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(11) **EP 0 978 449 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.02.2000 Bulletin 2000/06

(51) Int. Cl.⁷: **B65B 7/22, B65B 61/20**

(21) Application number: **99115026.9**

(22) Date of filing: **02.08.1999**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **03.08.1998 IT BO980484**

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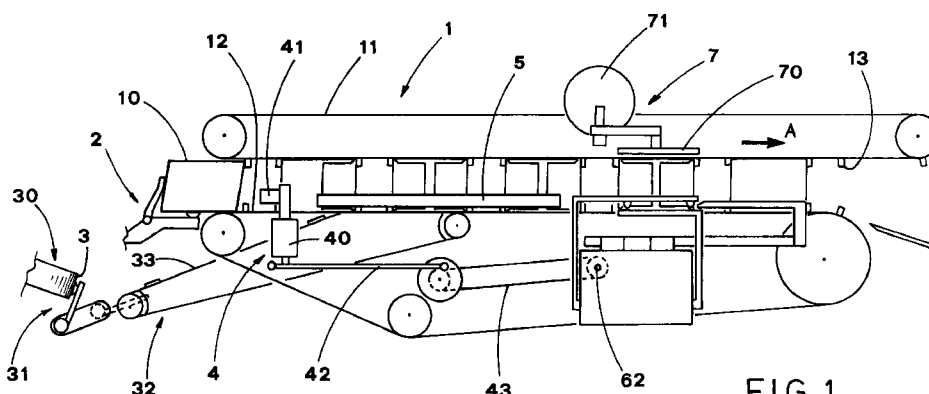
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(54) **Machine for packaging articles into relative boxes**

(57) A packaging machine includes a line (1) for conveying boxes (10) in which articles are to be packed and a line (32) for feeding informative sheets (3) to be associated to the articles. The feeding line (32) is equipped with a plurality of pliers means (34) for holding the informative sheets (3) during their transport. A tab folding group (4) co-operates with a stationary edge (5) situated longitudinally to the conveying line (1), to fold transversal inner tabs (10a,10b) of said boxes (10). A flap closing group (6) co-operates with a second folding member (7) to close the flap (10c) of the boxes (10), overlapping the tabs (10a,10b) while in closing position. The flap closing group (6) includes abutment means

(86) moving longitudinally to the conveying line (1) between an active position, in which the abutment means face the box (10) to be closed and a rest position. The first folding member (7) moves substantially perpendicular to the conveying line (1) and is aimed at bringing the flap (10c) closing the box (10) near the abutment means (86). A third folding member (72) acts in time relation to fold a wing (10d) of the flap (10c) against the abutment means (86). Then, pushing means (74) close the flap (10c) after the abutment means (86) had moved to the rest position.



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Description

[0001] The present invention relates to packaging articles into boxes.

[0002] Automatic machines, commonly known as articles packaging machines, have heretofore been provided, for packaging various articles into relative boxes.

[0003] In particular, such packaging machines automatically introduce one or more articles, e.g. pharmaceutical products, pharmaceutical blister pack, or other similar products, into a relative box and add a corresponding informative sheet thereto.

[0004] Such packaging machines usually include a conveying line for the boxes to be filled, another conveying line connected to the box for supplying the articles to be placed into the boxes, and a line for feeding informative sheets to be inserted into the boxes along with the articles.

[0005] These conveying lines are moved either in intermittent or continuous way.

[0006] A transfer device is situated along the boxes conveying line for introducing articles and informative sheets into the boxes.

[0007] The packaging machines are usually very big because of many working stations necessary for introduction of the articles and informative sheets into the boxes and then for closing inner tabs and outer flaps of these boxes.

[0008] Another drawback of the packaging machines used so far derives from the poor versatility of the means for closing the boxes, which results in complicated adjustment operations when different boxes are used.

[0009] This invention was evolved with the general object of proposing a machine for packaging articles into relative boxes which has a simple and small structure.

[0010] Another object of the present invention is to propose a machine for packaging articles into relative boxes, which is versatile, with particular reference to the operative means used to close the boxes, and easily adaptable for use with different types and sizes of boxes.

[0011] A further object of the present invention is to propose a packaging machine, which is reliable and whose structure is very simple.

[0012] The above mentioned objects are obtained in accordance with the contents of the appended claims.

[0013] The characteristic features of the invention will be more fully apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

- Figure 1 is a schematic lateral view of a packaging machine obtained according to the present invention;
- Figures 2a, 2b and 2c are section views of pliers for withdrawing informative sheets to be joined to the

articles, the pliers having been shown in different working steps;

- Figure 3 is a corresponding plan view of the pliers;
- Figures 4a and 4b are schematic top views of means for closing inner tabs of the boxes, also shown in different working steps;
- Figure 5 is perspective view of a boxes closing group;
- Figures 6a and 6b are respective schematic lateral views, seen from opposite sides, of the boxes closing group;
- Figure 7 is a section view of the boxes closing group, taken along a longitudinal plane;
- Figures 8a, 8b, 8c and 8d are schematic views or subsequent steps of closing the outer flap of a box.

[0014] With reference to the above described figures, the reference numeral 1 generally designates a conveying line for boxes 10 to be filled with articles on the proposed packaging machine.

[0015] The conveying line 1 for boxes 10 is operated stepwise by suitable motor means, not shown.

[0016] According to techniques known to those skilled in the art, the conveying line 1 includes a pair of parallel conveying belts 11, 12. For instance, and as shown in Figure 1, the two conveying belts are located one over the other, with horizontal rotation axes.

[0017] The boxes to be filled are conveyed between the two conveying belts and are suitably held by a plurality of protruding lugs 13, regularly equispaced on the belts 11, 12.

[0018] The boxes 10 are introduced between the conveying belts 11, 12 of the conveying line 1 by a device 2, that withdraws flat folded tubular sleeves from a magazine, not shown, and erects them into boxes.

[0019] For instance, a similar device is the one described and claimed by the Patent Application No. BO98A 000486 filed the same day as the Italian Patent application corresponding to the present one, by the same Applicant.

[0020] The articles to be packaged, not shown, are introduced into the boxes 10 by known means, also not shown in that they do not concern the claimed invention.

[0021] Respective informative sheets 3 are withdrawn one by one from a relative magazine 30 by a withdrawing device 31 and fed by a feeding line 32 to a station in which they are introduced, together with the articles, into the boxes 10.

[0022] The feeding line 32 includes a toothed belt 33 equipped with a plurality of spaced out pliers 34 aimed at holding informative sheets 3.

[0023] The belt 33 of the feeding line 32 is guided along a channel 32a integral with the stationary framework of the feeding line 32.

[0024] Basically, each pair of pliers 34 includes, as seen in Figure 2a, a plate 35 and a jaw 36.

[0025] The plate 35 is fastened to the belt 33 of the feeding line 32 by means of a counter-plate 35a, situ-

ated below.

[0026] The jaw 36 is hinged to the plate 35 and rotates on a plane transversal to the movement direction of the feeding line 32, against the action of a spring 37 (Figure 3).

[0027] The jaw 36 carries a transversal rod 36a, which is set parallel to the conveying line 32 and which, when the jaw is at rest position, elastically clamps the informative sheet 3 to the plate 35.

[0028] The jaw 36 is operated to open the pliers by a rocker arm 38, which rotate about a pivot 38a, in a plane perpendicular to the feeding line 32. The rocker arm 38 is driven by an actuator 39.

[0029] A transversal tab folding group 4 is located and operates along the conveying line 1, together with a stationary edge 5 situated longitudinally to the same conveying line 1. The task of the tab folding group 4 and stationary edge 5 is that of folding both the transversal tabs 10a, 10b of the boxes 10.

[0030] The transversal tab folding group 4 includes a column 40, operated by a crank mechanism 42 so that it oscillates around a vertical axis.

[0031] The crank mechanism 42 is operated by transmission means 43 driven by a main shaft 62. The shaft 62 sets the operational relation phase of the machine.

[0032] A first folding member 41 protrudes in radial direction from the column 40 (see also Figure 4a).

[0033] A flap closing group 6 is situated downstream of the tab folding group 4, considering the movement direction A of the conveying line 1, and closes the flap 10c of the box 10.

[0034] The flap 10c is situated outside the tabs 10a, 10b and covers them when the box 10 is closed.

[0035] The flap closing group 6, seen in Figure 5, cooperates with a second folding member 7, which partially closes the flap 10c.

[0036] The second folding member 7 includes a bar 70, situated longitudinally to the conveying line 1 and operated to move vertically by an alternative actuator 71, so as to act on the flap 10c of the box 10.

[0037] The flap closing group 6 includes a box-like body 60, situated beside the conveying line 1.

[0038] Inside the box-like body 60, there is a drum 61 supported so that it can rotate about an axis parallel to the conveying line 1 when driven by a suitable motor unit, through known transmission means.

[0039] The motor unit operates the drum via the shaft 62 that enters the body 60.

[0040] The opposite faces of the drum 61 feature a first radial cam 63 and a second radial cam 64, respectively.

[0041] Two rollers, namely a first and a second roller 65, 66, are connected to levers 67, 68, first and second, respectively, and engage the radial cams 63, 64.

[0042] The first lever 67 and the second lever 68 are pivoted to the body 60 on a pivot 69, so that they oscillate in vertical planes crosswise to the conveying line 1 (Figures 6a and 6b).

[0043] A third folding member 72, including substantially a plate, which extends along the conveying line 1, is cantilevered to the first lever 67.

[0044] A crosspiece 73, situated along the conveying line 1, is cantilevered to the second lever 68.

[0045] A pair of teeth 74, acting as pushers for the flap 10c closure, protrude from the crosspiece 73.

[0046] The position of the teeth 74 is adjustable along respective slots 75 made in the crosspiece 73.

[0047] The drum 61 features also, on its cylindrical surface, an axial cam 76, engaged with a third roller 77.

[0048] The third roller 77 is supported by a carriage 78 sliding on a stem 79 longitudinally to the conveying line 1 (Figure 7).

[0049] The carriage 78 forms a rack 80, which engages a pinion 81, carried inside the body 61 and rotating about a vertical axis.

[0050] The pinion 81 is linked to a pulley 82 outside the body 60. A belt 83 is mounted on the pulley 82 and is acted upon by a pair of tightening rollers 84.

[0051] The opposite ends of the belt 83 are fastened to a slide 85, which has the form of a bar and is guided on the body 60, parallel to the conveying line 1.

[0052] The slide 85 carries a trapezoidal bar 86, aligned with the conveying line 1 movement direction.

[0053] The bar 86 moves between a disengaged position, in which it is displaced to protrude sidewise from the body 60, and an active position, in which it acts as a stop for the flap 10c being folded.

[0054] Operation of the machine requires the boxes 10 being moved stepwise between the belts 11, 12 of the conveying line 1.

[0055] The articles and informative sheets to be introduced into the boxes are fed in time relation with the movement of the boxes 10 along the conveying line.

[0056] The informative sheets 3 withdrawn from the magazine 30 are transferred to the relative pliers 34 of the feeding line 32.

[0057] This happens while the pliers 34 are kept in open position due to the action of the rocker arm 38, operated by the actuator 39 (Figure 2a).

[0058] When the rocker lever 38 releases the jaw 36, the informative sheet 3 is clamped to the plate 35 by the rod 36a integral with the jaw 36 (Figure 2b).

[0059] Afterwards, the informative sheet 3 is folded in a substantially vertical plane, longitudinally to the feeding line 32, by a stationary abutment 8 (Figure 2c).

[0060] After the articles and corresponding informative sheets had been introduced into boxes, the lateral tabs 10a, 10b of the boxes 10 are folded by a combined action of the stationary edge 5, which first engages the first tab 10a of the box 10 (Figure 4a), and of the first folding member 41, rotated by the column 40 of the tab folding group 4 (Figure 4b).

[0061] The boxes 10 with the lateral tabs 10a, 10b closed, are then transferred to the station, in which the flap 10c is closed by the flap closing group 6.

[0062] First, the trapezoidal bar 86 is moved to the

active position, so as to act as an abutment for closing the flap 10c (Figure 8a).

[0063] Then, the first folding member 7 is operated, so that the bar 70 set parallel to the conveying line 1 push the flap 10c of the box 10 and brings it against the trapezoidal bar 86 (Figure 8b).

[0064] The rotation of the drum 61, in time relation therewith, determines, due to the first radial cam 63 and the second radial cam 64, a pre-established oscillation of the first lever 67 and the second lever 68, which carry, respectively, the third folding member 72 and the cross-piece 73 with the teeth 74 protruding therefrom as push means.

[0065] Moving the third folding member 72 folds a wing 10d of the flap 10c against the trapezoidal bar 86 (Figure 8c).

[0066] Then, the trapezoidal bar 86 is moved to the disengaged position.

[0067] Subsequently, the pushing teeth 74 are operated to act on the flap 10c in order to complete the closure of the box (Figure 8d).

[0068] The described machine fulfils the object of packaging articles into relative boxes using a simple and small structure.

[0069] In fact, the machine performs all the operations which are usually performed in different working stations, in a very limited space, which results in considerable reduction of longitudinal dimension.

[0070] Moreover, the proposed packaging machine is very versatile, especially during the boxes closing step, therefore, it can work with boxes of different shapes.

[0071] In particular, the flap closing group 6 can be situated in such a way, as to close the flap 10c downwards, as shown previously, or upwards, according to the position of the flap 10c.

Claims

1. Machine for packaging articles into boxes, the machine including:

- a line (1) for conveying boxes (10) for packaging articles therein;
- a line (32) for feeding informative sheets (3) to be associated to the articles;
- supply means for supplying articles to be packed into said boxes;
- said machine being characterized in that it includes:
 - plurality of pliers means (34) fastened to said line (32) for holding said informative sheets (3) during their transport;
 - a tab folding group (4), co-operating with a stationary edge (5) situated longitudinally to said conveying line (1), so as to fold transversal inner tabs (10a,10b) of said boxes (10);
 - a flap closing group (6), co-operating with a second folding member (7) to close the flap

(10c) of said boxes (10), overlapping said tabs (10a,10b), while in closing position.

2. Machine, according to claim 1, characterised in that said tab folding group (4) includes a column (40), which oscillates with alternate movement about a vertical axis, with a first folding member (41) protruding from said column (40) to act on a tab (10b) of said boxes (10).
3. Machine, according to claim 1, characterised in that said pliers means (34) include a plate (35) fastened to a toothed belt (33) of said feeding line (32) and carrying, hinged thereto, a jaw (36), which rotates on a plane transversal to the movement direction of the feeding line (32), against the action of elastic means (37), with said jaw (36) featuring a transversal rod (36a), which is longitudinal to said conveying line (32) and which, when in rest position, elastically clamps an informative sheet (3) to said plate (35).
4. Machine, according to claim 3, characterised in that said jaw (36) is operated to open said pliers by a rocker arm (38), which is driven by an actuator (39) so that it oscillates in a plane perpendicular to said feeding line (32).
5. Machine for packaging articles into boxes, the machine including a conveying line (1) for boxes (10), said machine being characterised in that it includes a flap folding group (6), said flap folding group (6) including:

abutment means (86) moving longitudinally to said conveying line (1) between an active position, in which said abutment means face a box (10) to be closed, and a rest position;

a first folding member (7) moving substantially perpendicular to said conveying line (1) and aimed at bringing a flap (10c) for closing the box (10) near said abutment means (86);

a third folding member (72) acting in time relation with folding a wing (10d) of said flap (10c) against said abutment means (86);

pushing means (74) aimed at closing said flap (10c) after the abutment means (86) have been moved to the rest position.

6. Machine according to claim 5, characterised in that said flap closing group (6) includes also a drum (61) rotating about an axis parallel to said conveying line (1) and featuring, on its opposite faces, respectively a first radial cam (63) and a second radial cam (64), which are engaged by relative first lever (67) and second lever (68), said first lever (67) and second lever (68) oscillating on vertical planes crosswise to the conveying line (1) and carrying respectively said

third folding member (72) and said pushing means (74).

7. Machine according to claim 6, characterised in that said third folding member (72) is cantilevered to said first lever (67) and includes substantially a plate extending longitudinally to said conveying line (1). 5

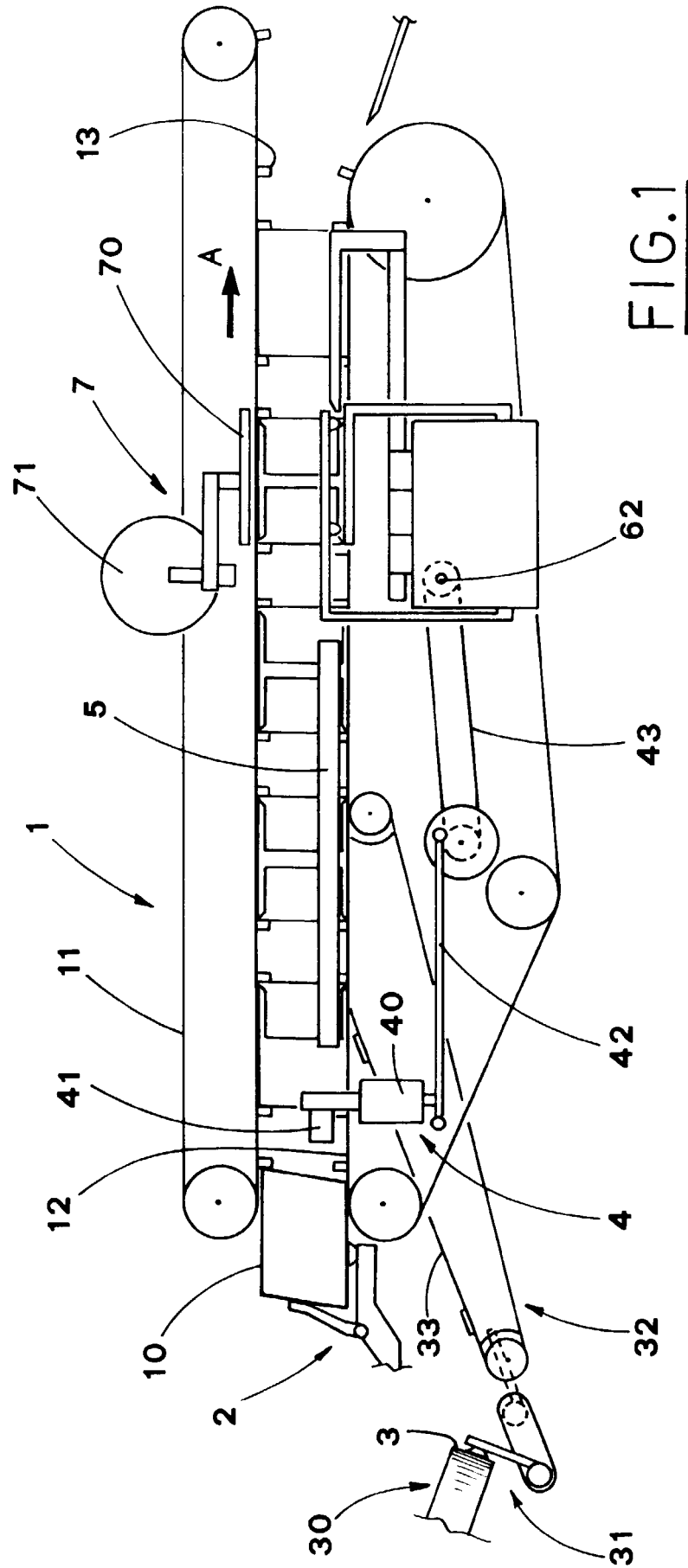
8. Machine according to claim 6, characterised in that a crosspiece (73), situated along said conveying line (1), is cantilevered to said second lever (68) and is provided with a pair of teeth (74) protruding from said crosspiece (73) for pushing the flap (10c) of the box (10), so as to close said flap (10c). 10
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9. Machine according to claim 5, characterised in that said flap closing group (6) includes a drum (61) featuring, on its cylindrical surface, an axial cam (76), which is engaged by a carriage (78) sliding along an axis (79) longitudinal to said conveying line (1), said carriage (78) being equipped with a rack (80), which engages a pinion (81), integral with a pulley (82) coupled with means (83) for transmission of motion to said abutment means (86). 20
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10. Machine according to claim 9, characterised in that said abutment means (86) include a slide (85), which is guided slidingly longitudinally to said conveying line (1) and which carries a trapezoidal bar (86) aligned with the conveying line (19) movement direction. 30

11. Machine according to claim 5, characterised in that said flap closing group (6) includes a drum (61) rotating about an axis parallel to said conveying line (1) and featuring, on its opposite front faces, respectively a first radial cam (63) and a second radial cam (64), which are engaged by relative first lever (67) and second lever (68), said first lever (67) and second lever (68) oscillating on vertical planes crosswise to the conveying line (1) and carrying respectively said third folding member (72) and said pushing means (74) and in that said drum (61) features, on its cylindrical surface, an axial cam (76), which is engaged by a carriage (78) sliding along an axis (79) longitudinal to said conveying line (1), said carriage (78) being equipped with a rack (80), which engages a pinion (81), integral with a fourth roller (82) coupled with means (83) for the transmission motion to said abutment means (86). 35
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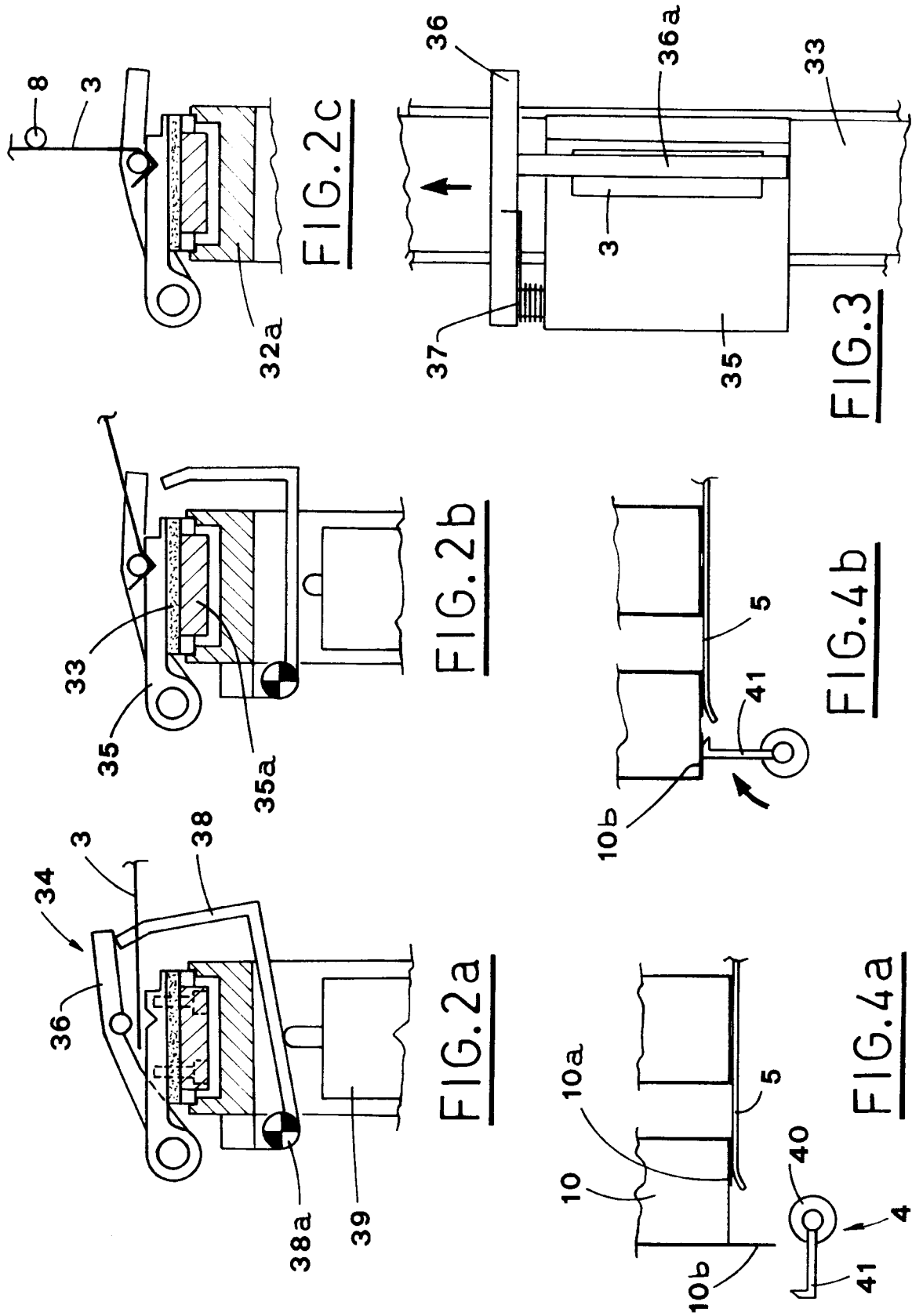


FIG. 5

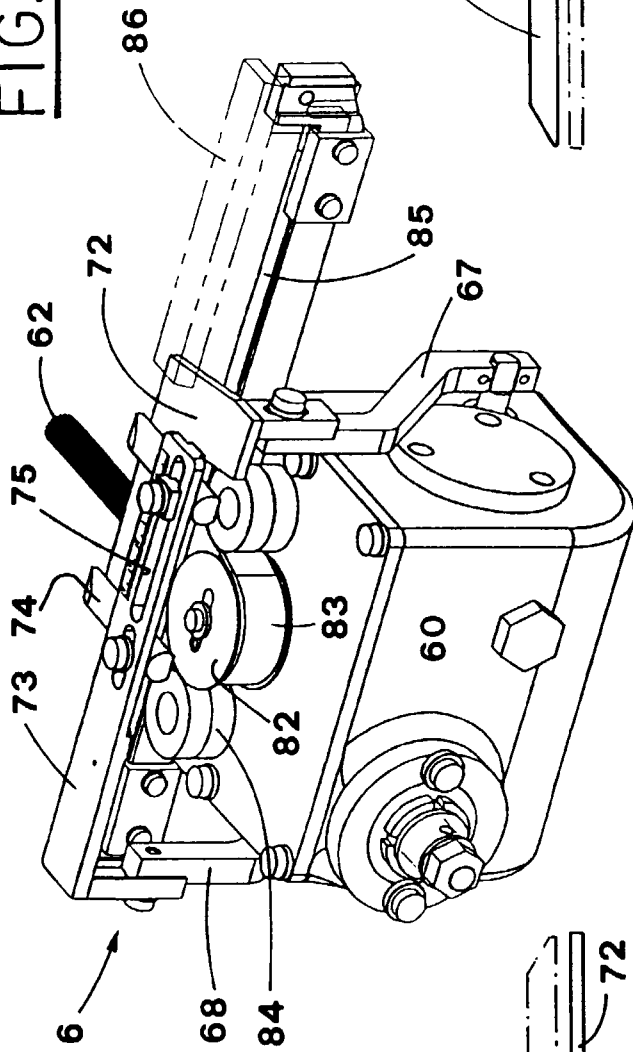


FIG. 6b

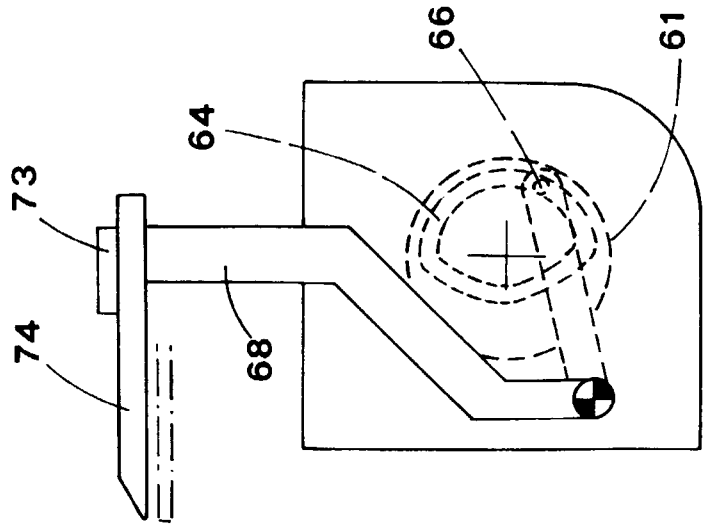


FIG. 7

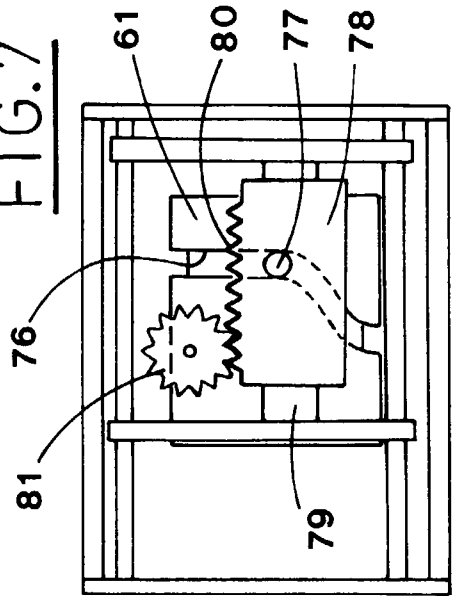
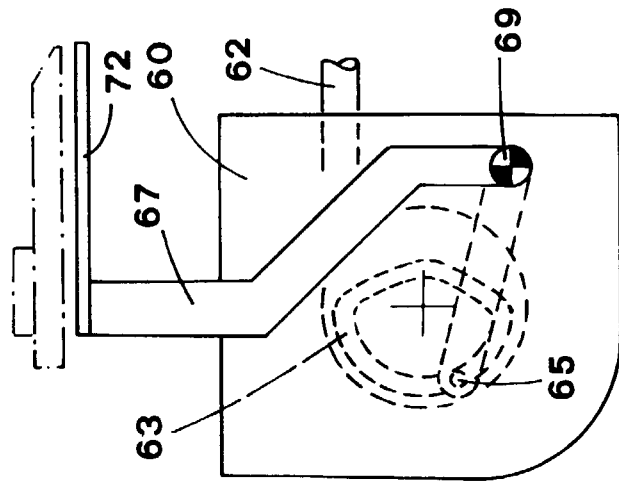
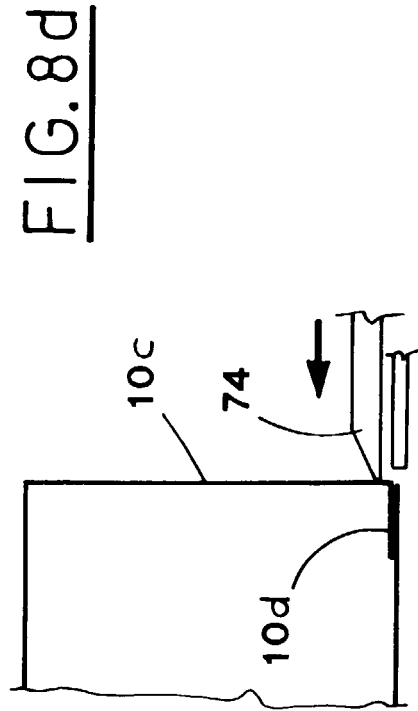
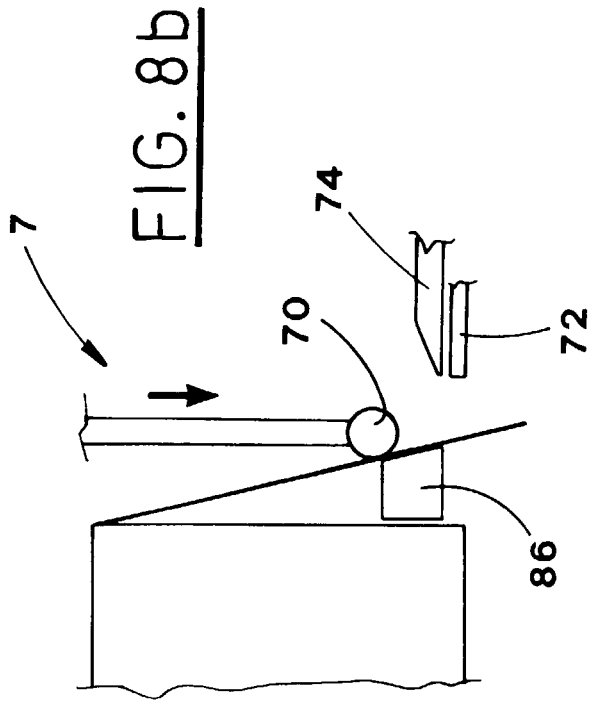
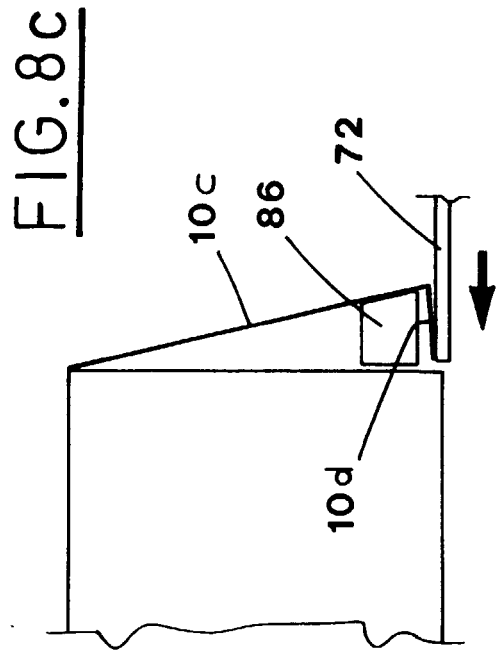
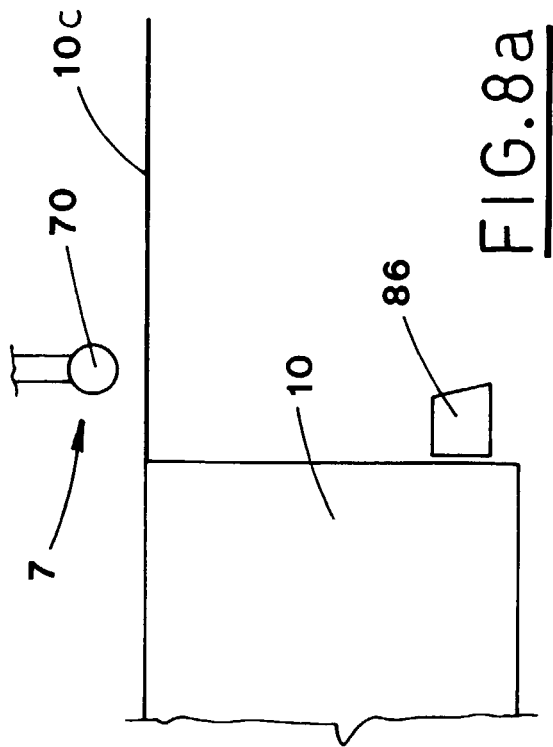


FIG. 6a







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EUROPEAN SEARCH REPORT

Application Number
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Place of search THE HAGUE		Date of completion of the search 11 November 1999	Examiner Bridault, A
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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**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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