an annular first slot extending continuously about the first tube and second slots extending into the first slot from an end of the first



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tube to allow the bayonets access to and exit from said first slot.

12. A pipe connector as claimed in claim 11, in which when the bayonets are in the first slot they
5 can be moved in either direction along said first slot to register with the second slots.

13. A pipe connector as claimed in claim 11, or claim 12 in which notches engageable by aforesaid bayonets are formed in a side of the first slot, and
10 said notches are off-set along the first slot from the second slots.

14. A pipe connector as claimed in any one of claims 1 to 8, in which said slots comprise a plurality of spaced first slots each extending partially
15 about the first tube, and a plurality of second slots each extending into a respective first slot from an end of the first tube to allow a respective bayonet access to and exit from the first slot.

15. A pipe connector as claimed in any one preceding claim, in combination with casing means
20 mountable on a support, said casing means being arranged for the first part to be mounted therein, and said casing means being apertured to allow the second part access to the first part.

25 16. A pipe connector in combination with casing means as claimed in claim 15, in which the apertured casing means allows the first part mounted therein to project in part from said casing means such



that the slots are outside the casing means.

17. A pipe connector substantially as hereinbefore described with reference to Figs. 1 to 5 or Figs. 6 to 11 of the accompanying drawings.

5 18. A pipe connector as claimed in claim 17 including one or both modifications as described with reference to Figs. 12 and 13 of the accompanying drawings.

10 19. A pipe connector as claimed in claim 17 or claim 18, in combination with a casing in which the casing is substantially as hereinbefore described with reference to Fig. 6 of the accompanying drawings.

15 20. A pipe connector as claimed in any one preceding claim, wherein said connector connects pipes conveying gas to a gas appliance.

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