

(19)



(11)

EP 2 497 716 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

12.09.2012 Bulletin 2012/37

(51) Int Cl.:

B65B 9/22 (2006.01)

B65B 41/12 (2006.01)

B65B 57/02 (2006.01)

B65B 59/00 (2006.01)

(21) Application number: **11002037.7**

(22) Date of filing: **11.03.2011**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA ME

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(54) Vertical flow wrapper with film feed means

(57) The present invention relates to a vertical flow-wrapper comprising:

- a film-feed (4), which feeds the film from a reel to a forming-unit (13),
- a forming-tube (5) and a forming-shoulder (6), which form a film into a film-tube (12),

- longitudinal sealing means to seal the longitudinal edges of the tube together,
- cross-sealing means to provide a cross-seal to the film-tube to produce individual packages and
- cutting means to separate the individual packages from the film-tube (12), and means for sensing and position the film (3) relative to the forming-shoulder.

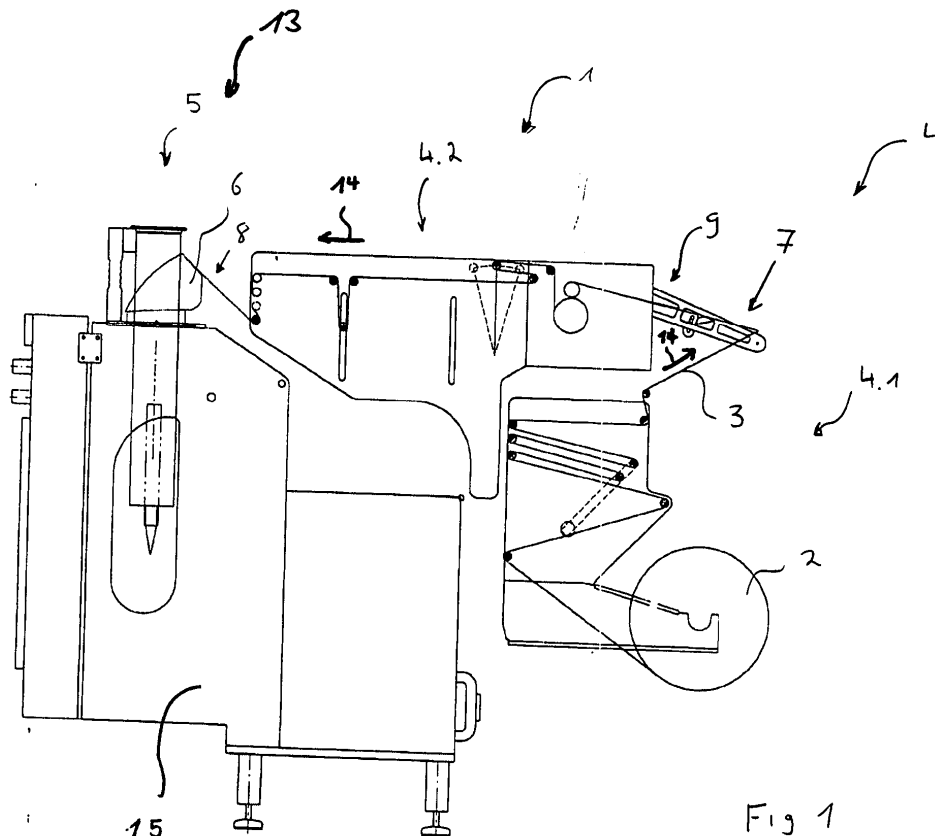


Fig 1

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Description

[0001] The present invention relates to a vertical flow-wrapper comprising:

- a film-feed, which feeds the film from a reel to a forming-unit,
- a forming-tube and a forming-shoulder, which form a film into a film-tube,
- longitudinal sealing means to seal the longitudinal edges of the film-tube together,
- cross-sealing means to provide a cross-seal to the film-tube to produce individual packages and
- cutting means to separate the individual packages from the film-tube.

[0002] This vertical flow wrapper is very well known to the person skilled of the art and is used, to form a web, for example a plastic film or a paper material, into a tube from which individual packages are produced. Nowadays, these packages become more and more sophisticated so that in some cases, the web needs to be preprocessed, before it is formed into a tube. In this preprocessing unit as well as during the transformation of the wrap into a tube, the film must be exactly positioned relative to the forming tube and/or the preprocessing unit, especially its position perpendicular to the transport direction of the film.

[0003] It was therefore the objective of the present invention to provide a vertical flow wrapper with exact film positioning.

[0004] This objective is attained by a vertical flow-wrapper comprising:

- a film-feed, which feeds the film from a reel to a forming-unit,
- a forming-tube and a forming-shoulder, which form a film into a film-tube,
- longitudinal sealing means to seal the longitudinal edges of the film-tube together,
- cross-sealing means to provide a cross-seal to the tube to produce individual packages and
- cutting means to separate the individual packages from the film-tube,

whereas at the film-feed comprises a first part and a second part and whereas both parts are jointly movable horizontally and perpendicular to the transport-direction of the film and whereas one part is movable relative to the other part horizontally and perpendicular to the transport-direction of the film.

[0005] The present invention relates to a flow wrapper, which comprises a film feed, which feeds the film, for example a plastic film and/or a paper material from a reel to a forming unit. This forming unit, which comprises a forming tube and a forming shoulder. Subsequently, the longitudinal edges of the tube are sealed together by lon-

gitudinal sealing means. In a next step, the tube is filled with a packaging item and cross seals are provided to the tube to produce individually closed packages which are finally cut a part. The flow wrapper can be operated with a continuously moving film or intermittently.

[0006] According to the present invention, the film feed comprises a first part and a second part. These parts are jointly movable horizontally and perpendicular to the transport direction of the film. Additionally, one part of the film feed is movable relative to the other part of the film feed horizontally and perpendicular to the transport direction of the film. This movement of the two parts jointly and the movement of one part relative to the other allows a very exact positioning of the film during its transport from the reel to the forming unit. The movement of the first and/or second part of the film-feed is at least partially transferred to the film.

[0007] Both parts preferably comprise rolls round which the film is guided. Furthermore, the first part preferably comprises means to bear the reel. The second part preferably comprises a dancer, which is particularly use for intermittent production of the packages. The first part can also comprise a dancer particularly to maintain the film under a certain tension.

[0008] Preferably the vertical flow wrapper comprises a first sensor in the vicinity of the forming tube, that determines the position of the film relative to the tube and/or the forming shoulder. The signal of this sensor is utilized to position both parts jointly relative to the forming tube. In a preferred embodiment, the sensor measures the position of the film on the forming shoulder. This preferred embodiment of the present invention has the advantage, that the film does not wobble, while it is in contact with the forming shoulder, so that the position of the film relative to the forming shoulder can be determined very exactly.

[0009] In yet another preferred embodiment of the present invention, the vertical flow wrapper comprises a second sensor, which measures the position of the film upstream from the first sensor; i. e. upstream relative to the transport direction of the film. The signal of this sensor is utilized to adjust the position of the first part of the film-feed relative to the second part of the film-feed.

[0010] In a preferred embodiment of the present invention, the vertical flow wrapper comprises a film processing unit, for example a film forming unit. This processing unit is preferably attached to the second part of the film-feed. Preferably, the second sensor is located upstream from this unit and its signal is utilized to optimize the position of the film relative to this film processing unit, for example by moving the first part of the film-feed relative to the second part of the film feed.

[0011] Preferably, the vertical flow wrapper has one motor, more preferably a servo motor, to shift both parts of the film-feed jointly and one motor, more preferably a servo motor, to shift the first part of the film-feed relative to the second part of the film-feed. Preferably at least one, more preferably both motors are linear motors.

[0012] According to another or a preferred embodiment of the present invention, the forming shoulder comprises a recess, preferably a hole, and a sensor is located in the vicinity of this hole. By means of this recess, the sensor, which comprises in general a sender and a receiver can be positioned such, that the sender is positioned at one side of the forming shoulder and the receiver is positioned on the opposite side of the forming shoulder. For example radiation and/or an acoustic signal is sent from the sender, through the forming shoulder to the receiver. The recess is located in the forming shoulder such, that during optimal production conditions, the film covers the hole partially. Thus, the sensor observes the edge of the film. Based on this information, the two parts of the film feed are moved jointly horizontally and perpendicular to the transport direction of the film. The sender and the receiver are preferably combined in one unit.

[0013] The invention is now explained according to figures 1 — 3. These explanations do not limit the scope of protection. The explanations are applicable for all inventions of the present application, respectively.

Figure 1 shows the inventive flow wrapper.

Figure 2 shows the adjustment of the two film feed parts.

Figure 3 shows the forming shoulder.

[0014] Figure 1 shows the inventive flow wrapper. A film 3, for example a plastic film or a paper material is unrolled from a reel 2 and transported by means of a film feed 4 to a forming unit 13, which forms the plane film 3 into a tube 12, which is subsequently longitudinally sealed, filled with the packaging-item and provided with cross seals. These packages are then cut apart by a cutting unit. The forming unit 13 comprises a form tube 5, which is also the filling tube and a forming shoulder 6. According to the present invention, the film feed 4 comprises two separate parts 4.1, 4.2. These two parts 4.1, 4.2 can both be shifted horizontally and perpendicular to the transport direction 14 of the film and relative to the machine frame 15, particularly relative to the forming tube 5, which is fixed directly or indirectly to the machine frame. The parts 4.1 and 4.2 can be moved jointly relative to the machine frame as described above and one part of the film-feed, preferably the first part 4.1, can be moved relative to the second part 4.2 of the film-feed and independently from the joint movement. Both parts 4.1, 4.2 move horizontally and perpendicular to the transport direction of the film, respectively. Preferably the inventive flow wrapper comprises at least one, preferably two sensors 7, 8 which are symbolized in Figure 1 by the arrows. The first sensor 8 is preferably located in the vicinity of the forming shoulder 6, preferably on the forming shoulder 6 itself, as described later according to figure 3. This sensor 8 monitors, whether the film is in the right position relative to the forming shoulder. Based on this signal, the

position of both parts 4.1 and 4.2 is set and their position is altered jointly in case that the sensor 8 sensors a misalignment of the film relative to the forming shoulder. Thus, the relative position of the two parts 4.1, 4.2 is, during this movement, not changed. The second sensor 7 is located upstream from sensor 8 i. e. upstream relative to the transport direction 14 of film 3. In a preferred embodiment, as described according to figure 2, the inventive flow wrapper comprises film processing means 9, which, for example, fold and seal edges into the film prior to its forming into a tube. Preferably, sensor 7 is located upstream from this processing unit 9 and sensor 7 monitors whether the film 3 is positioned correctly relative to this film processing unit 9. Based on this signal, the position of the first part of the film feed 4.1 relative to the second part of the film-feed 4.2 is altered horizontally and perpendicular to the transport direction 14 of the film; i.e. the first part 4.1 moves in and out of the paper plane relative to the second part 4.2.

[0015] The control scheme of the two film feed parts 4.1 and 4.2 is now explained according to figure 2. This figure shows schematically the inventive flow wrapper, i.e. reel 2, a film processing unit 9, here a film forming unit, and the forming unit 13 with its forming tube 5 and its forming shoulder 6. Furthermore, schematically two sensors 7, 8 are depicted and it can be clearly seen, that the film feed unit 4 comprises a first part 4.1 and a second part 4.2, which are separated from each other and which can be moved horizontally and jointly as depicted by arrow 17. Furthermore, at least one part, here the first part 4.1, can be moved horizontally as depicted by double arrow 16 horizontally and perpendicular to the transport direction 14 of the film as depicted by double arrow 16.

[0016] Referring now to figure 2b, in case, for example, sensor 8 detects a misalignment of the film relative to the forming shoulder both parts 4.1 and 4.2 are moved jointly, as depicted by double arrow 17, by a distance of Δx to the right. It can be clearly seen, that the middle plane 10 of the film feed 4 is not in alignment with the middle plane 18 of the forming tube 5 and/or the forming shoulder 6. However, during this movement, the relative position of the two parts 4.1, 4.2 is not changed.

[0017] Figure 2c shows the response of the system in case that, for example, the second sensor 7 detects a misalignment of the film 3 relative to the film processing unit 9. In this case, the first part 4.1 of the film feed is moved horizontally and perpendicular to the transport direction 14 of the film, as depicted by double arrow 16, by a degree of Δy . It can be clearly seen, that the middle plane 10.1 of the first part 4.1 of the film feed is not in alignment with the middle plane 10.2 of the second part 4.2 of the film feed. Additionally it can be seen, that the position of the second part 4.2 of the film feed relative to the film tube 5 is left unchanged.

[0018] Figure 3 shows the inventive forming shoulder 6, which extends around a forming tube 5 and comprises a forming plane which is three-dimensionally shaped. The forming shoulder 6 and the forming tube 5 form a

plane film 3 into a tube 12, here a tube with a square or rectangular cross section. According to the present invention, the forming plane 6.1 comprises a hole 11, which extends through the entire forming plane. The hole is positioned such, that under optimal conditions, the film covers this hole partially or extend till the circumference of the hole. On both sides of the hole a sensor is placed, which comprises a sender and a receiver. The sender is placed on one side of the forming plane and the receiver is based on the opposite side of the forming plane. The sender transmits a signal through hole 11, which is received by the receiver. The sent signal is weakened depending on the degree of coverage of hole 11 by film 3. The signal is for example based on radiation or an acoustic signal. The sensor can determine the edge of the film. Based on this signal, the position of the film, particularly its position perpendicular to its transport direction 14 is left as it is or altered.

List of reference signs:

[0019]

1	Vertical Flow-wrapper
2	Reel
3	Film, plastic film, paper
4	Film-feed
4.1	First part of the Film-feed
4.2	Second part of the Film-feed
5	Forming-tube
6	Forming-shoulder
6.1	forming-plane
7	Sensor, second sensor
8	sensor, first sensor
9	Film-processing-unit, film-folding-unit
10	plane, middle plane of the film feed
10.1	middle plane of the first part of the first part of the film-feed 4.1
10.2	middle plane of the second part of the second part of the film-feed 4.2
11	Hole in the forming-shoulder
12	Film-tube

13	Forming-unit
14	Transport direction of the film
5 15	Machine-frame
16	Movement of the first part 4.1 of the film-feed relative to the second part of the film feed 4.2
10 17	Joint movement of both film-feed parts 4.1, 4.2
18	Middle plane of the forming-tube
Δx 15	displacement of both parts 4.1, 4.2 relative to plane 10
Δy	displacement of both parts 4.1, relative to part 4.2

20 Claims

1. Vertical flow-wrapper (1) comprising:

- a film-feed (4), which feeds the film from a reel (2) to a forming-unit (13),
- a forming-tube (5) and a forming-shoulder (6), which form a film (3) into a film-tube (12),
- longitudinal sealing means to seal the longitudinal edges of the film-tube (12) together,
- cross-sealing means to provide a cross-seal to the film-tube to produce individual packages and
- cutting means to separate the individual packages from the film-tube (12), **characterized in that** the film-feed (4) comprises a first part (4.1) and a second part (4.2), whereas both parts (4.1, 4.2) are jointly movable horizontally and perpendicular to the transport-direction (14) of the film and whereas one part (4.1) is movable relative to the other part (4.2) horizontally and perpendicular to the transport-direction (14) of the film.

2. Vertical flow-wrapper (1) according to claim 1, **characterized in, that** it comprises a first sensor (8) in the vicinity of the forming tube (5) that determines the position of the film relative to the tube and/or the forming-shoulder and that the position of the both parts (4.1, 4.2) is jointly set according to the signal of the first sensor (8).

3. Vertical flow-wrapper (1) according to claim 2, **characterized in, that** the first sensor (8) measures the position of the film (3) on the forming-shoulder.

4. Vertical flow-wrapper (1) according to one of the preceding claims, **characterized in, that** it comprises a second sensor (7), which measures the position of the film (3) upstream from the first sensor (8) and

that the position of the first part (4.1) relative to the second part (4.2) is adjusted according to the signal of the second sensor (7).

5. Vertical flow-wrapper (1) according to one of the preceding claims, **characterized in, that** it comprises a film-processing-unit (9) and that the second sensor (8) is preferably in the vicinity of the film-processing-unit (9) and/or located upstream from this unit (9). 5
- 10
6. Vertical flow-wrapper (1) according to one of the preceding claims, **characterized in, that** it has one motor to shift both parts (4.1., 4.2) jointly and one motor to shift the first part (4.1) relative to the second part (4.2). 15
7. Vertical flow-wrapper (1) according to one of the preceding claims or the preamble of claim 1, **characterized in, that** the forming-shoulder comprises a recess (11), preferably a hole, and that a first sensor (8) is located in the vicinity of this recess. 20
8. Vertical flow-wrapper (1) according to claim 7, **characterized in, that** the first sensor (8) comprises a sender and a receiver and that the sender is located on one side of the forming-shoulder (6) and the receiver on the opposite side of the forming-shoulder, whereas the sender and the receiver are preferably one unit. 25
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9. Vertical flow wrapper form shoulder (6), **characterized in that** it comprises a recess (11), preferably a hole, in its forming plane (6.1). 35

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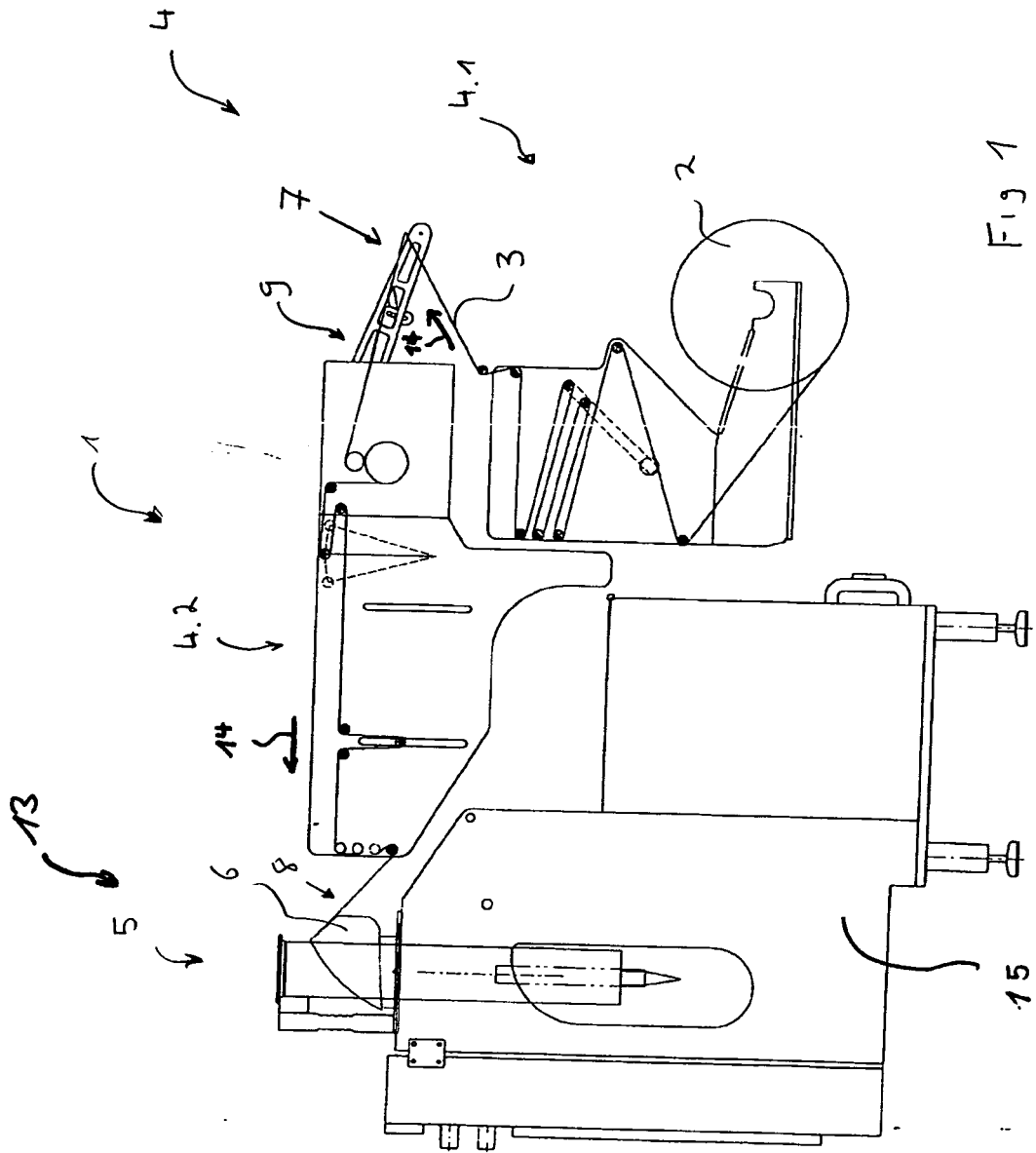


Fig 1

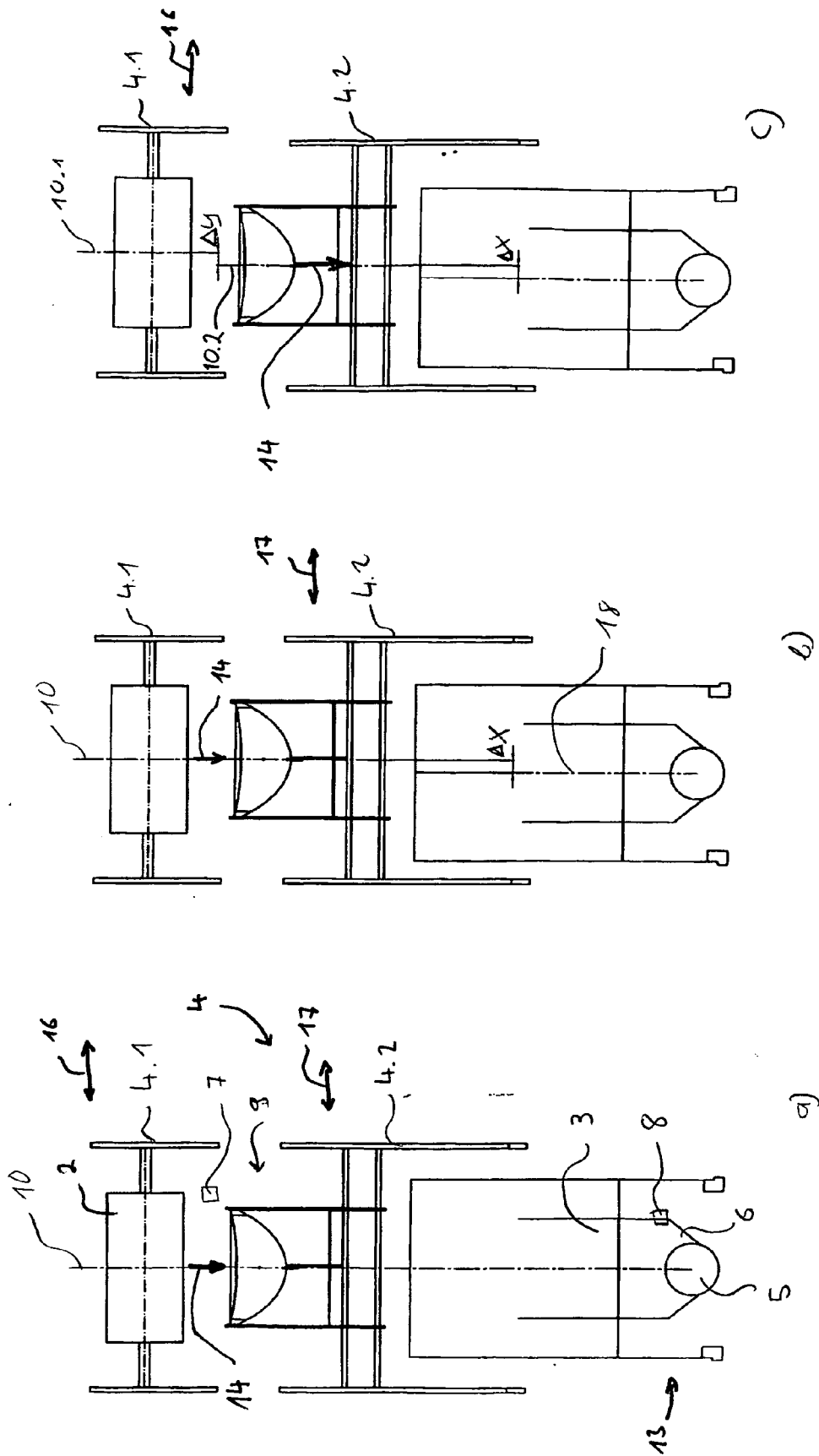
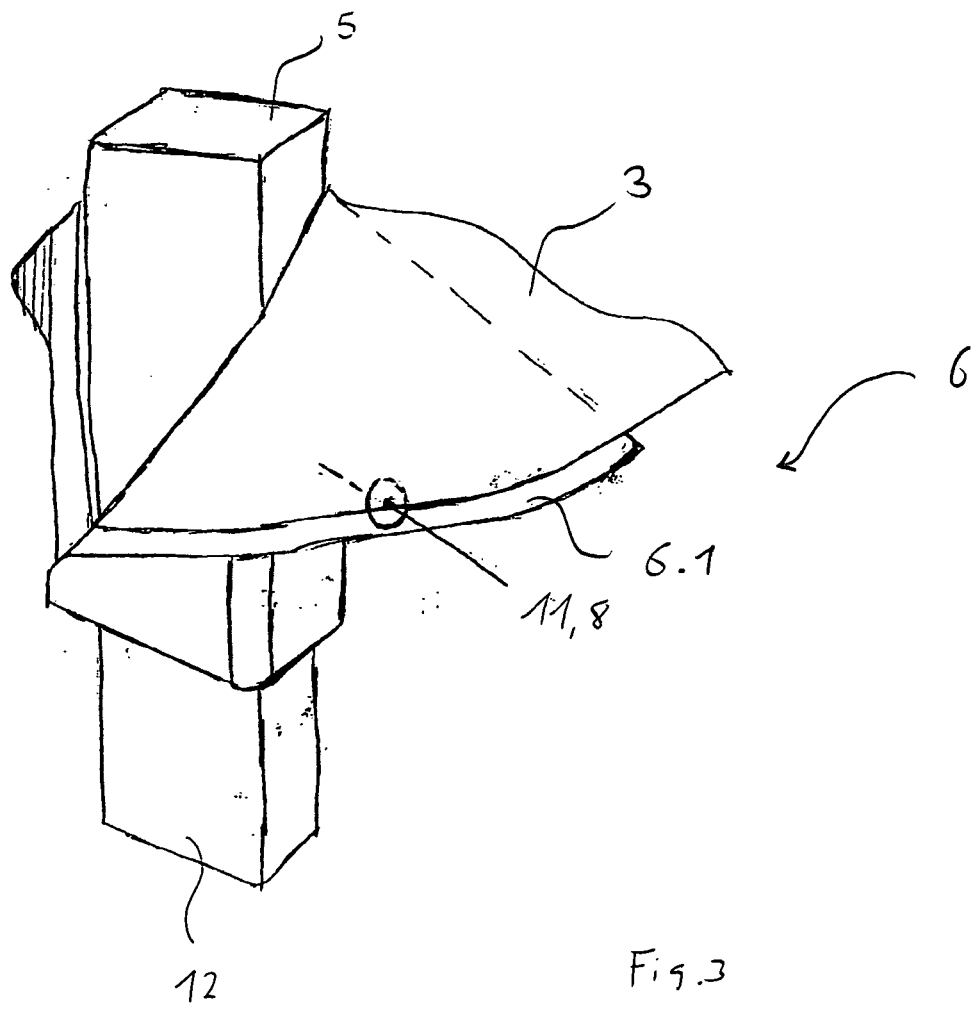


Fig. 2





EUROPEAN SEARCH REPORT

Application Number
EP 11 00 2037

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CH 611 854 A5 (HOBART ENG LTD [GB]) 29 June 1979 (1979-06-29) * the whole document *	1-9	INV. B65B9/22 B65B41/12 B65B57/02 B65B59/00
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
Place of search		Date of completion of the search	Examiner
Munich		13 September 2011	Ungureanu, Mirela
CATEGORY OF CITED DOCUMENTS 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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 11 00 2037

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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