(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 876 120 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.01.2008 Bulletin 2008/02

(51) Int Cl.:
B65H 21/00 *(2006.01)*

(21) Application number: **06447091.7**

(22) Date of filing: **07.07.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **Punch Graphix International N.V.**
2500 Lier (BE)

(72) Inventors:
- **Hermans, Bram**
  2650 Edegem (BE)
- **Van Weverberg, Erik**
  2640 Morstel (BE)
- **Costrop, Dirk**
  2570 Duffel (BE)

(74) Representative: **Bird, William Edward et al**
Bird Goën & Co.
Klein Dalenstraat 42A
3020 Winksele (BE)

(54) A stand alone splicing device

(57) A stand alone splicing device for splicing a trailing edge of a first web and a leading edge of a second web is disclosed, the first and second web each having a first and a second side edge and a first and a second surface.
The splicing device comprises
• a first web holding means for maintaining the first and second side edge of the first web during engagement and for releasing the first web from engagement such that the device can be removed from the spliced first and second web;
• a second web holding means for maintaining the first and second side edge of the second web during engagement and for releasing the second web from engagement such that the device can be removed from the spliced first and second web;
• a moveable supporting means adapted for being moved into a supporting position for supporting the second surface of the first web along the trailing edge and the second surface of the second web along the leading edge during splicing of the trailing edge and the leading edge, the moveable supporting means adapted for being moved into a device removal position for allowing the device to be removed from the spliced first and second web after release of the first and second web held by said first and second web holding means.

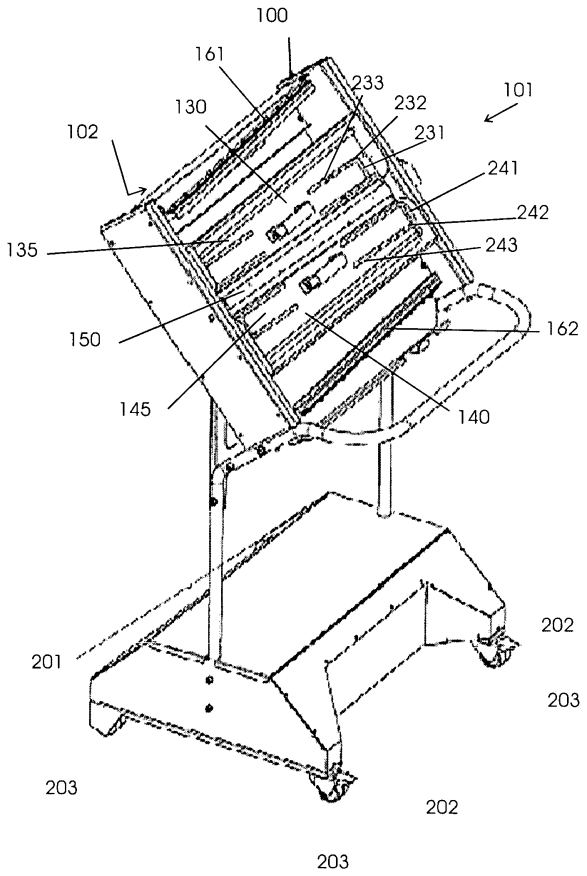


FIG 2

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Description

Technical field of the invention

[0001] This invention relates to movable and removable stand-alone apparatus and methods facilitating splicing operations for rolls of material, e.g. for use with printers.

Background of the invention

[0002] Machines are presently in use for receiving rolls of material in the form of a web of paper, paperboard, label material or film and for supplying this material to various processing operations, such as printing and optional consecutive steps such as sheeting, bag forming or packaging.

[0003] Examples are found in digital printing presses printing from a reel of print medium such as the Xeikon 5000 digital printing press marketed by Punch Graphix International, Lier, Belgium. Predecessors of this press, such as the Xeikon 500D printing systems had an attached unwind system holding reels of print medium or web, such as paper, of up to 50 cm diameter with a weight around 50 kg. This unwind had an integrated splicing position and was meant for receiving and splicing web of the fixed width of 500 mm.

[0004] In these systems, the splicing operation is off line and requires halting the print run.

[0005] Such 50 kg rolls can be manipulated by a single person using lightweight tools but have the disadvantage that in continuous printing, rolls have to be replaced several times in a work shift, the exact frequency depending on the paper caliper and the total length on such a roll of material.

[0006] With the increased success of digital printing, continuous multiple shift operation has become more wide spread and the use of so-called jumbo unwind systems, capable of holding rolls of over 500kg of paper is recommendable to reduce the operator workload related with exchanging reels of print medium. The frequency of reel replacement is reduced to less than once in a work shift and halting the press to exchange the exhausted reel once per work shift or every other work shift is generally acceptable.

In applications like rotational newspaper printing sophisticated tumbling systems for on the fly splicing as described in US6695027 are used. This type of operations however require substantial floor space as in fabrication halls. Floor space for on the fly splicing solutions is typically unavailable in the digital printing pressroom. The bulky on the fly splicing solutions are not of practical use in the current digital printing environments. As printing speeds for digital presses are moderate compared to rotational presses, successful digital print shops typically have multiple presses arranged next to each other in a single room in order to accommodate high printing volumes.

[0007] Commercially available unwind systems that can handle 700 kg rolls typically do not provide a splicing position with proper and sufficient provisions to facilitate the splicing steps of clamping, precise cutting, mounting of tapes and assuring proper joining with appropriate pressure in a controlled relative position.

[0008] Manual splicing requires experienced operators and it is observed that the quality of splices varies significantly between operators and varies from splice to splice.

[0009] Although it is permissible to halt the press for splicing, it is impermissible to lose production due to problems as a consequence of damage in the delicate press internals caused by a poor splice with tape- or web-wrinkles or dog-ears.

Summary of the invention

[0010] The present invention has been made in light of the observation that with delicate transfer systems employing corotrons with fragile corona wires that easily break when the paper is not fully flat and aligned at the join, it is not advisable to rely on the skill of an operator to create good splices time after time without appropriate tools.

[0011] In view of the foregoing, it is evident that there is a need for an apparatus and method capable of carrying out splicing operations in a predictable and reproducible manner and without the necessity for a high degree of operator skill. An advantage of the present invention is to provide a tool for the case when the web already in the machine differs in calliper and/or width from the new roll to be mounted. It is an advantage of some of the splicing devices of the present invention to enable an operator to make possible reproducible centered splicing when the new reel of material, e.g. print medium such as web, has a different width than the reel already present in the machine. It is an advantage of some splicing devices as subject of the present invention to provide an apparatus and method which will make possible reproducible splicing when the new reel of material, e.g. print medium such as web, has a different caliper than the reel already present in the machine. It is an advantage of some splicing devices as subject of the present invention that only one operator is needed to make a splice, i.e. a splice which at least meets the quality requirements of splices to be provided. It is an advantage of some splicing devices as subject of the present invention to make the quality of the splices less dependent on the dexterity of the operator. It is an advantage of some splicing devices as subject of the present invention to reduce machine downtime due to qualitatively unacceptable splices or machine damage due to qualitatively unacceptable splices. It is an advantage of some splicing devices as subject of the present invention to facilitate the splicing operations under the form of a stand-alone device that can be used with a variety of unwind equipment. It is an advantage of some splicing devices as subject of the present

invention to facilitate the splicing operations under the form of a stand-alone device that be brought in place for the splicing and can be removed after the splice is made while taking up little space. It is an advantage of some splicing devices as subject of the present invention to facilitate the splicing operations under the form of a stand-alone device that can be shared between a series of processing or printing systems taking away the need to have a splicing tool for every unwind-processing combination.

[0012] The above objective is accomplished by a method and device according to the present invention.

[0013] According to a first aspect of the present invention, a stand alone splicing device for splicing a trailing edge of a first web and a leading edge of a second web, the first and second web each having a first and a second side edge and a first and a second surface, the splicing device comprises

- a first web holding means for maintaining the first and second side edge of the first web during engagement and for releasing the first web from engagement such that the device can be removed from the spliced first and second web;
- a second web holding means for maintaining the first and second side edge of the second web during engagement and for releasing the second web from engagement such that the device can be removed from the spliced first and second web;
- a moveable supporting means adapted for being moved into a supporting position for supporting the second surface of the first web along the trailing edge and the second surface of the second web along the leading edge during splicing of the trailing edge and the leading edge, the moveable supporting means adapted for being moved into a device removal position for allowing the device to be removed from the spliced first and second web after release of the first and second web held by said first and second web holding means.

[0014] Possibly at least one of said first and said second holding means is adapted to be moveable into at least two positions. The moveable supporting means and the holding means may be arranged, e.g. positioned such that nothing obstructs removal of the stand alone splicing device from the spliced first and second web.

[0015] According to some embodiments of the present invention, the moveable supporting means may be moved into its supporting position and into its device removal position by sliding the moveable supporting means away from the second surface of the second web and the second surface of the first web. The moveable supporting means may be adapted to be slid in a lateral direction with respect to the spliced first and second web.

[0016] According to some embodiments of the present invention, at least one of said first and said second holding means may be a moveable web holding means, adapted to be moved into a first position for engaging a web and moved into a second position of releasing the web held by the moveable web holding means. Possibly both the first web holding means and the second web holding means may be moveable web holding means.

[0017] According to some embodiments of the present invention, the moveable web holding means may comprise a cutting guide for allowing cutting of the edge of the web being held by the moveable web holding means when the moveable web holding means is moved into its first position. The cutting guide may provide the trailing or leading edge, which edge and each of the side edges of the web being held by the moveable web holding mean may be inclined at an angle different from 90°.

[0018] According to some embodiments of the present invention, the moveable web holding means may be moveable between a first position and a second position by rotating the web holding means over an angle of 30° to 180° about an axis, which axis is substantially parallel with the web held by the moveable web holding means. Possibly, said axis may be substantially perpendicular to the direction of the side edge of the web held by the moveable web holding device.

[0019] According to some embodiments of the present invention, the moveable web holding means may comprise a plate for contacting the first surface of the web being held by the moveable web holding means, the plate extending from the first side edge to the second side edge the web being hold by the moveable web holding means. The plate may have a first side being substantially parallel to said axis

[0020] According to some embodiments of the present invention, each of the first holding means and the second holding means may comprise a first clamping device for claming the first web side edge and a second clamping device for clamping the second web side edge. The clamping devices may be laterally adjustable for holding webs of different widths. According to some embodiments of the present invention, the plate comprises magnetisable material, each of the clamping devices comprises a magnet for clamping the side edge between the magnet and the plate.

[0021] According to a second aspect of the present invention, a method to splice a trailing edge of a first web to a leading edge of a second web, comprising the steps of

- Providing a stand alone splicing device according to the first aspect of the present invention;
- Holding the first web by means of the first web holding means
- Holding the second web by means of the second web holding means
- Providing support to the second surface of the first web and the second surface of the second web by means of the supporting means, thereby bringing the trailing edge and the leading edge in abutting or overlapping relation

- Splicing the trailing and the leading edge
- Moving the supporting means into the device removing position
- Disengaging the first and second holding means
- Removing the stand alone splicing device from the spliced first and second web.

[0022] According to some embodiments of the present invention, the method may comprise the additional steps of

- Cutting a trailing edge to the first web
- Cutting a leading edge to the second web

[0023] According to embodiments of the present invention, the method may comprise the additional step of providing adhesive tape to the trailing and/or leading edge prior to the step of providing support to the second surface of the first web and the second surface of the second web by means of the supporting means.

[0024] Particular and preferred aspects of the invention are set out in the accompanying independent and dependent claims. Features from the dependent claims may be combined with features of the independent claims and with features of other dependent claims as appropriate and not merely as explicitly set out in the claims.

[0025] Although there has been constant improvement, change and evolution of devices in this field, the present concepts are believed to represent substantial new and novel improvements, including departures from prior practices, resulting in the provision of more efficient, stable and reliable devices of this nature.

[0026] The teachings of the present invention permit the design of improved methods and apparatus for various processing operations, such as printing and optional consecutive steps such as sheeting, bag forming or packaging. The transportable or movable stand alone slicing device can be designed for optimum splicing only, and does not need to take into account the complexity of the apparatuses onto which it is to be used. Neither are the requirements of a splicing device to be taken into account when developing processing operations, such as printing and optional consecutive steps such as sheeting, bag forming or packaging.

[0027] The above and other characteristics, features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention. This description is given for the sake of example only, without limiting the scope of the invention. The reference figures quoted below refer to the attached drawings.

Brief description of the drawings

[0028] Fig. 1 a and Fig. 1 b are schematically views of a stand alone splicing device in accordance with an embodiment of the present invention.
Fig. 2 and Fig. 3 are more detailed views of the stand alone splicing device of Fig. 1.
Fig. 4 is a schematically view of the method to provide a splice to a trailing and a leading edge of two webs in accordance with an embodiment of the present invention.

[0029] In the different figures, the same reference signs refer to the same or analogous elements.

Description of illustrative embodiments

[0030] The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes. The dimensions and the relative dimensions do not correspond to actual reductions to practice of the invention.

[0031] Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other sequences than described or illustrated herein.

[0032] Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. It is to be understood that the terms so used are interchangeable under appropriate circumstances and that the embodiments of the invention described herein are capable of operation in other orientations than described or illustrated herein.

[0033] It is to be noticed that the term "comprising", used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It is thus to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. Thus, the scope of the expression "a device comprising means A and B" should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

[0034] Similarly, it is to be noticed that the term "coupled", also used in the claims, should not be interpreted as being restricted to direct connections only. Thus, the scope of the expression "a device A coupled to a device

B" should not be limited to devices or systems wherein an output of device A is directly connected to an input of device B. It means that there exists a path between an output of A and an input of B which may be a path including other devices or means.

[0035] The following terms are provided solely to aid in the understanding of the invention. These definitions should not be construed to have a scope less than understood by a person of ordinary skill in the art.

[0036] The term 'trailing edge' is to be understood as the final edge of the web in use. The trailing edge is exposed when the roll of material is exhausted.

[0037] The term 'leading edge' is to be understood as the first edge of a new web to be spliced to the web in use, i.e. to the trailing edge thereof.

[0038] The term 'side edge' is to be understood as the edge of the web which, when wound on the reel, provides a side of the reel.

[0039] The term 'stand-alone splicing device' is to be understood as a device that supports the joining of a leading edge, e.g. of a new reel of paper or web, to the trailing edge of paper or web, e.g. as separated from an exhausted reel to be replaced. The device can be moved to and removed from the position in which the splicing is to be carried out. The device is therefore not part of nor permanently connected to another device such as a printer.

[0040] The term 'engaging" is to be understood as causing to maintain, i.e. hold, the web in a fixed relative position to the web holding means.

[0041] The term 'disengaging' or 'releasing' is to be understood as interrupting the holding action of the web in its fixed relative position to the web holding means and removing possible parts of the web holding means from being present at the second surface of the web held by the web holding means.

[0042] The invention will now be described by a detailed description of several embodiments of the invention. It is clear that other embodiments of the invention can be configured according to the knowledge of persons skilled in the art without departing from the true spirit or technical teaching of the invention, the invention being limited only by the terms of the appended claims.

[0043] Fig. 1 a shows schematically a side view of a stand alone splicing device 100 according to the first aspect of the present invention. Fig. 1 b shows schematically a top view of a stand alone splicing device 100. The splicing device 100 is to splice the trailing edge 111 of a first web 110 and the leading edge 121 of a second web120. The first and second web each have a first side edge 112, respectively 122, and a second side edge 113 respectively 123. The first and second web each have a first surface 114 respectively 124, and a second surface 115 respectively 125.

[0044] The splicing device comprises:

- a first web holding means 130 for maintaining the first and second side edge of the first web 110 during engagement. The web holding means as adapted for releasing the first web from engagement such that the device can be removed from the spliced first and second web:
- a second web holding means 140 for maintaining the first and second side edges of the second web 120 during engagement; The web holding means as adapted for releasing the first web from engagement such that the device can be removed from the spliced first and second web:
- a moveable supporting means 150 adapted for being moved into a supporting position, which situation is shown in Fig. 1 a and Fig. 1 b, for supporting the second surface 115 of the first web 110 along the trailing edge 111 and the second surface 125 of the second web 120 along the leading edge 121 during splicing of the trailing edge and the leading edge. The moveable supporting means 150 is adapted for being moved, e.g. in a sliding manner. For the splicing device shown in Fig. 1 a and Fig. 1 b, moving of the supporting means 150, such as a supporting bar, is done by sliding the supporting means from a supporting position, in a sliding direction 151, which direction is in the lateral direction with respect to the web, into a device removal position, in which there is no contact along the second surface of the second web and the second surface of the first web with the supporting means 150 and in fact the supporting means is no longer adjacent to the second surfaces. Having the web supporting means brought in this position, and having the spliced first and second web released from the first and second web holding means nothing obstructs removal of the stand alone splicing device from the spliced first and second web. There is therefore unobstructed access to the second surfaces.

Thus, by removing the supporting means from being adjacent to the second surface of both the first and second web and by so doing allowing unobstructed access to the first and second webs, it is possible to completely remove the splicing device 100 from the joined first and second web after the webs have been spliced.

[0045] The first web holding means 130 is adapted for releasing the first web from engagement such that the device can be removed from the spliced first and second web i.e. for providing unobstructed access to the second surface 115 of the first web 110 during disengagement of the web from the splicing device when the splice has been made and the splicing device is to be removed from the apparatus using the web. Similarly the second web holding means 140 is adapted for releasing the first web from engagement such that the device can be removed from the spliced first and second web i.e. for providing unobstructed access to the second surface 125 of the second web during disengagement of the web from the splicing device.

[0046] Preferably, at least one of the first web holding means 130 and the second web holding means 140 are

moveable web holding means. In the more preferred embodiments according to the present invention both the first web holding means 130 and the second web holding means 140 are moveable web holding means. Movable holding means are moveable between a first position (as shown in Fig. 1 a and Fig. 1 b in dotted lines) for engaging the first and second side edge of the web held by said moveable web holding means and a second position, (as shown in Fig. 1 a and Fig. 1 b in full lines) for permitting support of the second surface 115 and 125 of the webs held by the moveable web holding means 130 respectively 140 by the supporting means 150 during splicing.

[0047] The moveable web holding means, which in the embodiment of Fig. 1a and Fig. 1 b refers to both the first web holding means 130 and second web holding means 140, are moveable between a first position and a second position by rotating the web holding means over an angle α of 30° to 180°, more preferentially 90° to 180° about an axis 131 respectively 141, which axis is substantially parallel with the plane of the web 110, respectively 120, which web is held by the moveable web holding means 130 and 140. It is understood that when more than one web holding means is rotatable, the angles of rotation may be identical, but can optionally also be different from each other. For both the first web holding means 130 and second web holding means 140, the axis 131 and 141 are substantially perpendicular to the direction of the side edges 112 and 113, respectively 122 and 123, of the web 110 or 120, held by the moveable web holding device 100.

[0048] This rotation about the relevant axis also facilitates the engagement of the web in the web holding device, when the web holding device is placed in its first position. The web 110 is brought in the splicing device 100 from the lower side (indicated 102) and is bent in order to contact the web holding means 130. The operator, facing the web holding means from the upper side 101, can position the web 110 onto the web holding means, and activate the engagement of the web holding means. Similarly the web 120 is brought into the splicing device 100 from the lower side 102 and is bent to contact the web holding means 140. The operator can position the web 120 on the web holding means 140, and activate the engagement of the web holding means.

[0049] The web holding means may be provided with elements facilitating the engagement, i.e. facilitating the correct positioning of the web in the splicing device and fixing, e.g. by clamping, the web to the web holding device in a fixed relative position.

[0050] Each of the web holding means 130 and 140 may be provided with two laterally moveable clamping devices 132 and 133, respectively 142 and 143, laterally moveable as indicated by reference 135 and 145, respectively. This facilitates the holding of webs having variable widths and also facilitates splicing two webs having different widths. The useful web widths applicable for the splicing device as subject of the present invention preferably ranges from 200 mm to 540 mm

[0051] The clamping device 132 and 133, respectively 142 and 143, are provided on a plate of the web holding means, i.e. plate 134 respectively 144, which is to contact the first web surface 114 or respectively 124. The plate 134 extends from the first side edge 112 to the second side edge 113 of the web 110, so support is provided to the web in lateral direction of the web. The plate 144 extends from the first side edge 122 to the second side edge 123 of the web 120, so support is provided to the web in lateral direction of the web.

[0052] In a preferred embodiment, the plates 134 and 144 comprise or even consist of magnetisable material, e.g. steel. The clamping devices 132 and 133, respectively 142 and 143, are magnets positioned to contact the second surface of the web to be clamped. The magnets are to clamp a part of the side edge between the plate and its lower surfaces. The magnets can be moved in a direction 136 respectively 146, which direction is perpendicular to the second web surface, i.e. surface 115 respectively 125. The use of magnets facilitates the splicing of webs having different calipers.

[0053] Prior to engagement of the web by the web holding means, i.e. prior to providing a fixed relative position between the web holding means and the web held by the web holding means, the web holding means is brought in its first position. The web is first positioned correctly on plate of the web holding means. The clamping devices are moved in a direction perpendicular to the second web surface and away from the plate, to create a gap between the plate and the lower side of the magnet, and are then laterally moved towards the side edge of the web to be clamped, until a small part of this side edge is located between the magnet and the plate. The magnet is then moved in a direction perpendicular to the second web side, towards the second surface to engage the clamping device, i.e. to clamp and hold the web. When both the clamping devices are engaging a side edge of the web to the plate, the web is held by the web holding means in a fixed relative position.

[0054] After both web holding means are brought, e.g. rotated, into their second position, a splice between the leading and trailing edges is completed by conventional means using the abutting or overlapping relation of the trailing and the leading edge.

[0055] When the splice has been made, the supporting means 150 is removed from its presence at the second surface 115 and 125 of both the first and second web. Also the magnets are moved in a direction perpendicular to the second web surface, away from the web surface. The holding of the web is thus ended. The magnets are moved laterally away from the side edges.

[0056] As no element of the splicing device 100 is now present at the second side 102 of the device and there is unobstructed access to the web, the slicing device 100 can easily be removed from the spliced webs.

[0057] It is understood that the clamping means have the possibility to be activated and deactivated from both sides of the plate. They can be activated or deactivated

from the device side 101 when the moveable web holding means are in both their first and second position.

[0058] The plates 134 and 144 of the web holding means 130 respectively 140 are given a shape having one edge substantially parallel to the axis of rotation 131 respectively 141, of the plate.

[0059] The moveable web holding means 130 and 140 each comprise, optionally, a cutting guide 161 and 162 for allowing cutting of the edge of the web being held by the moveable web holding means when the moveable web holding means is moved into its first position. The cutting guide 161 and 162 may be used to prepare and finish the trailing or leading edge to the web, as the case may be. The leading or trailing edges edge and each of the side edges of the web being held by the moveable web holding mean can be under an angle different from 90°, preferably in a range of 90° to 110°, such as more preferred in the range of 91° to 97° or even more preferred in the range of 93° to 94)

[0060] Optionally, the plate of the moveable web holding means may have one side 138, respectively 148, cooperating with the cutting guide 161 and 162, which plate side is inclined compared to the side edge of the web to be held.

[0061] The web holding means may also be provided with rulers 170 to indicate the position of the web in relation to the other web holding means.

[0062] It is understood that, in case the stand-alone splicing device has one or two web holding means which are not moveable or fixed, the step of bringing the web holding means in a fist and second position is not executed for the fixed web holding means. However all other steps are taken in a similar way using the fixed web holding means. Possibly, the supporting means provided a cutting guide for cutting the edge of the web held by the fixed web holding means.

[0063] A more detailed view of the splicing device of Fig. 1 a and 1 b is shown in Fig. 2 and Fig. 3. The splicing device is positioned on a floor stand 201, having wheels 203 that can be locked using appropriate locking means 202. The splicing device is optionally oriented inclined to the horizontal plane to facilitate the positioning of the splicing device in front of the webs to be spliced on large rolls. The moveable web holding means 130 and 140 are positioned in their second position. The supporting means 150 are in the position where it is present at the second surface of both the first and second webs. As more clearly shown in Fig. 2 and Fig. 3, each of the clamping means, e.g. magnets, can be activated and deactivated when the web holding means are positioned in the second position. The clamping means comprises handles 231 and 242, which have at least one, but as shown typically two studs 232, 242 extending through the plates 135 respectively 145. The studs can slide into a slit 233, 243, thereby allowing the clamping means to be moved laterally towards and away from the side edge of the web to be held. As more clearly shown in Fig. 3, at the other side of the clamping means 132, the clamping means are provided with a magnet 234 and a second handle 235 to enable manipulation, i.e. activation/deactivation of the clamping device, when the web holding means is positioned in its first position.

[0064] It is understood that the features shown in Fig. 2 and Fig. 3 for the clamping device 142 are provided in similar or identical way to clamping devices 132, 133 and 143.

[0065] According to a second aspect of the present invention, a method to splice a trailing edge of a first web to a leading edge of a second web is provided. As schematically shown in Fig. 4, a method comprises the steps of

- Providing a stand alone splicing device according to the first aspect of the present invention. The splicing device is brought in line with, e.g. in front of the webs to be spliced. This step is referred to by "A" in Fig. 4. e.g. the stand alone splicing device 100 is brought in the vicinity of the unwind device equipped with a new reel.

- Holding the first web 110 by means of the first web holding means 130 and holding the second web 120 by means of the second web holding means 140. These steps are shown in Fig. 4 "B". The trailing edge of the web in use and the leading edge of the new web are fed into the device 100 for clamping with the adjustable clamping means. As shown in Fig. 4, when moveable web holding means 130 and 140 are used, the web holding means 130 and 140 are brought into their first position, and the web holding means are engaging the webs. No other element of the splicing device except the supporting means 150 and possibly one or more overlapping parts of clamping devices 132, 142 are facing the second surfaces of the webs 110 and 120 i.e. are present at the second surface of at least one of the firs or second web.

[0066] The second surfaces 115 and 125 of the webs are facing towards the front side 101 of the splicing device 100. In order to hold the webs, the clamping means are brought in position along the side edges of the webs.

- optionally, as shown in Fig. 4 "C", the operator is to prepare the trailing edge by cutting the trailing edge 111 of the first web 110 and to prepare the leading edge of the new roll by cutting the leading edge 121 of the second web 120 using the cutting guides present in the splicing device. Along one of the guides in a guide part, a controlled new edge to the trailing part of the first web is cut, and along one of the guides in a guide part a controlled new edge to the leading part of the second web is cut. Optionally, prepared trailing and leading edges are already provided prior to placing the splicing device in line with the webs to be spliced.

• as shown in Fig. 4 "D", the trailing and leading edges are provided with a joining means such as an adhesive tape or any other useful means to, later on, create the splice.
• As shown in Fig. 4 "E", support is provided to the second surface of the first web and the second surface of the second web by means of the supporting means, whereby the trailing edge and the leading edge are brought into abutting or overlapping relation. When moveable, e.g. rotatable web holding means are used as shown in Fig. 4, the support is provided by rotating the two web holding means 130 and 140 towards the support means 150. As shown in Fig. 4 E, the first web holding means and the second web holding means of the device are moved, relatively (holding the respective webs) in what is essentially a rotation of between 90 and 180 degrees along an axis as such turning the clamped web upside down. It is turned from a so-to-say opened to a closed position for fixing a first joining means such as a tape and optionally mounting a second joining means such as a tape after closing the device.
• After the support is provided, a splice is made to the trailing and the leading edge, e.g. by properly fixing the edges to each other using joining means such as a tape, which tape may already have been installed on the trailing and/or leading edge.
• As shown in Fig. 4 F, the supporting means is moved to the position for device removal, e.g. as shown in Fig. 4 F, by sliding the supporting means in lateral direction out of the splicing device.
• As shown in Fig. 4 F, the first and second holding means are disengaged, in this particular embodiment by moving the clamping means of the web holding means in a lateral direction away from the side edge of the first and second web.
• The stand alone splicing device is now disengaged from the spliced web and can be removed from the spliced webs.

[0067] It is to be understood that although preferred embodiments, specific constructions and configurations, as well as materials, have been discussed herein for devices according to the present invention, various changes or modifications in form and detail may be made without departing from the scope and spirit of this invention.

[0068] For example, the clamping devices may be provided as devices which can be adapted for proving unobstructed access to the second surface of the first web during disengagement by rotation, whereby the part present to contact the second surface of the web hold, is rotated away from the second surface. Alternatively the web holding means may hold the web using air pressure or by vacuum, for example, holding the web to the holding means by creating a vacuum between the holding means and the web to be hold.

[0069] The supporting means may be moved between its two positions by rotation, e.g. rotating around an axis being perpendicular to the web surfaces and located e.g. at an outer side of the splicing device.

Claims

1. A stand alone splicing device for splicing a trailing edge of a first web and a leading edge of a second web, the first and second web each having a first and a second side edge and a first and a second surface, the splicing device comprising

   • a first web holding means for maintaining the first and second side edge of the first web during engagement and for releasing the first web from engagement such that the device can be removed from the spliced first and second web;
   • a second web holding means for maintaining the first and second side edge of the second web during engagement and for releasing the second web from engagement such that the device can be removed from the spliced first and second web;
   • a moveable supporting means adapted for being moved into a supporting position for supporting the second surface of the first web along the trailing edge and the second surface of the second web along the leading edge during splicing of the trailing edge and the leading edge, the moveable supporting means adapted for being moved into a device removal position for allowing the device to be removed from the spliced first and second web after release of the first and second web held by said first and second web holding means.

2. A stand alone splicing device according to claim 1, wherein the moveable supporting means can be moved into its supporting position and into its device removal position by sliding the moveable supporting means away from the second surface of the second web and the second surface of the first web.

3. A stand alone splicing device according to claim 1, wherein the moveable supporting means is adapted to be slid in a lateral direction with respect to the spliced first and second web.

4. A device according to claim any one of the claims 1 to 3, wherein at least one of said first and said second holding means is a moveable web holding means, adapted to be moved into a first position for engaging a web and moved into a second position of releasing the web held by the moveable web holding means.

5. A device according to claim 4, wherein both the first web holding means and the second web holding means are moveable web holding means.

6. A stand alone splicing device according to claim 4 or 5, wherein the moveable web holding means comprises a cutting guide for allowing cutting of the edge of the web being held by the moveable web holding means when the moveable web holding means is moved into its first position.

7. A stand alone splicing device according to claim 6, wherein the cutting guide provides the trailing or leading edge, which edge and each of the side edges of the web being held by the moveable web holding mean are inclined at an angle different from 90°.

8. A stand alone splicing device according to any one of the claims 4 to 7, wherein the moveable web holding means is moveable between a first position and a second position by rotating the web holding means over an angle of 30° to 180° about an axis, which axis is substantially parallel with the web held by the moveable web holding means.

9. A stand alone splicing device according to claim 8, wherein said axis is substantially perpendicular to the direction of the side edge of the web held by the moveable web holding device.

10. A stand alone splicing device according to any one of the claims 8 to 9, wherein the moveable web holding means comprises a plate for contacting the first surface of the web being held by the moveable web holding means, the plate extending from the first side edge to the second side edge the web being hold by the moveable web holding means.

11. A stand alone splicing device according to claim 10, wherein the plate has a first side being substantially parallel to said axis

12. A stand alone splicing device according to any one of the claims 1 to 11, wherein each of the first holding means and the second holding means comprises a first clamping device for claming the first web side edge and a second clamping device for clamping the second web side edge.

13. A stand alone splicing device according to claim 12, wherein the clamping devices are laterally adjustable for holding webs of different widths.

14. A stand alone splicing device according to any one of the claims 12 to 13, wherein the plate comprises magnetisable material, each of the clamping devices comprises a magnet for clamping the side edge between the magnet and the plate.

15. A method to splice a trailing edge of a first web to a leading edge of a second web, comprising the steps of

- Providing a stand alone splicing device according to any one of the claims 1 to 14;
- Holding the first web by means of the first web holding means
- Holding the second web by means of the second web holding means
- Providing support to the second surface of the first web and the second surface of the second web by means of the supporting means, thereby bringing the trailing edge and the leading edge in abutting or overlapping relation
- Splicing the trailing and the leading edge
- Moving the supporting means into the device removing position
- Disengaging the first and second holding means
- Removing the stand alone splicing device from the spliced first and second web.

16. A method to splice a trailing edge of a first web to a leading edge of a second web according to claim 15, comprising the additional steps of

- Cutting a trailing edge to the first web
- Cutting a leading edge to the second web

17. A method to splice a trailing edge of a first web to a leading edge of a second web according to claim 15 or 16, comprising the additional step of providing adhesive tape to the trailing and/or leading edge prior to the step of providing support to the second surface of the first web and the second surface of the second web by means of the supporting means.

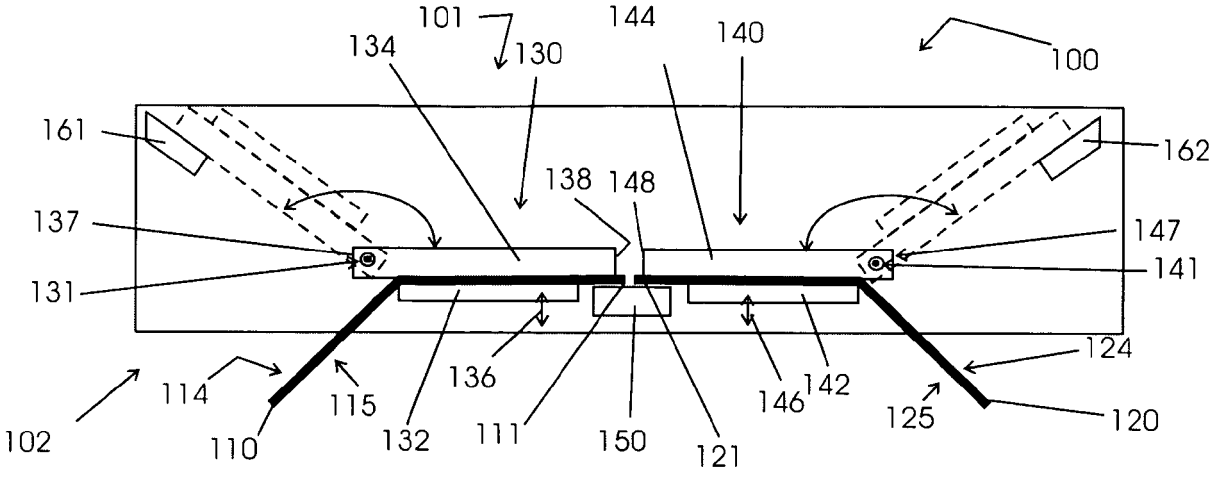

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FIG 1a

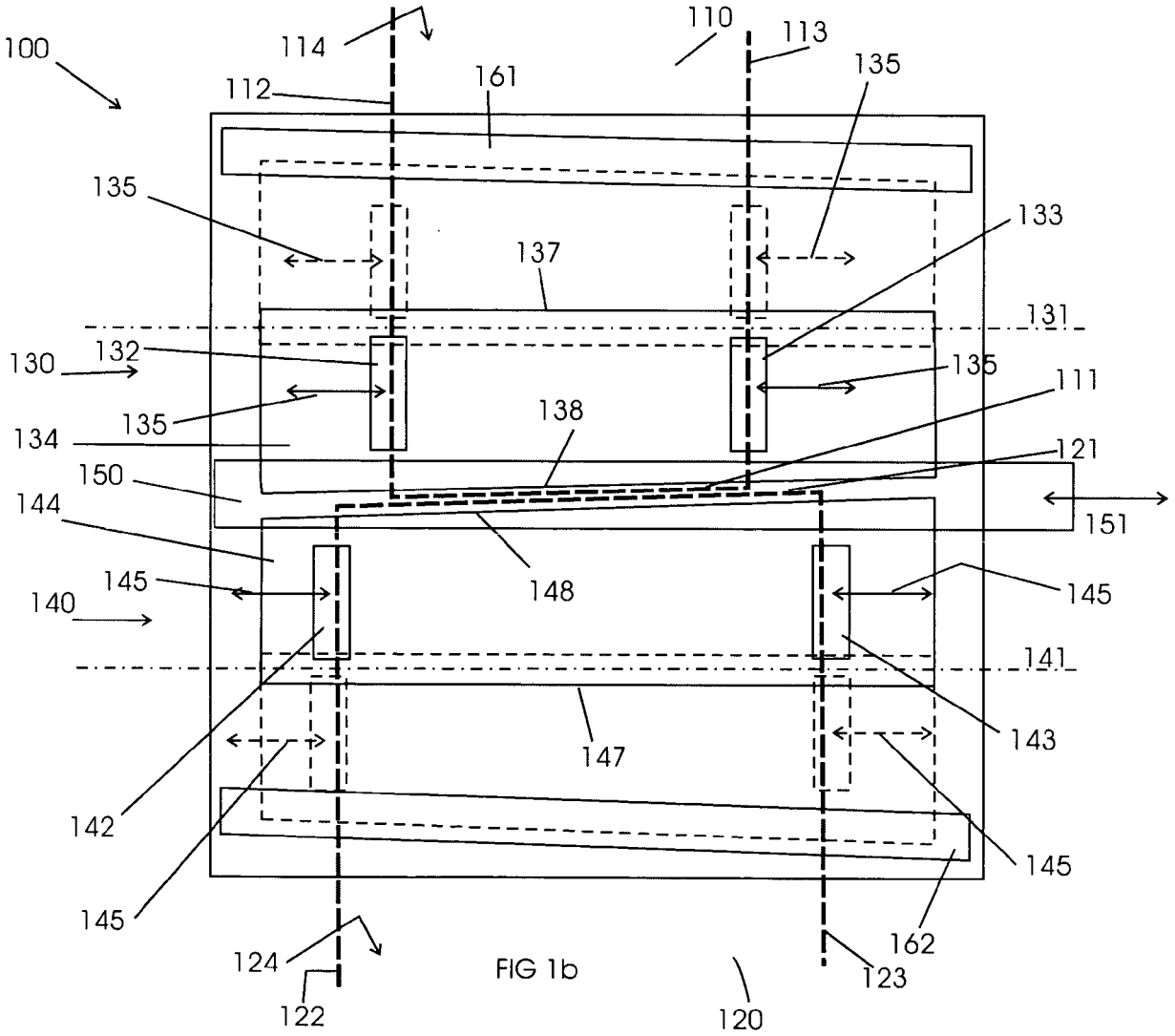

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FIG 1b

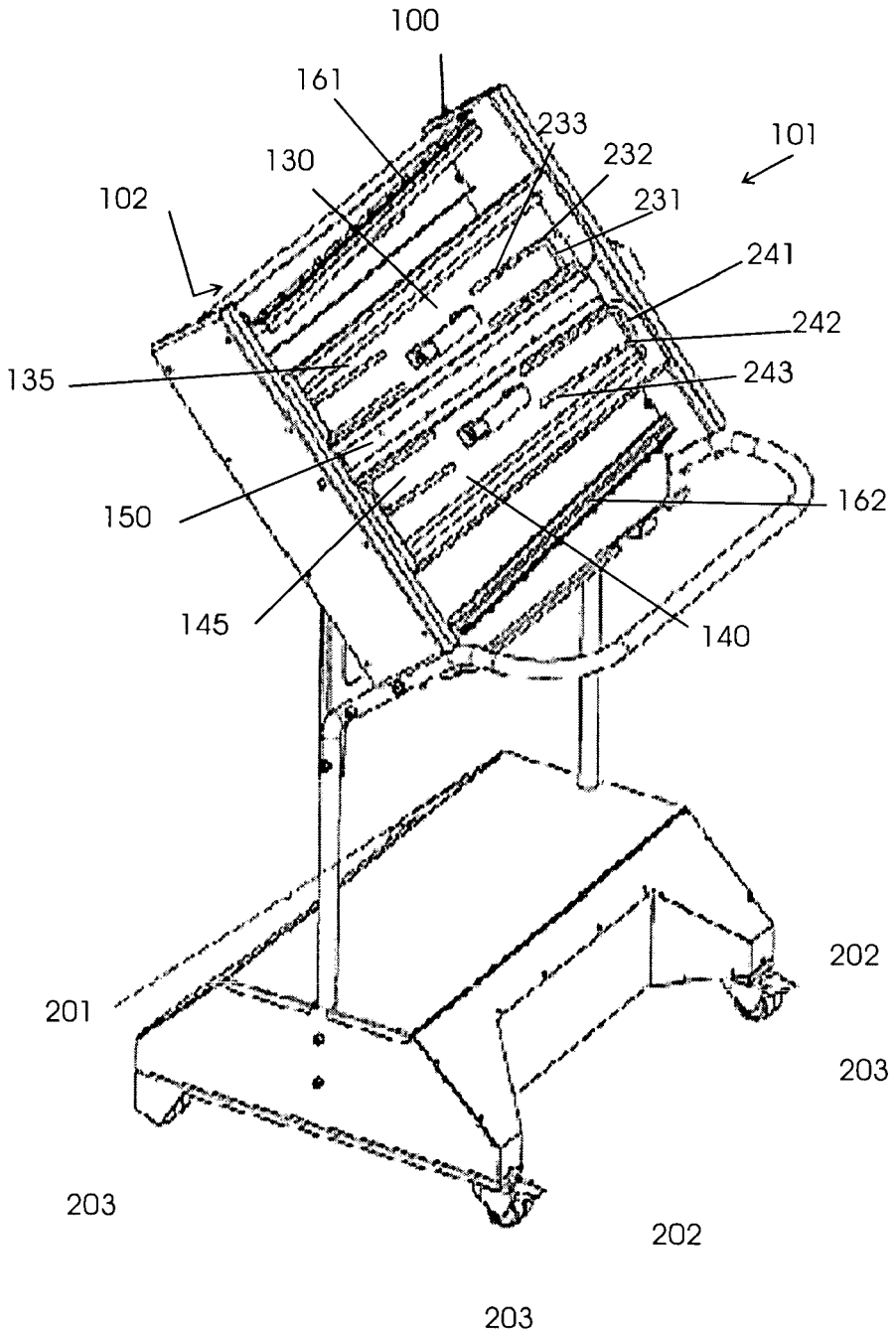

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FIG 2

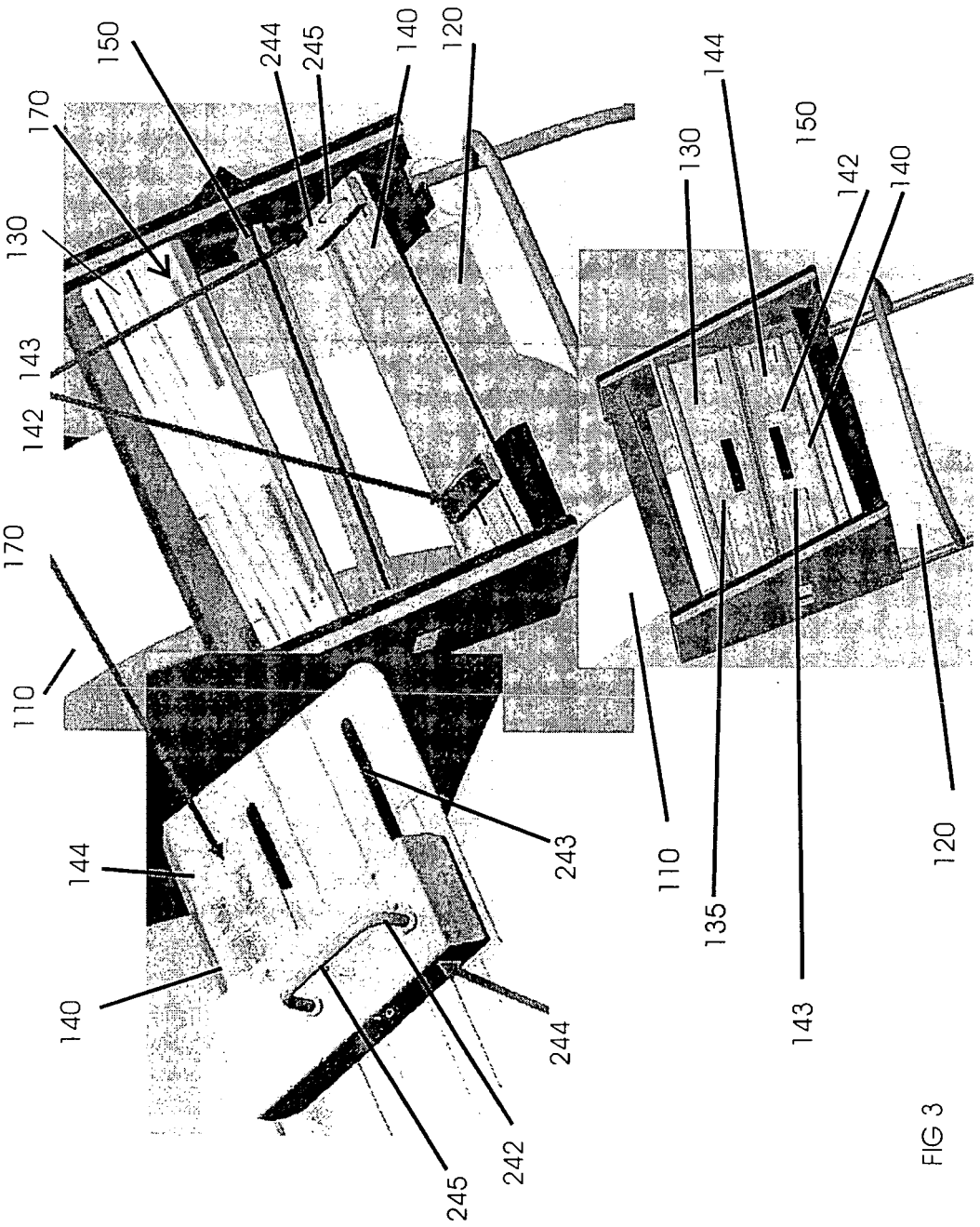

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FIG 3

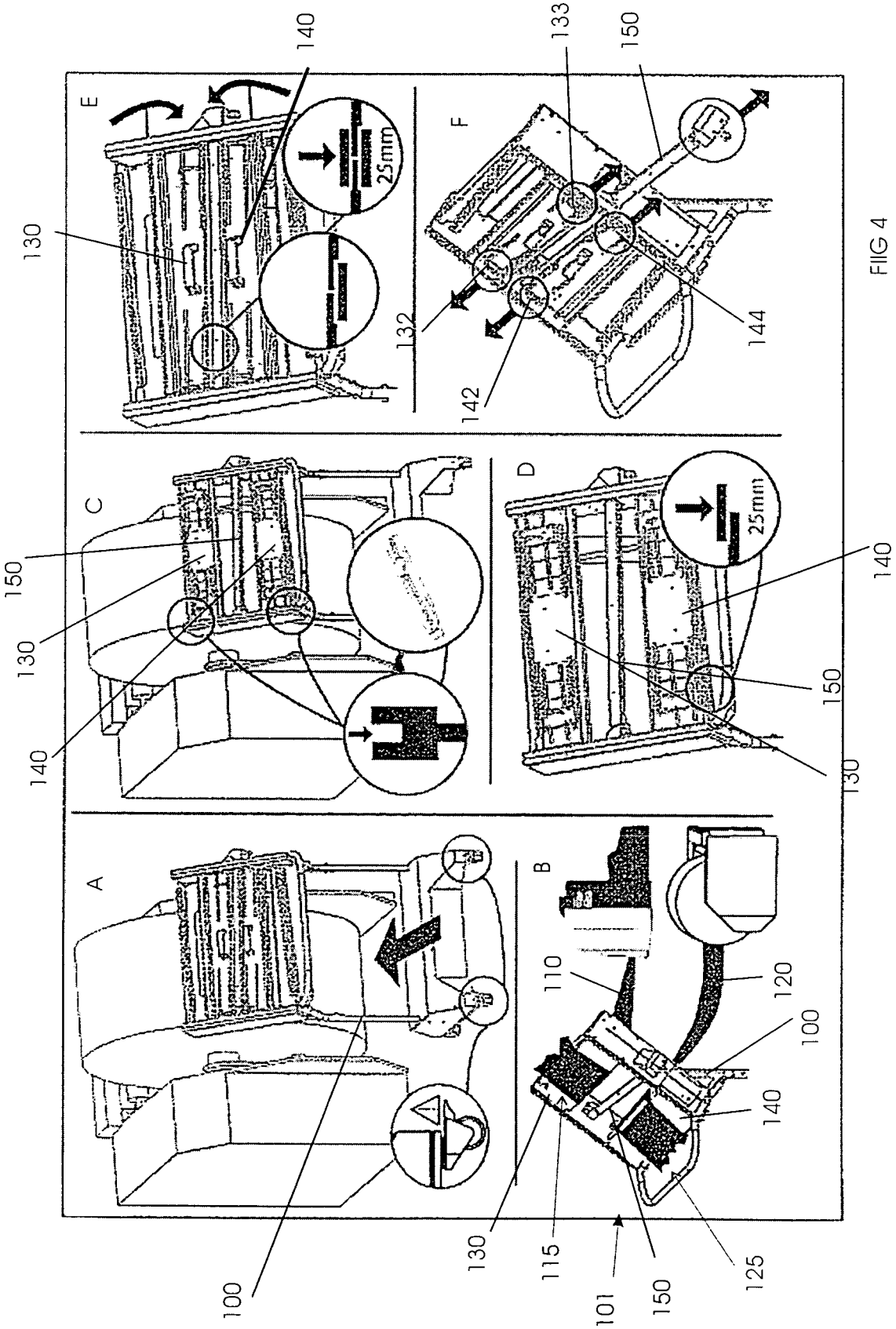

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FIG 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 44 7091

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 2 822 557 A (HAZEBROUCK STEPHANE ANDRE ROGE [FR]) 27 September 2002 (2002-09-27) * page 3, line 31 - page 5, line 26; figures *	1,15	INV. B65H21/00
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TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 December 2006	Haaken, Willy

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14-12-2006

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

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