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

(11) Publication number: **0 434 110 A2**

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **90203116.0**

(51) Int. Cl.[5]: **F17C 1/00**, F17C 13/08

(22) Date of filing: **23.11.90**

(30) Priority: **27.11.89 GB 8926755**

(43) Date of publication of application:
**26.06.91 Bulletin 91/26**

(84) Designated Contracting States:
**BE DE FR GB IT**

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

(57) A container for liquefied gases having a cylindrical side wall 1 and at least a separately formed bottom wall 3 connected thereto, the bottom wall 3 having a central part substantially perpendicular to a central longitudinal axis of the container and a rim part 7,9 bended and extending axially outward from said central part 15,17 and being concentrical with the cylindrical wall 1, the outer diameter of said rim part 7,9 being equal to the inner diameter of the inner cylindrical side wall 1, wherein said rim part 7,9 is bended over an angle greater than 90° and at least partly overlapped by the cylindrical wall 1.

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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 a separately formed bottom wall connected thereto, the bottom wall having a central part substantially perpendicular to a central longitudinal axis of the container and a rim part bended and extending axially outward from said central part and being concentrical with the cylindrical wall, the outer diameter of said rim part being equal to the inner diameter of the inner cylindrical side wall.

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.

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 is characterized in that said rim part is bended over an angle greater than 90° and at least partly overlapped by the cylindrical wall.

In two further embodiments of the invention at its lower end the rim part is connected onto the inner cylindrical side wall or the inner cylindrical wall at the lower end thereof is connected onto the outer side of said rim part.

In a further advantageous embodiment of the container in accordance with the invention said rim part extends along a bend portion to a further concentrical rim part axially outward therefrom, resulting in a two-bend bottom wall. The cylindrical wall and the bottom wall are connected on said bend portion.

More advantageously said bend portion comprises a double bend, the outer diameter of said further rim part being substantially equal to that of the cylindrical wall. Hereinafter said rim part and said further rim part will be referred to as first and second rim parts respectively.

In a suitable way for the above two-bend bottom wall the first 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 rim part become arranged in the required position for connection of the bottom wall to the side wall, for example by welding those on the double bend.

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;

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

Fig. 3 shows schematically a detail of a second embodiment of a container according to the invention; and

Fig. 4 shows schematically a detail of a third embodiment of a 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 the Figs. 2, 3 and 4.

In Fig. 2 the end walls 3, 5 are integrally formed, pulltruded, or extruded to dome-shaped central parts 15, 17 and rim parts 7, 9 extending axially outward from said central parts. The side wall 1 partly overlaps said rim parts thus forming overlap sections.

As can be seen from Fig. 2 said rim parts are bended from said central parts over an angle greater than 90°.

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 parts 15, 17 and the side wall 1. Furthermore, even when the central

parts are pressed outwardly to a minor extent the rim parts and the side wall 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.

The side wall 1 is at a lower annular edge 27 connected to the outer side of the rim part 7, and at an upper annular edge connected 29 correspondingly to the rim part 9 of the top wall 5.

Connecting the container elements can be carried out by welding, brazing or by using a suitable adhesive dependent on requirements as to pressure and temperature.

From Fig. 2 it will be clear that the lower end of the rim part 7 functions as a bottom ring upon which the container will stand.

In Fig. 3 a second embodiment of the invention is shown. Here the rim parts 7, 9 are connected at a lower end annular edge 42 to the inner side lower end 40 of the side wall 1.

For the second embodiment as shown above it is notified that suchlike containers can be stacked advantageously since they are resting now on the lower ends 40 of the side wall 1.

Furthermore it is notified for the embodiments as disclosed above and shown in the Figs. 1 and 2 the outer diameters of the rim part 7, 9 are equal to the inner diameter of the side wall 1 thus resulting in advantageous fits of the container elements.

In Fig. 4 a third embodiment of the invention is shown. Said embodiment comprises also rim parts 7, 9, however first and second rim parts, respectively 19, 21 and 23, 25 are applied with double-bend portions 11, 13 therebetween, respectively for the bottom wall 3 and the top wall 5.

Side wall 1 partly overlaps the rim parts 7, 9 and is connected thereto, for example by a weld, at the lower and higher end annular edges 27, 29 of the side wall upon the double-bend portions.

As clearly shown in Fig. 4 the side wall 1 and the rim parts 19, 21 and 23, 25 have closely fitting diameters. In particular the outer diameters of the first rim parts 19, 21 are equal to the inner diameter of the side wall, and the outer diameters of the second 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.

Moreover, it has appeared the flexibility to high pressures within the container is further increased.

Dependent on stacking and storing requirements for said containers it can be sufficient to apply only one bend in the bend portions 11, 13. Then the containers are standing on axially outward extending collorlike second rim parts 23, 25.

The bends of the bend portions 11, 13 advantageously comprise bend angles up to 50°. Furthermore in the case of the double-bend embodiment 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 and at least a separately formed bottom wall connected thereto, the bottom wall having a central part substantially perpendicular to a central longitudinal axis of the container and a rim part bended and extending axially outward from said central part and being concentrical with the cylindrical wall, the outer diameter of said rim part being equal to the inner diameter of the inner cylindrical side wall, characterized in that said rim part is bended over an angle greater than 90° and at least partly overlapped by the cylindrical wall.

2. The container as claimed in claim 1, wherein at its lower end the rim part is connected onto the inner cylindrical side wall.

3. The container as claimed in claim 1, wherein at its lower end the inner cylindrical side wall is connected onto the outer side of said rim part.

4. The container as claimed in claim 1, wherein said rim part extends along a bend portion to a further concentrical rim part axially outward therefrom, the cylindrical wall and the bottom wall being connected on said bend portion.

5. The container as claimed in claim 4, wherein the bend portion comprises a double bend, the outer diameter of said further rim part being substantially equal to that of the cylindrical wall.

6. The container as claimed in claim 5, wherein the double bend is a symmetrical bend.

7. The container as claimed in claim 4 to 6, wherein for said bends bend angles up to 50° are comprised.

8. The container as claimed in any one of the claims 1-7, further comprising a separately formed top wall connected similarly to the cylindrical wall as claimed in any one of the claims 1-7.

9. The container as claimed in one of the claims 1-8, wherein the cylindrical wall and the bottom wall are connected by welding.

10. The container of any one of claims 1-9, wherein the top wall of the container is covered by a disc shaped plastic cover clamped thereupon.

11. The container of claim 10, wherein a central section of the plastic cover is provided with a handle for carrying the container.

12. The container of claim 10 or 11, wherein 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.

13. The container of claim 12, wherein the pressure regulator is formed as an integral part of the plastic cover.

14. The container substantially as described hereinbefore with reference to the Figures.

FIG.1

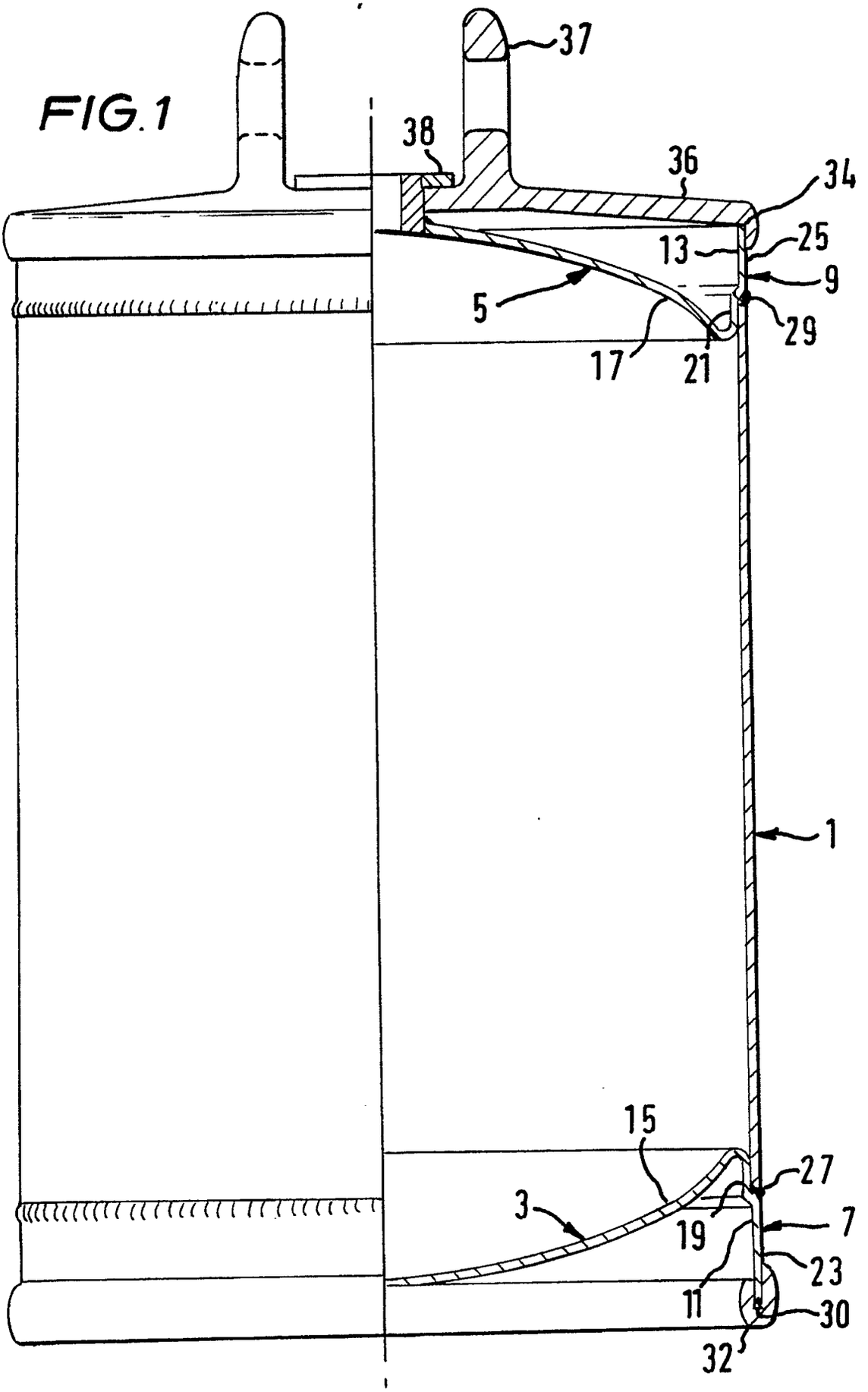
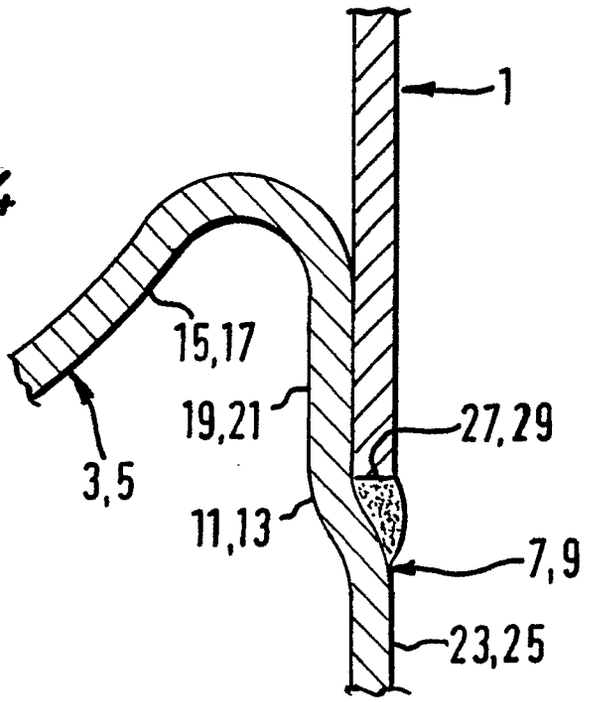


FIG. 4



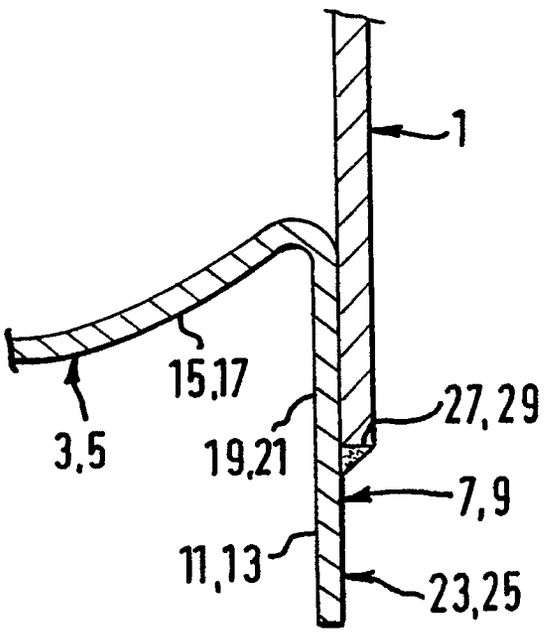




FIG. 2

FIG. 3