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(72) Inventor: **Cholsaipant, Natthi**  
**Kratoomban, Samutsacorn 74110 (TH)**

(71) Applicant: **Cholsaipant, Natthi**  
**Kratoomban, Samutsacorn 74110 (TH)**

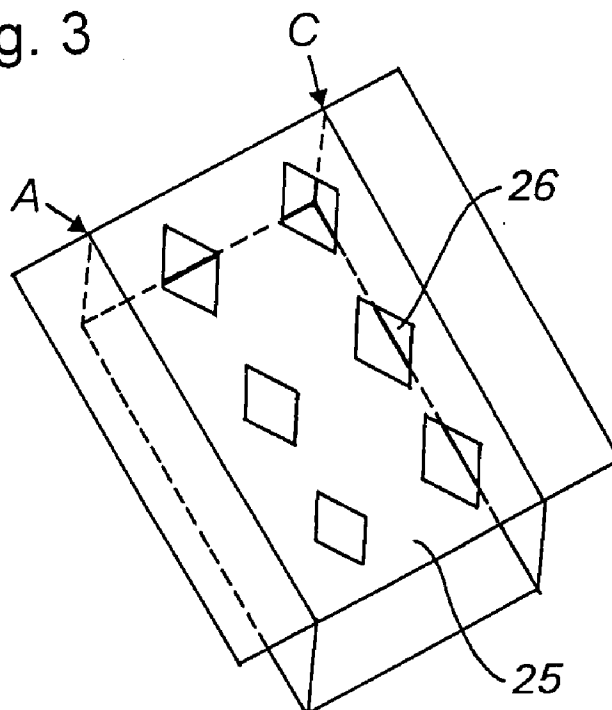
(74) Representative: **Hynell, Magnus**  
**Hynell Patenttjänst AB,**  
**Patron Carls väg 2**  
**683 40 Hagfors/Uddeholm (SE)**

**(54) Flexible bulk bag**

(57) A flexible bulk bag has two longitudinal and parallel recesses (21,23 and 22,24) at the outer parts of its bottom (15) for engagement with the forks of a fork-lift. The recesses maintain their form because of flexible

tension elements ( 25-32) inside the bag. Thus, a fork-lift can lift the bag without the use of a pallet.

**Fig. 3**



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## Description

This invention relates to a flexible bulk bag having longitudinal recesses at the outer parts of its bottom for fitting to the forks of a fork lift so that a protruding portion of the bottom is formed between the recesses.

Such a bulk bag is described in EP 665175 A1. It has external reinforcing members on the recesses. Such reinforcement must be very stiff in order to prevent the recesses from bulging out.

It is an object of the invention to provide for a bulk bag of this kind which has no stiff reinforcement but is completely flexible so that, when empty, it can be folded together completely and take up a minimum of space. Still it should be possible to lift the bulk bag by directly engaging the forks of a fork lift with the bulk bag so that it will not be necessary to use a pallet.

This object is accomplished by means of flexible stiffening elements inside the bulk bag as defined in the claims.

The invention will be described with reference to the drawings.

Figure 1 shows in a perspective view a bulk bag according to the invention. Interior stiffening elements are not shown.

Figure 2 shows in a perspective view the bottom of the bulk bag shown in Figure 1 but it does not show any stiffening elements.

Figures 3-10 show in perspective views the bottom of the bulk bag as shown in Figure 2 and they also show various alternative stiffening elements in accordance with the invention. Like parts have like reference numerals in the Figures.

The bulk bag shown in Figure 1 is made of a flexible, thin material, for example a fabric. It comprises four side walls 11-14, a bottom 15 and a top 16 with a closable inlet 17. The bulk bag has four top loops 35-38 by which it can be lifted. All parts of the bulk bag can preferably be tailored from the same material, for example the same fabric and they are fixed together, suitably by being sewn together. The side walls 11,13, the bottom 15 and the top 16 can be one piece to which the other two side walls 12,14 are sewn or glued. Before the side walls are sewn together, the bottom 15 is reinforced so that it will have the form shown in Figures 1 and 2. The bottom 15 will have two longitudinal and parallel recesses 21,23 and 22,24 respectively that are formed by two vertical walls 21,22 and two horizontal bottom portions 23,24. The recesses 21,23 and 22,24 are adapted to be engaged by the forks of a fork lift so that the forks can lift the entire bulk bag when the bulk bag is filled with a bulk material, for example cement, corn or whatever the goods may be. In order to keep the recesses from bulging out, there is internal reinforcement as shown in Figures 3-10 which show alternative embodiments of such reinforcement. No reinforcement is shown in Figure 1.

In Figure 3, the reinforcement comprises a flexible

sheet 25, for example a sheet of fabric, which is sewn along the corner A-B between the walls 21,23 and the corner C-D between the walls 22,24, so that the bottom 15, the sheet 25 and the side walls 21,22 will have a rectangular cross section. The sheet 25 has a number of holes 26 that permit the bulk material to pass through the sheet 25 so that it will be completely embedded in the bulk material. The sheet 25 will thus be tension loaded so that it stabilizes this rectangular form when the bulk bag is filled with bulk goods. Thus, the bulk bag can be lifted by the forks of a fork lift as an alternative to be lifted in its lift loops.

In Figure 4, there are two sheets 27,28 which are sewn along the corners A-B and C-D and also sewn to the bottom 15 along the lines E-F and G-H. These two sheets 27,28 have also holes 26 so that they will be embedded by the bulk material. Alternatively to having two separate sheets 27,28, one can use a single large sheet that includes the parts 27,28 and extend all the way between the parts 23 and 24.

Figure 5 shows an embodiment slightly modified from the one in Figure 4. The sheets 27,28 has a common seam E-F to the bottom 15.

In Figure 6, there are a number of individual strips 29 extending between the corner A-B and the corner C-D and sewn to the corners. Between these strips 29 there are strips 30 extending the opposite way. All these strips will also be embedded in the bulk material. From the emptying point of view, separate strips with openings between them are better than sheets with holes in them. The embodiment of Figure 3 can be modified to have separate strips coupled between the corners A-B and C-D instead of the single sheet 25. Then, there can be a distance between adjacent strips to allow for the bulk material to embed the strips.

Figure 7 shows an embodiment in which there are a number of vertical parallel strips 31 extending between the walls 21,22 and sewn to these walls. The strips 31 are sewn to the walls and they can additionally be sewn to the bottom 15. Figures 8 and 9 show other arrangements of strips extending between the walls 21,22.

Figure 10 shows four vertical strips 32 arranged between the side walls 12,14 of the bag and the walls 21,22 and extending past the four corners of the protruding bottom portion.

In all the alternative embodiments shown, the stiffening and stabilizing sheets or strips are arranged symmetrically and are arranged to be embedded in the bulk material when the bag is filled. They will be tension loaded by the bulk and will maintain the form of the longitudinal recesses 21,23 and 22,24. The stabilizing strips or sheets can preferably be made of the same material as the entire bag. The entire bulk bag with its stabilizing strips or sheets is described as being sewn together. It can alternatively be glued together or fixed together in any other suitable way.

The bulk bag can be provided with a bottom spout

for emptying the bag. In the embodiments of Figures 7-9, the stabilizing strips should then preferably not be fixed to the bottom 15. In addition to stabilizing elements in the bottom portion of the bag, there can be stabilizing strips also between the centers of the side walls 11-14 5 of the bag so that the bulging out of these walls are minimized. Other modifications can also be made within the scope of the claims.

## Claims

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1. A flexible bulk bag having longitudinal recesses (21,23 and 22,24) for the forks of a fork lift at the outer parts of its bottom (15) so that a protruding bottom portion (15,21,22) is formed between the recesses, 15  
characterized by  
flexible stiffening elements (25-32) inside the bag and coupled between parts of the protruding bottom portion (15,21,22) so as to be tension loaded 20  
and embedded in the bulk material when the bag is filled .
2. A bulk bag according to claim 1, characterized in that said stiffening elements (25,26,29-32) are coupled between the opposite side walls (21,22) that form the recesses (21,23 and 22,24). 25
3. A bulk bag according to claim 1, characterized in that stiffening elements (27) are coupled between a side wall (21) of one of said recesses and stiffening elements (28) coupled between a side wall (22) of the other recess. 30
4. A bulk bag according to claim 1, characterized in that said stiffening elements (32) are coupled between adjacent side walls (12,14,21,22) of said protruding bottom. 35

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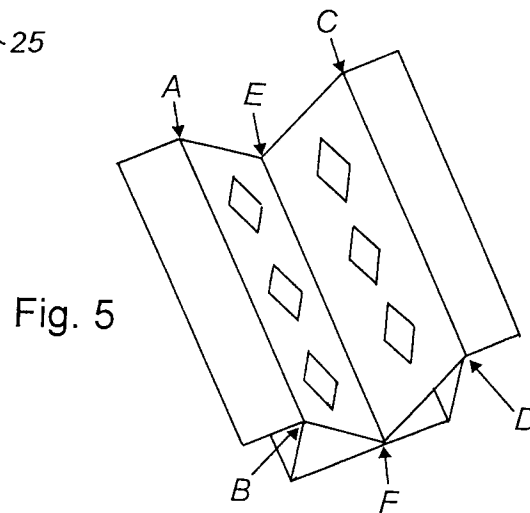
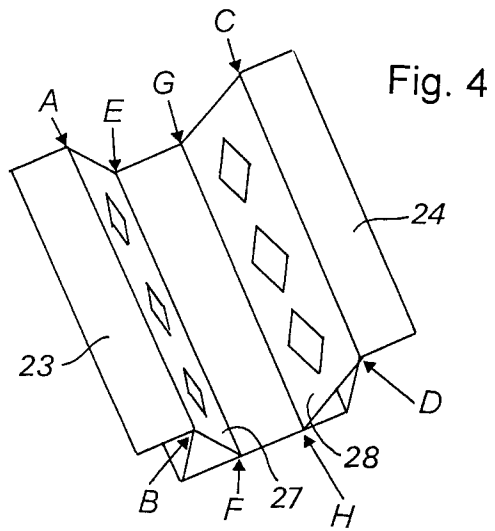
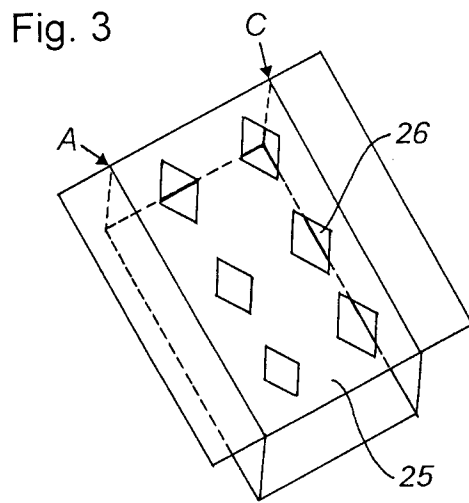
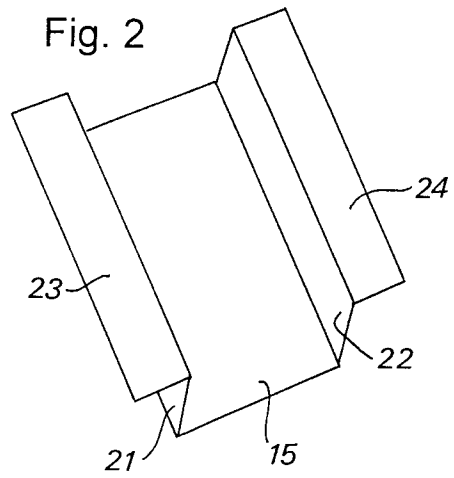
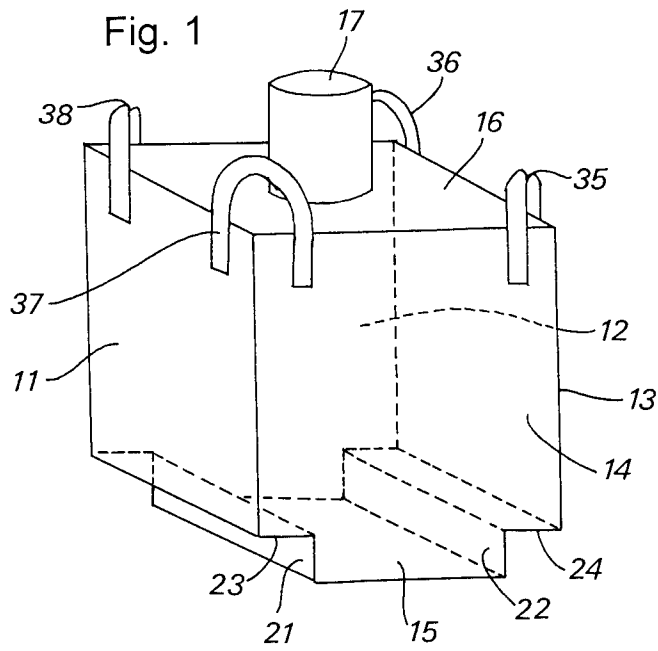


Fig. 6

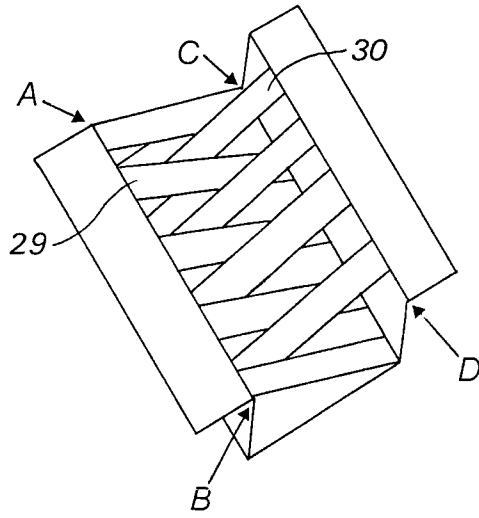


Fig. 7

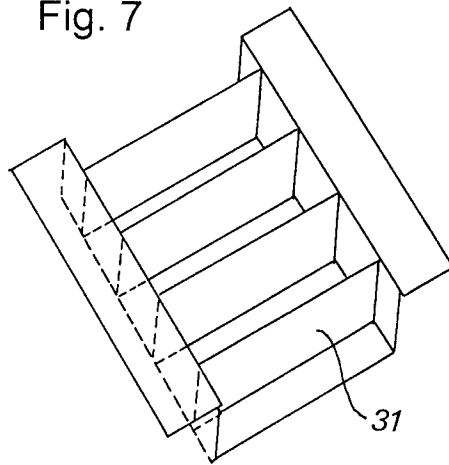


Fig. 8

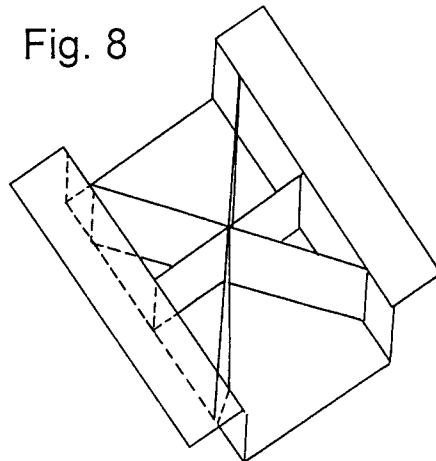


Fig. 9

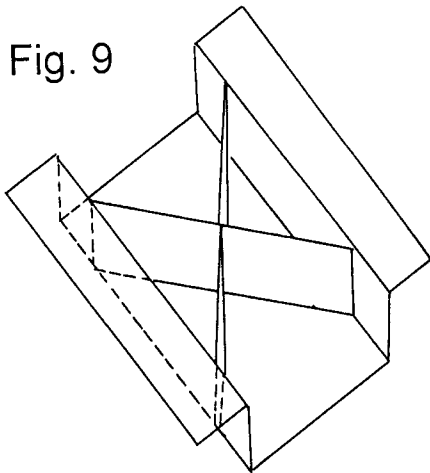
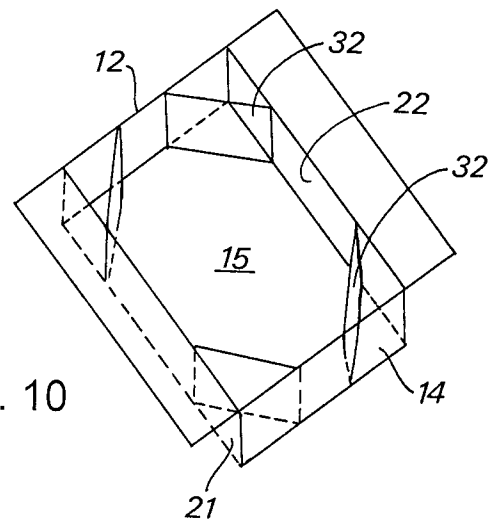


Fig. 10





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# EUROPEAN SEARCH REPORT

Application Number  
EP 96 20 1950

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.6)
D,A	EP-A-0 665 175 (BRIDGESTONE CORP) 2 August 1995 * abstract; figures *	1	B65D88/16
A	WO-A-92 13781 (WISAPAK OY AB) 20 August 1992 * abstract; figures *	1	
A	WO-A-92 21572 (LEER KONINKLIJKE EMBALLAGE) 10 December 1992 * abstract; figures *	1	
The present search report has been drawn up for all claims			<b>TECHNICAL FIELDS SEARCHED (Int.Cl.6)</b> B65D
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>12 December 1996</b>	Examiner <b>Van Rollegheem, F</b>
<b>CATEGORY OF CITED DOCUMENTS</b> 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			

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