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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Container for liquefied gas with integral end ring.**

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FR-A- 1 256 366
GB-A- 11 059
GB-A- 667 974
US-A- 1 577 974
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(73) Proprietor: **SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.**
Carel van Bylandtlaan 30
NL-2596 HR Den Haag (NL)

(72) Inventor: **Tomsett, Alan Clive**
Shell-Mex House,
Strand
London, WC2R 0DX (GB)

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Description

The invention relates to a container for liquefied gases. More particularly it relates to a portable container for liquefied gases.

A container of this kind generally comprises a cylindrical side wall and at least one end wall connected to it which end wall comprises a central part perpendicular to the central longitudinal axis and a rim extending from the central part. For example the rim comprises a curved part bended over an angle greater than 90° and an annular rim part.

The above said containers are well known, both for domestic and for industrial use. For example in FR 2 548 758 a container for liquefied gases under pressure comprises a cylindrical wall and a bottom wall having an elliptical dome form and extending to a rim part welded to the inner side of the cylindrical wall thereby sealing the container whereas the container can stand on the lower end of the cylindrical wall. Furthermore explained therein gases under high pressure will deform the bottom wall, i.e. hollowing out the elliptical form. However, when repeated frequently, as caused by intensive use or temperature variations, the risk exists that often bended bottom parts become weak.

In FR 1 449 870 a cylindrical tank for containing liquefied gases is disclosed. The tank shown has two end caps welded to the cylindrical tank wall on a double bend joint to be inserted therein, the tank and the joint being provided with mutually matching diameters. However, said tank can not be positioned vertically. Furthermore when under high pressure expansion of the dome will take place, the joint can act as a hinge thereby causing cracks and fissures from the inwardly bending inner end of the joint.

In the U.S. patent 1,681,955 a container, for example for transportation of liquefied gases is shown. The container has a cylindrical side wall and a bottom wall connected thereto. The end wall comprises a central part perpendicular to the central longitudinal axis and a rim extending from the central part.

In particular the rim comprises a curved part bended over an angle greater than 90° and an annular rim part, the outer diameter of which is equal to the inner diameter of the side wall.

Furthermore, an annular gripping member such as a ring is secured to the inner surface of the side wall directly against the outer edge of the annular rim part, referred to as "flange". The ring is partially covered by peening over the adjacent edge of the side wall serving as a holding means, as a reinforcing means, and as a protecting edge. The annular rim part is connected to the side wall for example by brazing at the interface therebetween.

From the British patent 667,974 it is known for drums used for various purposes to connect the cylindrical side wall of the drum to an end plate which has an annular rim part, referred to as "flange", which part extends to an extended rim part, referred to as "flange extension".

Between said two parts and the lower edge of the side wall an approximately V-shaped and outwardly presented annular recess or cavity is afforded for the welding metal. Especially for the requirements of examination and detection of possible flaws by X-rays or gamma rays such connections are proposed.

It is a main object of the present invention to provide a container having a bottom wall which is capable to withstand high pressure more reliably.

It is another object of the invention to provide a container which can be stored and stacked in an economic and reliable way.

To this end the container according to the invention further comprises a second annular rim part extending from the above first annular rim part by a further bend portion, wherein the outer diameter of the first annular rim part is equal to the inner diameter of the cylindrical wall, in that the outer diameter of the second annular rim part is equal to the outer diameter of the cylindrical wall and in that the end wall is joined to the cylindrical wall at the further bend portion.

In a suitable way the above first annular rim part fits in the cylindrical side wall. During assembling the first rim part is inserted into the side wall, so that the end part of the side wall and the second annular rim part become arranged in the required position for connection of the end wall to the side wall, for example by welding those on the further bend portion.

The invention will now be described by way of example in more detail with reference to the Figures, in which:

Fig. 1 shows schematically a longitudinal cross-section of a container according to the invention; and

Fig. 2 shows schematically a detail of the container according to the invention.

In the above Figures the same references will refer to corresponding elements.

In Fig. 1 a longitudinal cross-section of a container as a whole according to the invention is shown. A cylindrical side wall 1, a separately formed bottom wall 3, and also a separately formed top wall 5, being the end walls, are the most important elements of the container. Further details with respect to the invention will be discussed in relation to Fig. 2.

In Fig. 2 the end walls 3, 5 are integrally formed, pulltruded, or extruded to dome-shaped central parts 15, 17 and rims 7, 9 extending from

the central parts. The rims 7, 9 comprise a curved part 10, 12 bended over an angle greater than 90°, a first annular rim part 19, 21, and a second annular rim part 23, 25 extending from the first annular rim part 19, 21 via a further bend portion (11, 13). The side wall 1 partly overlaps said rim parts 19 and 23, thus forming overlap sections.

It has appeared very advantageous to apply the above bends. Experiments did reveal that by combination of said bends and said overlap sections the flexibility to high pressures occurring within the container is increased substantially. Thus high pressures are divided more equally over the outwardly bended dome-shaped central parts 15, 17 and the side wall 1. Furthermore, even when said central parts are pressed outwardly to a minor extent the rims 7, 9 and the side wall 1 will be pressed against each other in the overlap sections. Thus reversely impressing wall parts and consequently weakening those has been avoided.

Advantageously, the content of such a container is increased by the construction explained above.

It will be clear for any person skilled in the art that a range of angles can be chosen dependent on the wall materials used and on the field to which sand containers have to be applied.

As clearly shown in Fig. 2 the side wall 1 and the annular rim parts 19, 21 and 23, 25 have closely fitting diameters. In particular the outer diameters of the first annular rim parts 19, 21 are equal to the inner diameter of the side wall 1, and the outer diameters of the second annular rim parts 23, 25 are substantially equal to those of the side wall 1. Thereby both an easy and advantageous way of assembling said containers and a reliable way of stacking them are obtained. Furthermore it has appeared that the flexibility to high pressures within the container is further increased.

Side wall 1 overlapping the annular rim parts 19, 23, is connected thereto, for example by a weld, at the lower and higher end annular edges 27, 29 of the side wall 1 upon the further bend portions 11, 13. Furthermore, connecting the container elements can be carried out by brasing or by using a suitable adhesive dependent on requirements as to pressure and temperature.

The bends of the further bend portions 11, 13 advantageously comprise bend angles up to 50°. The bends can be symmetrical.

As to some further details in Fig. 1 an annular edge 30 of the bottom rim 7 is covered by a plastic bottom ring protector 32 which is clipped to the bottom rim 7. The top wall 5 and an annular edge 34 of the top rim 9 are covered by a disc-shaped plastic cover 36 of which a central section is provided with a handle 37 for carrying the container. The plastic material used is advantageously fibre-reinforced plastic. The cover 36 is retained by a collar 38 screwed to the top wall 5.

It will be understood that any suitable means for retaining the plastic cover other than the collar can be applied, for example a clip attached to the top wall.

Suitably a space is present between the plastic cover and the top wall, in which space a pressure regulator is arranged for supplying gas from the container to associated equipment at a predetermined pressure. The pressure regulator can be formed as an integral part of the plastic cover.

Claims

1. A container for liquefied gases having a cylindrical side wall (1) and at least one end wall (3,5) connected to it, which end wall (3,5) comprises a central part (15,17) perpendicular to the central longitudinal axis and a rim (7,9) extending from the central part (15,17), the rim (7,9) comprises a curved part (10,12) bended over an angle greater than 90°, characterized by a first annular rim part (19,21) and a second annular rim part (23,25) extending from the first annular rim part (19,21) by a further bend portion (11,13), and in that the outer diameter of the first annular rim part (19,21) is equal to the inner diameter of the cylindrical wall (1), in that the outer diameter of the second annular rim part (23,25) is equal to the outer diameter of the cylindrical wall (1) and in that the end wall (3,5) is joined to the cylindrical wall (1) at the further bend portion (11,13).

2. The container as claimed in claim 1, wherein the further bend portion (11,13) is symmetrical.

3. The container as claimed in claim 1 or 2, wherein for said further bend portions (11,13) angles up to 50° are comprised.

4. The container as claimed in any one of the claims 1-3, wherein the cylindrical wall (1) and the bottom wall (3,5) are connected by welding.

Patentansprüche

1. Behälter für Flüssiggase, der eine zylindrische Seitenwand (1) und wenigstens eine mit ihr verbundene Stirnwand (3, 5) hat, wobei die Stirnwand (3, 5) einen mittleren Teil (15, 17) rechtwinklig zu der mittleren Längsachse, und einen Rand (7, 9) aufweist, der sich von dem mittleren Teil (15, 17) erstreckt und einen gekrümmten Teil (10, 12) aufweist, der über einen Winkel größer als 90° gebogen ist,

gekennzeichnet durch einen ersten ringförmigen Randteil (19, 21) und einen zweiten ringförmigen Randteil (23, 25), der sich über einen weiteren gebogenen Teil (11, 13) von dem ersten ringförmigen Randteil (19, 21) erstreckt, und

gekennzeichnet dadurch, daß der Außendurchmesser des ersten ringförmigen Randteils (19, 21) gleich dem Innendurchmesser der zylindrischen Wand (1) ist, der Außendurchmesser des zweiten ringförmigen Randteiles (23, 25) gleich dem Außendurchmesser der zylindrischen Wand (1) ist und daß die Stirnwand (3, 5) an dem weiteren gebogenen Teil (11, 13) mit der zylindrischen Wand (1) verbunden ist.

2. Behälter nach Anspruch 1,
bei welchem der weitere gebogene Teil (11, 13) symmetrisch ist.

3. Behälter nach Anspruch 1 oder 2,
bei welchem für die weiteren gebogenen Teile (11, 13) Winkel bis zu 50° umfaßt sind.

4. Behälter nach irgendeinem der Ansprüche 1 bis 3,
bei welchem die zylindrische Wand (1) und die Bodenwand (3, 5) mittels Schweißen verbunden sind.

Revendications

1. Conteneur pour des gaz liquéfiés ayant une paroi latérale cylindrique (1) et au moins une paroi d'extrémité (3, 5) reliée à celle-là, ladite paroi d'extrémité (3, 5) comprend une partie centrale (15, 17) perpendiculaire à l'axe central longitudinal et une couronne (7, 9) étendant de la partie centrale (15, 17), la couronne (7, 9) comprend une partie incurvée (10, 12) courbée sur un angle supérieur à 90°, caractérisé par une première partie de couronne annulaire (19, 21) et une seconde partie de couronne annulaire (23, 25) étendant de la première partie de couronne annulaire (19, 21) d'une portion à courbure supplémentaire (11, 13), et en ce que le diamètre externe de la première partie de couronne annulaire (19, 21) est égale au diamètre interne de la paroi cylindrique (1), en ce que le diamètre externe de la deuxième partie de couronne annulaire (23, 25) est égal au diamètre externe de la paroi cylindrique (1) et en ce que la paroi d'extrémité (3, 5) est reliée à la paroi cylindrique (1) à la portion à courbure supplémentaire (11, 13).

2. Conteneur selon la revendication 1, dans lequel la portion à courbure supplémentaire (11, 13) est symétrique.

3. Conteneur selon la revendication 1 ou 2, dans lequel pour lesdites portions supplémentaires courbées (11, 13) des angles supérieurs à 50° sont compris.

4. Conteneur selon l'une quelconque des revendications 1 à 3, dans lequel la paroi cylindrique (1) et la paroi de fond (3, 5) sont reliés par soudage.

FIG.1

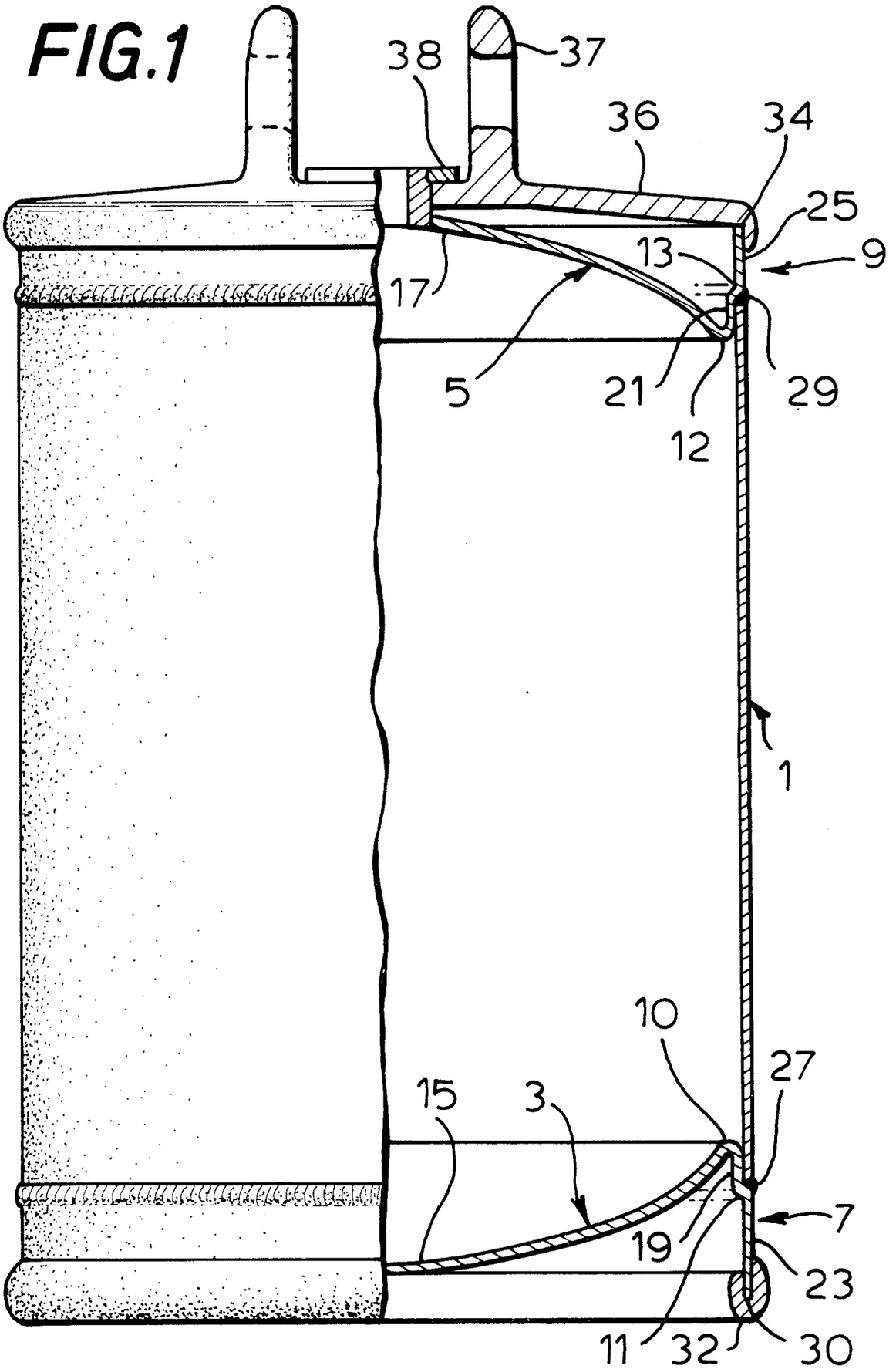


FIG. 2

