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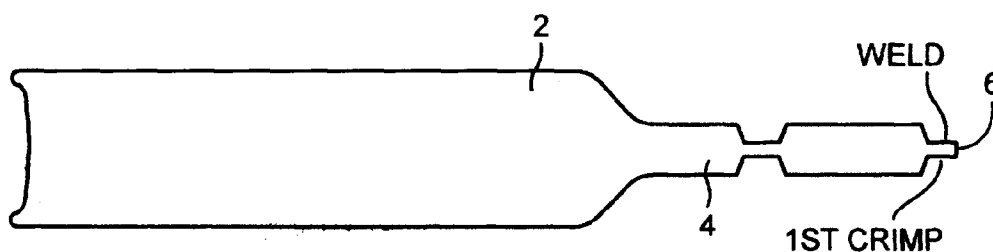
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(54) **Gas capsule**

(57) A method of filling a capsule with helium comprises making a first crimp in a neck portion of the capsule spaced from the free end of the neck and subse-

quently making a second crimp at or immediately adjacent the free end of the neck to effectively form a chamber between the two crimps which inhibits the helium reaching the free end which is subsequently welded.



**FIG. 3**

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## Description

**[0001]** The present invention relates to capsules for containing a volume of fluid at high pressure, that is, between 30 and 80 bar.

**[0002]** Sealed capsules are well known in circumstances where the force of the fluid under pressure is employed to dispense a substance such as discharging draught beer from a beer dispenser or expelling soda water from a soda siphon. They can also be used for liquid containers for soft drinks or beer under pressure.

**[0003]** It is also known to employ sealed capsules containing helium at high pressures in medical devices using the energy of the pressurised helium to drive a therapeutic agent through the skin of a patient.

**[0004]** In PCT published application W094/24263 there is described a needle-less syringe, which includes a metal capsule containing helium gas at high pressure which is used to force particles of a therapeutic agent through the skin of a patient in a substantially painless manner. The capsule is detachable from the remainder of the syringe and once used, either a new charge of gas can be placed in the capsule or more favourably the capsule can be discarded and a new capsule charged with gas can be attached to the remainder of the syringe.

**[0005]** In the circumstance where the gas capsule is a throw away item it is important that it can be manufactured simply and cheaply. In medical applications helium gas is a favoured fluid since it is very light which makes it suitable for use as a propellant for therapeutic agents in that when it impinges against the skin of a patient it will bounce off into the atmosphere and not pass through the skin of the patient. However, helium because it is light, is difficult to contain since it will leak through the most minuscule fault in a container.

**[0006]** It is an aim of the present invention to provide a method of filling a capsule with fluid under high pressure; and in particular a method of filling a gas capsule with helium at a pressure of at least 30 bar.

**[0007]** According to the present invention, a method of filling a capsule having a hollow body portion from which extends a hollow neck portion with a fluid under pressure comprises the steps of:-

- a) applying in a fluid tight manner a filling cap to the free end of the neck portion initially to evacuate the hollow body portion and subsequently to fill the hollow body portion with the fluid under pressure;
- b) with the filling cap still in place and pressure still applied to the fluid, crimping the neck portion at a location spaced from the free end of the neck portion;
- c) removing the filling cap thereby revealing the free end of the neck portion;
- d) applying a second crimp at or immediately adjacent to the free end of the neck portion; and

cent to the free end of the neck portion; and

e) welding the free end of the neck portion to hermetically seal the capsule.

**[0008]** Preferably the fluid is helium at a pressure of at least 30 bar.

**[0009]** An embodiment of the invention will now be described by way of example, reference being made to the Figures of the accompanying diagrammatic drawing in which;

Figure 1 is a plan view of a capsule for containing a fluid under pressure;

Figure 2 is a view similar to Figure 1 but showing a first crimp applied to a neck portion of the capsule; and

Figure 3 is similar to Figures 1 and 2 but showing a second crimp applied to the neck portion according to the present invention.

**[0010]** As shown, a capsule 1 comprises a hollow cylindrical body portion 2 made, for example, from aluminium or an aluminium alloy from which extends an elongate hollow neck portion 4 of smaller diameter than the body portion 2. Initially the neck portion 4 has an open free end 6.

**[0011]** When it is desired to fill the capsule 1 with a fluid such as helium under pressure, a filling cap (not shown) is applied in a manner known per se to the free end 6 of the neck portion 4. A vacuum is applied at the filling cap to evacuate the hollow cylinder body portion 2 after which the body portion 2 is filled with the fluid under pressure. With the filling cap still in place over the free end of the neck portion 4 and pressure still applied to the fluid within the body portion 2, the neck portion 4 is crimped at a location spaced from said free end 6 (see Figure 2). This crimp is made sufficiently firm to avoid significant leakage of fluid from the body portion 2.

**[0012]** The filling cap is then removed from the free end 6 of the neck portion 4 to reveal said free end 6. Immediately said free end 6 is revealed then a second crimp is applied (see Figure 3) at or immediately adjacent said free end and at substantially the same time the free end 6 is laser welded to seal hermetically the end of the neck portion 4.

**[0013]** The purpose of the first crimp is to prevent fluid under pressure from reaching the second crimp and thus the free end 6 so that the laser weld can be made without gas permeation holes. Effectively, the two crimps define an interim chamber which prevents or inhibits fluid under pressure reaching the point where the free end 6 of the neck portion 4 is to be welded.

**[0014]** The crimps can be effected with either a circular swage type crimp or a simple flat crimp.

**[0015]** When the capsule is to be used in connection

with a needleless syringe then the fluid will be helium at a pressure of at least 30 bar.

[0016] Clearly there will be other applications where the capsule will contain a gas or liquid under pressure at substantially less than 30 bar.

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## Claims

1. A method of filling a capsule having a hollow body portion and a hollow neck portion extending therefrom with fluid under pressure, comprising the steps:- 10

- a) applying in a fluid tight manner a filling cap to the free end of the neck portion initially to evacuate the hollow body portion and subsequently to fill the hollow body portion with the fluid under pressure; 15

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- b) with the filling cap still in place and pressure still applied to the fluid, crimping the neck portion at a location spaced from the free end of the neck portion; 25

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- c) removing the filling cap thereby revealing the free end of the neck portion; 30

- d) applying a second crimp at or immediately adjacent the free end of the neck portion; and 30

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- e) welding the free end of the neck portion to seal hermetically the capsule.

2. A method as claimed in claim 1, in which the fluid is helium at a pressure of at least 30 bar. 35

3. A method as claimed in claim 1 or 2, in which the capsule is made from aluminium or an aluminium alloy. 40

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4. A method as claimed in any one of claims 1 to 3, in which the free end of the neck portion is laser welded to seal hermetic the capsule. 45

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5. A method of filling a capsule with a fluid substantially as hereinbefore described with reference to and as illustrated in the Figures of the accompanying drawing. 50

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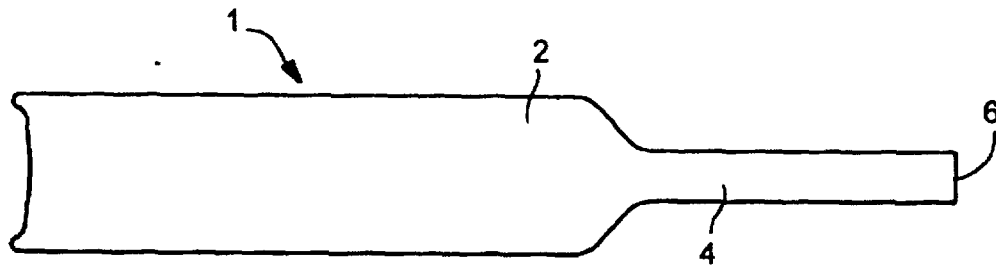


FIG. 1

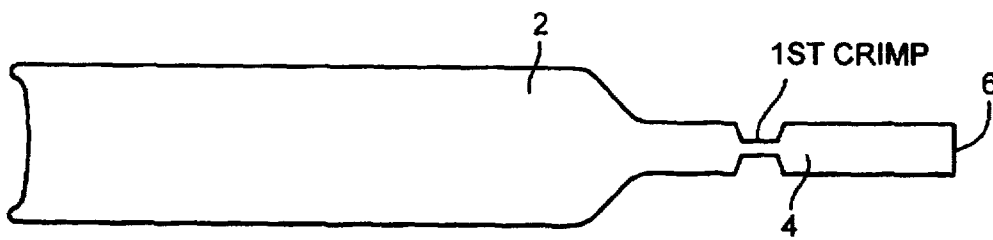


FIG. 2

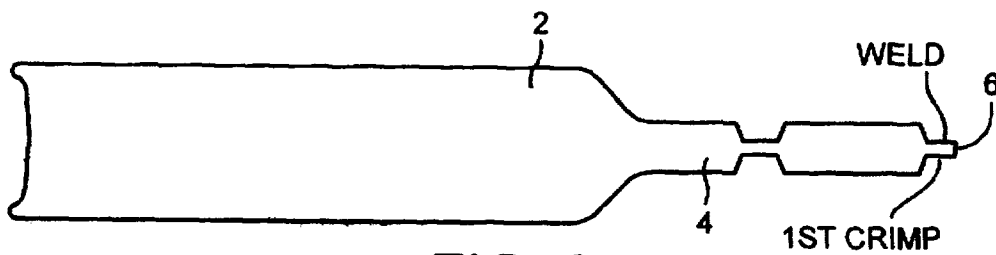


FIG. 3