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(54) **Vertical flow wrapper to produce for example doypack-style bags**

(57) The present invention relates to a process for the production of a doypack-style bag that comprises a gusset at its bottom with tips on which the bag can take a stable stand up position, which is carried out on a vertical flow-wrapper. The present invention also relates to a vertical flow wrapper.

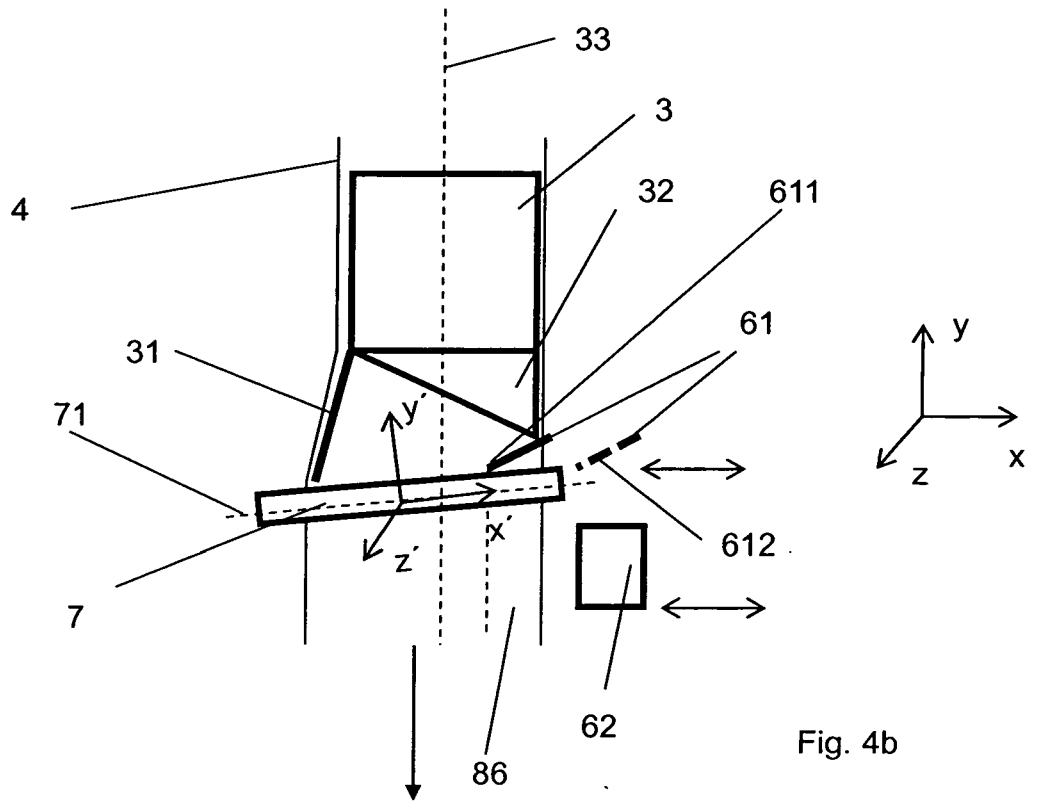

Fig. 4b

EP 2 508 435 A1

Description

[0001] The present invention relates to a vertical flow wrapper, for the production of a bag, preferably a doypack-style bag, that comprises a gusset at its bottom, with a forming shoulder to form a film tube from a planar film, a filling tube to fill packaging items into the film tube, longitudinal sealing means to apply a longitudinal seal to the film tube, cross sealing/cutting-means to apply cross seals to the film tube and to cut the filled bag from the film tube.

[0002] Such packaging machines are, for example, known from EP 1 894 845, WO 97/15497, DE 102 51 069, WO 00/73052 and EP 0 792 801 A1. The doypack-style bags, produced by these machines, have a limited filling volume, because the volume around the gusset is not or not sufficiently filled with the packaging item. Thus, very much film is needed for these doypack-style bags.

[0003] It was therefore the objective of the present invention to provide a vertical flow wrapper that does not have the disadvantages of the machines known from the state of the art.

[0004] The problem is attained by a vertical flow wrapper, for the production of a bag, that comprises a gusset at its bottom, with a forming shoulder to form a film tube from a planar film, a filling tube to fill a packaging item into the film tube, longitudinal sealing means to apply a longitudinal seal to the film tube, cross sealing/cutting-means to apply cross seals to the film tube and to cut the filled bag from the film tube, whereas, the center axis of the filling tube and the center axis of the cross sealing/cutting-means are not arranged perpendicularly.

[0005] The present invention relates to a vertical flow wrapper. Such a machine is known to a person skilled and for example described in EP 1 894 845, WO 97/15497, DE 102 51 069, WO 00/73052 and EP 0 792 801 A1. These documents are herewith included by reference and are therefore part of the disclosure of the present invention. Due to the non perpendicular alignment of the filling tube and the cross sealing/cutting-means, the film tube can move slightly upwards while the gusset is formed and/or while the cross-seal is applied, at the location of the film where the gusset is formed, without a misalignment between the printing image on the film and the cross-seal. The cross seal is nevertheless parallel to the printing image on the film tube. This allows the production of bags with larger gussets, which can be filled with the packaging item.

[0006] The cross section of the tube is preferably rectangular, a triangle or a hexagon.

[0007] This non-perpendicular arrangement of the filling tube relative to the cross sealing/cutting-means can be achieved by tilting the filling tube and/or preferably only the outlet of the filling tube, relative to a vertical plane, while maintaining the cross sealing/cutting-means horizontally or by maintaining the filling tube in a vertical direction and tilting the cross sealing/cutting-means relative to a horizontal plane. Preferably the filling tube is tilted relative to a vertical plane around the axis along which the two cross sealing/cutting-means are arranged, in the present case the z-axis. The corresponding coordinate system is depicted in figure 4b. In another preferred embodiment, the centre axis of the cross sealing/cutting-means is tilted relative to a horizontal plane around the axis, along which the two cross sealing/cutting-means are arranged, here the z-axis according the coordinate system as depicted in figure 4b. The degree by which the cross sealing/cutting-means and/or the filling tube and/or the outlet of the filling tube is tilted relative to each other depends on the length of film that moves upwards during the formation of the gusset. Preferably, the angle between the cross sealing/cutting-means and the filling tube is adjustable.

[0008] Preferably, the vertical flow wrapper comprises at the lower end of the forming tube a stretcher to form the top of the bag. This stretcher is preferably a bent wire or a bent metal-strip or a forming shoulder, which flattens the bag at its top, preferably without deforming it elastically or plastically. The stretcher is preferably a separate part fixed to the lower part of the filling tube or part of the filling tube.

[0009] In a preferred embodiment, the vertical flow wrapper comprises at the lower end of the forming tube an outlet whose axial extension in the y-direction, i.e in the direction of the motion of the film tube, changes with its circumference. Preferably, the extension of the outlet in the y-direction; i.e. the direction of motion of the film tube, is largest where the gusset is formed. The outlet is preferably a separate part fixed to the lower part of the filling tube or part of the filling tube.

[0010] However, preferably, the extension of the stretcher in thy y-direction; i.e. the direction of motion of the film tube, is larger than the extension of the outlet in the y-direction at any location of its circumference. The stretcher and the outlet are preferably arranged at opposite sides of the filling tube.

[0011] In order to form the gusset, the vertical flow wrapper preferably comprises a first forming plate. This forming plate is preferably movable, more preferably horizontally, toward the filling tube and away from the filling tube, whereas the movement towards the filling tube forms the gusset. In a discontinuous operation, i.e. intermittent advancement of the forming tube, the gusset is preferably formed by moving the forming plate towards the film tube while the film stands still and the first forming plate is retrieved away from the filling tube preferably before or while the film advances. In a continuous operation, i.e. during continuous movement of the film tube, the forming plate is additionally moveable up- and downwards and forms the gusset, while it moves downwards. In this case, the forming plate is preferably connected to the cross sealing/cutting-means, which also move up- and downwards during continuous movement of the film tube. The first forming plate is preferably located upstream from the cross sealing/cutting-means and downstream from the filling tube, preferably downstream from

the outlet of the filling tube. In a preferred embodiment of the present invention, the horizontal extension of the first forming plate, perpendicular to its direction of motion is at least 30%, preferably at least 45%, even more preferably at least 60% and most preferably more than 65% of the width of the bag at the bottom. Most preferably the width of the forming plate is equal or essentially equal to the width of the gusset.

[0012] Preferably, the first forming plate has forming edge that interacts with the film during forming of the gusset. Preferably, this forming edge is tapered. Preferably, the front edge is sloped from its center in two opposite directions.

[0013] Preferably, the first forming plate comprises a forming plane, which is located behind the forming edge. More preferably, this forming plane inclines from the forming edge upwards. Preferably, the forming plane interacts at least temporarily with the outlet of the filling tube.

[0014] In case, that the cross sealing/cutting-means are tilted relative to the filling tube, the cross sealing/cutting-means have their highest point in the vicinity of the first forming plate and from there slope downwards.

[0015] Preferably, the vertical flow wrapper comprises a second forming plate, which is preferably plane and arranged parallel to the motion of the film tube. This second forming plate is preferably located below the cross sealing/cutting-means. The second forming plate is preferably movable, more preferably horizontally, toward the filling tube and away from the filling tube, whereas the movement towards the filling tube supports the gusset against deformation by the packaging item, preferably while the film stands still, whereas the first forming plate is retrieved preferably before or while the film advances.

[0016] The movement of the first- and/or is the second forming plate is simultaneous and/or sequential with the movement of the cross sealing/cutting-means. Preferably, the cross sealing/cutting-means support the forming of the gusset. Preferably the filling of the packaging item takes place after the cross-sealing jaws are closed to apply the cross seal to the film tube.

[0017] The inventions are now explained according to figures 1 to 7. The explanations are only exemplarily and do not limit the scope of the present invention. The figures and their description apply to all inventions, respectively.

Figure 1 and 2 show an embodiment of the doypack-style bag.

Figure 3 shows an embodiment of the inventive vertical flow wrapper.

Figure 4a shows the stretcher and the first forming plate.

Figure 4b show the forming of the gusset into the doypack-style bag.

Figures 5a and 5b show the forming of the gusset into the doypack-style bag.

Figure 6 shows yet another embodiment of the outlet of the filling tube.

Figure 7 shows a preferred embodiment of the cross section of the filling tube.

[0018] **Figures 1 and 2** show an embodiment of the bag, here a doypack-style bag, which can be produced on the inventive vertical flow wrapper. This doypack-style bag has at its right and at its left hand side a cross seal 81, respectively. At the bottom 87, the doypack-style bag comprises a gusset 86. In the present case, the bag 8 stand on a fold 82 and the longitudinal seal 83. At its top 88, the bag also comprises a fold 82. The folds 82 are preferably inserted into the planar film, before it is formed into a tube.The angle α between the two wings of the gusset 86 is preferably relatively large, so that the volume in the vicinity of the gusset can also be filled with the packaging item, which is not possible in case the gusset is rather flat as shown in EP 1 894 845 A1. Preferably this angel α is larger than 45°, prefab larger than 60° and more preferably 70 - 120°. The doypack-style bag has the advantage that it can take in a stable stand-up position on top of the tips of the gusset 86. This stand-up position is depicted in **figure 2,** in which a three-dimensional filled doypack-style bag is shown.

[0019] **Figure 3** shows a schematic of the inventive vertical flow wrapper 1. This flow wrapper can be operated with a continuously advancing film or a intermittently advancing film, whereas in the following, the intermittent operation is described. A plane film (not depicted) is formed via a symmetrical or non symmetrical forming shoulder 2 into a film tube 4 around a filling tube 3. A longitudinal seal 84 is applied to the film tube by longitudinal sealing means 9. The film tube is transported vertically and intermittently or continuously by conveyors 5. Below the filling tube 3, the inventive vertical flow wrapper comprises forming means 6, which form the gusset 86 into the film tube 4. Furthermore, the inventive vertical flow wrapper comprises cross sealing/cutting-means 7, which are here located on the same sides of the filling tube 3 as the conveyors 5, in order to apply cross seals 81 to the film tube 4. The cross sealing/cutting-means 7 also comprise cutting means in order to cut the ready made bag, here a doypack-style bags 8, from the film tube 4. Prior to entirely closing the bag with a second upper cross seal 81, the packaging items (not depicted) are filled into the film tube 4 via the filling tube 3. This filling of the packaging item takes place after the gusset 86 is formed into the film tube 4 and the cross sealing/cutting-means 7 are closed to apply the lower cross seal 81.

[0020] The sequence of the production of a bag is as follows:

After and/or while the forming means 6 has formed/forms

the gusset into the film tube 4, a first lower cross seal 81, is applied to the film tube 4 by the cross sealing/cutting-means 7. Subsequently, the packaging item is filled into the film tube 4 via the filling tube 3. Afterwards, the film tube is moved downwards by a distance which is equal to the width of the doypack-style bag. Subsequently, the next gusset is formed into the film tube and then, another cross seal 81 is applied to the film tube. The ready made doypack-style bag 8 is cut from the film tube by the cutting means which are part of the cross sealing/cutting-means 7.

[0021] **Figures 4a and 4b** shows details of means 6 to form the gusset von. This means comprises, here on the left hand side, a stretcher 31 which is locate below the filling tube and which flattens the top of the film tube 4 as it is moved downwards as depicted by the vertical arrow in figure 4b. Opposite from the stretcher 31 also at the bottom of the filling tube, an outlet 32 is located, whose length in y-direction varies around its circumference, whereas the longest extension of the outlet is preferably in the vicinity of the first forming plate 61, which forms the gusset 86 into the film tube. The outlet is preferably a separate part fixed to the lower end of the filling tube. The first forming plate 61 moves, as depicted by the horizontal double arrows in figures 4a and 4b, preferably horizontally, towards the film tube 4 to form the gusset 86 and away from the film tube 4 before and/or during the advancement of the film tube 4. The formation of the gusset 86 preferably takes place during stand-still of the film tube 4 and below the front end of the outlet 32. Then, as can be seen, particularly from figure 4b, the forming plate 61 moves towards the film tube and forms with its front end 611 the gusset 86 into the film tube 4. During the formation of the gusset, the forming plane 612 preferably cooperates a least temporarily with the lower edge of the outlet 32, as depicted. The first forming plate is preferably located above the cross sealing/cutting-means 7. The vertical flow wrapper may comprise a second forming plate 62, which is located below the cross sealing/cutting-means 7. The second forming plate, which is optionally part of the inventive flow wrapper, also moves back and forth, as already described above. Preferably the two forming plates 61, 62 move simultaneously. The forming plate 62 below the cross sealing/cutting-means 7 supports the forming of the gusset 86, but is not mandatory. From figure 4b it can be clearly seen, that the cross sealing/cutting-means 7 are arranged along the z-axis of the coordinate system and that they are tilted around this z-axis. The highest point of the cross sealing/cutting-means 7 is in the vicinity of the forming plate 61 and from there, both cross sealing/cutting-means 7 slope downwards.

[0022] As can be seen from figure 4a, the width of the first forming plate perpendicular to its direction of motion is rather larger, which results in a large and wide gusset. Since such a wide gusset requires material, the film tube 4 below the outlet 32 is moved slightly upwards, but only on the side, where the first forming plate 61 interacts with the film tube 4. Thus, prints on the film tube are not perpendicular to the filling tube anymore, but tilted. In order to avoid, that the cross seals on the film tube are not parallel to the prints on the film tube 4, here the cross sealing/cutting-means 7 are tilted around the z-axis as shown by the coordinate system x', y', z', while the filling tube 3 and thus the film tube 4 are maintained vertically as shown by the coordinate system x, y, z. The longitudinal axis 71 of the cross sealing/cutting-means is not perpendicular to the middle axis 33 of the filling tube 3 and not parallel to the x-axis of the coordinate system. The angle between the axis 71 and the axis 33 depends on the degree of upward movement of the film during the formation of the gusset 86. This angle is preferably adjustable, more preferably automatically. The person skilled in the art understands that it is also possible to tilt the filling tube 3, and/or its outlet 32 around the z- axis and to maintain the cross sealing/cutting-means 7 in a horizontal position. However, tilting of the cross sealing jaws, cutting means 7 is preferred.

[0023] Figures 5a and 5b also depict the formation of the bag according to figures 1 and 2 from a rectangular film-tube. A stretcher 31, here a forming shoulder, flattens the bag at one end 88 and on the opposite side 87, a spreader 61 forms the gusset 86 into the film tube. While and/or after the gusset 86 is formed, the cross sealing/cutting-means 7 move together, as depicted by the arrow, to apply the cross seal 81 to the film tube 4 and separate the bag 8 from the film tube 4. The cross sealing/cutting-means may support the formation of the gusset 86. The width w2 of the forming plate is preferably has at least the width of the gusset w1. In the present case, the width w2 of the forming plate is slightly smaller than the width of the gusset, so that the forming plate can be inserted between the fold 82 and the longitudinal seal 82 (please compare figure 1). The angle β of the forming edge is preferably between 70 - 120°, preferably 80 - 100° and more preferably 85 -95°. In the present case, β is 90°. The forming plate is preferably symmetrical relative to one of its center axis.

[0024] Figure 6 shows a preferred embodiment of the stretcher 31 and the outlet 32. In the present case both parts 31, 32 are attached to the lower end of the filling tube. However one or both parts and the filling tube can be made from one piece. In the present case, the lower edge of the outlet is at least partially curved. This is preferably also true for the stretcher. During intermittent operation, the forming plate moves towards the film tube until it is only a small distance a away from the lower edge of the outlet 32. During continuous operation, the distance a is maintained, by moving the forming plate forward and downward.

[0025] Figure 7 shows a preferred cross section of the filling tube 3. In the present case, the cross section is hexagonal.

[0026] **Reference signs:**

1 vertical flow wrapper

2	forming shoulder
3	filling tube
31	stretcher, forming shoulder
32	outlet of the filling tube
33	centre axis, longitudinal axis
4	film tube
5	conveyor, transportation means
6	forming means to form the gusset
61	first forming plate
611	forming edge
612	forming plane
62	second forming plate
7	cross sealing jaws, cutting means, cross sealing/cutting-means
71	centre axis of the cross seal jaw perpendicular to its direction of motion
8	bag, doypack-style bag
81	cross seal
82	fold
83	longitudinal seal
86	gusset
87	bottom of the doypack-style bag
88	top of the doypack-style bag
9	longitudinal sealing means
α	angel of the gusset
β	angel of the forming edge
w1	width of the gusset at the bottom of the bag
w2	width of the forming plate
x, y, z	coordinate-system
x', y', z'	tilted coordinate-system

Claims

1. Vertical flow wrapper (1), for the production of a bag (8), that comprises a gusset (86) at its bottom (87), with a forming shoulder (2) to form a film tube (4) from a planar film, a filling tube (3) to fill packaging items into the film tube, longitudinal sealing means (9) to apply a longitudinal seal to the film tube, cross sealing/cutting-means (7) to apply cross seals (81) to the film tube (4) and to cut the filled bag (8) from the film tube (3), **characterized in**, the center axis (33) of the filling tube (3) and the center axis (71) of the cross sealing/cutting-means (7) are not arranged perpendicularly.

2. Vertical flow wrapper (1) according to claim 1or the preamble of claim 1, **characterized in, that** the filling tube and/or its outlet (32) is tilted relative to a vertical plane around an axis (z) along which the two cross sealing/cutting-means are arranged.

3. Vertical flow wrapper (1) according to claims 1 or 2 or the preamble of claim 1, **characterized in, that** the centre axis (71) of the cross sealing/cutting-means (7) is tilted relative to a horizontal plane around an axis (z) along which the two cross sealing/cutting-means are arranged.

4. Vertical flow wrapper according to one of the preceding claims, **characterized in, that** it comprises at the lower end of the forming tube (3) a stretcher (31) to form the top (88) of the bag (8).

5. Vertical flow wrapper according to one of the preceding claims, **characterized in, that** it comprises at the lower end of the forming tube (3), an outlet (32) whose axial extension in the y-direction changes with its circumference.

6. Vertical flow wrapper according one of claims 4 or 5, **characterized in, that** it the extension of the stretcher (31) in thy y-direction is larger than the extension of the outlet in the y-direction.

7. Vertical flow wrapper according to one of the preceding claims, **characterized in, that** it comprises a first forming plate (61), whose horizontal extension (w2) perpendicular to its direction of motion is at least 30%, preferably at least 45%, even more preferably at least 60% and most preferably more than 65% and most preferably more than 95% of the width (w1) of the bag (8) at the bottom (87).

8. Vertical flow wrapper according to claim 7, **characterized in, that** the forming edge (611) of the first forming plate (61) is tapered.

9. Vertical flow wrapper according to claim 7 or 8, **char-**

acterized in, that the forming plane (612) of the first forming plate is slopped relative to its direction of motion.

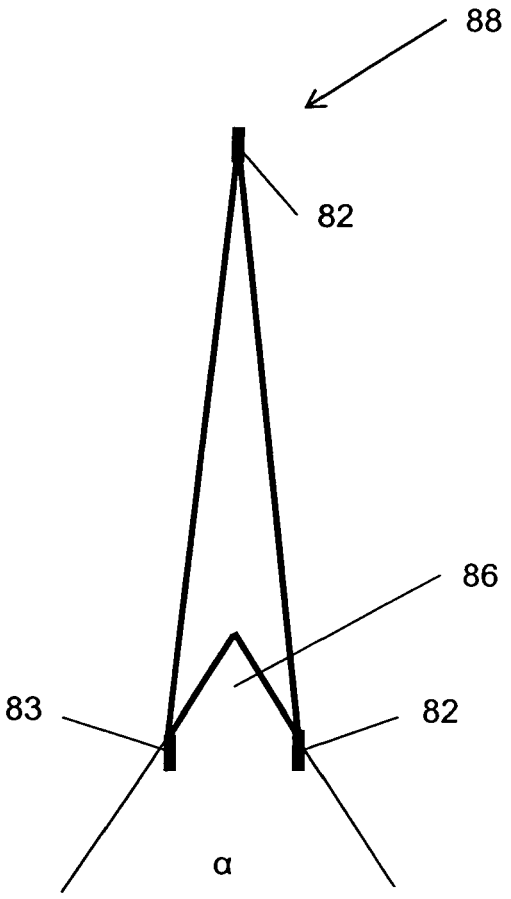

Fig. 1

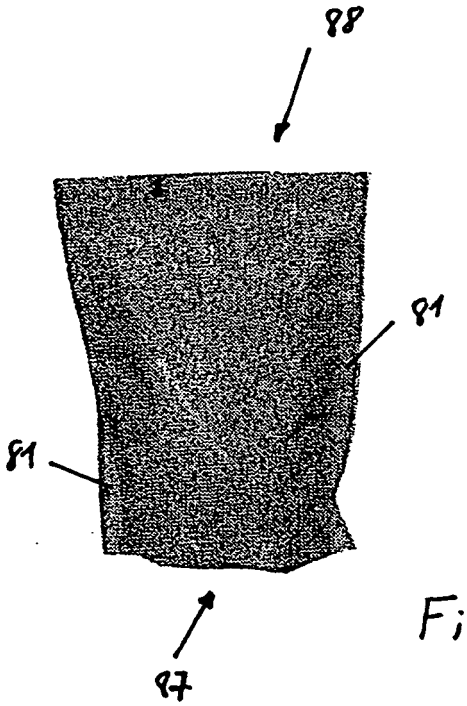

Fig. 2

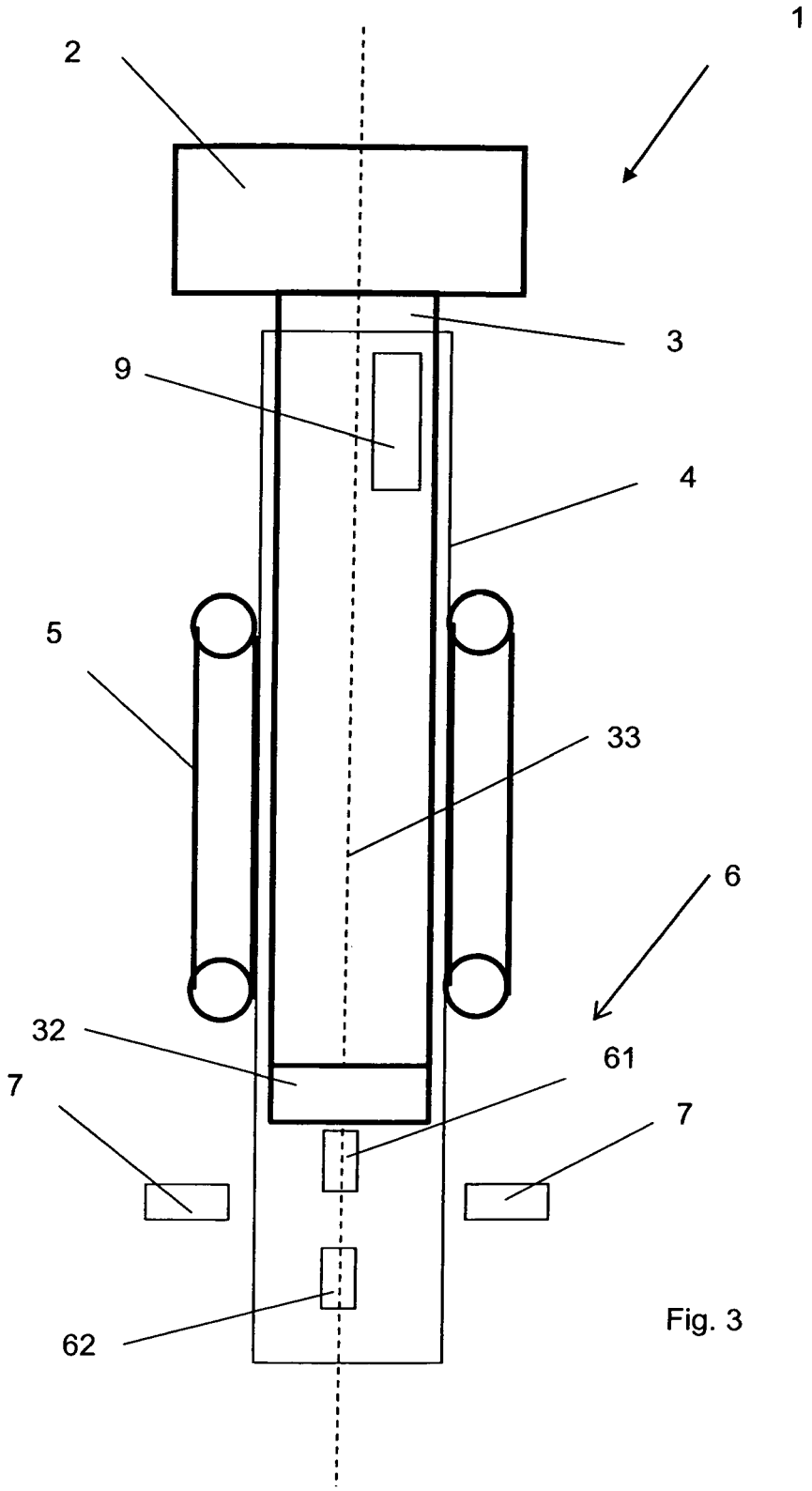

Fig. 3

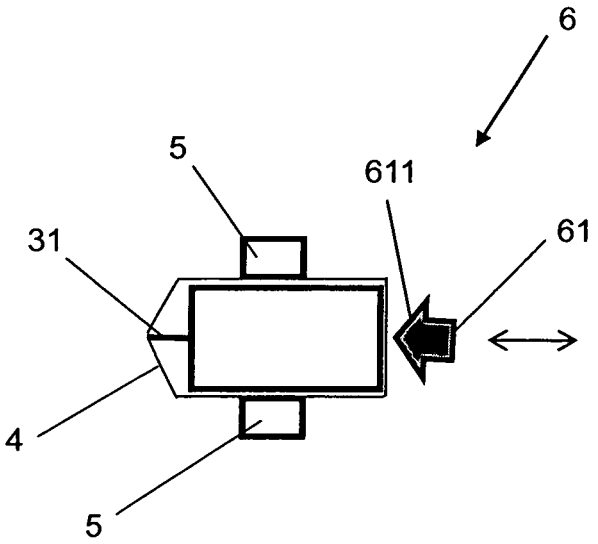

Fig. 4a

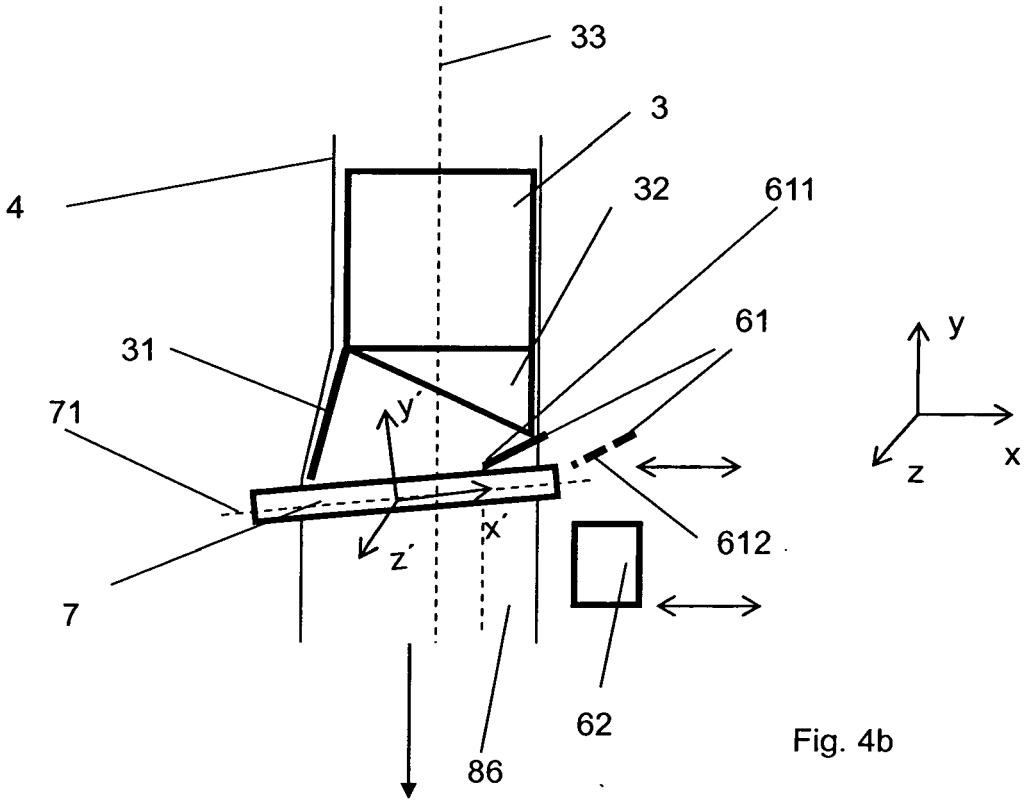

Fig. 4b

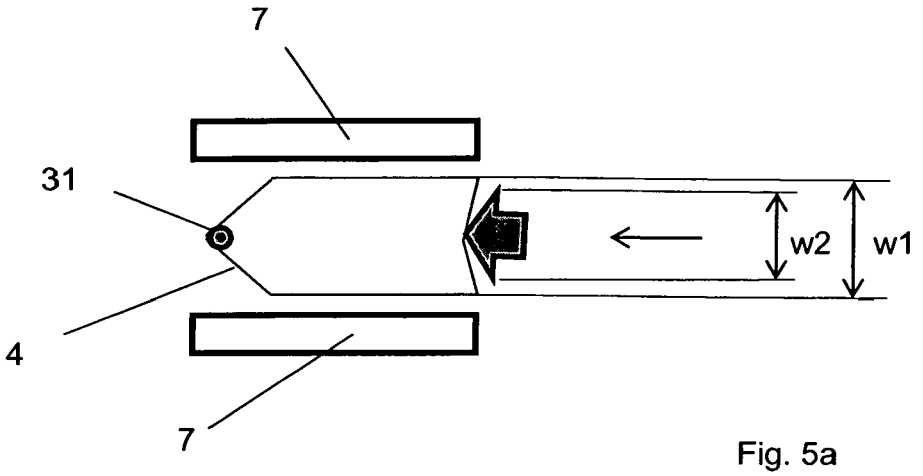

Fig. 5a

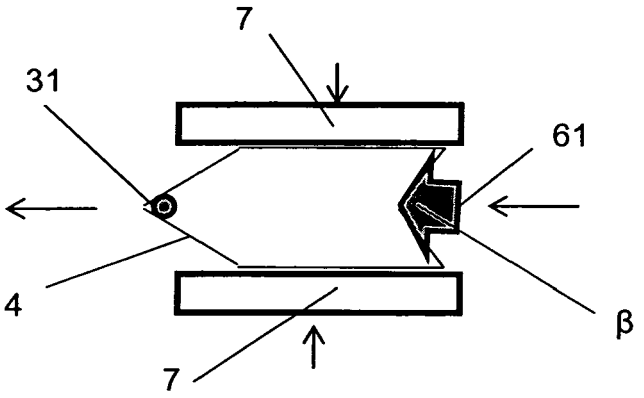

Fig. 5b

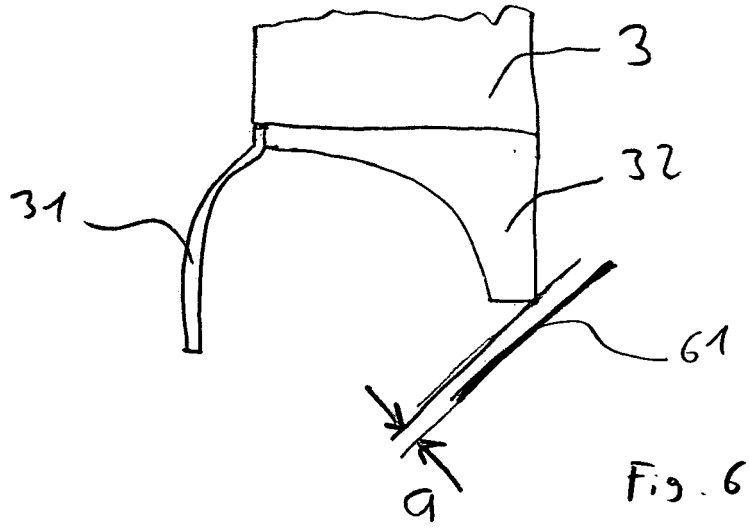

Fig. 6

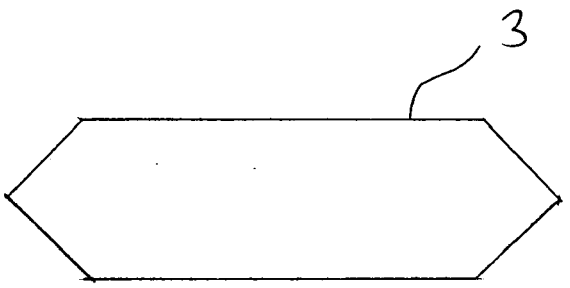

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 11 00 2854

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TECHNICAL FIELDS SEARCHED (IPC)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 September 2011	Lawder, M

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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