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

(11) Publication number : **0 580 411 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **93305704.4**

(51) Int. Cl.[5] : **B65D 88/16**

(22) Date of filing : **20.07.93**

(30) Priority : **20.07.92 GB 9215381**
06.08.92 GB 9216725

(43) Date of publication of application :
26.01.94 Bulletin 94/04

(84) Designated Contracting States :
BE DE FR GB IE IT NL SE

(71) Applicant : **SOME GUYS LIMITED**
Fowler Road, West Pitkerro Industrial Estate
Dundee DD5 3RY (GB)

(72) Inventor : **Caldwell-Nichols, Jeffrey Robin**
3a Charles Avenue
Arbroath DD11 2EZ (GB)

(74) Representative : **Sanderson, Michael John et al**
MEWBURN ELLIS 2 Cursitor Street
London EC4A 1BQ (GB)

(54) Flexible containers.

(57) A flexible container comprises an outer body (30) and a liner (10) of substantially impermeable flexible material having a load-containing section (14) housed within the outer body (30), and a protective shroud (20) of substantially impermeable flexible material located, prior to filling of the container, between the liner (10) and the outer body (30) to surround at least the upper regions of the load-containing section (14) of the liner (10).

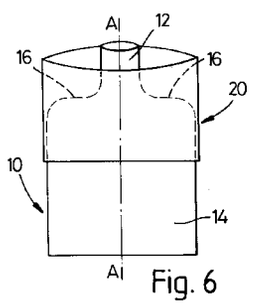

Fig. 6

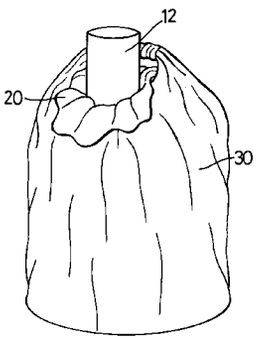

Fig. 8

EP 0 580 411 A1

This invention relates to large capacity flexible containers which are suitable for storage and transport of various goods, particularly dry goods of powdered or granular type.

Such containers are often referred to as flexible intermediate bulk containers (F.I.B.C.) and they typically have a capacity in the range from 0.25 - 2.0m^3 and are rated as safe for loads of half a tonne up to three tonnes. They are made of a flexible material which must be of adequate strength for lifting of the filled containers by engaging one or more handles or loops at the top of the containers. The usual material is woven synthetic plastics, for example woven tapes of polypropylene.

Containers of this type, as disclosed in EP-A-0118112 and in the applicant's own earlier specifications PCT/GB92/00287 and PCT/GB92/00489, are typically produced with a single integral lifting loop or handle at the top for engagement by a fork lift mechanism or hook. Generally, such containers are produced from a body of tubular woven material, although it is also possible to produce them from flat woven material which is seamed to provide a tube, the containers including a sewn-in base thereto.

The invention is more particularly concerned with such flexible intermediate bulk containers which are provided with an inner liner of a flexible, substantially impermeable plastics sheet material, into which the goods to be stored, typically fertilisers, are inserted and from which said goods are subsequently discharged.

The discharge of goods from such containers is typically effected by lifting the container and slitting or otherwise opening the base of the main body and the liner.

Such containers, when filled, are frequently stored out of doors for long periods, and are therefore exposed to all types of weather conditions. During storage out in the open, wet conditions are prevalent, and water often accumulates on the top of the containers, particularly on the top of the load containing sections of the containers below the lifting loops. In any event, the contents of a container can be damaged, even completely ruined, by water ingress, which may occur if the liner is inadequately closed or sealed, or is damaged.

Various arrangements are known whereby one or more layers of waterproof material may be provided over the top of a container. This is usually achieved by sewing the protective material to the upper opening of the container. Entry to the container may be achieved by a single slit, or more commonly by a filling spout. Another arrangement is known whereby one or more additional layers of waterproof material are provided over the top of the container liner and down between the liner and the main body of the container at least over an upper region of the load containing section of the container as an additional barrier to water ingress. These either take the form of a separate sheet of waterproof material which has to be manually positioned over the liner and tucked down between the liner and the main body after filling of each container, or of a waterproof layer connected to the internal surface of the main body, at least in the upper region thereof. In some cases it may be a combination of both.

It would be desirable to be able to minimise the need for manual intervention upon filling of containers, and to provide any such additional waterproof barrier in such a manner that it is automatically positioned where it is required.

It is therefore an object of this invention to provide an additional layer of material over the top of a liner of a flexible intermediate bulk container, so as to improve the resistance of the liner to damage and to ingress of water, in a manner which does not introduce any complexity to the procedure for manufacturing and assembling such containers.

The liners of flexible intermediate bulk containers may consist of simple tubular bodies sealed at the base. These may be considered as straight sided envelopes. In use, the top region is gathered together to provide a neck for the purposes of filling.

Alternatively, the liners may be formed with a load containing section which is specifically delimited by a narrowing leading to a neck, through which the liner can be filled. The most common form of liner of this latter type may be termed as a liner of 'bottle top' form, as it has shoulder regions leading to a neck in the manner of an outline of a bottle.

Both types of liner may be gussetted during their formation.

The present invention is applicable to containers incorporating any of the above type of liner, and, as previously mentioned, to all types of flexible intermediate bulk containers, in particular those disclosed in EP-A-0118112, PCT/GB92/00287 and PCT/GB92/00489.

According to one aspect of the present invention, there is provided a flexible container comprising an outer body and a liner of a substantially impermeable flexible material having a load-containing section and housed within the outer body, characterised by a protective shroud of substantially impermeable flexible material located, prior to filling of the container, between the liner and the outer body to surround at least the upper regions of the load-containing section of the liner.

With such an arrangement, it will be appreciated that the shroud can be held in position by co-operation with the outer body and the liner without being secured in any manner to the material of either of these components, although the shroud and liner may be secured together, for example by gluing.

In its simplest form, the shroud comprises a tubular section of a waterproof film surrounding the up-

per regions of the load-containing section of the liner.

In one embodiment of the invention, the load-containing section of the liner is delimited by a shoulder portion leading to a neck portion upstanding from the load-containing section of the liner and through which the liner is filled, the shroud incorporating therein abutment means which, on location of the shroud over the liner, co-operate with the shoulder portion of the liner to determine the axial position of the shroud on the liner.

The abutment means may comprise a pair of seals each connecting opposing walls of the liner over a transverse extent thereof to define therebetween an aperture in the shroud through which, on location of the shroud on the liner, the neck portion of the liner extends.

The abutment means may be formed intermediate the height of the shroud whereby the upper regions of the shroud extend above the shoulder portion of the liner and surround the neck portion thereof or, alternatively, said abutment means may define the upper end of the shroud whereby, on location of the shroud on the liner, the neck portion of the liner extends upwardly beyond the shroud.

The shroud may comprise a tubular section delimited by a shoulder portion leading to a neck portion such that, on location of the shroud over the liner, the shoulder portion of the shroud seats on the shoulder portion of the liner, and the neck portion of the shroud surrounds the neck portion of the liner.

The manner in which the upper portion of the liner and the surrounding shroud are caused to project from the top of the outer body may also assist in retaining the shroud in its correct position relative to the liner. In this respect, the upper portion of the liner and its shroud may be caused to project through a slit in a top closure to the container (which top closure may be formed by one or more flaps of material of the outer body).

Alternatively the liner and its shroud may be caused to project through a relatively narrow space between the side edge of such a top closure and the base of one of the lifting loops. Insertion of the liner and the shroud through such a slit, or the projection of these components through a narrow space, has been found to be sufficient to hold the shroud in position, owing to the inherent friction or contact forces between the liner and the shroud and the respective edges of the material of the outer body which define the slit and/or the gap.

Folding of a liner along one or more longitudinal fold lines, generally at least a medial longitudinal fold line, is conventional practice to facilitate insertion of the liner into the associated outer body. However, it has not previously been appreciated that such folding could, by itself, be adequate to hold a separate shroud in position surrounding the upper portion of the liner during the insertion of the combination into an outer body.

According to a further aspect of the present invention, there is provided a method of assembling a flexible container as defined above comprising the steps of locating the shroud over at least the upper regions of the load-containing section of the liner, folding the combination of shroud and liner along at least one longitudinal fold line, and inserting the folded combination into the outer body so that a portion of both the liner and the shroud adjacent the open end of the liner project from the top of the outer body.

In one such method, the combined liner and shroud are folded along a central longitudinal fold line, each half of the combination then being folded in a reflex manner about a longitudinal fold line central to that half to provide a combination of generally W-shape in transverse section.

By way of examples only, embodiments of the invention now be described in greater detail with reference to the accompanying drawings of which:

Figs. 1,3 and 5 show a liner and a shroud of three different embodiments of container according to the invention prior to location of the shroud on the liner;

Figs. 2,4 and 6 show the liners and shrouds of Figs. 1, 3 and 5 respectively in the assembled condition;

Fig. 7 shows the liner/shroud combination of Fig. 6 folded prior to location in an outer body, and

Fig. 8 shows an assembled container according to the invention prior to filling.

Referring to Fig. 1, there is shown a liner 10 of tubular form sealed across its base. The liner 10 has a narrow neck or spout 12 extending upwardly from the middle of the top of a load-containing section 14 of the liner 10, the top of said liner 10 otherwise being bounded by a narrowing which, in this case, takes the form of a shoulder region 16.

Such a liner is conventional and is continuous or sealed around the entire load containing section 14, including the shoulder region 16.

A shroud is shown at 20 and consists of a tubular section of polythene film or other waterproof material which is open at both ends. Intermediate its open ends, transversely extending heat seals 22,24 connect opposing overlying walls at each side. These heat seals 22,24 extend inwards from each side edge of the shroud, substantially at the same level as each other, and define therebetween a gap substantially centrally of the shroud.

The manner in which the shroud 20 is located over the liner 10 is readily apparent from Figs. 1 and 2 of the drawings.

The shroud 20 is pulled over the liner 10 from the top so that the heat seals 22,24 rest upon the shoulder region 16 of the liner 10 and the neck 12 of the liner 10 protrudes through the central gap between the heat seals 22,24. In this way, the neck 12 of the

liner 10 is surrounded by the portion of the shroud 20 above the heat seals 22,24 while the portion of the shroud 20 below the heat seals 22,24 extends around and covers an upper section of the liner 10. The position of the heat seals 22,24 is chosen such that there is sufficient material below the seals to extend below the fillheight of the container - i.e. below the top of the load containing section of the liner 10.

If desired, the shroud can be long enough for the portion thereof below the seals 22,24 to extend right to the base of the liner 10. In any event, at least the upper section of the filled liner 10 is provided with an additional protective layer which serves to protect it both from damage and water ingress.

In the assembly of a flexible intermediate bulk container, the liner 10 with the shroud 20 located over it as shown in Fig. 2 is placed inside an outer container body as shown at 30 in Fig. 8 and of the type described in the introduction hereto. The heat seals 22,24 serve to locate the shroud 20 - i.e. to position and retain it - over the upper section of the liner 10 in situations where an additional barrier layer is required. The additional shroud material surrounding the neck 12 of the liner 10 above the heat seals 22,24 is also useful in that it will lie over the top of the liner 10 when the latter is filled, and thereby give an added protective effect, as a swear pad, further reducing the likelihood of damage to the top of the liner. It is to be appreciated, however, as will be detailed below, that the presence of heat seals or other locating means on the shroud is not essential to the basic invention.

After filling of the liner 10, the neck 12 is closed and is tucked below the shroud material above the heat seals 22,24, which is overlying the container top. That shroud material can then be gathered and folded over the top of the container. Any other conventional manners of closure of the container top are, however, possible.

The main advantage of providing a shroud to the liner which is located in this way between the liner and the outer body of the container is that it provides the desirable added protection yet avoids any need to connect the protective material to the outer body material of the container, which would otherwise inevitably complicate the manufacturing procedure. Additionally, since the shroud is not attached to either the liner or the outer body, these three components can be readily separated for purposes of recycling.

The shroud illustrated in Figs. 1 and 2, with additional material above the heat seals 22,24 in a simple tubular body 20, is advantageous because, as well as providing the additional top protection material, it is extremely simple to produce. Naturally, it does not matter if the heat seals 22,24 are continuous or discontinuous. Adhesive or an alternative method of connecting the opposed walls of the shroud could be used in place of the heat seals.

Figs. 3 and 4 show an alternative shroud 20 in which the heat seals 22,24 are formed at the top edge of the shroud and define between them an aperture 26. Thus there is no shroud material above the seals 22,24, and the cost of production is reduced compared with the shroud of Figs. 1 and 2.

On location of the shroud 20 of Fig. 3 onto the liner 10 of Fig. 3, the neck 12 of the liner 10 projects through the aperture 26 in the upper edge of the shroud 20.

Other shapes of shroud 20 could be produced which would be equally effective in providing the additional protection given by the embodiments so far described. For example, a shroud could be provided matching the shape of the top of the liner of the style shown in Figs. 1 and 3 by cutting out two notches and sealing the edges to provide the shroud with a shoulder region and a neck. Alternatively, material above the heat seals of a shroud of the style shown in Figs. 1 and 2 could be partially cut away, with the remainder used to form a neck.

The shrouds so far described have incorporated means for locating them in their operative positions on the liners surrounding at least the upper parts of the load containing sections 14 of the liners.

However, the invention is not limited to the provision of such co-operating location means, as will be described with reference to Figs. 5 and 6.

In these drawings there is shown a liner 10 of conventional bottle-top form, the shroud 20 consisting of a tubular section of polythene film or other waterproof material which is open at both ends.

To produce a complete container comprising an outer body, a liner and a shroud, the shroud 20 is initially pulled over the liner 10 to the position shown in Fig. 6 in which the shroud encompasses the upper regions of the load containing section 14 of the liner 10 and the neck 12 of the liner 10 just projects from the upper open end of the shroud 20.

The liner 10 and shroud 20 together are then folded in half along fold line A-A indicated in Figs. 6 and 7. Each half of the liner and shroud combination may then be folded again along a central longitudinal axis, preferably in a reflex manner, to produce a folded combination of generally W-shape in transverse section, the width of which is one quarter of the initial laid flat width of the combination. However, other configurations of longitudinal folding may be used to produce combinations of various cross-sections

The folding has two purposes. Firstly it reduces the width of the liner/shroud combination to a size that is easy to insert into an outer body 30 of a flexible intermediate bulk container. Secondly the shroud 20 is trapped by the folding and therefore has little tendency to move relative to the liner 10.

The combined liner and shroud are then inserted into the outer body 30. Once the liner and shroud are correctly positioned within the outer body, the neck 12 of the liner 10, and the surrounding shroud 20,

may be inserted through a filling slit of the outer body 30, or may simply hang out from a gap at one side of a top closure to the body 30. If the outer body 30 is of a type without a top closure, particularly with two or more lifting loops, then the liner/shroud combinations shown in Figs. 2 and 4 are advantageous, as these types of container do not easily allow co-operation of the outer body and the inner liner to hold the shroud in position.

By folding the shroud/liner combination and subsequently inserting the combination into the outer body 30, the position of the shroud 20 relative to the liner 10 (i.e. around the upper and neck region) is maintained right up to the time of filling of the container, and the shroud is then automatically positioned, as required, between the filled liner and the outer body, as an extra protective layer.

After filling of the liner 10, the neck 12 will probably be closed and it can be tucked below the shroud material. The shroud material can then be gathered and folded over the top of the container. If a top closure is provided to the outer body, the top of the shroud material may itself be tucked back below that top closure. However, any other conventional manner of closure of the container top is possible.

The method of folding described in relation to Figs. 5 to 7 is equally applicable to any other type of liner and shroud combination whether or not the shroud is positively located on the liner as in Figs. 1 to 4. Furthermore, it is applicable to liners which are not of bottle top form with a specific neck region, but have substantially parallel sides. In such cases, the upper sections of the liner will, in use, just be gathered in the manner of a neck to receive a filling spout during filling of the containers. In the case of the simple tubular shroud of Figs. 5 and 6, the liner may be physically secured to the shroud, for example by gluing.

Provision of a shroud around at least the upper portion of a liner, in accordance with the invention, is, of course applicable in respect of flexible containers which have any style of outer container body. Specifically, such a shroud may be used in a container which has an open top to the outer body, or in a container which has integral flaps at the top of the outer container body providing a closure across the top of the said outer body between the base of the lifting loops, or in a container having an additional top closure secured between cut edges of the body, and extending between the base of the lifting loops. In the latter cases, the shroud will be below the top closure of the outer container and this is preferred as it will assist in holding the shroud in position as well as generally increasing the overall protection at the top of the filled container. The manufacturing/assembly procedure for the containers does not need to be changed in any way. The liner with the shroud positioned thereover is still inserted into the outer body, either prior to closing the top closure to the outer body, or, in the majority of the instances, after closing it. The latter is most common since openings still remain at each side of the top closure in the vicinity of the respective bases of the lifting loops, through which the unfilled liner together with its shroud can be passed.

Claims

1. A flexible container comprising an outer body (30) and a liner (10) of a substantially impermeable flexible material having a load-containing section (14) and housed within the outer body (30), characterised by a protective shroud (20) of substantially impermeable flexible material located, prior to filling of the container, between the liner (10) and the outer body (30) to surround at least the upper regions of the load-containing section (14) of the liner (10).

2. A container as claimed in claim 1 in which the shroud (20) comprises a tubular section of a waterproof film surrounding the upper regions of the load-containing section (14) of the liner (10).

3. A container as claimed in claim 1 in which the load-containing section (14) of the liner (10) is delimited by a shoulder portion (16) leading to a neck portion (12) upstanding from the load-containing section (14) of the liner (10) and through which the liner (10) is filled, the shroud (20) incorporating therein abutment means (22,24) which, on location of the shroud (20) over the liner (10), co-operate with the shoulder portion (16) of the liner (10) to determine the axial position of the shroud (20) on the liner (10).

4. A container as claimed in claim 3 in which the abutment means comprise a pair of seals (22,24) each connecting opposing walls of the shroud (20) over a transverse extent thereof to define therebetween an aperture (26) in the shroud (20) through which, on location of the shroud (20) on the liner (10), the neck portion (12) of the liner (10) extends.

5. A container as claimed in claim 3 or claim 4 in which the abutment means (22,24) are formed intermediate the height of the shroud (20) whereby the upper regions of the shroud (20) extend above the shoulder portion (16) of the liner (10) and surround the neck portion (12) thereof.

6. A container as claimed in claim 3 or claim 4 in which the abutment means (22,24) define the upper end of the shroud (20) whereby, on location of the shroud (20) on the liner (10), the neck por-

tion (12) of the liner (10) extends upwardly beyond the shroud (20).

7. A container as claimed in claim 3 or claim 4 in which the shroud (20) comprises a tubular section delimited by a shoulder portion leading to a neck portion such that, on location of the shroud (20) over the liner (10), the shoulder portion of the shroud seats on the shoulder portion (16) of the liner (10), and the neck portion (12) of the shroud (20) surrounds the neck portion of the liner (10).

8. A method of assembling a flexible container as claimed in any one of claims 1 to 7 comprising the steps of locating the shroud (20) over at least the upper regions of the load-containing section (14) of the liner (10), folding the combination of shroud (20) and liner (10) along at least one longitudinal fold line (A-A), and inserting the folded combination into the outer body (30) so that a portion of both the liner (10) and the shroud (20) adjacent the open end of the liner (10) project from the top of the outer body (30).

9. A method as claimed in claim 8 in which the combined liner (10) and shroud (20) are folded along a central longitudinal fold line (A-A), each half of the combination then being folded in a reflex manner about a longitudinal fold line central to that half to provide a combination of generally W-shape in transverse section.

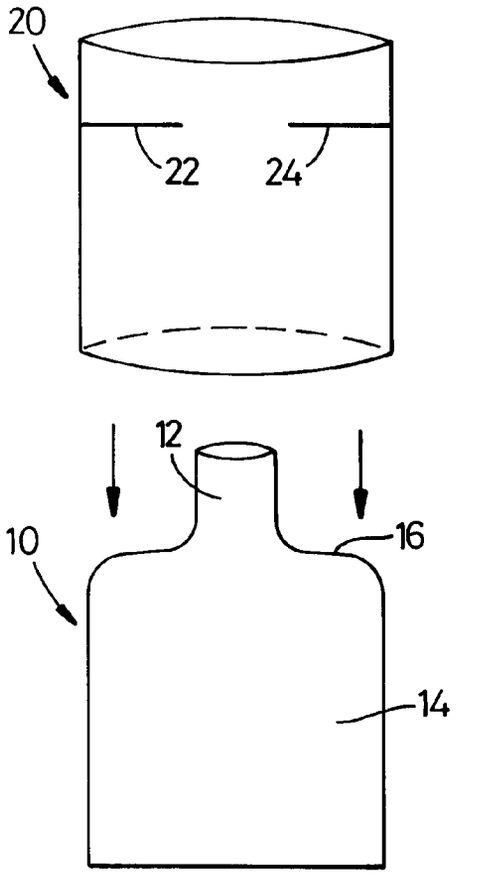

Fig. 1

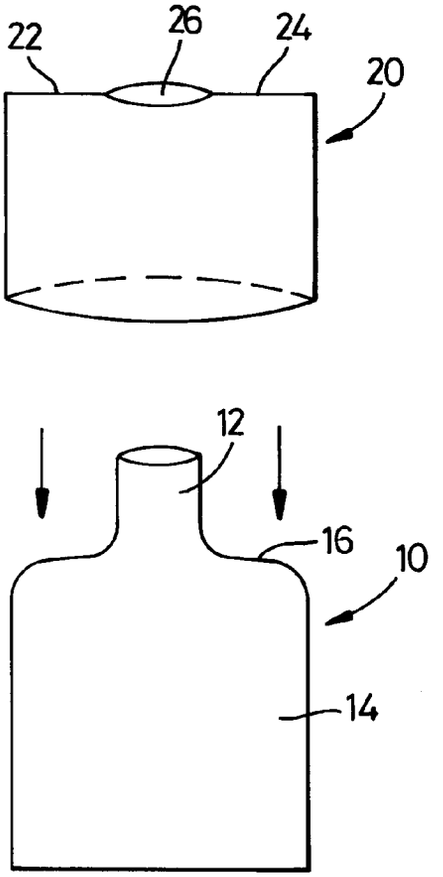

Fig. 3

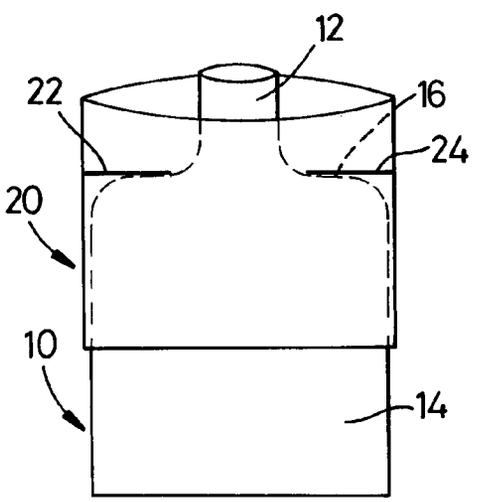

Fig. 2

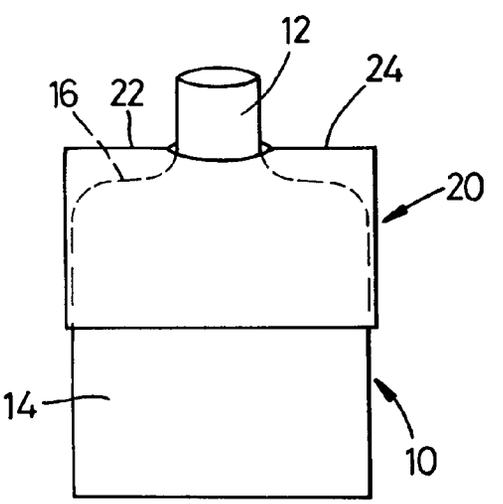

Fig. 4

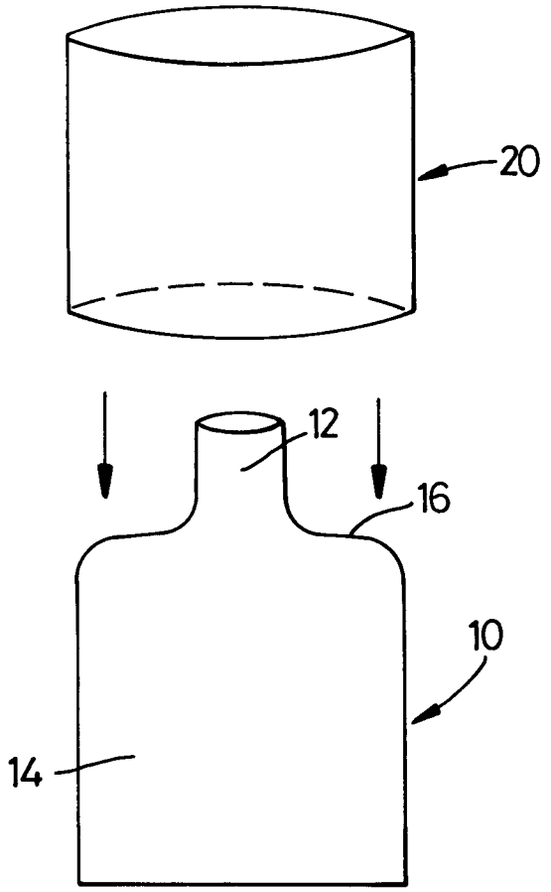

Fig. 5

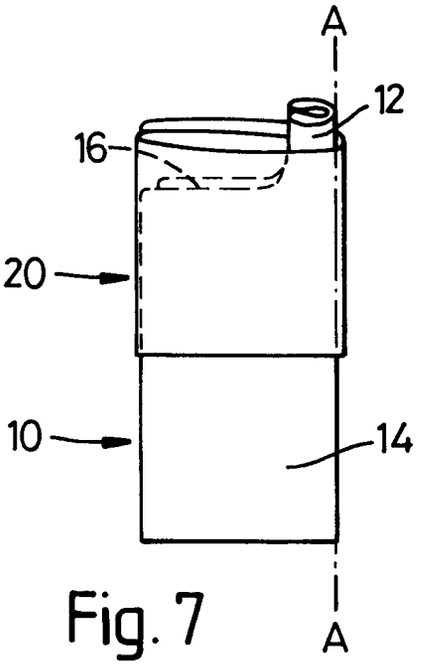

Fig. 7

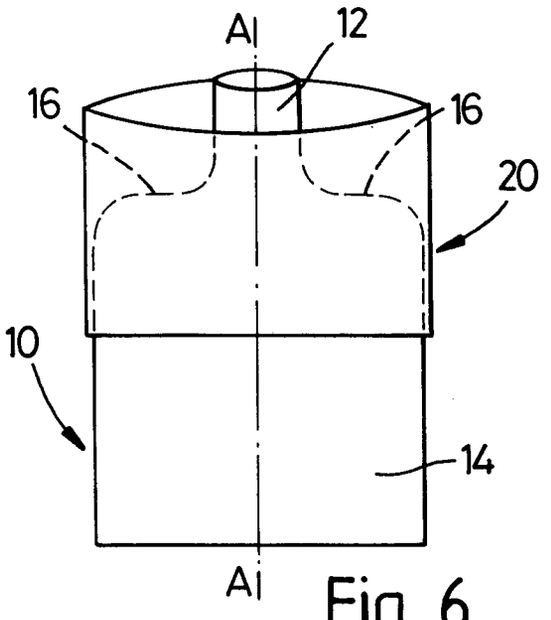

Fig. 6

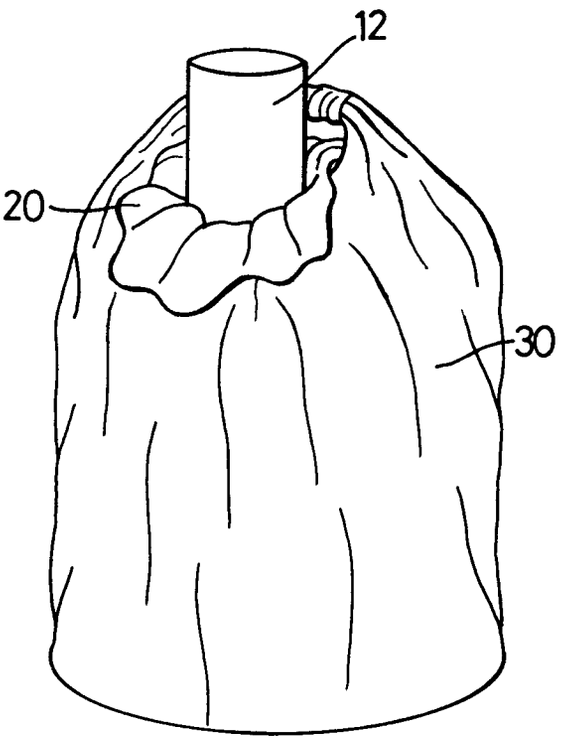

Fig. 8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number EP 93305704.4

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	WO - A - 91/16 249 (NORSK HYDRO A.S.) * Abstract; fig. 1a-3 *	1,8	B 65 D 88/16

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	28-09-1993	WIDHALM

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

EPO FORM 1503 03.82 (P0401)