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54 Flexible container for the transportation and storage of bulk material.

57 A flexible container for the transportation and storage of bulk material is disclosed. Such containers comprising a double-walled cylindrical body having inner and outer walls formed by folding a cylindrical member back along itself at about its centre is known in the art. Lifting loops (7) which are integral parts of both the inner walls (2') and the outer walls (1') and which also allow lashing of the inner walls of the container, are obtained by providing at least two openings (4) in the outer walls (1') extending longitudinally downwards from the top of said walls (1'). Both ends of the cylindrical member are closed thus forming the container bottom. Two short seams being spaced apart can be provided at the top of the inner walls (2') for formation of a filling opening (9).

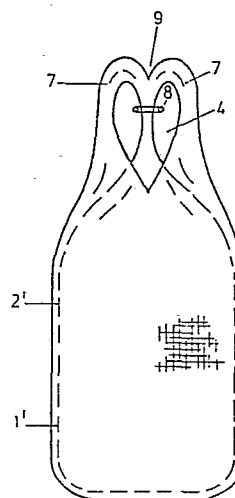


Fig 2

"Flexible container for the transportation and storage of bulk material".

The present invention relates to a flexible container for transportation and storage of bulk material, especially free-flowing powdery material. The container comprises a double-walled cylindrical body having inner and outer walls formed by folding a cylindrical member
5 back along itself at about its centre.

Most of the containers used today are made from at least one piece of woven fabric sewn together to form containers. One embodiment of the containers according to US-patent No. 4,136,723, is a container made from one piece of material folded double and sewn together to
10 form a single-walled container with integral lifting loops. The said container has a square base, and the bottom is made from at least four separate flaps each of which have free lateral edges and which are direct extensions of the container walls. The flaps are joined together in pairs to form joints that cross at a single point. Such a container
15 usually requires an inner bag of impervious material to avoid loss of the container's content through the woven material of the container itself.

Known in the art is also a double-walled container made from a cylindrical member. According to British patent No. 1,323,804 this
20 container has upper and lower closure means respectively, attached to the body at its upper and lower ends for at least partially closing the end openings. This container has very complicated bottom constructions which involve a great deal of labour and are very expensive. The upper opening of the container necessitates in most cases an extra lid since
25 the upper binding cords only partially close the upper opening. The lifting loops of the container comprises a plurality of endless loop-shaped cords attached to a binding cord inserted in the folded back end of the cylindrical body which forms the container.

It is an object of the present invention to provide an improved,
30 simple and inexpensive container which meets the requirements for easy loading, discharging and handling of the container.

Another object of the invention is to provide a particularly strong container with the minimum use of material and labour. The idea is that it should be economical to discard the container after
35 it has been used only once, and that it should be so versatile in use

that it can be employed for such different materials as dangerous materials and food stuffs.

During the development of the new container, the inventor soon found it advantageous to make the container from circular-woven material, and in order to make a strong container a double-walled cylindrical container gave the greatest promise. The cylindrical body can also be made from at least two flat-woven pieces of material which are sewn together. Containers thus made will, however, be weaker than those made from circular-woven material.

The lifting arrangements shown in the British patent previously referred to, were considered impractical and too expensive. The inventor then found that by making at least two openings in the upper part of the outer wall of a double-walled container, the upper container opening could be closed easily, and there would also be formed integrated lifting loops suitable for lifting the container by hooks or forks. The said openings, being parallel to the longitudinal axis of the container, would not weaken the container and lifting loops thus formed proved to be very strong. In the embodiment of the invention most preferred the openings start at the very top of the outer container wall and extend downward to a length of about one sixth of the containers circumference. By using two openings, the width of each lifting loop will be one half of the container's circumference.

The lower openings of the container can be closed in several ways to form the container bottom. However, both the inner and the outer walls should be closed either before or after folding the cylindrical member back along itself when forming the double-walled container. The inner and outer walls may be closed in different ways though. The simplest method of closing, however, is to sew a single seam along the lower openings of each of the two container walls. A strong bottom can be made by joining flaps which are direct extensions of the container walls and thereby forming a bottom being at least a double one. Such bottoms can be formed by sewing or by glueing laminated flaps together, thus obtaining a square base.

The invention also comprises further features which are of special importance when the container is being filled. At the upper edge of the inner wall two short seams can be made defining the filling

opening of the container. This opening can be of the same size as the spout used to fill material into the container. Before filling and before closing the lower parts of the container, a ring, preferably of flexible material, can be inserted around the inner walls.

- 5 The said ring would be about the same size as the filling spout. This ring will also be advantageous when closing the upper opening of the container.

The container can also be equipped with a discharge spout which is an extension of the inner walls and thereby allowing discharge
10 of the container without contaminating its content.

The double-walled container can be made from woven fabric, and the cylindrical member is preferably made by circular weaving. At least the inner walls may be laminated to form an impervious inner container. The container may also be equipped with an inner bag of
15 for instance polyethylene.

The invention will be further explained with reference to the drawings.

Fig. 1 shows a cylindrical member in the form of a deflated circular-woven piece of material.

20 Fig. 2 shows the double-walled container with integral lifting loops.

Fig. 3 shows the cylindrical member with integrated bottom flaps.

Fig. 4 shows the double-walled container before lashing.

Fig. 1 shows the deflated cylindrical member having a length which
25 is twice that of the double-walled container and consisting of section 1 forming the outer walls and section 2 forming the inner walls. The container is formed by folding section 1 back along section 2 along the central line 5 and closing the two openings of the sections at 6. At least two openings 4, are made in section 1,
30 extending downwards from the folding line 5 to a length of about $W/3$, W being the width of the deflated piece of material. The length of the openings 4 is not very critical, but it has been found that a length of $W/3$ is optimal using two openings 4 which are situated diametrically or right across each other.

35 Fig. 2 shows the double-walled container where section 2 forms the inner walls and section 1 the outer walls. Both of the sections are closed whereby a double bottom is formed. The container's filling

opening 9 is shown in a closed state by closing means 8. By means of the openings 4 there is formed two lifting loops 7 which are an integral part of the outer walls 1.

The inflated cylindrical member shown in Fig. 3 has a total length of L and a width W in the inflated state. Including the length of the bottom flaps 10, each of the sections 1 and 2 has a length of $L/2$. In section 2 there is provided two short seams 11, extending downwards from the folding line 5. The seams 11, which go through both sides of section 2, defines the filling opening 9. A ring 8 (Fig. 2) of rubber or the like, can be inserted around the seams 11 before section 1 is folded back along section 2. This ring 8 is used to fasten the containers to the filling spout during filling, and it will also make it easier to close the filled container. The openings 4 which form the lifting loops 7 have a length of $W/3$.

In Fig. 3 section 1 and 2 shown with two equally large flaps 10. Each of the sections 1 and 2 can, however, be equipped with from 2-4 flaps of the same size as that shown in Fig. 3. The number of flaps to be chosen depends on the strength required for the container's bottom. The most preferred size for the flaps 10 is $W/2$ times $W/2$, which gives the container square bottom. The flaps can be sewn together or laminated and glued.

According to the embodiment shown in Fig. 3, flaps a and b are joined to form an outer double bottom and flaps a' and b' form an inner double bottom. Extra seams may also be formed at the edges 12 along the lower parts of section 1 and 2.

The sections 1 and 2 can be reinforced at the edges 12 to give them a denser warp and thereby forming a fastening strip for the seams. The bottom can also be formed by first placing a and a' together and sewing at 12, and then b and b' which also are sewn at 12 and thus forming a square base.

Fig. 4 shows the double-walled container before lashing. The filling opening 9 defined by the seams 11 is clearly shown on the upper part of the container. The lifting loops are shown before being made ready for lifting by hooks or forks. At the bottom is shown a circular opening through which the discharge spout can be drawn. The reinforced edges 12 for the bottom seams clearly demonstrate the container's square base.

Containers according to the enclosed claims and shown in Fig. 1-4 have several advantages over previously known containers. First of all they have a new type of integrated lifting loops which are an integral part of both the inner and the outer walls of the

5 double-walled container. These loops are very strong as they comprise all the longitudinal threads of both the inner and outer walls. This means that the loops comprises about twice as many longitudinal threads as the loops of the container of the same size and being according to US patent No. 4,136,723.

10 Another advantage of the present container is that its upper opening is completely closed when the loops are made ready for use by simple lashing as shown in Fig. 2. This is a great improvement compared with the container according to British patent No. 1,323,804. which also have a more complicated and expensive bottom construction.

15 The construction of the container may also comprise more than two lifting loops. By making four openings 4 in the outer walls there will be four lifting loops, and this allows the container to be hung such that its opening is square during filling.

In most filling operations, however, it will be practical to

20 take advantage of the special filling opening 9 shown in Fig. 3. This opening can be adapted to any filling spout.

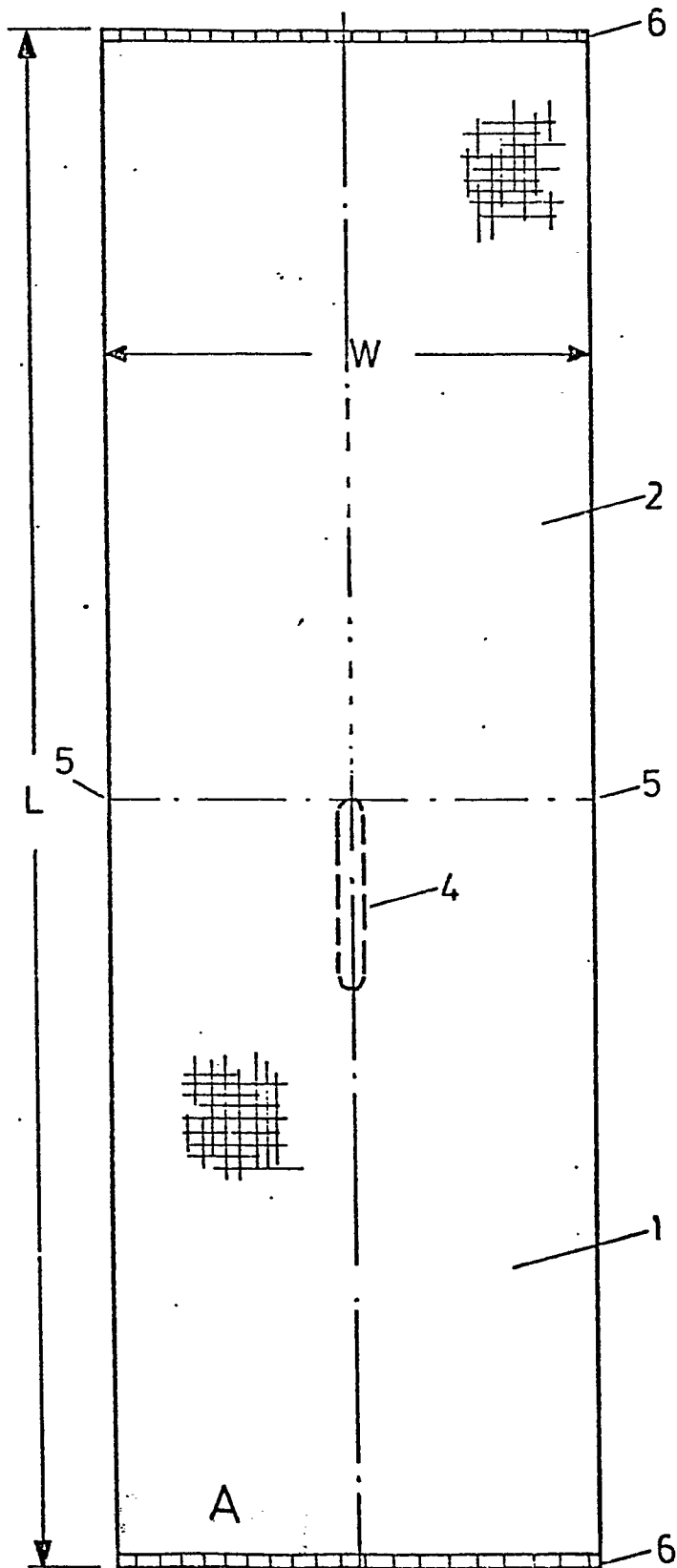
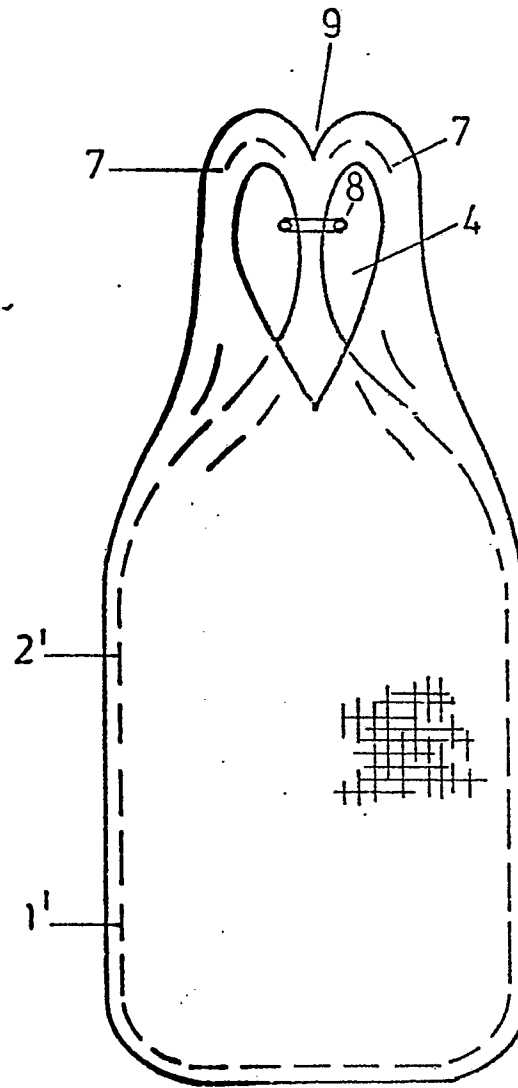
The combination of the present construction and the application of a cylindrical member, preferably of round-woven material, produces several advantages. By using a discharge spout the container can

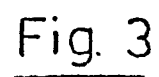
25 be used several times. The construction also permits highly mechanized container production.

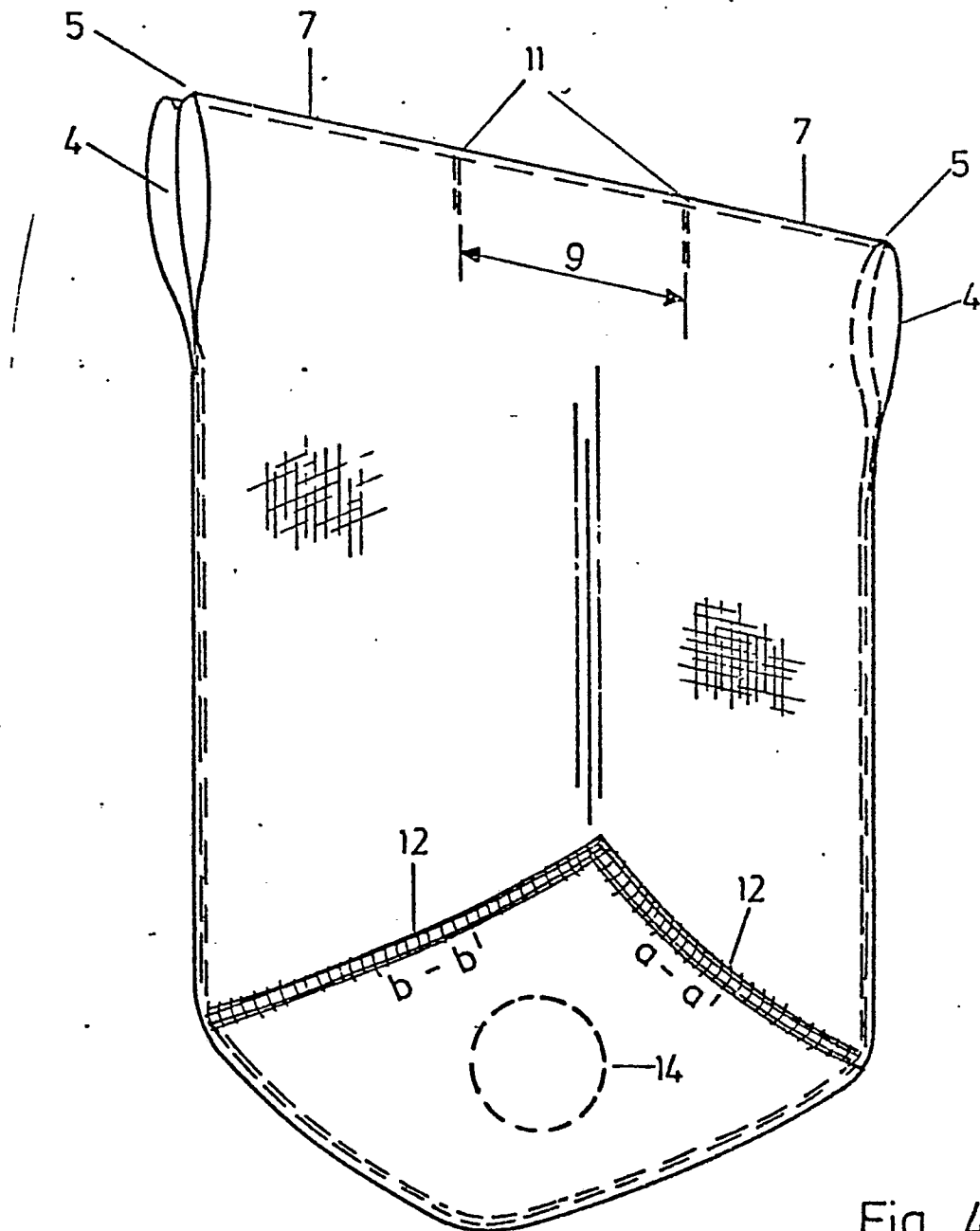
Claims

1. A flexible container for the transportation and storage of bulk material, the said container comprising a double-walled cylindrical body having inner walls 2' and outer walls 1', formed by folding a cylindrical member (A) back along itself at about its centre (5), characterized by that both ends (6) of the cylindrical member (A) are closed and thus forming the container bottom, and that there is provided at least two openings (4) in the outer walls (1'), the said openings (4) extending longitudinally downwards from the very top of the outer walls (1') to a length sufficient to form lifting loops which are an integral part of both the inner and the outer walls of the container and also allowing lashing of the container inner walls.
2. A flexible container according to claim 1, characterized by that the length of the openings (4) is $1/5 - 1/8$ of the containers circumference.
3. A flexible container according to claims 1 and 2, characterized by that two short seams (11) are provided at the very top of the inner walls (2'), the said seams (11) being spaced apart at a distance defining a filling opening (9).
4. A flexible container according to claims 1-3, characterized by that the ends (6) of the cylindrical member (A) are closed by means of bottom flaps (10) which are direct extension of the container walls.
5. A flexible container according to claims 1-4, characterized by that it comprises a discharge spout which is an extension of the inner walls (2'), and that flaps (10) which are extensions of the outer walls (1') are joined together to form the container's bottom.

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Fig. 1Fig. 2



Fig. 4



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>DE - C - 204 026</u> (KASHICHI SANO) + Totality + --	1	B 65 D 30/08
A	<u>US - A - 3 106 140</u> (UNION CARBIDE) + Totality + --		
D,A	<u>US - A - 4 136 723</u> (NORSK HYDRO) --		
D,A	<u>GB - A - 1 323 804</u> (SHINWA) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl. 7)
			B 65 D 30/00 B 65 D 88/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
X	The present search report has been drawn up for all claims		& member of the same patent family. corresponding document
Place of search VIENNA		Date of completion of the search 22-01-1981	Examiner JANC