



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.05.2011 Bulletin 2011/18

(51) Int Cl.:
B43M 3/04 (2006.01) **B43M 5/04** (2006.01)
B31B 19/00 (2006.01) **B31B 41/00** (2006.01)

(21) Application number: **09425436.4**

(22) Date of filing: **30.10.2009**

(84) Designated Contracting States:
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 SE SI SK SM TR
Designated Extension States:
AL BA RS

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(54) **Enveloping apparatus and method**

(57) A enveloping apparatus and a respective method, of the type operating with two distinct flows of paper material, is capable of generating envelope sheets and contents independently the ones from the others, but with the possibility of synchronizing the enveloping, and has: a first feeding direction between a feeding station (9) and a cutting and/or trimming station (11), from which single envelope sheets exit; a second feeding direction perpen-

dicular to the preceding one, along which a separation station of said single envelope sheets and a creasing station are provided, said second paper material flow, formed by distinct contents displaced on a feeding plane and fed along a respective feeding line, intersect said single envelope sheets realizing the enveloping, said feeding plane and said single envelope sheets being substantially perpendicular between them.

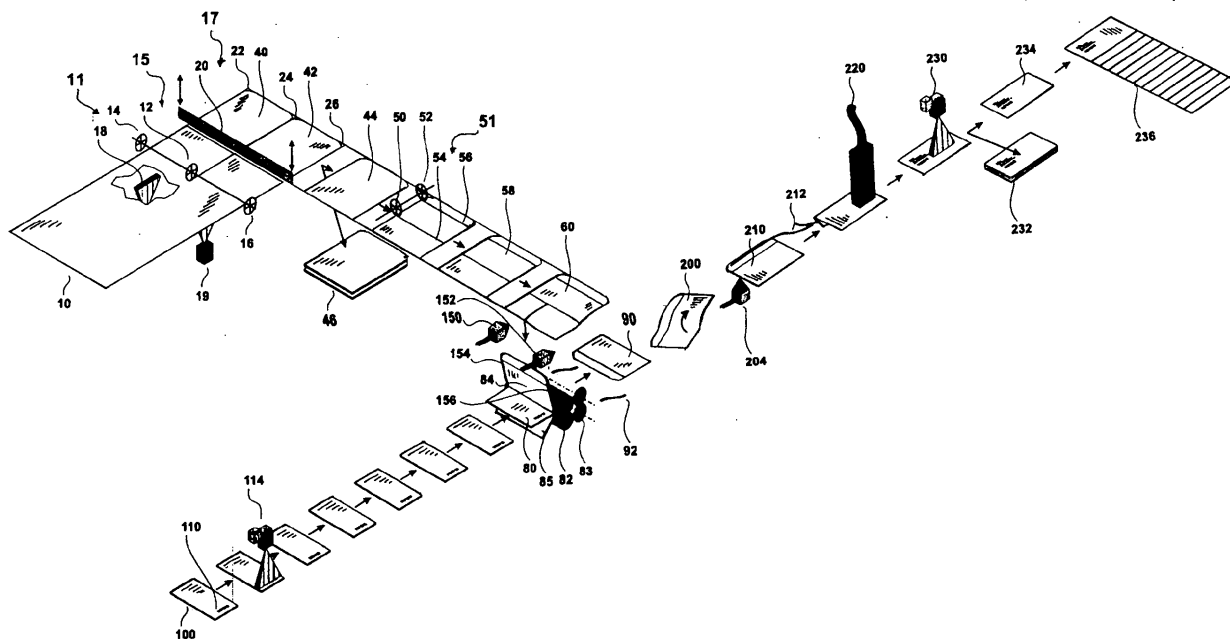


FIG.1

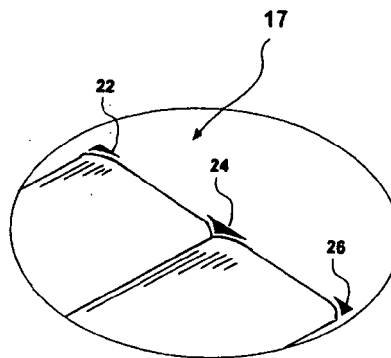


FIG. 2

Description

[0001] The present invention refers to an enveloping apparatus and method, of the type operating with two distinct flows of paper material, in particular a first paper material flow from which envelope shaped wrappers are realized and a second paper material flow apt to realize an overall contents to be enveloped.

[0002] Several apparatuses providing sheets and other contents enveloping in suitable wrappers or envelopes are known and also apparatuses provided with a plurality of sheets and wrappers feeding devices and, in case, with wrappers forming devices forming wrappers from paper material supplied as a ribbon are known. An example of such apparatuses is described in U.S. Patent No. US 5,155,973 to Hipko et al..

[0003] The apparatuses of this category suffer from a remarkable structural complexity since they operate on a plurality of paper material flows which should be successively assembled in order to provide sealed mails.

[0004] Such complexity also derives from that the first paper material flow is provided by a reel or by a sheet feeder the size thereof should be adjusted in order to make it consistent with the intended contents. To this regard, one yet unmet necessity relates to the use of big transversal sized reels, which should be reduced providing two or more sided envelope sheets in front of the reel, which should be successively trimmed and folded in separated sheets.

[0005] The technical problem underlying the present invention is to provide an enveloping apparatus, and a respective method, allowing to overcome the above-mentioned drawbacks with reference to the known art.

[0006] Such problem is solved by an enveloping apparatus as above specified, wherein said first paper material flow has:

- * a first feeding direction from a feeding station and a cutting and/or trimming station, from which single envelope sheets exit; and

- * a second feeding direction perpendicular to the preceding one, along which a separation station of said single envelope sheets and a creasing station are provided,

said second paper material flow, formed by contents separated therebetween placed on a feeding plane and fed along a respective feeding line, crosses said single envelope sheets providing the enveloping, said feeding plane and said single envelope sheets being substantially perpendicular between them.

[0007] According to the same inventive concept, the present invention also refers to an enveloping method as mentioned above, characterized in that it comprises the following steps:

- * providing a first homogeneous paper material flow

along a first feeding direction, and deviating said first paper flow substantially by 90° in correspondence of cutting and/or trimming operations of said first paper material flow, obtaining a second feeding line perpendicular to the preceding one;

- * separating said first paper material flow for providing distinct single envelope sheets, and creasing it with con creasing lines substantially parallel to said second feeding line; and

- * providing a second paper material flow along a respective feeding line, formed by distinct contents resting on a feeding plane,

such that said feeding plane and said single envelope sheets perpendicularly crosses one to the other, determining the enveloping of the contents.

[0008] The main advantage of the apparatus and of the method according to the present invention consist in individually providing envelope sheets and contents, but allowing to synchronize the respective enveloping.

[0009] According to a preferred exemplificative embodiment of the present invention, the envelope sheets, before crossing the second paper material flow, are 90° rotated about a median rotation axis corresponding to said second feeding direction, preferably passing from a horizontal arrangement ad to a vertical arrangement. In this way, the second contents flow can proceed on a horizontal plane until it crosses the vertically provided envelope sheets, with the respective internal face, i.e. directed to form the internal part of the final envelope, being facing the contents.

[0010] According to a further preferred aspect of the invention, the first paper material flow is initially formed by a sheet unreeled from a reel or from separated sheets continuously fed, which are gradually longitudinally separated in two or more single envelope sheets by means of a cut parallel to said first feeding direction, and successively trimmed for providing the envelope closure flap and in case a window, which should be in case matched with con a respective translucent label.

[0011] Therefore, the creasings forming the envelope from the single sheet, are fed parallel to the second feeding direction, while the deviation between the first and second feeding direction is functional to the separation, i.e. to physically space out one sheet from the others.

[0012] The apparatus and the method above defined will be hereby described according to a preferred exemplificative embodiment thereof, given by way of a non-limiting example, with reference to the annexed figures, wherein:

- figure 1 is a schematic and perspective view showing the enveloping method according to a first exemplificative embodiment of the invention;
- figure 2 shows an enlarged view of a detail of figure 1;

- figure 3 is analogous to figure 1 in order to show the feeding directions of said paper material flows and the their deviations;
- figure 4 is a perspective and schematic view showing a step of the method shown with reference to the preceding figures;
- figures 5a, 5b, 5c and 5d show successive steps to the method step already shown in figure 4;
- figure 6 is a view schematic and perspective showing the enveloping method of a second exemplificative embodiment of the invention;
- figure 7 shows an enlarged view of a detail of figure 6;
- figure 8 shows a top perspective view of an enveloping apparatus implementing the method shown with reference to the preceding figures; and
- figure 9 shows a top plan view of the apparatus of figure 8.

[0013] With reference to figure 1, a diagram showing an enveloping method is overall shown by means of the representation of the various operations taking place on two distinct flows of paper material. By means of said operations it is also described an apparatus in which they are performed.

[0014] A first homogeneous paper material flow is shown with the reference number 10. It can be generated, e.g., by a reel unreeling, wherein the unreeled sheet has a predetermined length. In this example, the width of the sheet is such that it can be used to provide two sided envelope papers, longitudinally separated by a cutting line substantially corresponding to the first feeding direction of said first paper material flow 10. The reel, which is not shown in figure 1, is housed in a feeding station for paper material.

[0015] In the present method, the reel can be provided with already printed sheets before being trimmed and cut. In figure 1 it should be noted that the face of the unreeled sheet directed upside is the non-printed face, and anyhow directed to represent the internal part of the envelope. To this regard, the reel is requested to be correctly placed before it is unreeled in order to the faces to be correctly oriented.

[0016] At the apparatus inlet, optical reading devices 18, 19 can be provided, verifying if the printing is correct, i.e. the printed content of the face of the unreeled sheet directed to be the external part of the envelop.

[0017] The verified information, e.g. a bar code, the name and/or address of the addressee, the indication on the content to be wrapped in the envelope and so on, serving to a synchronize the envelope sheets with the contents operated by the apparatus.

[0018] With envelope sheet it is meant a sheet which,

by means of suitable trimming, creasing, folding and gluing operations, will form an envelope directed to wrap an entity formed by a further material, in particular paper material, which will be indicated as contents in the following.

[0019] Following said flow 10, the apparatus comprises a cutting and trimming station 11 having a central blade 12 and a pair of lateral blades 14, 16 adjusting the width of the sheet so as to obtain two identical separated parts of the desired width.

[0020] Next, the flow 10 reaches a second cutting station 15, having a transversal blade 20 performing a cut substantially perpendicular to said feeding direction. At the outlet of this station, the unreeled sheet exit, dividing the two individual and sided sheets 40, 42, in a feeding mode normally known as *two up* or *dual sheet*.

[0021] The blade 20 can be placed by means of an actuator for continuously varying the position thereof and so as to accordingly continuously vary the length of the envelope sheet which is realized.

[0022] After the second cutting station 15, a second trimming station 17 is provided, anyhow optional, having the function of rounding the angle up of the two individual sheets 40, 42, performing two separated lateral cuts 22, 26 at the external angles of the first flow 10, and a single cut 24 at the centre of the first flow 10 (figure 2).

[0023] In correspondence of said cutting and/or trimming stations, i.e. in correspondence of cutting and/or trimming operations, and in particular after the second cutting station 15 performing said transversal cut, the first paper material flow 10 is deviated substantially by 90° in order to obtain a second feeding line perpendicular to the preceding one.

[0024] With reference to figure 3, a pair of rollers 13 is identified in the enveloping apparatus, governing said first paper flow 10 advancing and operated by a first motor M1, not shown. The transversal blade 20 is shown operated by a distinct motor M2 proving an ups and downs motion thereof.

[0025] Downstream the transversal blade 20, in correspondence of said trimming station 17, the apparatus has two pair of rollers A1 and A2, each operating on one of the two sided envelope papers, as previously cut and trimmed, and operated by a motor M3.

[0026] The two pairs of rollers selectively operates on said sheets in order to start them according to direction deviated by 90° and, at the same time, to separate them. To this regard, the first envelope sheet to be started is shown with the reference number 42 in figure 1, by means of the pair of rollers A2, i.e. the one next to the second feeding direction perpendicular to the preceding one. Then, after a predetermined time, the pair of rollers A1 is operated, starting the next envelope sheet, shown with the reference 40 in figure 1.

[0027] The rollers A1 and A2 form a separation station of said single envelope sheets 44, and start said envelope sheets on a belt defining said second feeding direction perpendicular to the preceding one, along which other

are present that will be described in the following. The belt, shown with the reference number 21 in figures 8 and 9, is operated by a further independent motor M4, not shown.

[0028] The belt 21 defines a first feeding plane, identified by the position of the single envelope sheets.

[0029] It is intended that the separation station will not non serve only in the *two up* mode but also in the a single sheet mode, as in any case said sheets should be separated by a known distance.

[0030] At the mouth of this belt 21, a substantially conventional waste extraction station 46 is provided. The operation of this station, which is capable of eliminating single sheets rather than pairs, is a consequence of the reading performed by sensors 18, 19 at the apparatus inlet.

[0031] Along said second feeding direction a creasing station 51 is provided, proving creasings parallel to the second feeding direction on each sheet. They comprises a pair of blades 50, 52. The first blade 50 produces a central creasing 54, allowing the folding of the single sheet on itself. On the contrary, the second blade 52 operates adjacent to an external edge del single sheet and the respective creasing 56 allows to provide a closure flap. At the outlet of this station 51, the single sheet, now shown with the reference number 58, is ready to be folded.

[0032] Therefore, according to the preceding description, in the method hereby described a separation operation for obtaining distinct single envelope sheets 44, and a creasing operation with creasing lines 54, 56 substantially parallel to said second feeding line are provided in said first paper material flow .

[0033] If feeding derives from a reel, i.e. from an unreeling station 9 (figures 8 and 9), also longitudinal and transversal cutting operations along said first feeding direction are provided, for advantageously perform correctly the separation operation. Furthermore, also a trimming operation is performed, for adjusting the edges of the single envelope sheet.

[0034] After the creasing station 51 envelope sheets and contents are matched. To this regard, the apparatus comprises a second paper material flow 100, composed by contents distinct among them and placed on a second feeding plane and fed along a respective feeding line determined by a feeding plane, e.g. of the sliding type provided with pushing members, for maintaining correctly separated the contents between them. The pushing members are operated by a distinct motor M6 (figure 3).

[0035] Each content is provided with at least one element, e.g. a first sheet or a cover sheet, provided with an indication 110 in particular relating to the envelope sheet with which it should be matched. Such indication, e.g. provided as a alphanumeric or a bar code, can be related to the type of content, the name and/or the address of the addressee and so on. Such indication is detected by an optical reading device 114, for the successive matching.

[0036] Along the contents feeding line 100 several sheet-feeding devices can be provided, for enriching the contents with further elements, the feeding thereof being operationally controlled according to the indication 110 reading on the contents.

[0037] In the apparatus and the method hereby described, said matching takes place intersecting said single envelope sheets and said contents according to feeding planes substantially perpendicular between them.

[0038] According to the present exemplificative embodiment of the apparatus and of the method hereby described, the envelope sheets to be intersected, shown with the reference number 60 in figure 1, before intersecting the second paper material flow, are rotated by 90° about a median rotation axis coinciding with said second feeding direction.

[0039] In this case, they passes from a horizontal arrangement to a vertical arrangement in which the sheets are captured by suitable pulling rollers, not shown, so as to direct the face intended to form the internal part of the envelope towards the second contents flow, instead remaining on a substantially horizontal plane.

[0040] Anyhow, it is intended that according to the same method, the 90° rotation can be also relative to the contents.

[0041] In said vertical arrangement, the rotated envelope sheets follows a descending path. At this point a first glueing station is provided with a pair of devices for placing a glueing line 150, 152 placing respective glueing lines 154, 156 in correspondence of the external edges of the envelope sheets 60 relative to its descending path (figure 4).

[0042] The rotation of the envelope sheet is guided by suitable sliding guides (not shown) operated by a further independent motor M5 (figure 3).

[0043] The matching between envelope sheets and contents is described with reference to figures 5a, 5b, 5c and 5d.

[0044] The vertical envelope sheet 81 and the contents 80 are perpendicular the one to the other and synchronized, in order to the front edge of the contents 80 be substantially incident on the centre line of the vertical envelope sheet 81, preferably in correspondence of said central creasing 54 (figure 5a) so as to the cause a reciprocal flexure of the two margins 84 and 85 (figure 5b).

[0045] Rear to the envelope sheet 81, two pairs of rollers 82, 83 are serially provided, apt to a pick the central creasing 54 and the contents 80 up together and making the two margins 84, 85 of the envelope sheet 81 (figure 5c) closer. Such rollers 82, 83 are operated by an independent motor M7 (figure 3).

[0046] Then, said rollers 82, 83 allow to a push said margins 84, 85 the one against the other, activating the glueing lines 154, 156 previously deposited and forming an envelope 90 full of contents 80 con the flap open and rear facing (figure 1); while possible wastes 92 are drawn from the bottom (figure 5d).

[0047] The flap is then directed rear and downwards.

Then, the envelope 90 is 90° rotated according to a vertical axis, such that the flap development is substantially parallel to the transport direction of the envelopes, the latter coinciding with the feeding direction of the contents 100.

[0048] From here on, the envelopes translate along a further transport line operated by an independent motor M8 (figure 3).

[0049] At this point, it is possible to deposit a glueing line 210 from the bottom, by means of a suitable applying device 204, parallel to the transport direction, after which the flap can be closed by a suitable yoke 212.

[0050] The face 200 of the envelope 90 direct upside is the one without flap, where the address and the stamping are normally placed. To this regard, a printing station 220 is provided for placing, the one, the other or both, after which the printed envelope passes above a further reading device 230 performing the last control, proving possible wastes 232.

[0051] Then, the controlled and closed envelope 234 is sent to a buffer section 236 before the final packaging and mailing. The last reading device 230 can also be used for allowing the routing of the envelopes according to post codes.

[0052] The buffer section defines a feeding line rotated by 90°, i.e. perpendicular to the flap, such that the envelopes can overlap. In this section, the motion is operated by a last motor M9 (figure 3).

[0053] With reference to the figures 6 and 7, an alternative version of method is described, wherein the first paper material flow is initially formed by an unreeling sheet from a reel or by single sheets continuously fed, which are gradually longitudinally separated in two or more single envelope sheets by means of cut parallel to said first feeding direction, as in the preceding example.

[0054] At the trimming station 17 (figure 6), the sheets are cut also forming widows 27 and 28 (figure 7) on the sided sheets which are successively separated.

[0055] After the creasing station 51, a station 71 for applying a respective translucent label 73 for covering the window is provided.

[0056] In this way, the address and the name of the addressee can be directly printed on the contents 100 and then made visible through said widow.

[0057] Instead, with reference to the apparatus arrangement, it comprises an envelope sheets feeding station, e.g. according said *two up* mode. Such station can be realized by the unreeling station 9 previously mentioned, from which said first homogeneous paper material flow 10 is obtained, that is transported along the first feeding line 100.

[0058] Before the 90° diversion, the apparatus comprises a first portion 109 comprising said optical reading devices 18, 19, the first cutting and trimming station 11 and the second cutting station 15 with the transversal blade 20.

[0059] In correspondence of the second trimming station 17, said 90° diversion is placed, from which a second

portion 209 of the apparatus extends, in which the feeding direction of envelope sheets is perpendicular to the preceding one.

[0060] From the second trimming station 17 the second portion 209 comprises a separation station of the envelope sheets, identified by the pairs of rollers A1 and A2 selectively operating on said sheets in order to direct them according to a 90° diverted direction and, at the same time, to space them out.

[0061] Successively, said portion 209, comprising the belt 21 forming a first feeding plane, comprises the waste extraction station 46, the creasing station 51. The second portion 209 ends with the matching station 309 between envelope sheets and contents.

[0062] In this point, said second portion 209 intersects the second paper material flow 100 generated by a linear sequence of devices such as a printer 509 fed by a respective feeding station 409, e.g. a reel or a single sheets, and possibly a cutting and trimming station.

[0063] Then, said sequence can comprise a plurality of sheet feeding devices 609, selectively operated for adding further elements to the contents.

[0064] In correspondence to the matching station 309, the envelope sheets are 90° rotated about a median rotation axis corresponding to said second feeding direction, and then perpendicularly intersects with the contents as previously described.

[0065] After matching, along a further portion 709, a 90° rotation station of each envelope is provided, followed by a glueing and closing station for closing the flap of each envelope, shown with the reference number 809. Such portion end with a control station and in case scrapping incomplete or erroneous envelopes.

[0066] It should be noted that, if the apparatus is formed by detachable modules, each corresponding to the above mentioned stations, it is possible to separate the stations for forming the envelopes from the station for inserting the contents in the envelopes, being possible to feed them with preformed envelopes.

[0067] To the above described enveloping apparatus and method a person skilled in the art, in order to satisfy further and contingent needs, could effect several further modifications and variants, all however encompassed in the protective scope of the present invention, as defined by the appended claims.

Claims

1. An enveloping apparatus, of the type operating with two distinct flows of paper material, in particular a first paper material flow (10) from which envelope-shaped wrappers are formed and a second paper material flow (100) apt to form contents to be wrapped, wherein said first paper material flow has:

* a first feeding direction between a feeding station (9) and a cutting and/or trimming station

(11), from which single envelope sheets exit;
and

* a second feeding direction perpendicular to the preceding one, along which a separation station of said single envelope sheets and a creasing station are provided,

said second paper material flow, formed by distinct contents displaced on a feeding plane and fed along a respective feeding line, intersect said single envelope sheets realizing the enveloping, said feeding plane and said single envelope sheets being substantially perpendicular between them.

2. The apparatus according to claim 1, wherein the first paper material homogeneous flow is generated by the unreeling of a reel in a unreeling station (9).
3. The apparatus according to claim 1, wherein optical reading devices (18, 19) verifying the correctness of the paper material printing forming said first flow are provided.
4. The apparatus according to claim 1 or 2, wherein the cutting and trimming station (11) has a central blade (12) and a pair of lateral blades (14, 16) adjusting the width of the sheet so as to obtain two distinct identical parts, having the desired width.
5. The apparatus according to claim 1, wherein said first and second feeding directions are deviated by substantially 90° between them, said separation station being placed at the beginning of said second feeding direction.
6. The apparatus according to any of the preceding claims, wherein the separation station comprises two pairs of rollers (A1, A2), each operating on one of the two sided envelope papers, selectively operating on said sheets for sending them according to 90° diverted direction and, at the same time, to space them out.
7. The apparatus according to any of the preceding claims, wherein, a creasing station (51) is provided along said second feeding direction, providing on each sheet creasings parallel to the second feeding direction, for providing a central creasing (54), allowing to fold the single sheet on itself, and an external creasing (56), allowing to form a closure flap.
8. The apparatus according to any of the preceding claims, comprising a matching station (309) for matching said envelope sheets with the respective contents, wherein the envelope sheets to be intersected (60) are 90° rotated about a median rotation axis corresponding to said second feeding direction, the contents remaining on a substantially horizontal

plane.

9. The apparatus according to claim 8, wherein a first glueing station providing respective glueing lines (154, 156) is provided in correspondence of external edges of the envelope sheets (60) relative to its descending path.
10. The apparatus according to claim 8, wherein in the matching station (309) the vertical envelope sheet (81) and the contents (80) are perpendicular to one to the other and synchronized, in order to the front edge of the contents (80) be substantially incident on the centre line of the vertical envelope sheet (81), preferably in correspondence of a central creasing (54) so as to the cause a reciprocal flexure of the two margins (84, 85) of the envelope sheet (81).
11. The apparatus according to any of the preceding claims, wherein, after enveloping, the envelope (90) is rotated by 90° according to a vertical axis, such that the flap development is substantially parallel to the envelopes transport direction.
12. The apparatus according to any of the preceding claims, wherein windows (27, 28) are provided in the envelope sheets, a station (71) for applying a respective translucent label (73) to cover the window being provided.
13. An enveloping method, of the type operating with two distinct flows of paper material, in particular a first paper material flow from which envelope shaped wrappers are formed and a second paper material flow apt to form contents to be enveloped, **characterized in that** it comprises the following steps:
 - * providing a first paper material homogeneous flow along a first feeding direction, and deviating said first paper flow substantially by 90° in correspondence of cutting and/or trimming operations of said first paper material flow, obtaining a second feeding line perpendicular to the preceding one;
 - * separating said first paper material flow for providing distinct single envelope sheets, and providing creasing lines substantially parallel to said second feeding line; and
 - * providing a second paper material flow along a respective feeding line, formed by distinct contents resting on a feeding plane,

such that said feeding plane and said single envelope sheets intersects perpendicularly to one to the other, thus enveloping the contents.
14. The method according to claim 13, wherein the envelope sheets, before intersecting the second paper

material flow, are rotated by 90° about a median rotation axis corresponding to said second feeding direction, passing from horizontal arrangement to a vertical arrangement.

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15. The method according to claim 13, wherein the first paper material flow is initially formed by an unreeled sheet from a reel or by single sheets continuously fed, gradually longitudinally separated in two or more single envelope sheets by means of a cut parallel to

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said first feeding direction, and successively trimmed for forming the closure flap, the creasings forming the envelope from the single sheet being provided parallelly to the second feeding direction.

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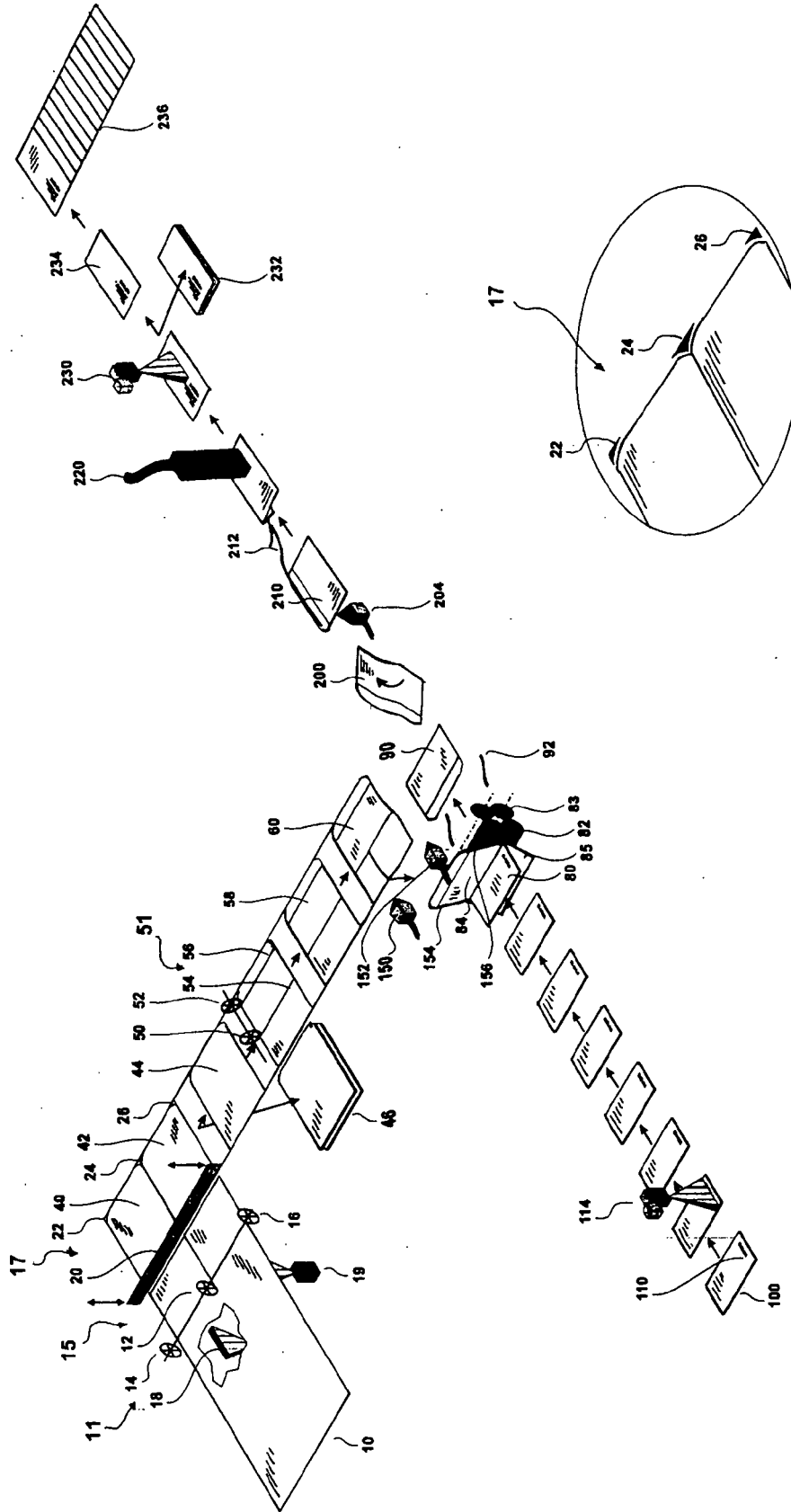


FIG.1

FIG.2

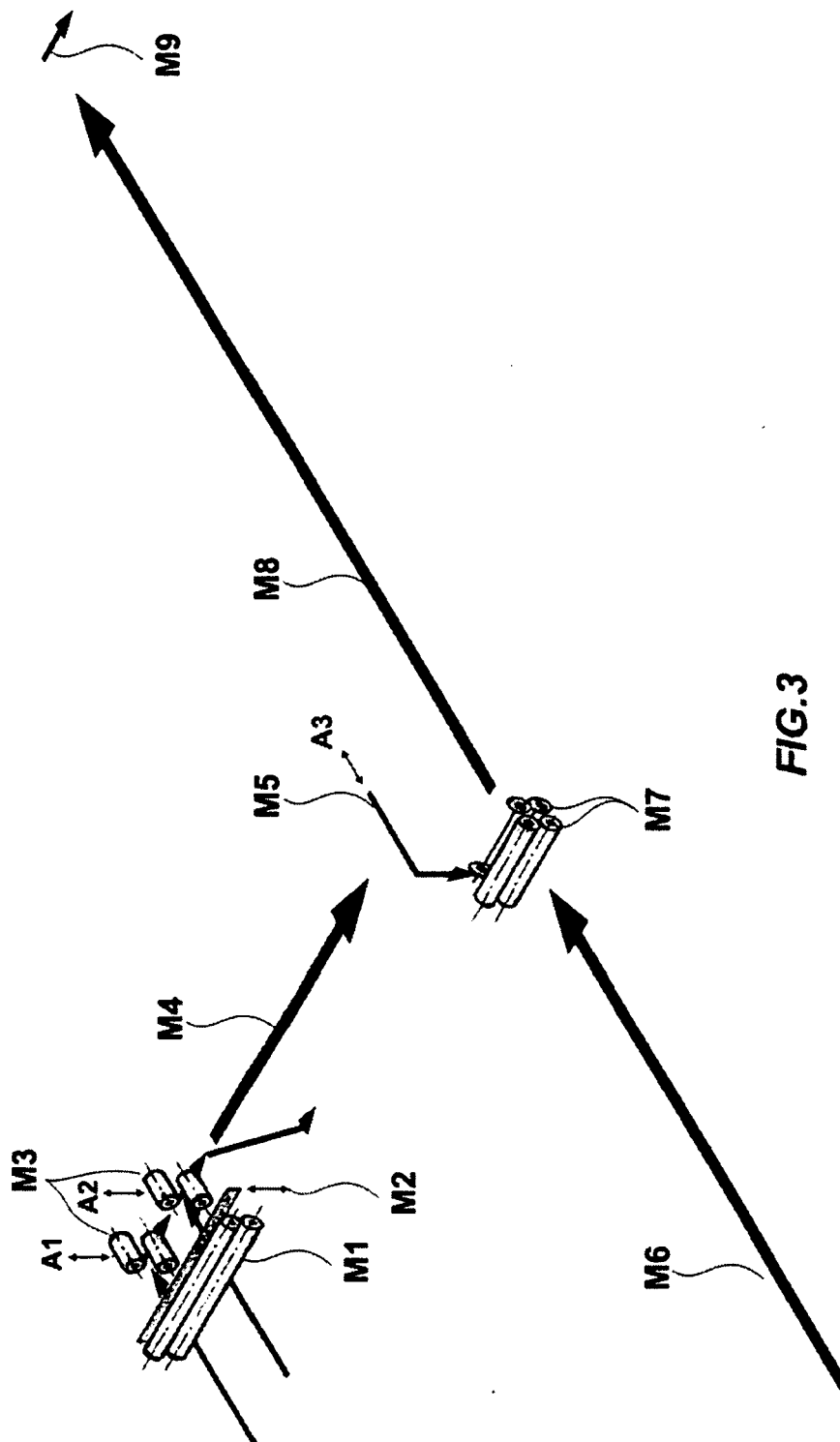


FIG. 3

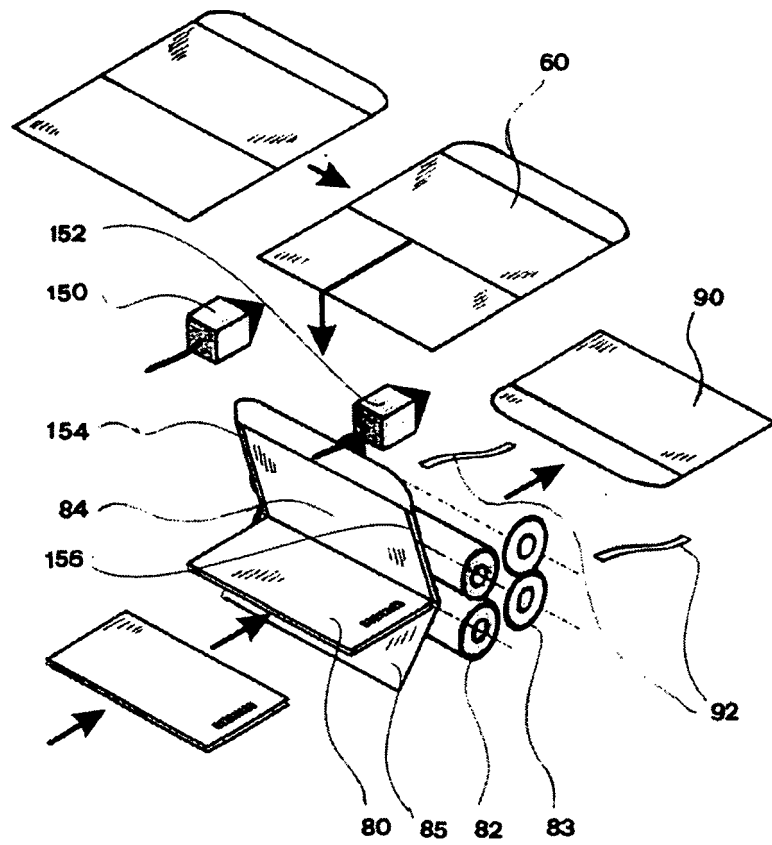


FIG.4

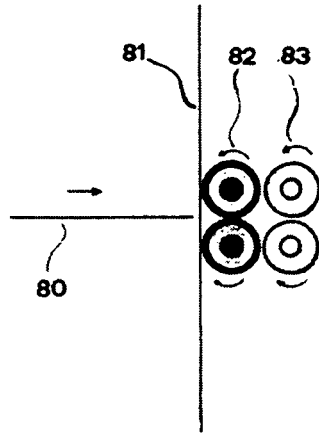


FIG. 5A

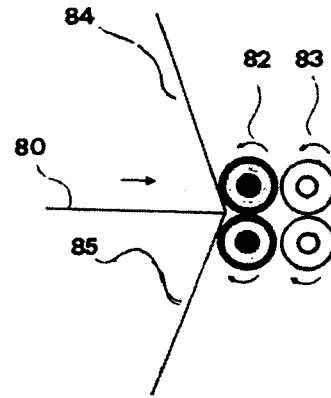


FIG. 5B

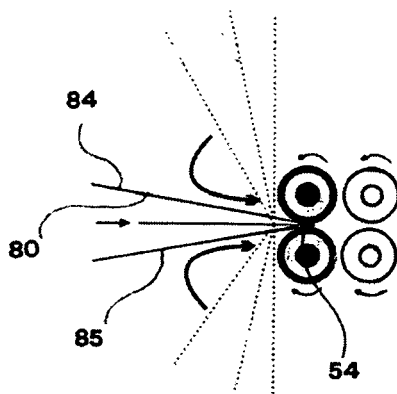


FIG. 5C

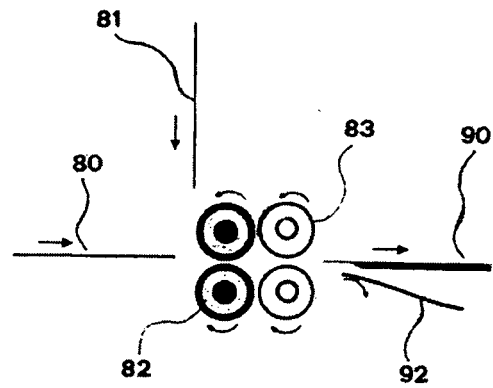
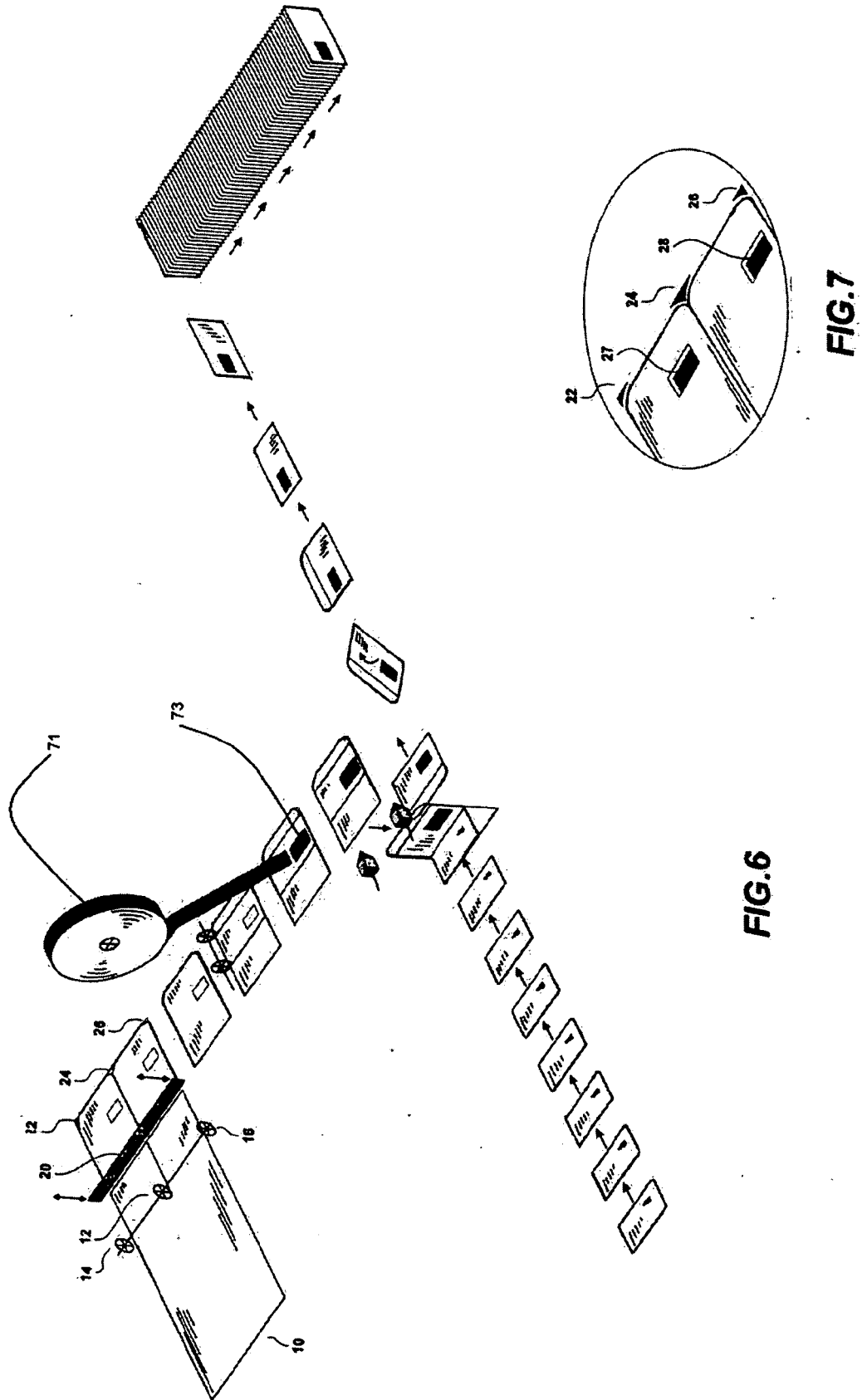


FIG. 5D



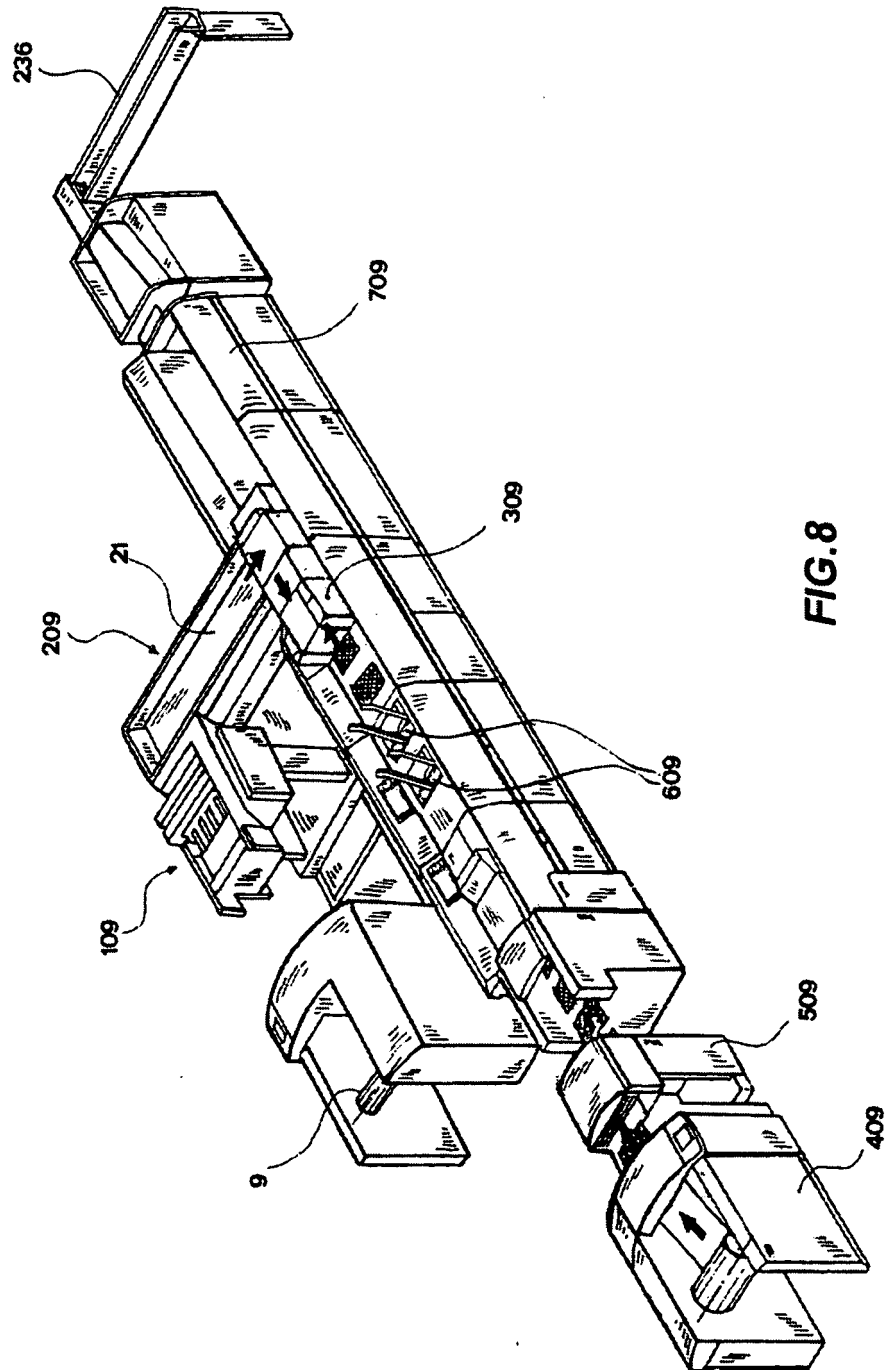


FIG. 8

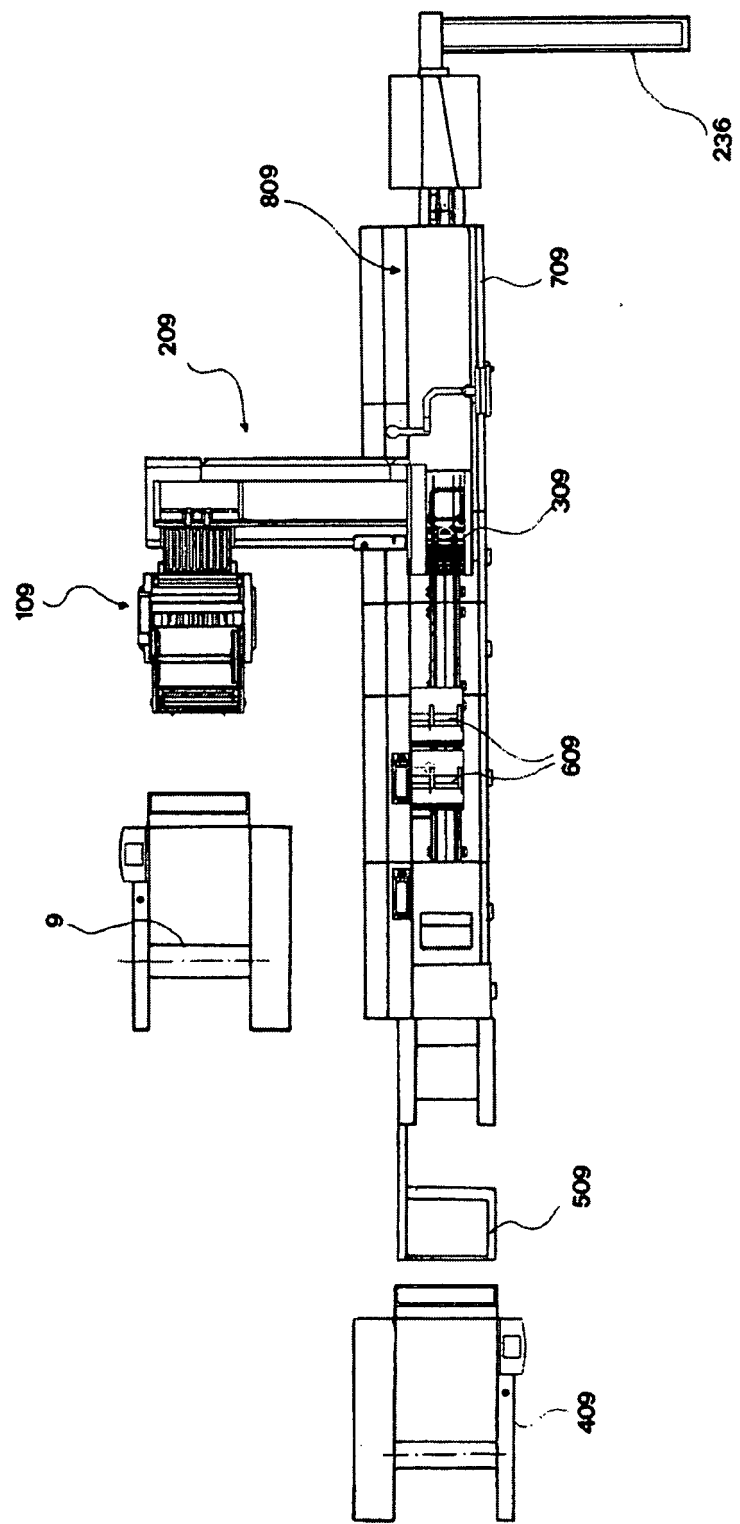


FIG.9



EUROPEAN SEARCH REPORT

Application Number
EP 09 42 5436

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	EP 1 693 187 A2 (PITNEY BOWES INC [US]) 23 August 2006 (2006-08-23) * paragraph [0053]; figures 7-8b *	1-15	INV. B43M3/04 B43M5/04 B31B19/00 B31B41/00
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A	DE 14 36 853 A1 (WINKLER RICHARD; DUENNEBIER KURT) 3 April 1969 (1969-04-03) * page 4, line 18 - page 4, line 32 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B43M B31B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 5 August 2010	Examiner Farizon, Pascal
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EPO FORM 1503 03.82 (P04C01)

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

EP 09 42 5436

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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05-08-2010

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