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(54) Method of forming and picking up packs of sheets

(57) A method of forming and picking up packs (2) off a stack (3) of sheets (4) superimposed in a first direction (5), whereby the packs (2), each defined by a first number (n) of sheets (4), are formed and picked up successively to leave on a supporting pallet (6) a last group (9) of sheets (4) defined by a second number (m) of sheets (4) smaller than the first number (n), and which is removed off the pallet (6) and transferred onto a new stack (3) in a second direction (45) perpendicular to the first direction (5), while the new stack (3) is retained at a top edge (44) crosswise to and at the rear in the second direction (45).

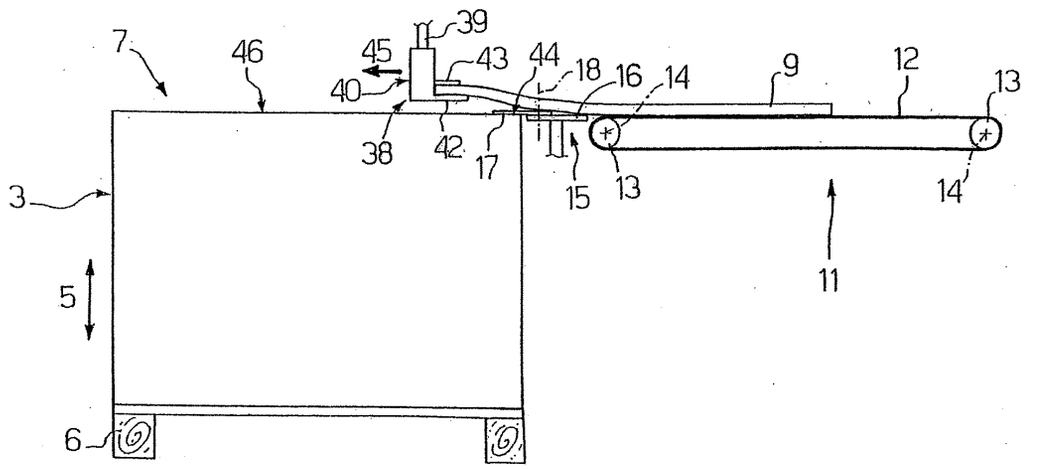

Fig.6

EP 1 505 018 A1

Description

[0001] The present invention relates to a method of forming and picking up packs of sheets.

[0002] In the packaging of packs of sheets, a unit is known for forming and picking up packs off a stack of sheets located at a work station and comprising a number of sheets stacked in a given first direction. It should be pointed out that the stack comprises a first group of sheets defining a number of packs, each defined by a first number of sheets; and a second group of sheets defined by a second number of sheets smaller than the first number.

[0003] The unit, of the type described for example in Patent Application EP-1264792-A1, normally comprises a pack selecting device, in turn comprising a top jaw which is placed on a top face of the stack, and a bottom jaw which is inserted inside the stack at a distance from the top jaw equal to the thickness of a pack, so as select a pack at each operating cycle of the unit.

[0004] The top and bottom jaws cooperate with each other to at least partly raise the selected pack and enable a pickup device to remove the pack from the selecting device and feed it to an input station of an operating unit in a second direction substantially perpendicular to said first direction.

[0005] Once the packs are formed and picked up, the second group of sheets is picked up in exactly the same way as described above for the packs, and is transferred by the pickup device in said second direction to enable a new stack of sheets to be fed to the work station.

[0006] At this point, the second group of sheets is transferred by the pickup device, in a third direction opposite the second direction, onto the new stack, so that the next pack selected by the selecting device comprises the second group and some of the sheets in the new stack.

[0007] A major drawback of known units of the type described above is that, when transferring the second group in the third direction onto the new stack of sheets, the new stack is only retained at a top edge crosswise to and at the front in the third direction, and is therefore disarranged by the second group.

[0008] It is an object of the present invention to provide a method of forming and picking up packs of sheets, designed to eliminate the aforementioned drawbacks.

[0009] According to the present invention, there is provided a method of forming and picking up packs of sheets, as claimed in the independent Claims.

[0010] A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view in perspective, with parts in section and parts removed for clarity, of a preferred embodiment of the unit according to the present invention;

Figures 2 and 3 show side views of a detail of Figure 1 in two different operating positions;

Figures 4 to 6 show, schematically and with parts removed for clarity, the Figure 1 unit in successive operating positions.

[0011] Number 1 in Figure 1 indicates as a whole a unit for forming and picking up packs 2 (Figure 3) off a stack 3 of sheets 4 superimposed in a substantially vertical direction 5. Stack 3 is supported on a pallet 6 at a work station 7, and comprises, in the example shown, a first group 8 (Figures 2 and 3) of sheets 4 defining a number of packs 2, each comprising an n number of sheets 4; and a second group 9 (Figures 4 to 6) of sheets 4 comprising an m number of sheets 4 smaller than the n number.

[0012] By means of a known feed device not shown, pallet 6 is fed in steps in direction 5 to enable unit 1 to select a pack 2 at each operating cycle, and to feed pack 2, in a substantially horizontal direction 10 perpendicular to direction 5, to an input station 11 of a known operating unit not shown.

[0013] In the example shown, station 11 comprises a conveyor belt 12 looped about two pulleys 13 (only one shown in Figure 1) fitted to a fixed frame (not shown) of unit 1 to rotate about respective longitudinal axes 14 perpendicular to directions 5 and 10.

[0014] Unit 1 comprises a supporting device 15 (operation of which is described in detail later on) located between stations 7 and 11, and in turn comprising a flat, substantially rectangular plate 16 mounted to move, linearly in direction 5 and under the control of a known actuating device not shown, to and from a lowered rest position (Figure 1), in which plate 16 is substantially coplanar with a top conveying branch of belt 12.

[0015] On its lateral edge facing station 7, plate 16 comprises a number of (in the example shown, two) substantially flat pressure members 17, each of which is fitted to plate 16 to rotate, with respect to plate 16 and under the control of an actuating device normally common to all of members 17, about a respective hinge axis 18 parallel to direction 5, and between a rest position (Figure 1), in which member 17 is located on plate 16, and a work position (Figure 6), in which member 17 projects from plate 16 in direction 10.

[0016] Unit 1 also comprises a known selecting device 19 for selecting each pack 2 from stack 3, and which comprises a slide 20 fitted in known manner to said fixed frame (not shown) to move linearly in directions 5 and 10 with respect to the fixed frame (not shown).

[0017] Slide 20 supports a gripping member 21 comprising a top jaw 22 bounded at the bottom by a substantially flat surface 23; and a bottom jaw defined by a flat blade 24 extending parallel to surface 23, and the distance of which from surface 23 is adjustable manually or by means of a known actuating device not shown. Blade 24 is fitted to jaw 22 to slide, with respect to jaw 22 and under the control of two parallel actuating cylinders 25, in a direction parallel to surface 23, so as to

penetrate stack 3 (Figure 2).

[0018] Jaw 22 is fitted to slide 20 to rotate, with respect to slide 20 and under the control of a known actuating device 26, about a hinge axis 27 perpendicular to directions 5 and 10, so as to move member 21 between a substantially horizontal position (Figure 2) to select pack 2, and a tilted position (Figure 3) in which a rear portion of the selected pack 2 is raised off stack 3.

[0019] Device 26 comprises a crank 28 rotated about axis 27 by an actuating cylinder 29 hinged to slide 20 and having an output rod 30, the free end of which is fitted, by the interposition of a pin 31 substantially parallel to axis 27, to slide inside a slot 32 formed through crank 28. Rod 30 is movable between a withdrawn position and an extracted position to enable crank 28 to engage or release a pin 33 projecting, parallel to axis 27, from jaw 22, and so move member 21 between the horizontal and tilted positions.

[0020] Unit 1 also comprises a known pressure member 34 defined by a substantially flat plate 35 extending perpendicularly to direction 5 and fitted to the free end of the output rod of an actuating cylinder 36, which moves plate 35 in direction 5 and is fixed to the output rod of an actuating cylinder 37 for moving cylinder 36, and therefore plate 35, in direction 10.

[0021] Finally, unit 1 also comprises a grip and transfer unit 38, in turn comprising a slide 39 fitted in known manner to said fixed frame (not shown) to move linearly in directions 5 and 10 with respect to the fixed frame (not shown). Unit 38 also comprises two grip and transfer members 40 aligned with each other in a direction 41 perpendicular to directions 5 and 10, and located substantially on opposite sides, in direction 41, of the assembly defined by selecting device 19 and pressure member 34.

[0022] Each member 40 comprises a substantially flat bottom jaw 42 perpendicular to direction 5 and extending in direction 10; and a substantially flat top jaw 43 parallel to jaw 42 and movable in direction 5 between a grip position and a release position to grip and release a pack 2 between jaws 42 and 43.

[0023] Operation of unit 1 will be described with reference to Figures 1 to 6, and as of the instant in which:

blade 24 is located at a distance from surface 23 of top jaw 22 substantially equal to the thickness of a pack 2;

selecting device 19 is set to the horizontal position; and

the two grip and transfer members 40 are set to the release position.

[0024] With reference to Figure 2, device 19 is moved by slide 20 in directions 5 and 10 so that surface 23 contacts stack 3, and blade 24 is moved in direction 10 by actuating cylinders 25 so as to penetrate stack 3 and select a first pack 2.

[0025] As shown in Figure 3, device 19 is then moved by actuating device 26 into the tilted position to partly raise the selected pack 2; pressure member 34 is moved in directions 5 and 10 onto and to retain the top sheet 4 of the next pack 2; and the two grip and transfer members 40 are moved in directions 5 and 10 to insert respective bottom jaws 42 beneath the raised pack 2.

[0026] Finally, device 19 is moved back into the horizontal position; top jaws 43 are moved into the grip position; device 19 releases pack 2; and pack 2 is transferred in direction 10 first onto supporting device 15, and then onto conveyor belt 12.

[0027] The above operating sequence is performed h number of times to form and pick up off stack 3 the packs 2 obtainable from first group 8 of sheets 4, and to leave the second group 9 of sheets 4 on pallet 6.

[0028] As shown in Figures 4 and 5, the above operating sequence is repeated to remove second group 9 off pallet 6 and transfer second group 9 onto conveyor belt 12 to clear both pallet 6 and plate 16.

[0029] At this point, the empty pallet 6 is removed from work station 7; a new pallet 6, with a new stack 3 of sheets 4, is fed into station 7; plate 16 is raised in direction 5; pressure members 17 are moved into the work position; plate 16 is moved back into the lowered rest position, so that members 17 engage a top edge 44, crosswise to direction 10, of the new stack 3; and second group 9 is transferred onto the new stack 3 in a direction 45 opposite direction 10.

[0030] When transferring second group 9 in direction 45, members 17 are maintained in the work position, so as to engage edge 44, i.e. the rear edge of the new stack 3 in direction 45, and so stabilize and prevent disarranging and/or creasing sheets 4 in the new stack 3.

[0031] Once second group 9 is released onto the new stack 3, selecting device 19 selects another pack 2 comprising second group 9 and some of the sheets 4 in the new stack 3.

[0032] In a variation not shown, when transferring second group 9 onto the new stack 3 in direction 45, the new stack 3 is retained, at two top edges 46 parallel to each other and to direction 45, by pressure members in addition to or instead of members 17.

Claims

1. A method of forming and picking up packs (2) off a stack (3) of sheets (4) superimposed in a given first direction (5); the stack (3) being located at a work station (7) and comprising a first and a second group (8, 9) of sheets (4); said first group (8) defining a number of packs (2), each comprising a first number (n) of sheets (4); said second group (9) comprising a second number (m) of sheets (4) smaller than said first number (n); and the method comprising the steps of successively forming and picking up said packs (2); removing said second group (9) from said work station (7); feeding a new

stack (3) of sheets (4) into the work station (7); and transferring said second group (9) onto said new stack (3) in a second direction (45) substantially perpendicular to said first direction (5); and being **characterized in that**, when transferring the second group (9) onto said new stack (3), the new stack (3) is retained at a top edge (44) crosswise to and at the rear in said second direction (45).

2. A method as claimed in Claim 1, wherein, when transferring the second group (9) onto said new stack (3), the new stack (3) is retained at at least one further top edge (46) parallel to said second direction (45).

3. A method as claimed in Claim 1 or 2, wherein each said pack (2) and said second group (9) are removed from said work station (7) in a third direction (10) substantially parallel to and opposite said second direction (45).

4. A method as claimed in any one of the foregoing Claims, and also comprising the step of forming and picking up a further pack (2) comprising said second group (9) and some of the sheets (4) in said new stack (3).

5. A method of forming and picking up packs (2) off a stack (3) of sheets (4) superimposed in a given first direction (5); the stack (3) being located at a work station (7) and comprising a first and a second group (8, 9) of sheets (4); said first group (8) defining a number of packs (2), each comprising a first number (n) of sheets (4); said second group (9) comprising a second number (m) of sheets (4) smaller than said first number (n); and the method comprising the steps of successively forming and picking up said packs (2); removing said second group (9) from said work station (7); feeding a new stack (3) of sheets (4) into the work station (7); and transferring said second group (9) onto said new stack (3) in a second direction (45) substantially perpendicular to said first direction (5); and being **characterized in that**, when transferring the second group (9) onto said new stack (3), the new stack (3) is retained at at least one further top edge (46) parallel to said second direction (45).

6. A method as claimed in Claim 5, wherein, when transferring the second group (9) onto said new stack (3), the new stack (3) is retained at a further top edge (44) crosswise to and at the rear in said second direction (45).

7. A method as claimed in Claim 5 or 6, wherein each said pack (2) and said second group (9) are removed from said work station (7) in a third direction (10) substantially parallel to and opposite said second direction (45).

8. A method as claimed in any one of Claims 5 to 7, and also comprising the step of forming and picking up a further pack (2) comprising said second group (9) and some of the sheets (4) in said new stack (3).

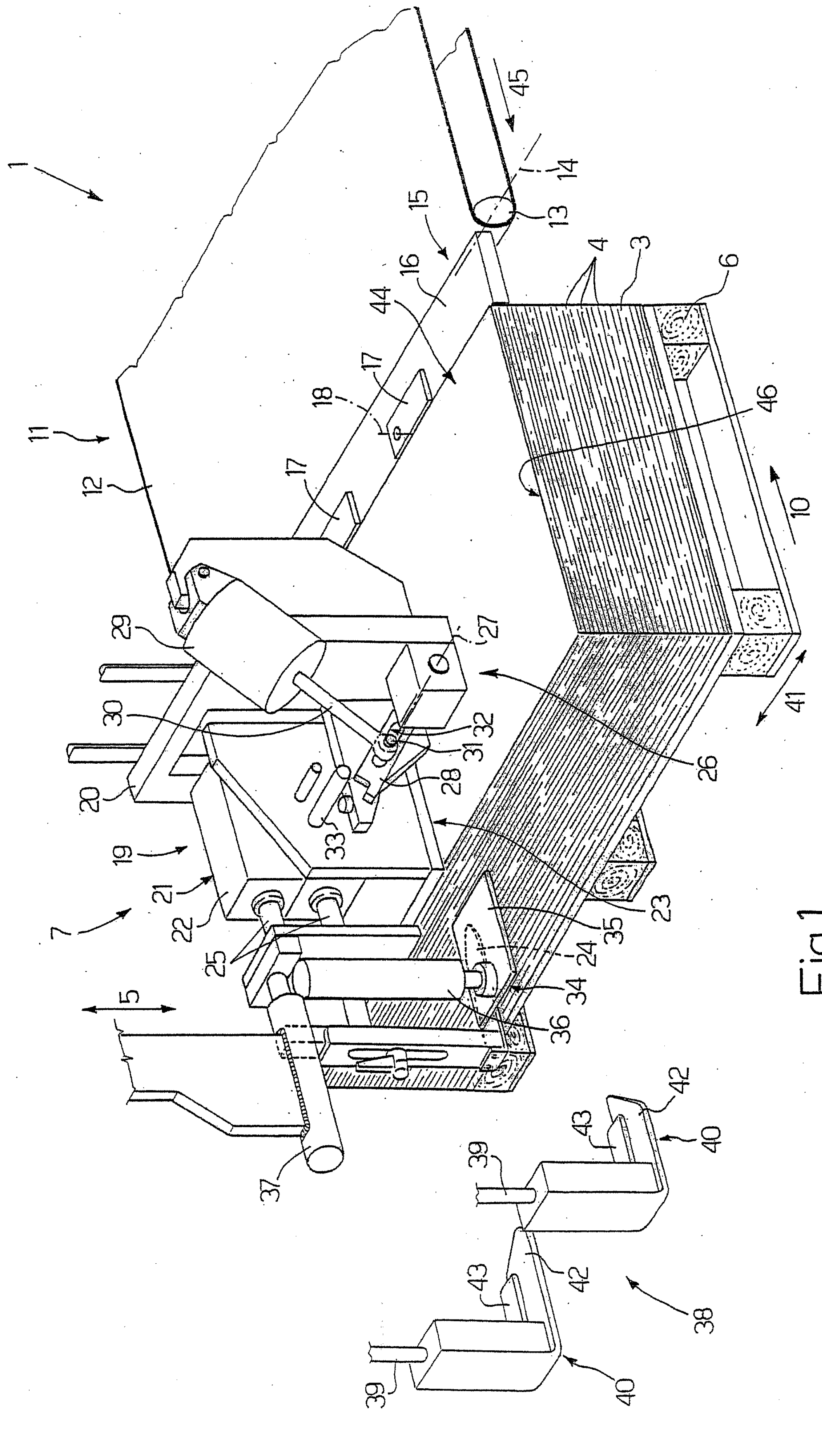
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Fig.1

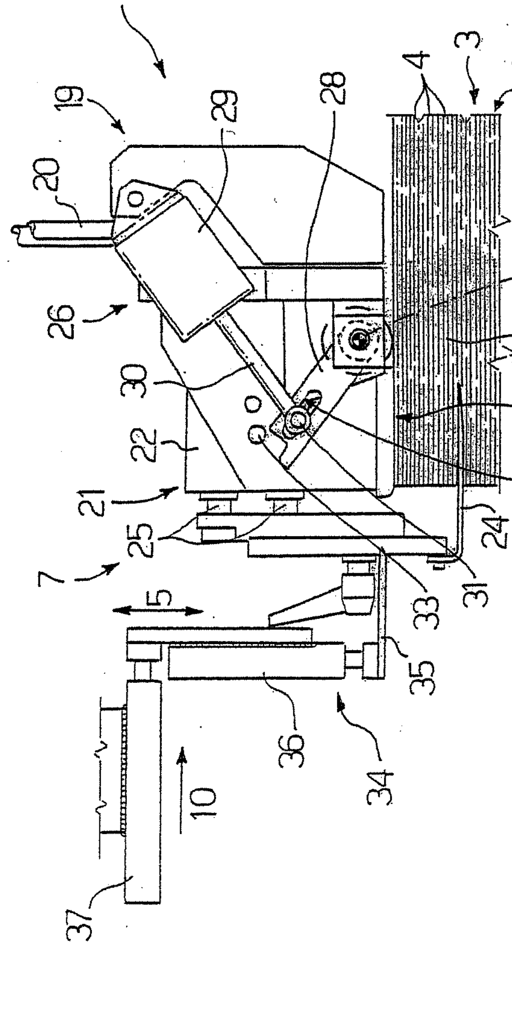
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Fig.2

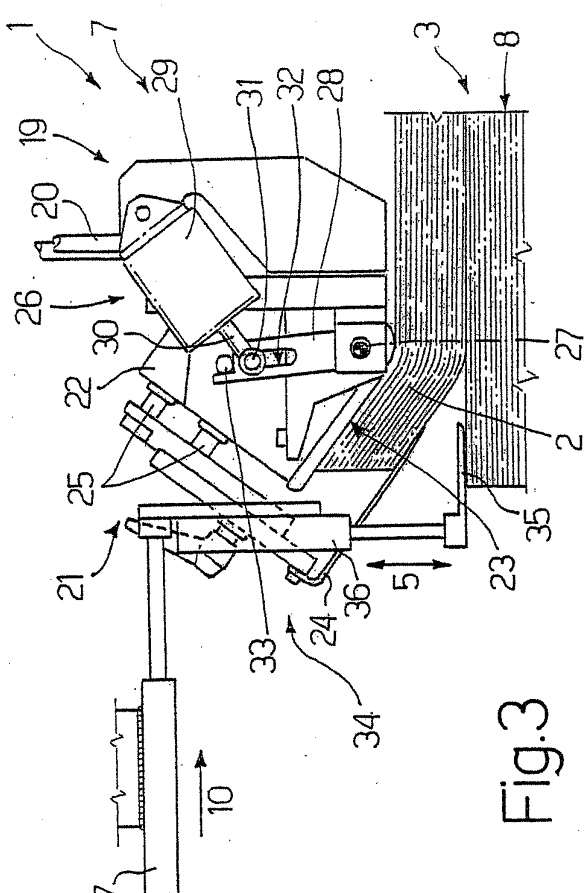
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Fig.3

Fig.4

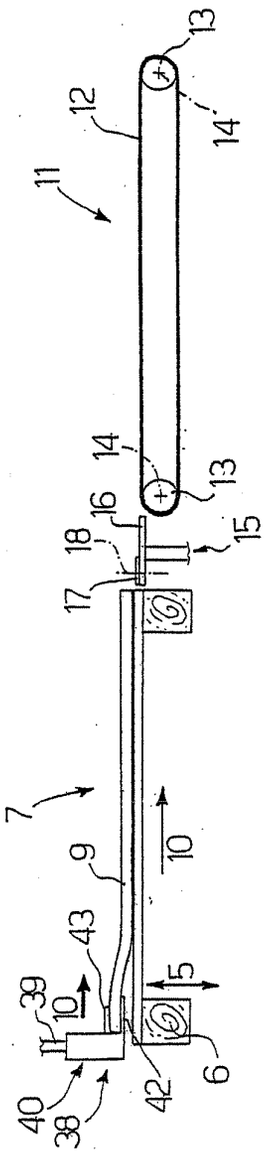


Fig.5

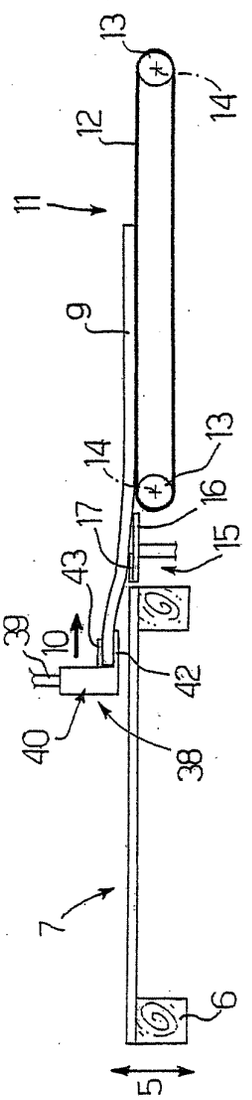
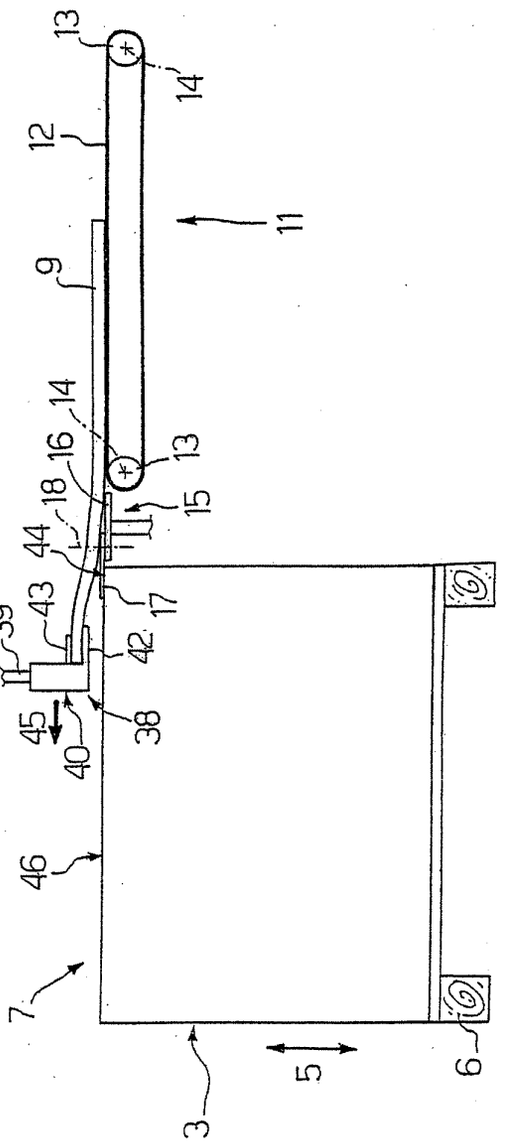


Fig.6



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EUROPEAN SEARCH REPORT

Application Number
EP 04 10 3805

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)
X A	EP 1 264 792 A (BIELOMATIK LEUZE & CO) 11 December 2002 (2002-12-11) * column 13, line 34 - column 13, line 46; figure 10 * * column 16, line 41 - column 17, line 5; figure 21 * -----	1,3,4 6-8	B65H3/32 B65H3/56
A	US 4 955 854 A (ROTH OSCAR) 11 September 1990 (1990-09-11) * the whole document * -----	1-8	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 November 2004	Rupprecht, A

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12-11-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1264792 A	11-12-2002	EP 1264792 A1	11-12-2002
US 4955854 A	11-09-1990	CH 675995 A5	30-11-1990
		EP 0353527 A2	07-02-1990
		JP 2075540 A	15-03-1990

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