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(54) **CONNECTING MEANS FOR PRESSING A COLLAR ONTO A GAS CYLINDER**

(57) A press means comprises a gas cylinder having a neck and an annular collar to be engaged on the neck of the gas cylinder, wherein there are multiple axial and parallel press-fit ribs are provided between the neck of

the gas cylinder and the annular collar, wherein the multiple press-fit ribs are distributed about the periphery of the annular collar at predetermined angles relative to each other. (Figure 2)

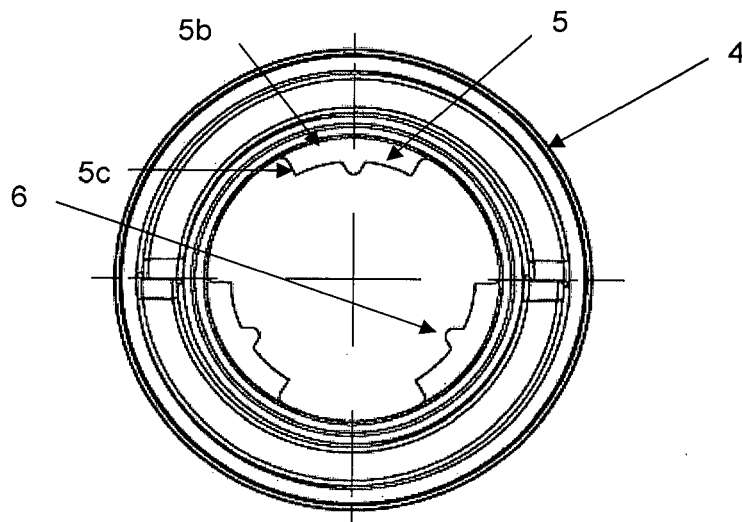


Fig. 2

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Description

[0001] The invention pertains a press means comprising a gas cylinder having a neck and an annular collar to be engaged on the neck of the gas cylinder.

[0002] It is well known to use gas cylinder to store or transport compressed gas as like carbon dioxide, oxygen, helium, nitrogen and so on. The compressed gas is held within a cavity defined by the cylinder wall and is usually enclosed at one end by a pieceable diaphragm which provides the gas outlet. The gas is able to be delivered from the gas cylinder by attaching a piercing element to the gas outlet which causes the diaphragm to be pierced and the gas is thereby released via the channel of the piercing element to further elements as like valve, pressure reducer, or end consumer.

[0003] A commonly used gas cylinder is cylindrical formed and comprises a main body and a neck portion on which the gas outlet is positioned. The neck portion or indicated as neck as well has a smaller diameter than the main body. In the manufacture process the gas cylinder is produced with a plain neck which means the neck does not possess any special structure as like screw, sealing member, bayonet pin or any groove which is used to be able to connect with other parts in a safe way.

[0004] Many commercially available compressed gas cylinders for storing gases are necessarily high pressured and relatively low volume, and thus any loss of the gas in the process of connecting the gas cylinder to the piercing housing or delivery mechanism or after such connection, is undesirable. It is therefore necessary to engage the gas cylinder to other parts in a safe, tight and reliable way. The other parts referred herein are the parts which have a fluid communication with the gas cylinder and used to treat or control the high pressure gas or to transport the gas to consumer.

[0005] It is commonly to install an annular collar on the neck of the gas cylinder which additionally possesses the desirable structure to facilitate the gas cylinder manufacture, while by using this collar a complicated neck manufacture is not necessary.

[0006] It is well-known to use a Starlock to press the collar and the gas cylinder neck together. The starlock is a structure which comprises a plurality of radial thin sheets on the collar protruding inward. The thin sheets are distributed about the inner circumference of the collar. The collar is pressed on the gas cylinder neck via the radial thin sheets which causes the thin sheets to deform to against the pulling back of the collar.

[0007] There are still increasingly demands to improve the press means to engage the collar and the gas cylinder in a more reliable and more commercialized way. The present invention provides a new press means to strengthen the engagement of the gas cylinder and collar in a simplified and efficient way and the design being production economical.

[0008] The present invention provides a solution with multiple axial and parallel press-fit ribs situated between

the neck of the gas cylinder and the annular collar, wherein the multiple press-fit ribs are distributed about the inner circumference of the annular collar at predetermined angles relative to each other.

[0009] The gas cylinder is provided with a preferred small size and designed to be easily portable and disposable e.g. having an overall length of about 6.5 cm to 7.5 cm and a diameter of about 1.5 cm to 2 cm. The gas cylinder herein refers generically to a container which is arranged for storing gas under pressure. The gas cylinder has a neck which includes the pierceable gas outlet, a top surface and a side surface extending downwardly from the top surface. The outlet of the gas cylinder preferably is enclosed by a pierceable diaphragm which can be opened by a piercing member such as a sharpened or blunt lance. The neck of the gas cylinder has a preferred diameter of about 0.8 cm and a length of about 1.5 cm to 2 cm.

[0010] Unlike the thin sheet of the starlock, the press-fit ribs extend axially between the neck of the gas cylinder and the collar. The axis here refers to the axis of the collar. The axial length of the press-fit ribs is amounted at least more than 5.5mm. The press-fit ribs are positioned parallel to each other and distributed about the inner circumference of the annular collar at predetermined angles relative to each other. The angels are preferred same so that the press-fit ribs are distributed evenly.

[0011] The press-fit ribs are preferably provided on the interior wall of the annular collar and protruding radially inward. The interior wall of the collar is the annular surface which is engaged to the neck when the collar is press on the neck of the gas cylinder. The press-fit ribs could be additional installed on the interior wall of the annular collar but is preferably be produced with the collar in one piece. In one piece means that the press-fit ribs is molded together with the annular collar in the manufacture. So when the collar with the press-fit ribs on the interior wall is pressed on the neck of the gas cylinder,

[0012] The press-fit ribs extend from the interior wall and protrude inward toward the axis of the collar. A complex of the production of the gas cylinder is avoided, as the collar contains all structures which the gas cylinder requires and the gas cylinder can be easily equipped by only pressing the collar on its neck.

[0013] The press-fit ribs could also be provided on the neck of the gas cylinder and protruding radially outward. The press-fit ribs could be produced with the gas cylinder neck in one piece. Additional work is therefore needed for constructing the press-fit ribs on the neck of the gas cylinder than a common plain neck. The press-fit ribs extend from the neck of the gas cylinder and protrude outward.

[0014] Preferably, there is odd number of press-fit ribs provided between the collar and the neck of gas cylinder as like three, five, seven, or even more pieces of press-fit ribs. Three press-fit ribs are especially preferred. The three press-fit ribs are preferable identical shaped and

distributed about the inner circumference of the annular collar at a same angle relative to each other. The structure provided with three symmetrically disposed press-fit ribs has a strong stability to hold the neck of the gas cylinder centrally and thus ensure a stable and accurate alignment of the collar in terms of the gas cylinder neck. Advantageously, the structure of three press-fit ribs simplifies the manufacture but with a most efficient performance.

[0015] The angle distance of the press-fit ribs has a range from 30° to 110. In one embodiment according to the invention there are three identical press-fit ribs provided with an angle distance of about 60° and these three press-fit ribs are distributed at a same angle relative to each other. This arrangement of the press-fit ribs provides a particularly strong stability by having the angle distance of the press-fit ribs as same as it of the void spaces between the press-fit ribs. The whole circumference is thereby equally divided which strongly strengthens the stability of the engagement and the alignment between the collar and the gas cylinder neck.

[0016] The protruding press-fit ribs are preferably cuboid-like shaped and the cuboid-like shape is provided with an axial length, a radial length and an arc length. The axial length is preferably longer than the arc length and the arc length is preferably longer than the radial length.

[0017] Preferably, there is an additional axial rib provided on at least one press-fit rib, particularly preferably, the additional axial rib is provided in the middle of every press-fit rib. The additional ribs deform by the neck of the gas cylinder when the collar is being pressed onto the neck of the gas cylinder, so it creates a geometry that holds the collar in a defined manner with the docking situation. It also enables that the collar not movable in axial and rotational direction after it is engaged with the neck of the gas cylinder, supporting a sealing and piercing process without rotation. It also creates a press-fit force on the neck of the gas cylinder without deforming or harming its sensitive mantle.

[0018] The press-fit ribs and/or the annular collar are preferably made of metal which is softer than the material of the gas cylinder which is usually made of steel, particularly preferably made of copper-zinc alloy. In case that the press-fit ribs are produced with the collar in one piece, this piece is preferably made of copper-zinc alloy. The copper-zinc alloy has a high resistance of corrosion and is easily to cast. It create a safe collar which resists individual gas safety requirements like high auto ignition temperatures, temperature shocks etc.

[0019] The exterior wall of the annular collar comprises preferably structures as like screw, groove, sealing member, O-ring, bayonet pin or any female portion which is used to connect with at least one downstream device tightly. By pressing an annular collar having such an exterior wall onto the neck of the gas cylinder, the gas cylinder is fully capable of engaging to downstream devices which has corresponding counterparts.

[0020] The annular collar is pressed onto the neck of the gas cylinder via the press-fit ribs permanently, so the user can not easily pull it off. A misuse or an interchange of gas cylinder in not suitable devices can be prevented.

[0021] The gas cylinder and the annular collar are preferably both portable.

[0022] It should be noted that the previously mentioned features and the features to be further described in the following are usable not only in the respectively indicated combination, but also in further combinations or taken alone, without departing from the scope of the present invention.

[0023] The present invention will now be described with reference to the following non-limiting examples and the accompanying schematic figures in which:

Fig. 1: A plane view of a gas cylinder with a plain neck

Fig. 2: An over view of an annular collar

Fig. 3: A section view of an annular collar

Fig. 4: A plane view of an annular collar

[0024] The figure 1 shows a common gas cylinder 1 for storing compressed gas. As shown the gas cylinder 1 is cylindrical shaped and has a neck 2 which has a smaller diameter than the main body of the gas cylinder 1. The gas cylinder 1 for storing pressurized oxygen has an overall length of 7 cm and a diameter of 1.7 cm. The neck 2 has a length of 1.5 cm and diameter of 0.5 cm. The pressure within the gas cylinder, when it is full filled, ranges from 100 bars to 200 bars. On the top surface of the gas cylinder there is a gas outlet 3 enclosed by a pierceable diaphragm. The gas cylinder 1 with a plain neck has no structure or connecting means, as like screw, groove, bayonet pin or any female or male portion, for engaging with another part to be fixed in position. It is thus necessary to install an annual collar 4 on the neck of the gas cylinder to contain such means to make the gas cylinder 1 be capable of connecting with the other parts.

[0025] The parts could be a piercing member containing structure which comprises a corresponding portion in terms of the structure in collar, so after the piercing the gas cylinder can be engaged to the structure tightly via the annular collar to avoid any gas escape and avoid accident disengagement as well.

[0026] Figure 2 shows an over view of an annular collar 4 in accordance with the present invention. The collar 4 defines a channel by its annular wall to allow the neck 2 of the gas cylinder access into the channel. The collar 4 has an inner diameter about 11 mm and an outer diameter about 13mm. There are three press-fit ribs 5 provided on the interior wall of the collar 4 which are molded with the collar in one piece. These three press-fit ribs are identical shaped and have an angle distance of about 57°. They are distributed about the inner circumference of the collar at same angle to each other. It is shown via the over view that the cross-section of the press-fit ribs 5 is formed by an arc length 5b and a radial length 5c. The

arc length 5a coincides with a part of the inner circumference of the collar 4 and defines the angle distance of the press-fit rib 5. The radial length 5c is the length which the press-fit ribs 5 are protruding above the interior wall of the collar 4 and is determined by the gap between the collar 5 the neck of the gas cylinder 2. The press-fit ribs 5 are cuboid-like shaped with this cross-section extending axially along the interior wall of the collar 4 and its axial length 5a (not shown in figure 2) is preferable longer than its arc length 5b.

[0027] An additional axial rib 6 is provided in the middle of every press-fit rib 5 and has a same axial length as the press-fit ribs 5. The additional ribs 6 are parabolic shaped and protrudes above the press-fit ribs 5. The collar 4 is pressed onto the neck of the gas cylinder 2 via the press-fit ribs 5 with the three additional ribs 6 touching the neck 2 and fixing it centrally and stably. These three additional ribs are positioned parallel as the press-fit ribs 5 and have preferably a same distance to each other which can constitute an equilateral triangle on the cross-sectional plane. This geometry enables a very stable alignment and fixation of the neck of the gas cylinder 2.

[0028] The whole collar 4 with the press-fit ribs 5 and the additional ribs 6 are molded in one piece and made of metal, preferably made of alloy and particularly preferably made of copper-zinc-alloy. This arrangement should be applied not only for three press-fit ribs but also for a larger quantity as like four, five or seven pieces of press-fit ribs.

[0029] Figure 3 shows a longitudinal section view of the annular collar 4. The axial length 5a of the press-fit ribs 5 amounts about 6mm by which the ribs 5 extending axially along the interior wall of the collar 4. The additional ribs 6 have a same axial length as the press-fit ribs. In this embodiment the neck of the gas cylinder 2 is pressed into the collar 4 upwardly till the end of the press-fit ribs 5. The remaining part of the collar 4 extends beyond the neck and provides thus a channel to allow a counterpart such as a piercing member to come into to meet the gas outlet provided on the neck of the gas cylinder 2. The lower portion of the collar 4 has preferably an expansion shape on which no press-fit ribs is present.

[0030] Figure 4 shows a plane view of the annular collar 4. The exterior wall of the annular collar 4 comprises a female portion 7 and an O-ring 8 which is used to engage to the other counterparts tightly which has corresponding connecting structures. This female portion 6 comprises exclusive recesses which allow the corresponding counterpart to be inserted into to fix the gas cylinder and to avoid a rotary movement as well. The O-ring 8 sits in a groove provided on the collar 4 to create a sealing with the counterparts to preventing the compressed gas escaping to the outside. As shown the press-fit ribs 5 are provided on the interior wall of the collar 3 to create a simple and reliable engagement with the neck of the gas cylinder 2.

Claims

1. A press means comprises a gas cylinder having a neck and an annular collar to be engaged on the neck of the gas cylinder, **characterized in that** there are multiple axial and parallel press-fit ribs provided between the neck of the gas cylinder and the annular collar, wherein the multiple press-fit ribs are distributed about the inner circumference of the annular collar at predetermined angles relative to each other.

2. The press means according to claim 1, **characterized in that** the press-fit ribs are provided on the interior wall of the annular collar and protruding radially inward.

3. The press means according to claim 1 or 2, **characterized in that** the press-fit ribs are provided on the neck of the gas cylinder and protruding radially outward.

4. The press means according to one of the preceding claims, **characterized in that** there are odd number of press-fit ribs provided.

5. The press means according to one of the preceding claims, **characterized in that** there are three press-fit ribs provided.

7. The press means according to one of the preceding claims, **characterized in that** the angle distances of the press-fit ribs ranges from 30° to 110°

8. The press means according to one of the preceding claims, **characterized in that** the press-fit ribs are cuboid-like shaped and the axial length of the press-fit ribs is longer than its arc length.

9. The press means according to one of the preceding claims, **characterized in that** there is an additional axial rib provided on at least one press-fit rib, preferably in the middle of the arc length of the at least one press-fit rib.

10. The press means according to one of the preceding claims, **characterized in that** the press-fit ribs and/or the annular collar are made of metal which is softer than the material of gas cylinder, preferably made of copper-zinc alloy

11. The press means according to one of the preceding claims, **characterized in that** the exterior wall of the annular collar comprises structures used to connect with at least one downstream device.

12. The press means according to one of the preceding claims, **characterized in that** the neck of the gas cylinder is pressed into the annular collar via the

press-fit ribs permanently.

13. The press means according to one of the preceding claims, **characterized in that** the gas cylinder is portable.

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14. The press means according to one of the preceding claims, **characterized in that** a gas outlet enclosed by a pierceable diaphragm is provided on the neck of the gas cylinder.

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15. The press means according to one of the preceding claims, **characterized in that** the collar is such constituted that when the collar is pressed onto the neck of the gas cylinder, the collar extends axially beyond the neck of the gas cylinder.

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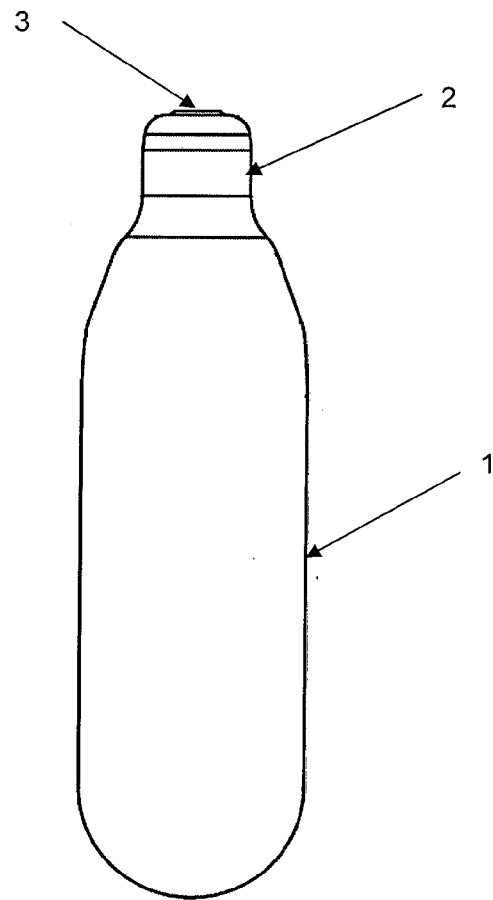


Fig. 1

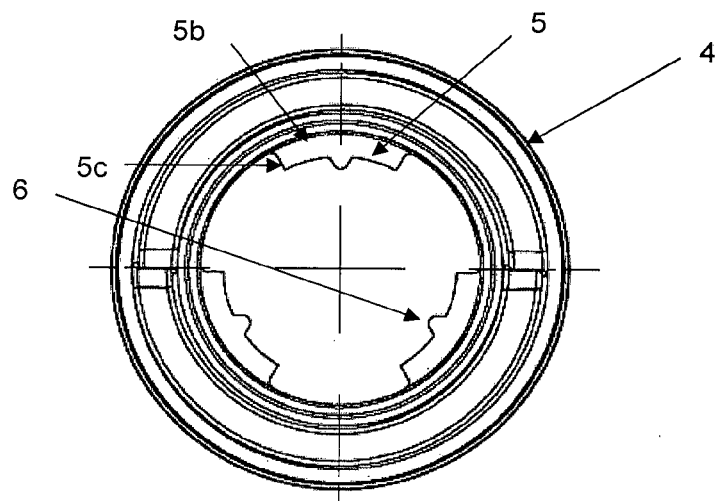


Fig. 2

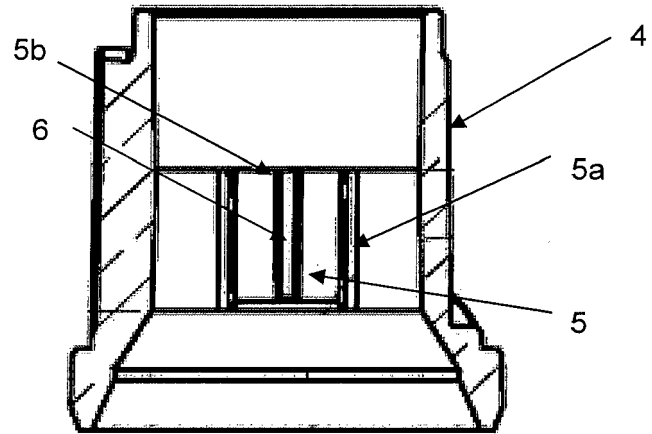


Fig. 3

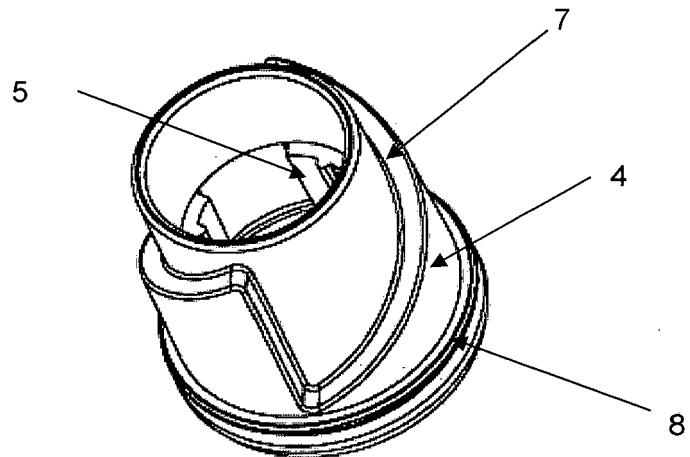


Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 16 00 1775

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 2011/210128 A1 (STRACK LUDGER [DE] ET AL) 1 September 2011 (2011-09-01) * fig.1, 2, (17), (18), (20); fig.11, (2), (9), (2b); [0025]-[0029] *	1-14	
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 January 2017	Examiner Todor, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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