(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 803 269 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.10.1997 Bulletin 1997/44

(51) Int Cl.[6]: **A62B 9/04**

(21) Application number: **97302545.5**

(22) Date of filing: **15.04.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **23.04.1996 GB 9608336**

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(54) Gas cylinder connection

(57) A connector for connecting a breathing gas cylinder to a respiratory device is described. Instead of the normal screw connection a bayonet fitting is used. In embodiments, a male connector 100 is fitted to the respiratory device. It has a stud 4 and a handwheel 8 which rotates around the stud 4. Pins 9 extend into the interior of the handwheel 4 and engage with the mounting flange 33 of a female type connector 110 which is connected to a cylinder valve 2 of a compressed air cylinder.

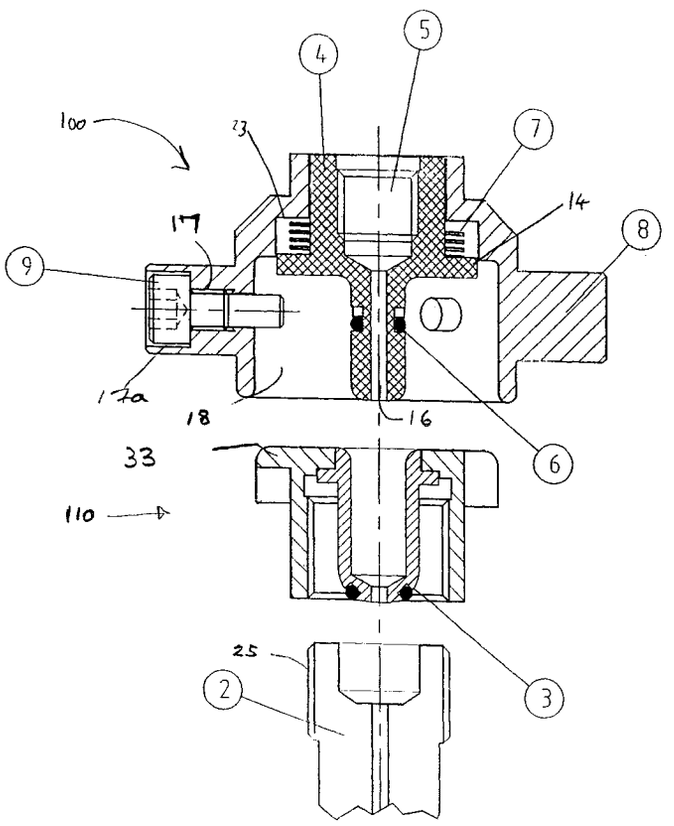

FIG. 2

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Description

This invention relates to the field of connectors for gas containers, particularly breathing gas containers for use with respiratory devices.

Current gas containers for respiratory devices are capable of storing breathing gas at a pressure of 200 bar or 300 bar (in America 2216 psi or 4500 psi) dependent on the cylinder. Ordinarily they include a valve fitted with an outlet connection comprising a screw thread and a sealing means. In order to connect the respiratory device to the container, the two must be screwed together. This takes time and, if the container is being worn during the changing process, is fairly difficult. There is therefore a need for an improved connection between the container and the respiratory device, to allow the container to be changed quickly and efficiently.

According to a first aspect of the present invention there is provided a container for breathing gas connected to a respiratory device by means of a connector which comprises a first connector member connected to one of said container and said device and a second connector member connected to the other of said container and said device, wherein said first connector member comprises a central stud through which the gas can pass and a housing surrounding the central stud, the connector including a bayonet-type latching means adapted to hold the first connector member resiliently against the second connector member.

According to a second aspect of the present invention there is provided a first connector member for use in accordance with the first aspect of the invention which first connector member is in the form of a male connector member wherein the latching means comprises a plurality of pins equally spaced around the inner circumference of the housing and extending radially into the interior of the housing and the central stud extends into the interior of the housing between the pins.

The housing is preferably in the form of a handwheel and the pins are preferably located in holes in the handwheel. There are preferably 2-5 pins, and advantageously 3 pins which gives a simple yet stable configuration.

A sealing member is advantageously provided, typically in the form of an O-ring around the central stud, adapted to form a seal with the second connector member. The central stud may have a slot around its circumference to locate the O-ring.

Preferably, the outer surface of that end of the stud which is most remote, axially, from the end of the stud to be connected to the second connector member and the inner surface of that end of the housing adjacent to said outer surface form an axially slidable rotating bearing. However, the stud can, if desired merely be axially slidable with respect to the housing.

In order to hold the housing resiliently against the second connector member, a resilient means may be provided to urge the housing away from the end of the stud to be connected to the second member. To this end, there may be provided a flange around an axially intermediate portion of the stud and a shoulder on the inside of the housing, the resilient means being located between the shoulder and the flange.

Preferably, the pins are adapted to engage with corresponding detent portions in the second connector member, under the action of the resilient means, to hold the second connector member in position.

The resilient means may be a spring in compression.

The male connector member is more complex than the female connector member to be connected thereto. It is therefore advantageous to attach it to the respiratory device, in particular to the pressure reducer of the respiratory device.

According to a third aspect of the present invention there is provided a second connector member for use in accordance with the first aspect of the invention which second connector member is in the form of a female connector member including a generally tubular part and a mounting flange provided circumferentially around an end of the tubular part, wherein the latching means comprises a plurality of gap-defining portions in the mounting flange for co-operation with the pins of the first connector member, a ramp portion adjacent to each gap and a locking detent portion adjacent to each ramp portion.

Advantageously, the female connector member has a hole provided in the centre of said end to receive the protruding central stud and to form a gas tight seal therewith.

The female connector member may be an adapter to be threadingly engaged with a standard cylinder valve, or it may be integrally formed with the cylinder valve.

When it is desired to assemble the male and female connector members together to form a connector as described above, the housing of the male connector member is turned until the pins of the latching means can be passed through the gaps in the mounting flange of the female connector member. The housing is then further rotated until the pins engage in the locking detent portions of the female connector member.

A specific embodiment of the connector will now be described, purely by way of example, with reference to the accompanying figures, in which

Figure 1 shows a perspective view of the connector, and

Figure 2 shows an exploded section through the connector of Figure 1.

A male connector member 100 has a hollow central stud 4 which is adapted to be airtightly attached at a first of its generally cylindrical ends to the pressure reducer 5 of a respiratory device (not shown). The second end of the stud 4 is also generally cylindrical but has a smaller diameter. A flange 14 is provided intermediate the

ends. A passage for air 16 is provided along the longitudinal axis of the stud.

A housing in the form of a handwheel 8 is provided. It has an inner surface which, together with the outer surface of said first end of the stud 4, defines an axially slidable rotatable bearing whereby the housing is rotatably and slidably mounted around said first end of the stud 4. The other, second, end of the handwheel surrounds the second end of the stud and has an inner diameter which is much greater than the outer diameter of the second end of the stud thereby providing a cylindrical space 18 between the handwheel and the stud into which a hollow female connector member 110 may be introduced. A sealing member in the form of an O-ring 6 is provided on the outer surface of said second end of the stud.

Three radially drilled holes 17 are provided in the handwheel 8 at equal spacings around its second end and three pins 9 are provided, one in each drilled hole 17. The pins 9 extend into the cylindrical space 18 and form a first part of a bayonet-type latching means. In this example the pins are constituted by the forward ends of bolts screwed into recesses 17a in the handwheel surrounding the holes 17. However, the pins could in principle be integral with the handwheel.

A resilient means in the form of a spring 7 is provided between the flange 14 and a corresponding shoulder 23 of the handwheel. The spring 7 applies pressure to the handwheel and urges it towards said first end of the stud 4 away from the female connector member 110.

The female connector member 110 is also provided with a sealing member 3. It is adapted to be screwed at one end onto a screw end 25 of cylinder valve 2 of compressed air cylinder 40 having a working pressure of 300 bars. It forms a standard connection with the cylinder that is sealed in the normal manner by the sealing member 3.

At its other end, the female connector member 110 is adapted to be connected with said second end of the stud 4 of the male connector member 100. In the centre of the end face of the female connector member a cavity is provided that is adapted to accept the second end of the stud 4 of the male connector member 100 and form an airtight seal with the O-ring 6.

The end face of the female connector member 110 fits in the space 18 of the male connector member 100. A mounting flange 33 is provided circumferentially around the end face of the female connector member 110 and includes portions defining three gaps 35, equally spaced around the flange 33. The pins 9 can pass through these gaps which form a second part of the bayonet-type latching means. Circumferentially adjacent to these gaps are provided three ramp portions 37 each starting at one of the gaps 35 and ending in a locking detent portion 39.

To connect the cylinder 40 to the respiratory device, first the male connector member 100 is connected to the pressure reducer 5 of the respiratory device and the female connector member 110 is screwed onto the cylinder valve 2. These operations may be performed in advance.

The female connector member 110 is then slid onto the male connector member 100, around the stud 4 and inside the handwheel 8. If the pins 9 and gaps 35 are not already aligned, the handwheel 8 is rotated until the three pins 9 can pass through the gaps 35 in the flange 33 so that the female connector member enters the space 18 between the pins 9. The handwheel 8 is then rotated further so that the pins 9 slide up the ramps 37, compressing the spring 7, until they finally reach the locking detent portions 39, where they lock into place.

The spring 7 applies pressure to keep the pins 9 locked into place. Once the cylinder valve 2 is opened, moreover, the air pressure increases the locking force.

To disconnect the cylinder 40 the unit is depressurised to remove the locking force of the air pressure. The hand wheel 8 is then pushed against the action of the spring 7 towards the female connector member 110. The hand wheel 8 is then rotated in the opposite direction to that used during mounting until the pins 9 pass through the gaps 35 and the female connector member 110 is then pulled away from the hand wheel 8.

In an alternative embodiment of the invention, the cylinder valve 2 has the female connector member 110 integrally incorporated within it, a separate female connector member then not being required.

It is important to ensure that the connector cannot be used to connect a high pressure (300 bar) gas container to a respiratory device designed to operate at lower pressures (200 bar). Accordingly, the stud 4 of a first connector member for use with a low pressure (200 bar) gas container is longer than the stud 4 of a first connector member for use with a high pressure (300 bar) container. This longer stud prevents the low pressure first connector member from being brought sufficiently close to a high pressure second connector that the pins 9 can be engaged in the detent recesses 39.

In a further alternative embodiment of the invention, the male connector member is connected to the cylinder valve and the female connector member is connected to the respiratory device. In a further alternative version the resilient means may be in the female connector member rather than in the male connector member.

Claims

1. A connector for connecting a container of breathing gas (40) to a respiratory device, which connector comprises a first connector member (100) connected to one of said container and said device, and a second connector member (110) connected to the other of said container and said device, wherein

   said first connector member (100) comprises a central stud (4) through which the gas can pass and a housing (8) surrounding the central stud (4) ,

the connector including a bayonet-type latching means (17,33) adapted to hold the first connector member (100) resiliently against the second connector member (110).

2. A connector according to claim 1 in which the bayonet-type latching means includes a first part comprising a plurality of pins (17) extending from the housing (8) radially inwards towards the central stud (4) and a second part comprising a plurality of gap-defining portions provided on the second connector member (110), for co-operation with said pins.

3. A connector according to claim 2, in which the second connector member (110) has detent portions (39) adapted to engage the pins (17) of the first connector member (100) and hold the first and second connector members (100,110) together.

4. A connector according to claim 1, 2 or 3, in which the housing (8) is in the form of a handwheel.

5. A connector according to claim 4 in which the stud (4) has first and second ends wherein the second end is for connection to the second connector member (110) and the first end has an outer surface and in which the handwheel has an inner surface forming with said outer surface an axially slidable rotating bearing about which the handwheel is rotatable.

6. A connector according to claim 5 in which a resilient means (7) is provided to urge the housing (8) towards the first end of the stud (4).

7. A connector according to claim 6 in which the resilient means is a spring (7) mounted between a flange (14) on the stud and the housing.

8. A connector according to any preceding claim in which a sealing member (6) is provided around the central stud (4) for forming a seal with the second connector member (110).

9. A connector according to any preceding claim, in which the first connector member (100) is connected to a respiratory device and the second connector member is connected to a container of breathing gas.

10. A male connector member (100) for use in connecting a respiratory device to a container for breathing gas, which male connector member comprises

a housing (8) enclosing a cylindrical space,
a plurality of pins (17) equally spaced around the housing (8) and extending radially into the cylindrical space, and
a hollow central stud (4) extending into the cylindrical space between the pins (17).

11. A female connector member (110) for connecting a cylinder of breathing gas to a respiratory device, adapted to connect to the male connector (100) according to claim 10, which female connector member comprises

a generally tubular part, adapted to fit within the cylindrical space of the housing (8) of the male connector member (100), and a mounting flange (33) provided circumferentially around an end of the tubular part,
the mounting flange (33) having a plurality of gap-defining portions for co-operation with the pins (17), a ramp portion (37) adjacent to each gap and a detent portion (39) adjacent to each ramp portion (37).

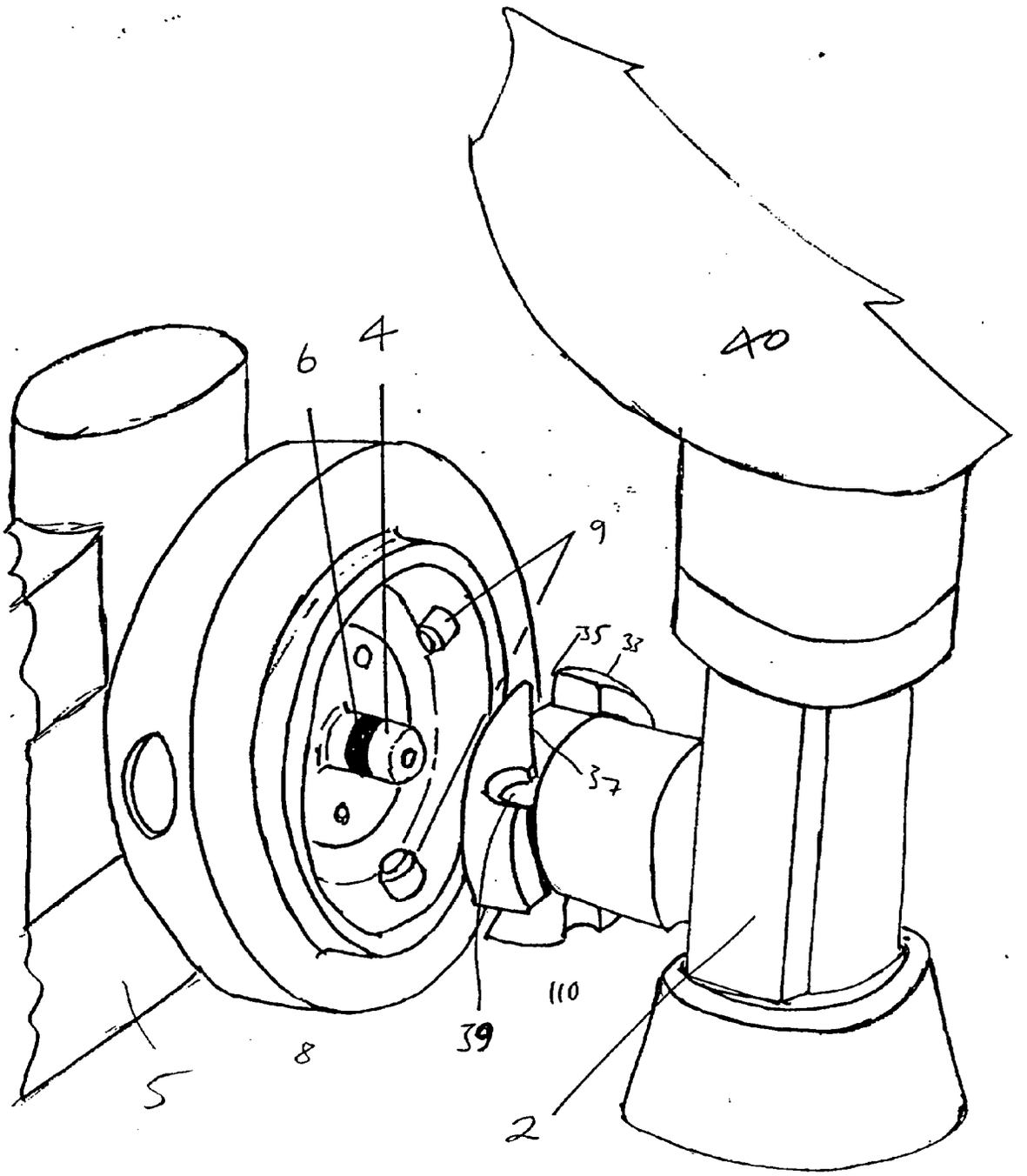

FIG 1

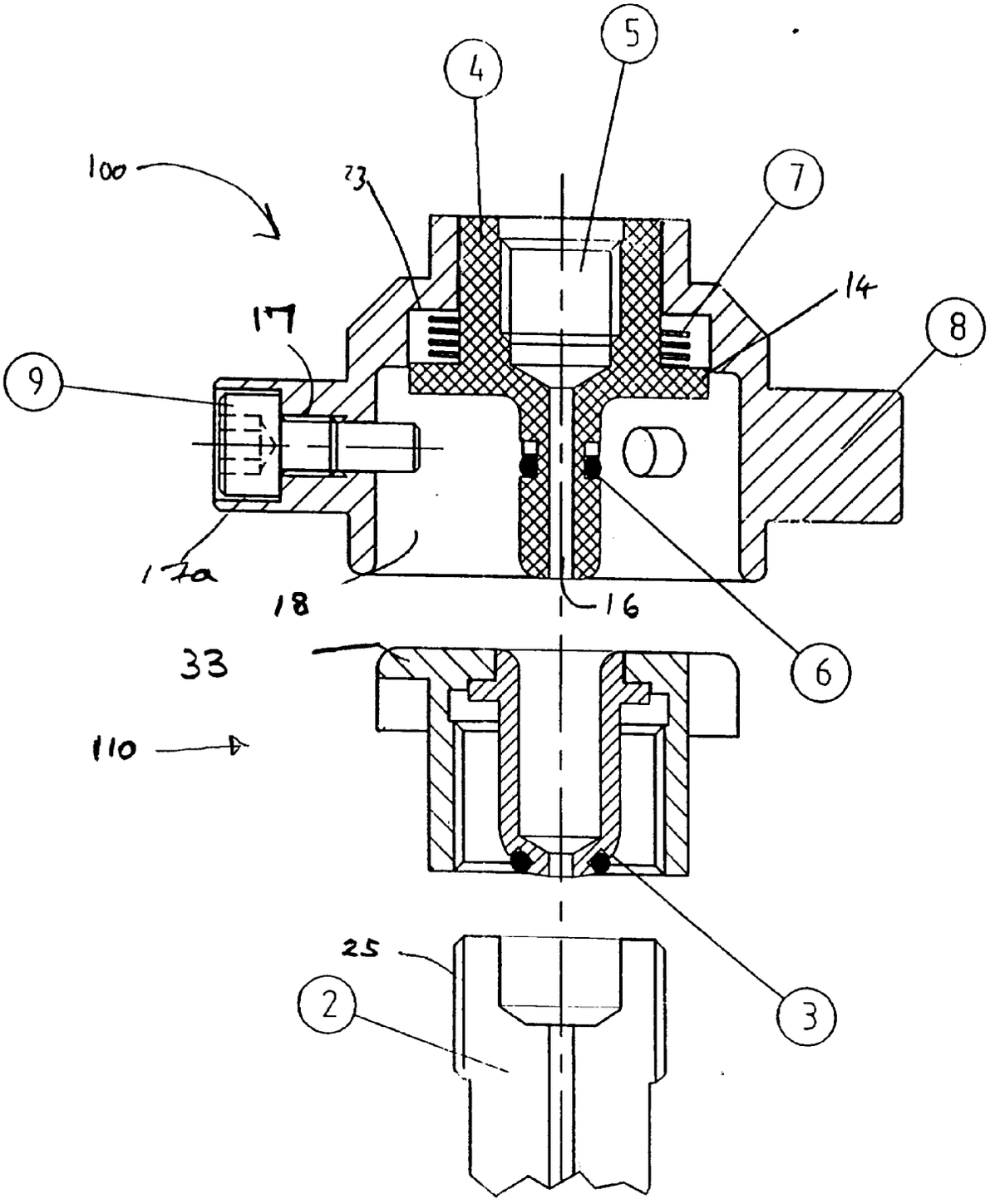

FIG. 2