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(54) Apparatus and method for bending first and second cross seals of a tubular bag

(57) The present invention relates to an apparatus to bend a first and a second cross seal (1,2) of the bag (3) made of a flexible packing material towards the side-wall (5). The present invention further relates to a packaging machine comprising the inventive apparatus and a method for producing a bag (3) made of a flexible packaging material.

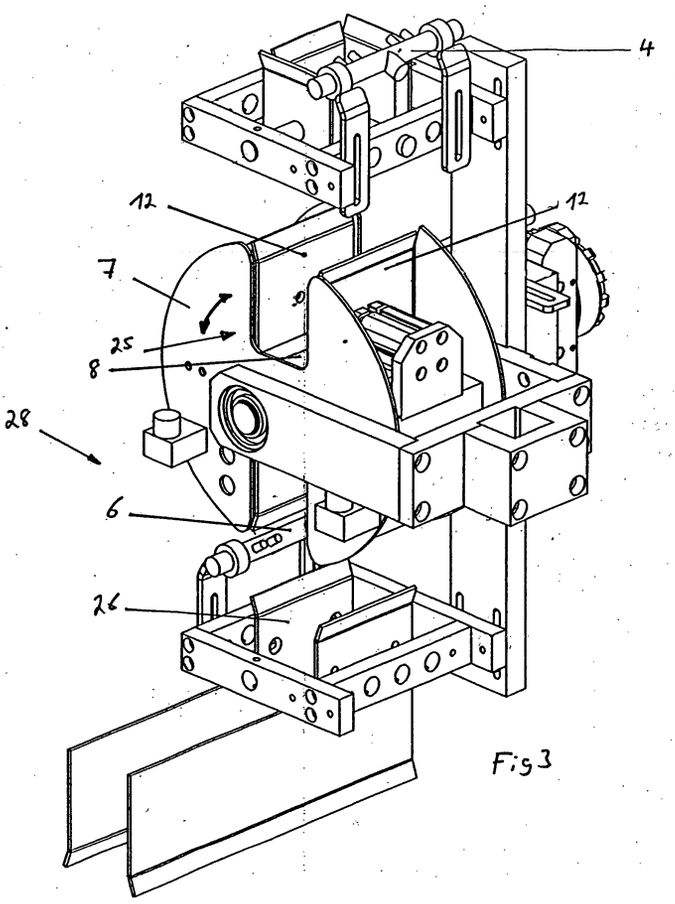

Fig 3

EP 1 547 924 A1

Description

[0001] The present invention relates to an apparatus to bend a first and a second cross seal of the bag made of a flexible packing material towards the sidewall. The present invention further relates to a packaging machine comprising the inventive apparatus and a method for producing a bag made of a flexible packaging material.

[0002] Food stuff, especially sweets and snacks are nowadays merchandised in packaging items made of a plastic material. These packaging items must be manufactured cost-efficiently and must be appealing in order to present the packaged product appropriately. In this respect, it is desireable to produce cuboid-shaped bags with cross seals that are oriented towards the sidewalls.

[0003] It is therefore the problem of the present invention to provide an apparatus to produce bags made of a flexible packaging material with cross seals which are bent towards the sidewall of the bag.

[0004] The problem is solved by an apparatus according to claim 1. Preferred embodiments of the inventive apparatus are claimed in the subclaims 2-4.

[0005] It was totally surprising and could not have been expected by a person skilled in the art that the inventive apparatus allows to produce bags with cross seals bent towards the sidewall of the bag. The inventive apparatus is produced and operated easily and cost-efficiently.

[0006] According to the present invention, the apparatus comprises first and second means to orientate the first and the second cross seal towards the sidewall of the bag. These means can be any means known by a person skilled in the art which bends the cross seal toward the sidewall. Preferably, these bending means are one or more nozzles which blows gas, preferably air against one side of the cross seals in order to bend them to the sidewall. In another preferred embodiment of the present invention, the bending means are mechanical means like a plate.

[0007] Furthermore, the inventive apparatus comprises turning means in order to turn the bag, preferably upside down. Before the bag is turned, it is fixed at the turning means. Consequently, in a preferred embodiment of the present invention, the turning mean comprises fixing means, for example clamping jaws or means to produce a vacuum in order to fix the bag at the turning means. After the bag has been fixed at the turning means, the turning mean rotate preferably by 180 °.

[0008] In a preferred embodiment of the present invention, the turning means comprises a plane, preferably a plate, on which the bag after the lower cross seal has been bend, is dropped. Due to the impetus and due to the weight of the packaged item, the bend cross seals and/or the side folds of the bag are further shaped; i. e. the shape of a cuboid is improved.

[0009] Another subject matter of the present invention is a packaging machine, preferably a vertical type packing machine for producing tubular bags from a foil web which comprises the inventive apparatus to bend the first and the second cross seal.

[0010] It was surprising and could not have been expected for a person skilled in the art that the inventive packaging machine is produced and operated easily and cost-efficiently. The inventive packaging machine allows to produce packaging bags which have almost a cuboid shape.

[0011] Another subject matter of the present invention is a method to produce a bag made of a flexible packaging material and filled with packaging item whereas the bag is turned while it is produced.

[0012] It could not have been expected and was totally surprising for a person skilled in the art that the inventive method is carried out easily. With the inventive method, it is possible to produce packaging bags with almost cuboid shape.

[0013] In a preferred embodiment of the inventive method, two cross seals of the bag are oriented towards the sidewall of the bag.

[0014] Preferably, the shape of the bag is stabilized by the packaging item.

[0015] In another preferred embodiment of the present invention, the cross seals are bent towards the sidewall of the bag by the weight of the packaging item.

[0016] Another subject matter of the present invention is a method to produce a bag made of a flexible material filled with a packaging item and comprising a side wall, whereas the weight of the packaging item is used to support the shaping of at least 2 sides of the side wall.

[0017] The inventions are now described in greater details hereinafter in connections with drawings 1-3 which illustrate exemplary embodiments of the present invention. The illustrations are applicable to the inventive apparatus, the inventive packaging machines and the inventive methods. The drawings show:

Figure 1 a cuboid bag.

Figure 2 a scheme of a vertical form fill packaging machine.

Figure 3 an embodiment of the inventive apparatus.

[0018] **Figure 1** shows a tubular cuboid shape bag which can be filled with a packaging item (not depicted). The bag comprises a sidewall 5 and a top area 22 and a bottom area 23. The bag has four side folds 19, 29, 21, 24 whereby two side folds, e.g. sidefolds 19, 29 and sidefolds 21, 24 are sealed together by cross seals 1, 2, respectively. At the top and at the bottom, the bag comprises welded edges 18 in order to improve the cuboid form. The longitudinal seal 17 extends or is aligned with one of the welded edges 18. It can be seen that the cross seal 2 has already been bent towards the sidewall of the bag, especially towards the sidefolds,

while cross seal 1 is still more or less perpendicular with respect to the sidefolds

[0019] In **Figure 2,** a vertical form fills a seal packaging machine; i. e. a vertical flow rapper is systematically depicted, which allows for example the production of the bag according to Figure 1. A web of a foil 9, especially a sealable plastic film 9, is supplied by rolls (not shown) of film material. The foil 9 web is then shaped by the shaping shoulder 16 to provide a rather tubular form to the material. According to the present invention, "tubular form" of the bags or of the foil means any cross-sectional form including a circular form or another form, and especially a rectangular or generally a polygonal form. The vertical flow wrapper further comprises longitudinal sealing means 27 in order to produce the longitudinal seal 17 of the bag and edge sealing means 30 in order to manufacture edge seals 18. The person skilled in the art understands that the edge seals are optional. After applying the longitudinal seal and optionally the edge seals, the bottom of the bag 2 can be formed by a special bottom forming means 13. The bottom forming means especially comprise means to produce the sidefolds 19, 21, 24 and 29. Finally, cross seals 1, 2, extending perpendicularly (or transversally) to the direction of flow of the foil, are applied, especially by means of cross-seal jaws 14. The cross seal jaws 14 further comprises cutting means which separate the completed bags. Thus the cross seal applied is the bottom seal 2 for one bag and the top seal 1 the next bag.

[0020] **Figure 3** shows the inventive apparatus which is arranged under the cross seal 14 according to Figure 2. The packaging item is positioned above the nozzles 4. The nozzles 4 are directed towards the side of lower cross seal 2 of the packaging item according to Figure 1. Air is ejected through the nozzles 4 for a very short period of time, i. e. some milliseconds in order bend the cross seal 2 towards the sidewall, while the upper cross seal 1 of the bag according to Figure 1 is produced and the bag 3 is cut from the foil web 9. After the bag 3 has been separated from the foil web, it drops into the gap 25 and hits plate 8. Since the lower seal 2 is already bent by the nozzles 4 and due to the impetus and the weight of the packaged items, cross seal 2 is further bent towards the sidewall. Additionally, the side folds 21 and 24 are further allined towards the lower side of the packaging item, so that the cuboid-shape of the bag is improved. Since the cross seal 2 still has an elevated temperature which is caused by the cross seal process, the cross seal 2 is deformed plastically. The bag looks now as shown in figure 1; i.e. cross seal 1 has not yet been bent. After the packaging item 3 has hit plate 8, jaws 12 are moved towards each other to fix the bag 3. After the bag 3 has been fixed, the turntable 7 rotates counterclockwise by 180 ° The person skilled in the art understands that turntable 7 needs not rotate back and forth, but can always rotate in one direction. At the lower end 28, the inventive apparatus further comprises another set of nozzles 6 which can eject air and which are directed against the side of cross seal 1 after the bag has been turned upside down by the turntable 7. The nozzles 6 or any other means to bend the cross seals need not be at the lower end, but can be anywhere in the vicinity of the inventive apparatus. Due to the impact of the air, the upper cross seal 1, which still has an elevated temperature, is also oriented towards the sidewall. The orientation of cross seal 1 can be in the same direction as cross seal 2 or asymmetrical. After the orientation of the cross seal has been taken place, the jaws 12 are moved apart, so that the bag 3 falls into channel 26 and from there on a plate (not depicted) which further forms the cross seal 1 as well as the side folds 19 and 23 in order to improve the cuboid shape of the bag 3. Since the seal 1 is already bent by the nozzles 4 and due to the impetus and the weight of the packaged items, cross seal 1 is further bent towards the sidewall. The a. m. plate can be designed as a jotting table. Finally, the turntable rotates clockwise by 180° and the process starts again.

Reference signs

[0021]

1,2	cross seal
3	bag
4,6	gas ejection nozzles
7	turning mean
8	plate
9	film
10,11	one side of the bag
12	jaws
13	means to produce the side fold
14	cross seal
15	filling tube
16	forming shoulder
17	longitudinal seal
18	corner seal
19, 21	side folds
20	direction of flow
22	top area
23	bottom area
24, 29	side folds
25	gap
26	channel
27	longitudinal sealing means
28	lower end
30	corner sealing means

Claims

1. Apparatus to bend a first and a second cross seal (1, 2) of a bag (3), made of a flexible packaging material, towards the sidewall (5) with:

   - first means (4) to orient the first cross seal (2)

towards the sidewall (5) of the bag,

- turning means (7) to fix and turn the bag and
- second means (6) to orient the second cross seal (1) towards the sidewall (5) of the bag.

2. Apparatus according to claim 1, **characterized in that** turning means (7) comprises a plane (8) on which the bag is dropped before it is fixed.

3. Apparatus according to claim 1 or 2, **characterized in that** the turning means rotate by 180° back and forth.

4. Apparatus according to one of the preceding claims, **characterized in that** the means (4, 6) are gas ejection means or meachanical means, preferably a plate

5. Packaging machine (1), especially vertical-type packaging machine, for producing tubular bags (3) from a foil (9) web, **characterized in that** it comprises an apparatus according to one of the claims 1 - 4.

6. Method to produce a bag (3) made of a flexible packaging material and filled with a packaging item, **characterized in that** it is turned while it is produced.

7. Method according to claim 6, **characterized in that** two cross seals (1, 2) of the bag are oriented towards the sidewall (5) of the bag.

8. Method according to claim 7, **characterized in that** the shape of the bag is stabilized by the packaging item.

9. Method according to claim 7 or 8, **characterized in that** the cross seals (1, 2) are bent towards the sidewall (5) of the bag (3) by the weight of the packaging item.

10. Method to produce a bag (3) made of a flexible packaging material, filled with a packaging item and comprising a sidewall (5), **characterized in that** the weight of the packaging item is used to support the shaping of at least two sides (10, 11) of the sidewall.

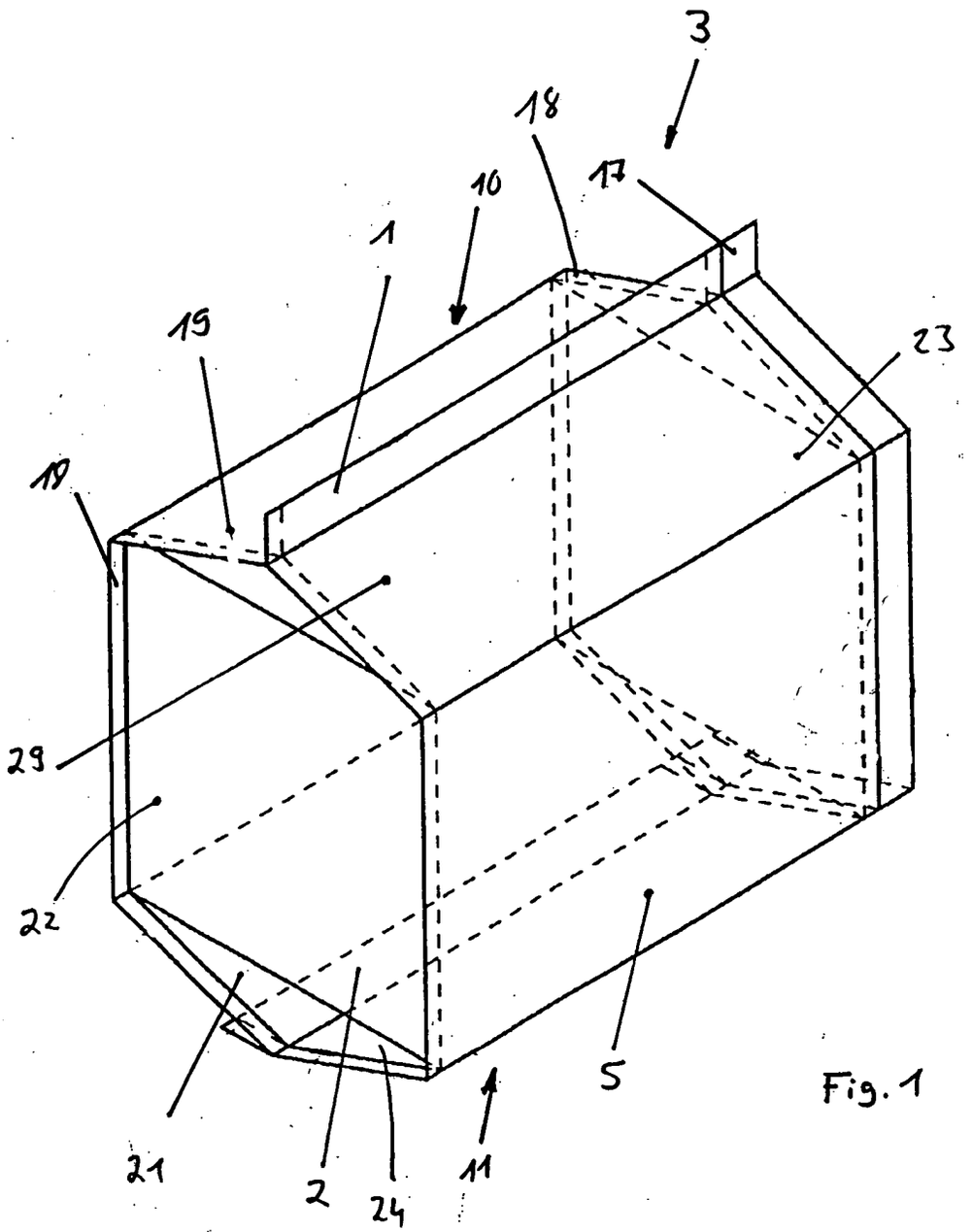

Fig. 1

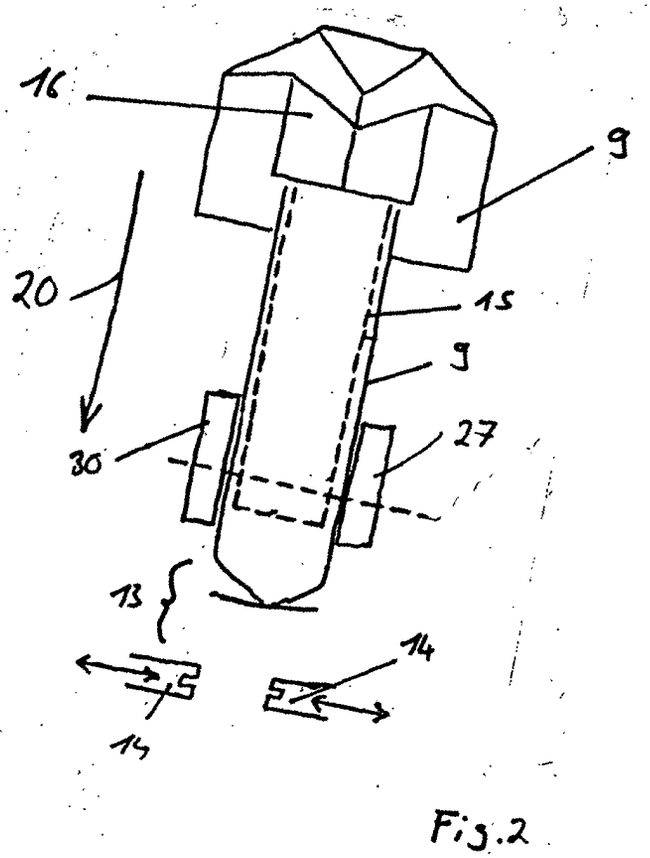

Fig.2

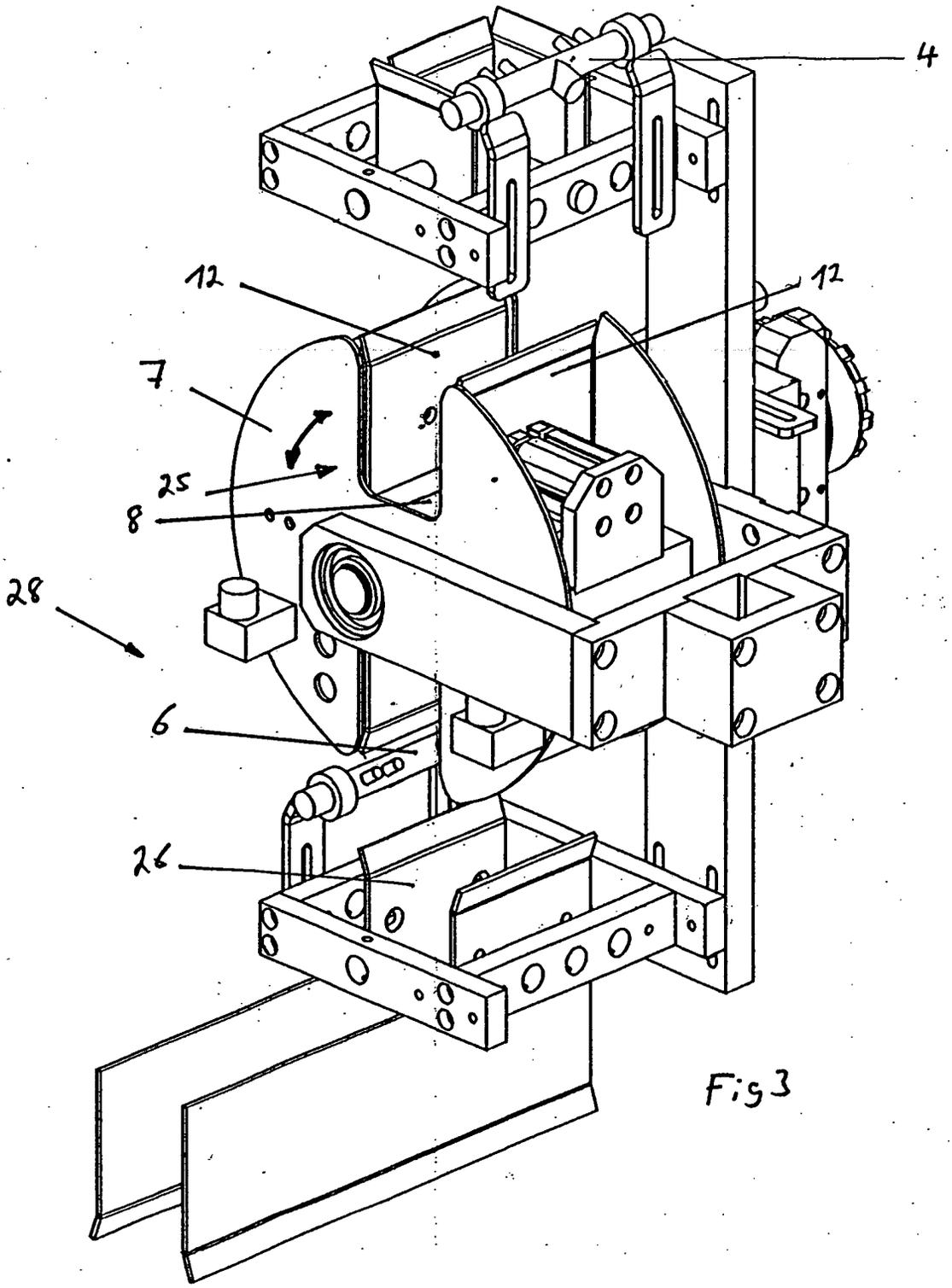

Fig 3

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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 9722

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 September 2004	Johne, O

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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EPO FORM 1503 03.82 (P04C01)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 02 9722

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.7)
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 September 2004	Johne, O

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Application Number
EP 03 02 9722

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 03 02 9722

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1,2,5-7

   dropping bag on a plane before the bag is fixed
   ---

2. claim: 3

   turning means rotate by 180° back and forth
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3. claim: 4

   gas ejection means
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4. claim: 8

   stabilizing shape of bag by packaging item
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5. claims: 9,10

   bending cross seals by the weight of packaging item

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 02 9722

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