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(54) Method and apparatus for opening a packaging bag

(57) An outermost packaging bag (2) of an ordered store (1) of flat-laid bags made of flexible plastic foil is opened by a vacuum being selectively applied during restraint of the bag (2) against the store (1) for suction and lifting free of a local area (12) of the outward wall

(4) of the bag without movement of the opposite inward bag wall.

The area (12) lifted free is restrained by clamping so that at release of its restraint against the bag store, the outward bag side (4) can be moved away from the inward wall.

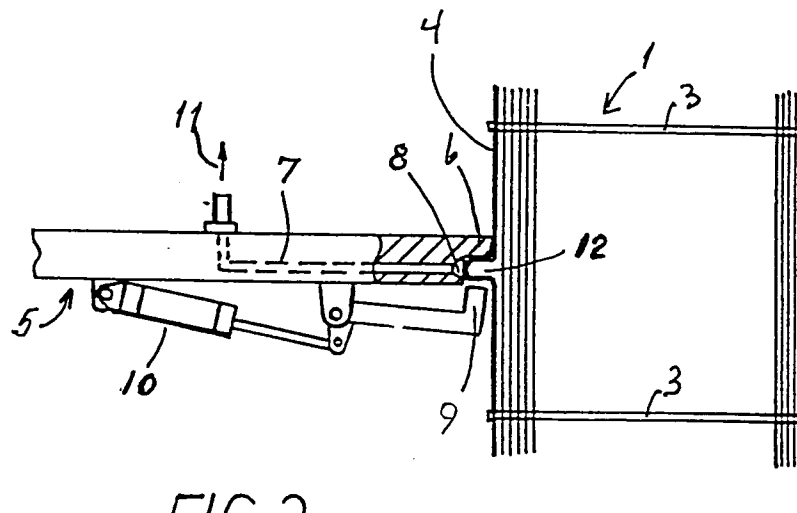


FIG. 2

EP 0 959 006 A1

Description

[0001] The present invention relates to a method for opening an outermost packaging bag of an ordered store of flat-laid bags of the type having bag walls made of flexible plastic foil.

[0002] In connection with packaging of goods in plastic bags it is known to design bags with a side portion extending some distance beyond the edge of the bag at its throat, suspension holes being provided in the extended portion. From a store of such bags suspended from horizontal rods it is possible to grip the front bag along the non-extended edge, which will naturally be slightly everted from the store and thus freely accessible for a gripper.

[0003] For opening of the top bag in a store of such bags arranged horizontally, an apparatus is known from DE-A1-195 10 669, in which the extended throat portion of the lower wall of the top bag facing the store is restrained against the bag store by a jaw-like holder while the upper wall is gripped by a gripper with movable jaws.

[0004] In an envelope opening method described in US-A-5,651,238, the front of an envelope with an open flap extending in the same plane is restrained by a stationary vacuum suction device with a plane suction surface while the back of the envelope is lifted by means of a movable vacuum cup.

[0005] However, when packaging certain goods, such as fruit and vegetables, it is desired to use ordinary bags having a substantially straight edge without any extension of one bag wall beyond the other at the bag throat. In this type of bags a vertically suspended bag store will exhibit no everted edge part of the outward bag wall that can be gripped by a gripper brought into contact with the inner surface of the bag wall.

[0006] Against this background the object of the invention is to provide a method of the type stated above, which permits a secure and simple opening of the outermost bag of a bag store, whether it consists of bags of the design with an extended side portion or bags having no everted extended portion of one bag wall in relation to the other.

[0007] To obtain this object, the method according to the invention is characterized in that a vacuum is selectively applied at at least one local area of the outward wall of the bag near the throat edge for lifting free the said local area without movement of the opposite inward bag wall while the outermost bag is restrained against the store, and that the area lifted free is restrained by clamping so that at subsequent release of its restraint against the bag store the outward bag side can be moved away from the internal wall.

[0008] Through the suction applied in the method according to the invention to a local area of the outward wall of the outermost bag while the bag is restrained against the bag store, the outward wall is securely lifted free of the inward wall so that the area lifted free can be gripped and restrained at the subsequent clamping.

When restraint of the outward bag wall against the bag store is then released, the outward wall can be moved away from the bag store while its inward wall will not accompany it due to the force of adhesion to the subsequent bag in the bag store.

[0009] Thus secure opening is obtained also of bags of the above type where it is not possible to insert a gripper into the bag throat at the back of the outward bag wall.

[0010] In a suitable embodiment of the method, said restraint, lifting free and clamping are performed by means of a reciprocating gripping device movable in relation to the bag store and arranged substantially at right angles to said outward wall, the gripping device having a selectively actuatable vacuum suction device set back from an abutment surface for restraining said outward wall and a selectively actuatable clamping device for clamping the area lifted free by means of the vacuum cup against said abutment surface, whereby the vacuum suction device is actuated in a first end position of the reciprocating movement of the gripping device with the outward bag wall restrained against the bag store, while release of the clamping device takes place in a second end position in which the outward bag wall has been moved away from the bag store while the inward bag wall is restrained against the bag store during the entire movement from the first to the second end position.

[0011] In this connection, actuation of the clamping device and subsequent cessation of the application of the vacuum can suitably be effected during the movement of the gripping device away from the first towards the second end position in an intermediate position in which the bag area lifted free has been moved a distance away from the bag store.

[0012] In an especially preferred embodiment of the method, restraint of the inward bag wall against the bag store as well as restraint of the outward bag wall by means of said abutment surface and clamping device are effected over a narrow elongated surface extending in parallel with the throat edge of the bag over a substantial part of the bag width so that in the second end position the throat of the bag assumes a substantially rectangular shape with stretched throat edges.

[0013] To carry out the method, the invention provides an apparatus comprising means for restraining a store of packaging bags with bag walls made of flexible plastic foil in a flat-laid condition and with aligned throat edges of the bag walls, which apparatus is characterized in that a reciprocating gripping device movable in relation to the bag store and arranged substantially at right angles to the outward side of the bag store comprises an abutment surface for external restraint of the outermost bag against the bag store in a first end position of the gripping device, a selectively actuatable vacuum suction device set back in relation to said abutment surface and adapted for lifting said local area of the external bag wall of the outermost bag free of the opposite bag wall in said

first end position, and a selectively actuatable clamping device arranged in operative cooperation with said abutment surface and vacuum suction device for clamping the lifted local area of the external bag wall against said abutment surface during the movement of the gripping device from the first end position towards a second end position in which the outward wall of the outermost bag has been moved away from the inward wall while the latter is restrained against the bag store.

[0014] Suitable embodiments of this apparatus are stated in claims 6 and 7.

[0015] The invention will now be described in further detail below with reference to the schematic drawing, in which

Figs. 1, 2 and 3 are top views illustrating three consecutive phases of carrying out the method according to the invention, and

Figs. 4 to 6 are schematic top illustrations of a preferred embodiment of a reciprocating gripping device in the apparatus according to the invention.

[0016] In Figs. 1 to 3, a store or stack 1 of flat-laid bags provided with holes (not shown) for the purpose near their upward throats are suspended in a vertical position from rods 3.

[0017] A reciprocating gripping device 5 capable of moving towards and away from the bag store 1 substantially at right angles to the plane of the outermost bag 2 comprises a relatively narrow elongated abutment surface 6 which, in the first end position of the movement of the gripping device 5 shown in Fig. 2, restrains the outward side 4 of the outermost bag 2 against the bag store.

[0018] A selectively actuatable vacuum suction device comprises a suction channel 7 connected to a vacuum source (not shown) via a controlled valve (also not shown) and opening into a wall portion 8 of the gripping device 5 set back in relation to the abutment surface 6.

[0019] The gripping device 5 also comprises a selectively actuatable clamping device comprising, in the schematic design shown, a swingable clamping jaw 9, which can be swung by means of a control mechanism in the form of, for example, a hydraulic actuator 10 from an inactive position shown in Fig. 2 to the active position shown in Fig. 3, in which the jaw is brought into abutment on the wall portion 8 into which the suction channel 7 opens.

[0020] Fig. 1 shows the gripping device 5 during movement towards the first end position shown in Fig. 2, in which the abutment surface 6 has been brought into abutment on the outward wall 4 of the outermost bag 2, and the vacuum suction device with the suction channel 7 is actuated as indicated by an arrow 11, whereby a local area 12 of the outward bag wall 4 immediately below the abutment surface 6 is sucked against the set-back wall portion 8, while the clamping jaw 9 is still in its inactive position.

[0021] By the movement illustrated in Fig. 3 of the reciprocating gripping device 5 in the opposite direction indicated by an arrow 12 towards a second end position (not shown), the clamping jaw 9 is actuated for clamping the sucked local area 12 of the outward bag wall 4 against the wall portion 8, while the vacuum suction device is deactivated.

[0022] As it appears in further detail from the following, to ensure that the opposite inward wall of the outermost bag 2 remains in contact with the bag store as a consequence of the natural force of adhesion to the subsequent bag, the clamping jaw is suitably only actuated when the area 12 of the outward bag wall sucked locally has been moved some distance away from the bag store 1, that is, in an intermediate position of the gripping device during its movement from the first towards the second end position.

[0023] The reciprocating movement of the gripping device 5 can be produced by means of a conventional driving assembly with a suitable control system to control the movement of the individual parts and ensure suitable abutment pressure of the abutment surface 6 on the outermost bag 2 in the first end position.

[0024] By arranging a pressurized air assembly 13 in connection with the throat of the bag 2 lifted free, as shown in Fig. 3, an injection of air into the bag can be provided to support the opening of the bag. This may be of importance, especially in case of bags that are impermeable and have no air holes.

[0025] In the preferred embodiment shown in Figs. 4 to 6, the gripping device 14 is arranged with the abutment surface 15 extending in parallel with the upward throat of the outermost bag 16 and at a short distance therefrom. The abutment surface 15 is made to have such length that it extends over a substantial part of the width of the bag 16 corresponding to the distance between the suspension rods 17 for the bag store 18.

[0026] At the ends of the abutment surface 15, recesses 19 are formed with wall portions 20 which are set back in relation to the contact surface of the abutment surface 15 and into which the suction channel 21 opens. The clamping device comprises two movable clamping jaws 22 which are swingable towards each other in connection with a joint hydraulic actuator 22a, through which the clamping jaws 22 can be moved from the inactive position shown in Fig. 4, in which local areas 23 of the outward wall 24 of the bag 16 are sucked against the wall portions 20, to the active position shown in Fig. 5 for clamping the local areas 23 of the bag wall 24 against the set-back wall portions 20 at the recesses 19.

[0027] As shown in Fig. 6, the result of this design of the gripping device is that the throat of the outermost bag 16 with the outward bag wall 24 lifted free assumes a substantially rectangular shape with two parallel sides formed by the part of the bag wall 24 restrained by the clamping jaws 22 and the opposite part of the inward bag wall 25 located between the suspension rods 17

and still restrained against the bag store 18, and two parallel sides 26 and 27 extending substantially at right angles to the bag store so that, as explained below, they are easily accessible for gripping by a bag feeder in a bag feeding system.

[0028] The bag 16 is now ready for filling with the products to be packaged. The filling can be effected by means of conventional filling equipment in direct connection with the apparatus according to the invention, i. e., without moving the bag from the position shown in Fig. 6, or it may be effected in a packaging machine with several work stations comprising a filling station separated from the apparatus according to the invention, to which the bag is moved from the position shown in Fig. 6 by means of a movable bag feeder.

Claims

1. A method for opening an outermost packaging bag (2, 16) of an ordered store (1, 18) of flat-laid bags of the type having bag walls made of flexible plastic foil, **characterized** in that a vacuum is selectively applied at at least one local area (12, 23) of the outward wall (4, 24) of the bag (2, 16) near the throat edge for lifting free the said local area (12, 23) without movement of the opposite inward bag wall while the outermost bag (2, 16) is restrained against the store (1, 18), and that the area (12, 23) lifted free is restrained by clamping so that at subsequent release of its restraint against the bag store (1, 18) the outward bag side (4, 24) can be moved away from the internal wall.
2. A method according to claim 1, **characterized** in that said restraint, lifting free and clamping are performed by means of a reciprocating gripping device (5, 14) movable in relation to the bag store (1, 18) and arranged substantially at right angles to said outward wall, the gripping device having a selectively actuatable vacuum suction device (7, 21) set back from an abutment surface (6, 15) for restraining said outward wall (4, 24) and a selectively actuatable clamping device (9, 22) for clamping the area (12, 23) lifted free by means of the vacuum suction device against said abutment surface (6, 15), whereby the vacuum suction device is actuated in a first end position of the reciprocating movement of the gripping device (5, 14) with the outward bag wall (4, 24) restrained against the bag store, while release of the clamping device (9, 22) takes place in a second end position in which the outward bag wall (4, 24) has been moved away from the bag store (1, 18) while the inward bag wall is restrained against the bag store during the entire movement from the first to the second end position.
3. A method according to claim 2, **characterized** in that actuation of the clamping device (9, 22) and subsequent cessation of the application of the vacuum are effected during the movement of the gripping device (5, 14) away from the first towards the second end position in an intermediate position in which the bag area (12, 23) lifted free has been moved a distance away from the bag store (1, 18).
4. A method according to claim 2 or 3, **characterized** in that restraint of the inward bag wall against the bag store as well as restraint of the outward bag wall by means of said abutment surface (6, 15) and clamping device (9, 22) are effected over a narrow elongated surface extending in parallel with the throat edge of the bag (2, 16) over a substantial part of the bag width so that in the second end position the throat of the bag assumes a substantially rectangular shape with stretched throat edges.
5. An apparatus for carrying out the method according to any one of claims 1 to 4, comprising means (3, 17) for restraining a store (1, 18) of packaging bags with bag walls made of flexible plastic foil in a flat-laid condition and with aligned throat edges of the bag walls, **characterized** in that a reciprocating gripping device (5, 14) movable in relation to the bag store and arranged substantially at right angles to the outward side of the bag store (1, 18) comprises an abutment surface (6, 15) for external restraint of the outermost bag (2, 16) against the bag store (1, 18) in a first end position of the gripping device (5, 14), a selectively actuatable vacuum suction device (7, 21) set back in relation to said abutment surface and adapted for lifting said local area (12, 23) of the outward bag wall (4, 24) of the outermost bag (2, 16) free of the opposite bag wall in said first end position, and a selectively actuatable clamping device (9, 22) arranged in operative cooperation with said abutment surface (6, 15) and vacuum suction device (7, 21) for clamping the lifted local area (12, 23) of the external bag wall (4, 24) against said abutment surface (6, 15) during the movement of the gripping device (5, 14) from the first end position towards a second end position, in which the outward wall (4, 24) of the outermost bag (2, 16) has been moved away from the inward wall while the latter is restrained against the bag store (1, 18).
6. An apparatus according to claim 5, **characterized** in that the abutment surface (6, 15) of the gripping device (5, 14) comprises a relatively narrow elongated surface of abutment, while the vacuum suction device comprises at least one vacuum channel (7, 21) opening out in a wall portion (8, 20) set back from the abutment surface and extending substantially in parallel therewith, and the clamping device comprises a clamping jaw (9, 22) swingable in relation to the abutment surface and said wall portion

(8, 20), which jaw is brought, by actuation of the clamping device, from an inactive position to a clamping position in which the outward bag wall (4, 24) is clamped against said wall portion (8, 20).

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7. An apparatus according to claim 6, **characterized** in that the abutment surface of the gripping device (14) extends in parallel with the throat edges of the outermost bag at a short distance therefrom and over a substantial part of the bag width, and that means (17) for restraining the bag store are designed for point-wise restraint of the outermost bag (16) at points substantially in alignment with the ends of the abutment surface, the vacuum suction device comprising two vacuum channels (21) opening out in respective wall portions (20) at the ends of the abutment surface and the two clamping jaws (22) of the clamping device, said jaws being swingable in a plane parallel with the longitudinal direction of the abutment surface.

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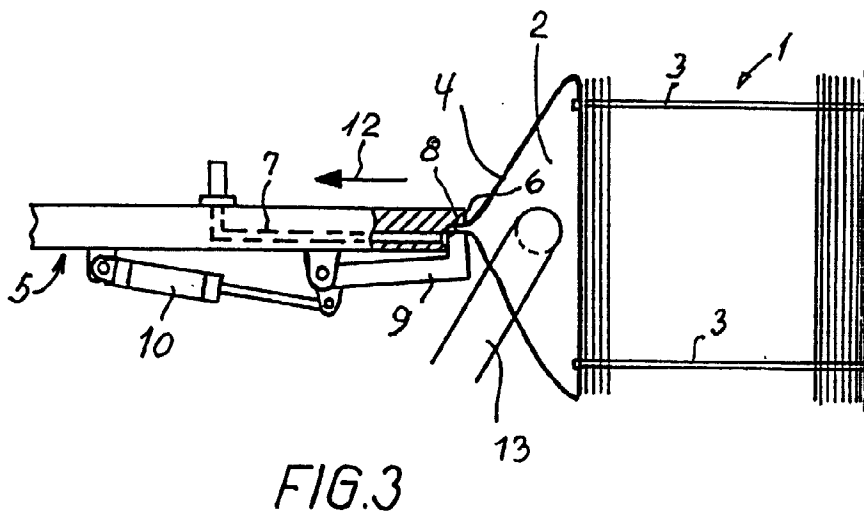
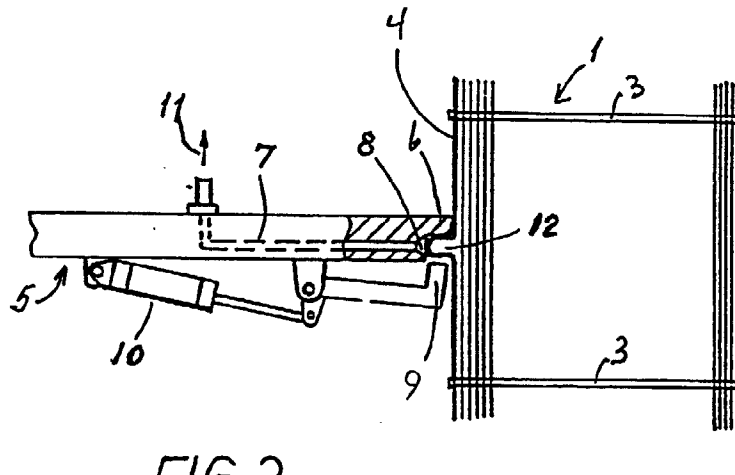
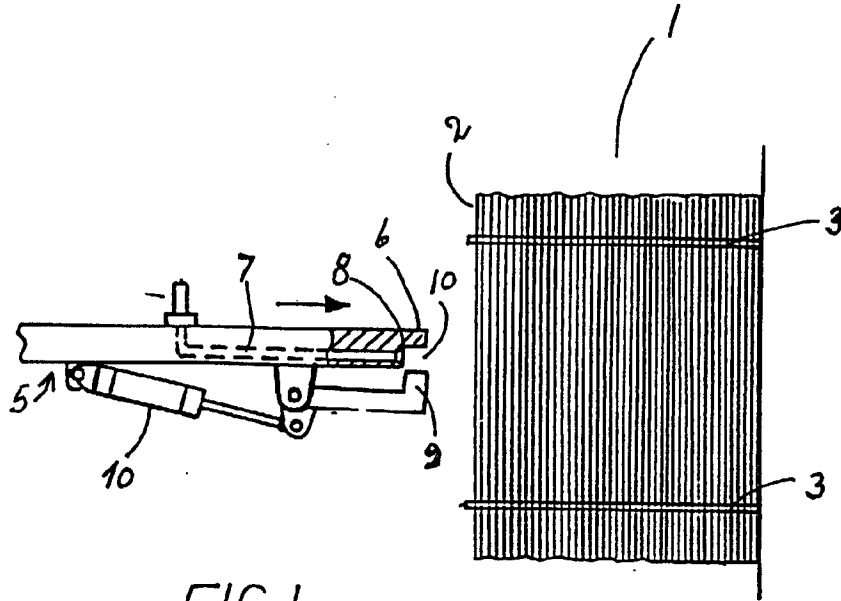
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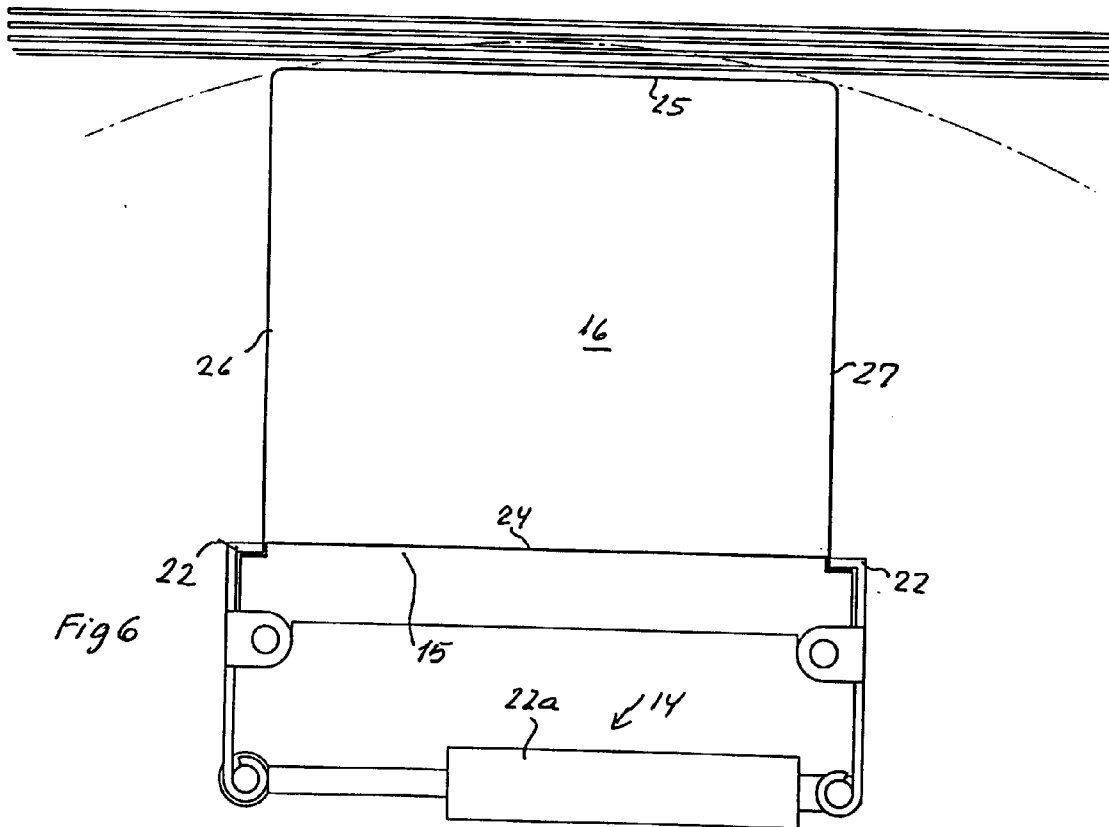
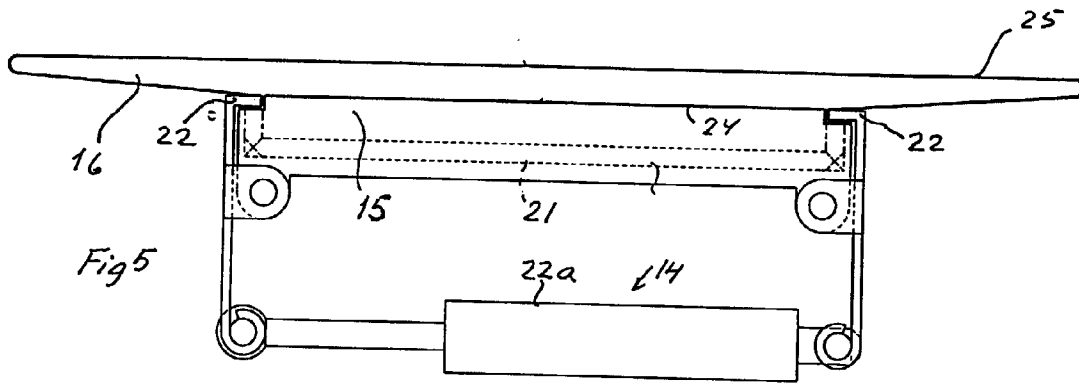
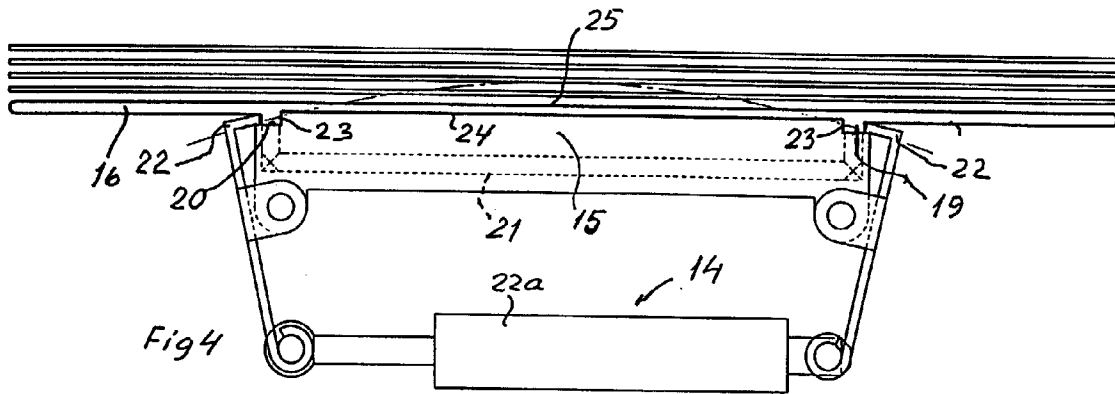
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EUROPEAN SEARCH REPORT

Application Number
EP 99 61 0032

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)
A	US 2 814 488 A (KIPERS) 26 November 1957 (1957-11-26) * column 2, line 71 - column 3, line 57; figures 1-4 *	1,2,5	B65B43/28 B65B43/16
A	EP 0 002 075 A (MOBA) 30 May 1979 (1979-05-30) * abstract; figures 1-6 *	1,5	
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 August 1999	Examiner Claeys, H
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EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 61 0032

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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