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(71) Applicant: **T.P.T. LIMITED**
Oakwood Mills Romiley
Stockport Cheshire, SK6 4DY(GB)

(72) Inventor: **Riley, Arthur John**
6 Cottam Crescent Maple Bridge
Stockport Cheshire(GB)

(74) Representative: **Barker, Rosemary Anne et al,**
c/o O'BRIENS 94 Market Street
Manchester M1 1PJ(GB)

(54) **Liquid container and dispenser.**

(57) A collapsible multilayer bag (10) formed from a plurality of substantially impermeable plastics sheets (14, 15,16) joined together around their peripheries is located within an inextensible outer casing, e.g. a cylindrical cardboard casing (11) with end plates (12, 13). Liquid, such as beer, can be filled into a first interlayer space (27) of the bag (10) via first inlet/outlet means (17) against a counter pressure provided by a pressure medium, such as air or water, in second interlayer space (28) which is gradually bled off via second inlet/outlet means (18). The liquid is subsequently dispensed by controlled supply of pressure medium to the second interlayer space (28) so as to exert pressure on the liquid filled space (27).

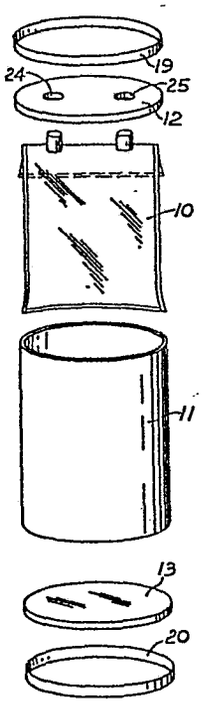

Fig. 1

EP 0 194 871 A2

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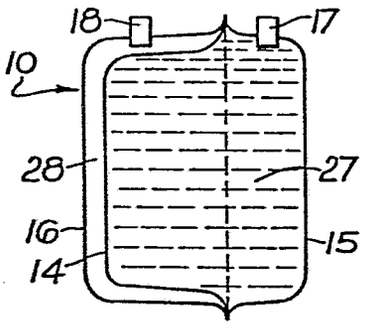

Fig. 2

LIQUID CONTAINER AND DISPENSER

This invention relates to a container and dispenser for a liquid, particularly but not exclusively a disposable container and dispenser for a carbonated beverage.

A carbonated beverage such as lemonade or beer is conventionally dispensed from a semi-bulk container or keg by application of gas pressure directly to the surface of the liquid in the container. Once some of the beverage has been dispensed, such gas pressure also has to be maintained to prevent carbon dioxide dissolved in the beverage coming out into the head space. Moreover, during filling of the container the gas pressure also has to be maintained for the same reason to prevent excessive frothing.

Pursuant thereto it has been usual to provide a device, known as a spear, inside the bulk container, which device includes a long dip tube extending from an upper inlet/outlet opening almost to the bottom of the container. To fill the container, gas is firstly supplied via the dip tube of the spear until an appropriate pressure is attained. Carbonated liquid is then supplied via a surrounding part of the spear whilst the gas is gradually bled off via the dip tube. In this way carbon dioxide is not lost from theliquid, that is to say the liquid does not go flat while it is being filled into such a container. When the liquid is subsequently dispensed, gas is supplied via the surrounding part of the spear and the liquid flows out of the container under pressure via the dip tube of the spear. As the inlet/outlet opening of the container is at the top, this arrangement ensures that liquid is properly dispensed even when it is at a low level.

Nowadays, there is a desire for a disposable or one-trip bulk container for a carbonated beverage, such as beer. To this end, efforts are being made to reduce the cost of the container and its various components and one drawback is the cost of the spear which has hitherto been essential for satisfactory filling and

dispensing of the carbonated beverage.

It is therefore an object of the invention to provide a container having less expensive alternative means which allow satisfactory filling and dispensing of a carbonated beverage.

With this object in view, the present invention provides a container and dispenser for a liquid comprising a collapsible multilayer bag located within an inextensible outer casing, the bag being formed from a plurality of substantially impermeable plastics sheets joined together around their peripheries and having first inlet/outlet means leading to a first interlayer space for reception of liquid to be stored and dispensed and second inlet/outlet means leading to a second interlayer space, the second inlet/outlet means being connectable to a supply of gas or liquid pressure medium which acts to inflate the second interlayer space and apply pressure to the first interlayer space.

At its simplest the bag may be formed from three sheets of material superimposed and bonded together around all their edges so as to provide two adjacent interlayer spaces separated by the middle layer of material. Alternatively, the bag may be formed from two sheets of material, which are superimposed, folded in half and

bonded together around their free edges so as to provide four layers in the final bag and a second interlayer space which extends at both sides and around one edge of the first centrally located interlayer space.

Additional layers of material may be used, but only two interlayer spaces are essential to put the invention into practice.

When the container and dispenser of the invention is used for a carbonated beverage (or other pressurized liquid), an appropriate pressure medium will be fed into the second interlayer space of the bag via the second inlet/outlet means to provide a counterpressure against which the beverage canbe filled. As the beverage is filled into the first interlayer space of the bag via the first inlet/outlet means, the pressure medium will be gradually bled off so that a substantially constant pressure is maintained within the second interlayer space. Once the filling is completed both inlet/outlet means are sealed.

The bag may be placed into the outer casing either before or after filling, depending on the circumstances and the materials used for the bag and the outer casing.

To dispense the beverage, the second inlet/outlet

means is connected to a supply of the pressure medium by way of a valve. Whenever the valve is opened, pressure medium is introduced into the second interlayer space of the bag thus increasing pressure on the first interlayer space so that carbonated beverage is dispensed therefrom via the first inlet/outlet means.

One advantage of this proposal is that it allows the bag-in-box principle to be successfully applied to a relatively large container for a carbonated beverage. As the multilayer bag into which the beverage and pressure medium are filled is necessarily impermeable, the outer casing need not be impermeable and it can therefore be made of a less expensive and lighter material than the metal or wood which has usually been used hitherto. For example, the outer casing in accordance with the invention may conveniently be made of paperboard, cardboard or plastics.

A cylindrical shape is preferred for the outer casing as this has less tendency to deformation than a box.

Another advantage, as already implied, is that a spear is nolonger required for successful filling and dispensing of a carbonated beverage. Thus costs are

reduced and it becomes feasible to provide a disposable or one-trip container of inexpensive material.

A further advantage of the container and dispenser of the invention is that the pressure medium is not applied directly to the liquid to be stored and dispensed, as a layer of the bag is interposed therebetween. This increases the range of pressure media which can be used. Where direct pressure was in the past applied to the surface of a carbonated beverage only gaseous carbon dioxide or nitrogen could be used for obvious reasons. With the present invention, these or other gases, for example air, could be used as there is no contact between the gas and the beverage. Moreover a liquid could be used to exert pressure on the beverage in the first interlayer space from the second interlayer space. In this respect, mains water would probably be of sufficient pressure.

Of course, the proposed container is not exclusively for carbonated or other pressurized beverages and can be advantageously used for storage and dispensing of uncarbonated liquids, such as post-mix syrup concentrates and wine. In the latter case, direct contact of the liquid with Co_2 is forbidden under U.K. customs and excise provisions so the proposed method of dispensing from bulk containers is particularly favourable.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is an exploded perspective view of a first embodiment of a container and dispenser of the present invention;

Fig. 2 is a schematic cross-sectional diagram illustraing the construction of one type of multilayer bag which may be used in the invention;

Fig. 3 A is a schematic cross-sectional diagram showing the construction of a second type of bag which may be used;

Fig. 3 B is another schematic diagram illustrating the construction of a third type of bag which may be used;

Fig. 4 is a partial cross-section to an enlarged scale of a second embodiment of the invention;

Fig. 5 is a similar partial cross-section of a third embodiment of the invention;

Fig. 6 is a similar partial cross-section of a fourth embodiment of the invention; and

Fig. 7 is a similar partial cross-section of a fifth embodiment of the invention.

Referring firstly to Fig. 1, a first embodiment of the container and dispenser of the invention comprises

a collapsible bag 10 located within an inextensible outer casing in the form of a cardboard or paperboard cylinder 11 having respective end plates 12, 13.

As shown in Fig. 2, the bag 10 is formed of three layers of material, namely an inner layer 14 of poly-

ethylene and two outer layers 15, 16 of nylon/aluminium/polyolefin laminate. These materials are quite safe as regards contact with food-stuffs and are substantially impermeable to gases as well as completely impermeable to liquids. The respective inner and outer layers 14, 15, 16 are bonded together, e.g. by adhesive or heat welding, around all their edges so as to define two side by side interlayer spaces 27, 28 between the layers 14, 15 and 14, 16 respectively. A first inlet/outlet sleeve 17 leads into the first interlayer space 27, while a second inlet/oulet sleeve 18 leads into the second interlayer space 28.

The cardboard or paperboard cylinder 11 is formed as a spiral wound tube and may be coated on the outside and/or inside with plastics amterial. The bag 10 is located inside the cylinder 11 which is closed by the upper and lower end plates 12, 13 made, for example, of plywood with an external wax coating. The end plates 12, 13 are held in position by adhesive and/or a friction fit and also by respective cardboard or paperboard collars 19, 20 which are glued, rivetted or stitched just inside the ends of the cylinder 11. The inlet/outlet sleeves 17, 18 project through respective holes 24, 25 provided in the upper end plate 12.

The container has a capacity of up to about 50 to

60 litres and can withstand whatever pressure is necessary for a beer container, up to and including 8 atmospheres above normal.

In use, beer is filled into the first interlayer space 27 between the inner layer 14 and the outer layer 15 by way of the sleeve 17, which may be internally screw-threaded to facilitate attachment of a supply pipe or valve. In the case of keg beer, that is to say beer which has had carbon dioxide added other than by natural fermentation, such filling should preferably take place against a counter pressure of gas or liquid in the second interlayer space 28 to avoid excessive frothing of the beer by carbon dioxide coming out of solution. The counter pressure is obtained by firstly supplying a pressure medium such as pressurized air, carbon dioxide, nitrogen or water to the second interlayer space 28 by way of the second inlet/outlet sleeve 18 and bleeding this off gradually as the beer is filled into the first interlayer space 27.

The filling of the first interlayer 27 may take place either before or after the bag 10 is installed inside the outer casing 11, 12, 13. After filling, the sleeves 17 and 18 are sealed off.

To dispense the beer from the first interlayer space

27, the sleeve 17 is attached to an outlet pipe (not shown) possibly via a valve contained within the sleeve 17 and the chosen pressure medium is supplied to the second interlayer space 28 by way of the sleeve 18 thereby inflating the second interlayer space 28, compressing the first interlayer space 27 and forcing beer to flow into the outlet pipe. Appropriate valves will probably be located in the inlet/outlet sleeves 17/18 and/or the supply and outlet pipes.

It should be appreciated that the container just described is suitable for storing and dispensing other liquids as well as beer and is not confined to use with carbonated beverages although it has been initially devised with such beverages in mind.

The materials of the bag and the outer casing may differ from those described. In particular, the casing may be made of plastics, wood, metal or carboard or paperboard or any combination of these. The casing can also be of a different shape to that described above. Also, instead of two completely separate inlet/outlet sleeves, a single device with concentric or adjacent openings may be employed.

The bag material is envisaged as being substantially inelastic, but use of elastic material for at least one of the layers is not ruled out. Furthermore, the bag may be

formed with more than three layers so long as the liquid to be stored and dispensed is filled into one of the interlayer spaces and a pressure medium can be introduced into another of the interlayer spaces.

In this respect, Fig. 3 A shows a bag 30 comprising four layers of material 31 to 34. These layers are formed by four separate sheets of material superimposed and bonded together around all their edges so as to provide three interlayer spaces, only two of which 47, 48 are used. Alternatively, as shown in Fig. 3 B these layers may be formed by two elongate sheets of material which are folded in half after they are superimposed and joined together around their remaining edges. In this way only two interlayer spaces are provided, namely a central interlayer space 49 with a further space 50 extending therearound on both sides and around one edge.

As regards the various possible outer casings within the scope of the invention, a cardboard or paper board cylinder 11 with plywood end plates 12, 13 held in place by cardboard or paperboard collars 19, 20 has already been described with reference to Fig. 1. Figs. 4 to 7 illustrate modified embodiments in which the cardboard or paperboard cylinder 11 is closed in a different manner at one end at least. In each case the same reference numerals are used for the cylinder 11, the bag 10 and the sleeves 17,

18 as in Fig. 1.

In Fig. 4, in place of a plywood end plate and a collar, a metal end plate 26 is used. This has an upturned rim 21 which is of inverted U-shaped in cross-section,. This rim 21 is fitted over the end of the cylinder 11 and rivetted thereto. Elongate slots 23 are provided in the rim 21 as hand holds. Also upwardly directly projections or teeth 22 are provided around that part of the rim which engages the inside of the cylinder 11 to dig into the cylinder 11 and prevent the removal of the end plate 26. There are two holes through the plate 26 to accommodate the sleeves 17, 18. A similar lower end plate without holes could also be provided, possibly with a shallower overturned rim.

Fig. 5 illustrates use of a special plastics end plate 40 which fits into the end of the cylinder 11 and also engages over the cylinder edge. A plastics ring 39 having external upwardly directed teeth which themselves have spikes is located around the end plate 40 such that the teeth dig into the inner face of the cylinder 11 and prevent removal of the end plate 40.

The aforesaid metal and plastics end plates 26, 40 may be less prone to damage and more tamper-proof than the plywood end plates 12, 13. They also have the advantages

of easier assembly of the casing and protection of the ends of the cylinder 11 from dampness. However, they are more expensive to produce than the plywood end plates 12, 13.

Another method of securing end plates in the cylinder 11 is shown in Fig. 6. In this case, an end plate 38 of wood,plastics or cardbaord is held in place by an annular indentation 37 in the material of the cylinder 11, the indentation being maintained by a steel band 36.

Finally, Fig. 7 shows an advantageous method of securing an end plate 43 to a plastics cylinder 41. The cylinder 41 has external screw threads 42 fashioned in its end region and an annular member 44 is provided with internal screw threads to engage therewith and with an internal cirmular flange 45 to clamp the end plate 43 against the end of the cylinder 41.

CLAIMS

1. A container and dispenser for a liquid comprising a coallapsible multilayer bag (10) located within an inextensible outer casing (11,12,13) characterised in that the bag (10) is formed from a plurality of substantially impermeable plastics sheets (14,16;31 to 34) joined together around their peripheries and having first inlet/outlet means (17) leading to a first interlayer space (27;47;49) for reception of liquid to be stored and dispensed and second inlet/outlet means (18) leading to a second interlayer space (28;48;50), the second means (18) being connectable to a supply of gas or liquid pressure medium which acts to inflate the second interlayer space (28;48;50) and apply pressure to the first interlayer space (27;47;49).

2. A container and dispenser as claimed in claim 1 wherein the bag (10) is formed from three sheets of material (14,15,16) superimposed and bonded together around all their edges so as to provide two adjacent interlayer spaces (27,28) separated by the middle layer (14) of material.

3. A container and dispenser as claimed in claim 1 wherein the bag (10) is formed from two sheets of material which are superimposed, folded in half and bonded together

around their free edges so as to provide four layers (31 to 34) with the second interlayer space (50) extending at both sides and around one edge of the first centrally located interlayer space (49).

4. A container and dispenser as claimed in claim 1, 2 or 3 wherein the outer casing (11) is of cylindrical shape.

5. A container and dispenser as c imed in any preceding claim wherein the outer casing (11) is of cardboard or paperboard.

6. A container and dispenser as claimed in any preceding claim wherein the first and second inlet/outlet means (17,18) include valves.

7. A container and dispenser as claimed in any preceding claim wherein the first and second inlet/outlet means (17.18) are incorporated in a single device.

8. A method of dispensing liquid from a container comprising a collapsible multilayer bag (10) located within an inextensible outer casing (11,12,13) wherein the bag (10) is formed from a plurality of substantially impermeable plastics sheets (14 to 16; 31 to 34) joined together around their peripheries and having first inlet/outlet means (17)

leading to a first interlayer space (27;47;49) containing the liquid to be dispensed and second inlet/outlet means (18) leading to a second interlayer space (28;48;50), said method comprising supplying a gas or liquid pressure medium to the second interlayer space (28;48;58) via the second inlet/outlet means (18) so as to exert pressure on the liquid in the first interlayer space (27;47;49) and cause it to be dispensed via the first inlet/outlet means (17).

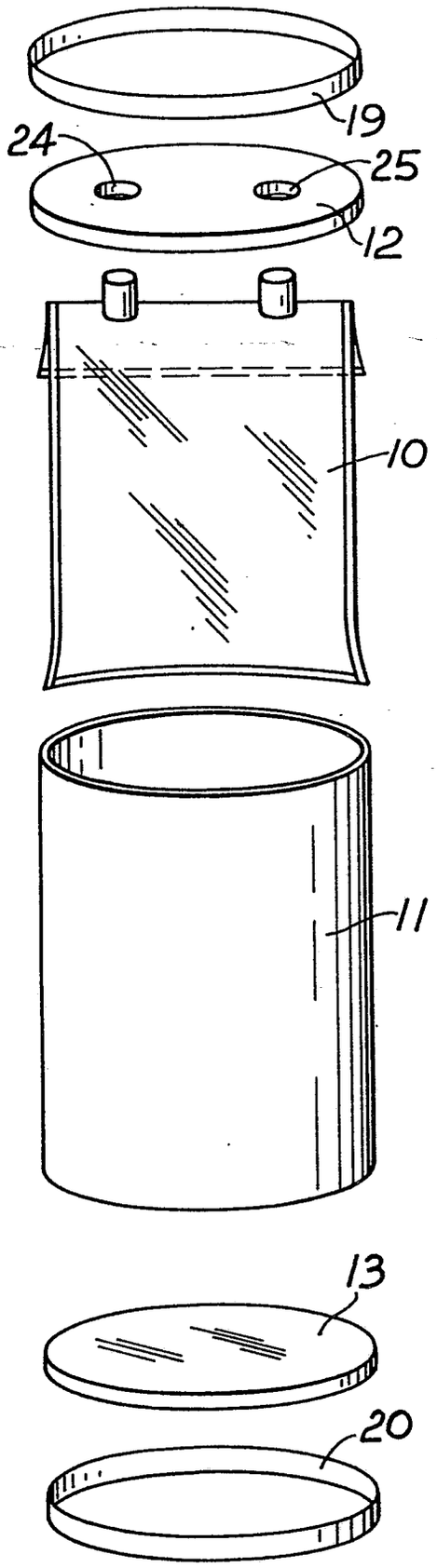

Fig. 1

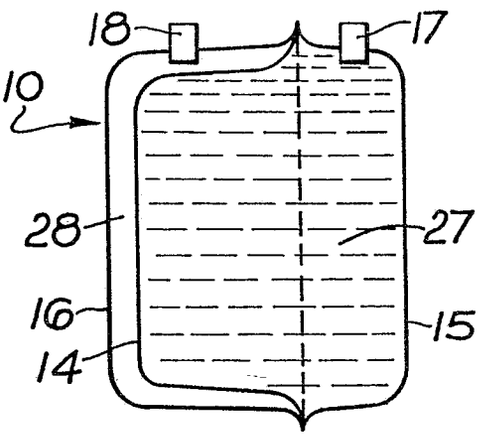

Fig. 2

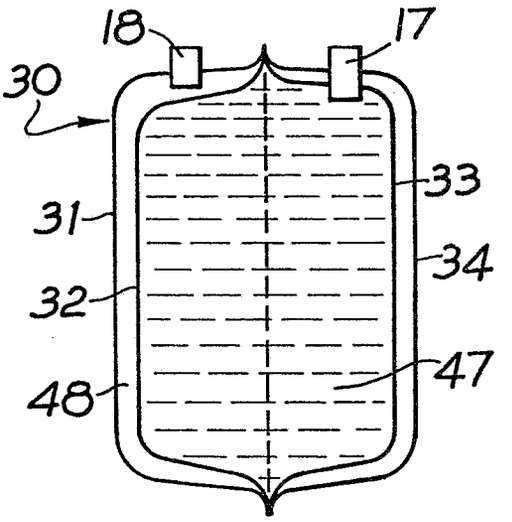

Fig. 3A

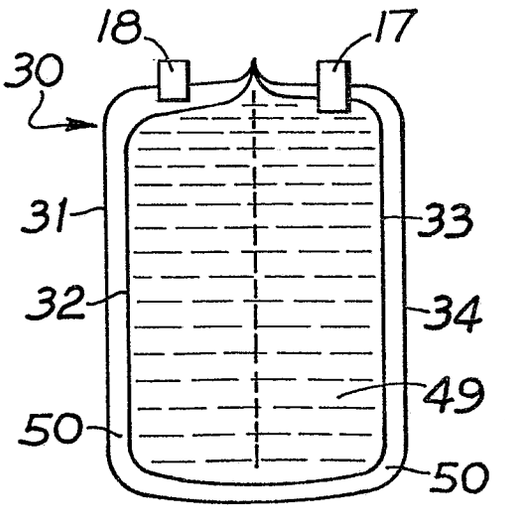

Fig. 3B

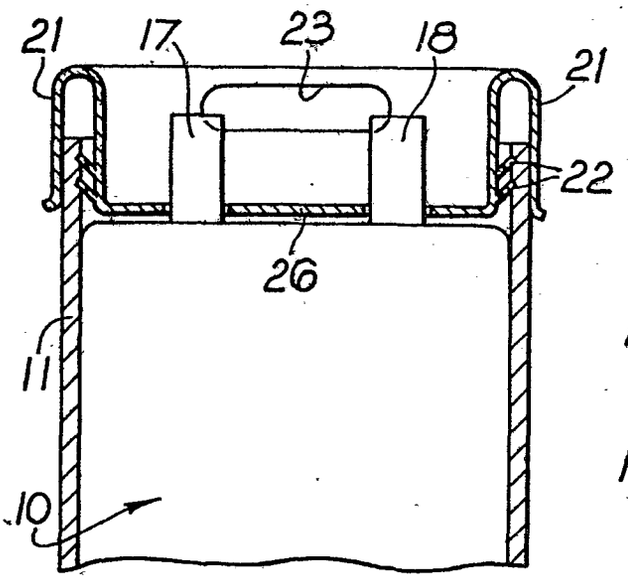

Fig. 4

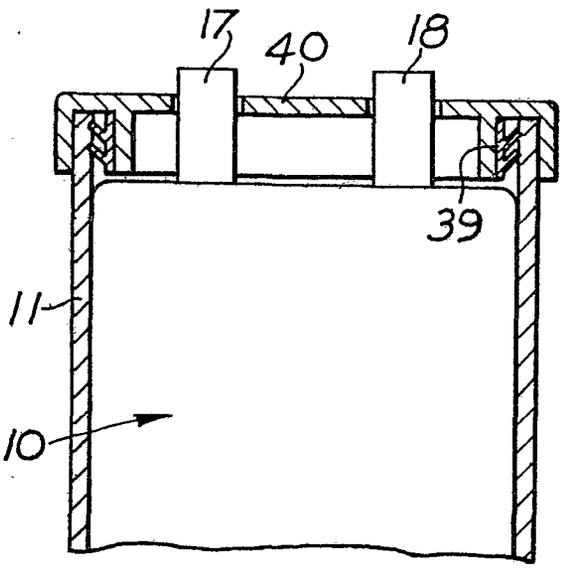

Fig. 5

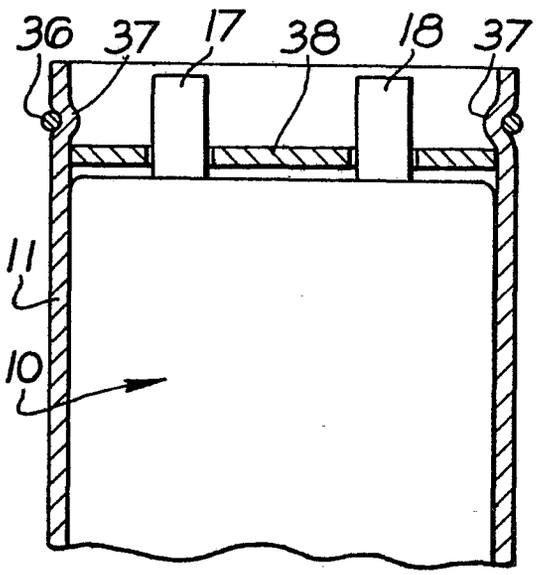

Fig. 6

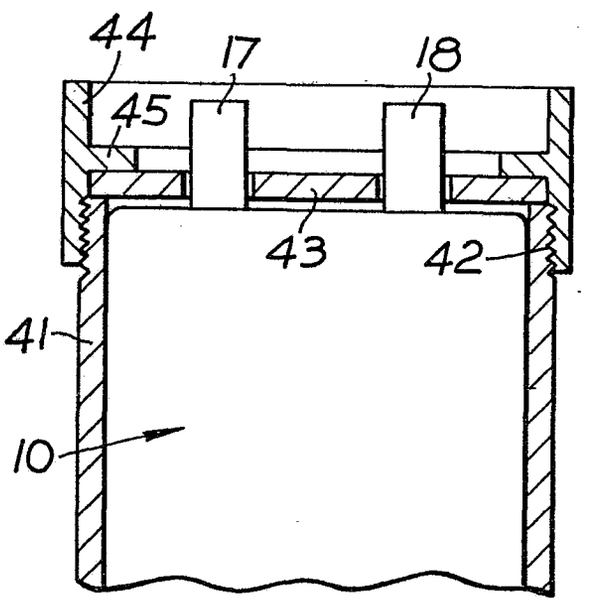

Fig. 7