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(54) Automatic desktop printer for security booklet documents

(57) Automatic desktop printer (10) for security booklet documents (1), comprising a transport mechanism to transport said document (1) along a Y axis from an entrance to an exit of the printer (10).

It is essentially characterized in that it comprises:
- at least one roller (105);
- a casing (101) comprising a first flat surface (102) on which said document can slide when being gripped with said roller;
- a flattening mechanism (201-205),
- a pair of elongated transporting belts (106, 107) configured to move the document through said flattening mechanism and on which said document can slide from the flat surface (102); and,
- at least one printing bridge (311), which can move longitudinally and which comprises a printing head,

wherein said printing head is
- a printing head (315) which is movable along a direction perpendicular the Y axis direction, or
- a standstill printing head.

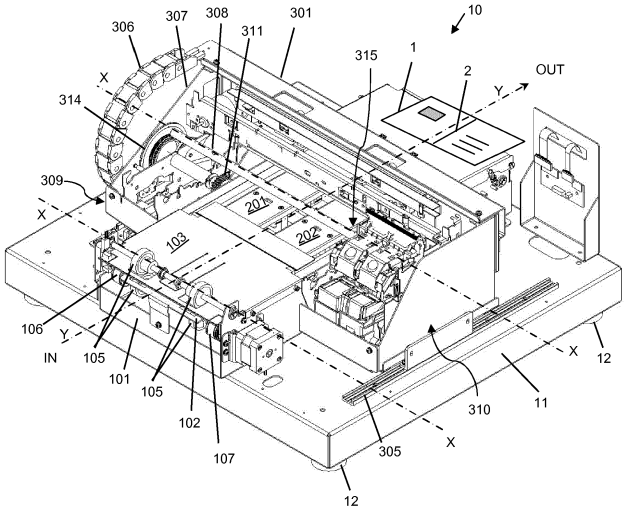

FIGURE 1

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Description

[0001] The present invention relates to desktop printers for security booklet documents, and in particular to automatic desktop printers, where security booklet documents are documents such as e.g. passports.

[0002] Two categories of printers exist. A first category relates to manual feeding printers. Such printers have a good print quality but are not suitable with industrial needs because of the time that is required to insert the booklet in the printer and to take it out.

[0003] Such printers are known for instance form document EP1520715 which discloses a passport that is moved in a shuttle along a Y direction under a printing device that is standing still at least along the Y direction. Accordingly, a passport needs to pass twice under the printing device before being fed out of the printer. In addition, the position of the shuttle must be known and controlled very precisely to get a good printing quality.

[0004] A second category of printers relates to automatic feeding printers. Such printers are more suitable for industrial needs and are known for instance from documents such as US7931270, in which a large number of security documents or smart cards are arranged in an input station and are picked up in a direction by means of a shuttle system which can be displaced back and forth parallel to the longitudinal axis. The shuttle is designed in such a way that it can feed to or remove documents from output areas of processing stations by means of a pivoting movement or by means of a pusher. As for manual printers, such printers face the issue by which the position of the shuttle must be known and controlled very precisely.

[0005] Thus, specific printers for printing on security booklet document exist but are complex, especially their printing head assembly, heavy (not desktop), and therefore very costly.

[0006] In this context, it is therefore an aim of the present invention to provide a simple desktop printer for security booklet such as e.g. passports.

[0007] According to a first of its objects, the present invention relates to an automatic desktop printer for security booklet documents comprising:

- a chassis (11), and
- a security booklet document transport mechanism, configured to automatically transport a security booklet document (1) along a Y axis linear direction, from an entrance to an exit of the printer (10) through a printing position.

[0008] It is essentially characterized in that said transport mechanism further comprising:

- a first set of at least one roller (105);
- a casing (101) comprising a first flat surface (102) on which a security booklet document can slide when being gripped with said first set of at least one roller;

And in that the printer (10) further comprises:

- a flattening mechanism (201, 202, 203, 204, 205),
- a pair of transporting belts (106, 107), positioned downstream of the rollers (105) in the Y axis direction, each belt being elongated along the Y axis direction and being positioned such that a security booklet document (1) slides from the flat surface (102) on top of the transporting belts (106, 107) when rollers (105) are activated and grips said security booklet document (1), each belt being positioned on a respective side of the security booklet document; said transporting belts being configured to move the security booklet document from the entrance of the printer (10) to its exit, through said flattening mechanism; wherein the entrance of the printer (10) is different to its exit,
- at least one printing bridge (301), which can move longitudinally along a pair of guiding rails (304, 305) and which comprises a set of at least one ink cartridge (302), a printing shaft (308) and a printing head,
  wherein said printing head is
  - a movable printing head (315) which can slide over said security booklet document (1) along an X axis direction, which is perpendicular the Y axis direction, or
  - a standstill printing head, said standstill printing head having a printing width that is sufficient to cover the width of the page or the pages of said security booklet document (1).

[0009] Preferably, the chassis (11) comprises a set of legs (12) having an adjustable height.

[0010] In one embodiment, the printer further comprises an input stacker wherein security booklet documents (1) are stacked at least partially open on the page(s) that is(are) to be printed.

[0011] In one embodiment, the printer further comprises a detection sensor to detect the entrance of a security booklet document into the transport mechanism.

[0012] In one embodiment, the transport mechanism comprises a first set of at least one roller (105) located on top of the flat surface (102), a roller being designed to be in contact with the page of a security booklet document that is to be printed such that when activated, said roller grips that page and slides the security booklet document along the Y axis direction on the flat surface.

[0013] In one embodiment, the printer further comprises a second set of rollers (105),
in which the first set and the second set of rollers are arranged such that a roller of the first set faces a roller of the second set though a through hole (104) of the flat surface (102).

[0014] In one embodiment, the security booklet document transport mechanism is configured to transport automatically the security booklet document from the print-

ing position to the exit of the printer along the Y axis linear direction.

[0015] In one embodiment, the transporting belts (106, 107) each comprise a set of abutments (108), the distance between two consecutive abutments preferably being equal to the length of the security booklet document.

[0016] In one embodiment, said security booklet document (1) comprises a seam, said automatic desktop printer (10) further comprising a flattening mechanism designed to come underneath the security booklet document (1) so as to compensate a difference in thickness between thickness of said security booklet document (1) on one side of its seam and thickness of said security booklet document (1) on the other side of its seam, such that both pages to be printed on are substantially comprised in a same horizontal plane.

[0017] In one embodiment, the flattening mechanism further comprises a flap (203) which is movable between a resting position and the printing position wherein,

- in the resting position, the flap is open and the security booklet document can be transported underneath the flap by the transporting belts; and
- in the printing position, the flap is operated to cover a non printable part of an edge of the security booklet document.

[0018] In one embodiment, the transport mechanism comprises a pair of covering rails (109, 110), each covering rail being located above a respective transporting belt (106, 107) and comprising a flat portion which is parallel to the Y axis direction, and configured to cover a lateral edge of the security booklet document when said security booklet document is transported by the transporting belts.

[0019] In one embodiment, the printer further comprises a second printing bridge located along said pair of guiding rails.

[0020] In one embodiment, one of the first printing bridge and the second printing bridge comprises a first set of cartridges comprising visible inks, and the other of the first printing bridge and the second bridge comprises a second set of cartridges comprising invisible ink or a set of at least one marking heads.

[0021] In one embodiment, the printer comprises a first electronic circuit that controls the movement of the security booklet document along the Y axis direction from the entrance to the exit of the printer; and a second electronic circuit that controls both the movement of the printing bridge and the printing head.

[0022] In one embodiment, the printer further comprises a laminator, configured to laminate said security booklet document once printed.

[0023] The present invention enables fully automatic printers to perform feeding, printing and retrieving of a security booklet document from the printer.

[0024] In particular, desktop printers available on the market can be easily converted into printers according to the present invention.

[0025] In addition, security booklet documents are fed to the printer until a full stop for the printing operation to occur, since there is no feeding of the booklet while printing, there is no need to synchronize the printing advance; accordingly, there is no need to a full access to the printer firmware from the printer manufacturer.

[0026] Advantageously, according to the present invention, the entrance of a security booklet document on the one side of the printer is opposite to its way out on the other side of the printer, enabling operations in series such as e.g. lamination just after printing.

[0027] The belts and clamping device of the present invention is much more simple than the shuttle systems according to the prior art solutions.

[0028] Thanks to the invention, transport means are independent, disconnected, from the printing means.

[0029] Other features and advantages of the present invention will appear in the detailed description that is given as a mere illustrative and non limitative example.

DRAWINGS

[0030]

- figure 1 illustrates a partial view of a printer according to the invention,
- figure 2 illustrates a partial view of a printer according to the invention emphasizing a casing at the entrance of a printer according to the invention,
- figure 3 illustrates a partial view of the entrance of a printer according to the invention,
- figure 4 illustrates another partial view of a printer according to the invention,
- figure 5 illustrates a partial view of the printer of figure 4 from a different angle, with a partial view of a printing bridge according to the invention,
- figure 6 illustrates a partial view of the printer of figure 5, from a different angle, with a partial view of a printing bridge according to the invention,
- figure 7 illustrates a partial view of the entrance of a printer according to the invention, and
- figure 8 illustrates a simplified cross section of a printer according to the invention where the printing bridge slides between a first position A and a second position B .

[0031] For the sake of simplicity, the printer 10 will be described as based on a horizontal support, such as e. g. a desktop.

[0032] The printer 10 comprises a longitudinal axis, here called Y axis, along which security booklet documents 1 are moved as described later.

[0033] A partially exploded view of a printer 10 is illustrated on figure 1, illustrating the entrance and the right side of the printer viewed from above.

[0034] The printer 10 comprises a chassis 11. The

chassis 11 comprises a substantially flat horizontal surface on which a transport mechanism, a printing bridge and a flattening mechanism, which are all described later, are mounted. Preferably, the chassis 11 comprises a set of legs 12 having an adjustable height.

[0035] According to the present domain, security booklet documents 1 must be printed on one or two pages only. Both pages must be consecutive and on a same plane, meaning a leaf shall not be turned to print from one page to the other.

[0036] A security booklet document 1 comprises a seam 2 in its centre.

[0037] Security booklet documents 1 are stacked in an input stacker (not shown). Preferably, they are stacked at least partially open on the page(s) that is(are) to be printed. This avoids the necessity of implementing a page-turning mechanism within the printer 10. Security booklet documents 1 are fed from the input stacker to the entrance of a transport mechanism along the Y axis in a feeding direction. In this case security booklet documents are fully opened (180 degrees) by an input hopper (not shown) and pushed into the printer. A sensor inside the printer detects the presence of a security booklet document and automatically activates the transporting belts. Thus they enter into the transport mechanism in a substantially flat position, opened on the page(s) that is(are) to be printed. Preferably, the seam is parallel to the Y axis.

Transport mechanism

[0038] The printer 10 comprises a security booklet document transport mechanism, here after transport mechanism by concision, which enables a security booklet document 1 to automatically move along the Y axis from an entrance IN to an exit OUT of the printer 10.

[0039] The entrance of a security booklet document 1 into the transport mechanism can be detected by sensor (not shown), typically an optical sensor, and for instance a photocell, or by any other detection mechanism.

[0040] The transport mechanism comprises a casing 101 that substantially fits into a parallelepiped shape, which simplifies the construction of the printer.

[0041] Figure 2 is the same view as figure 1, focusing on the casing 101, i.e. where several elements of the printer, such as e.g. the printing bridge that is further described, are omitted. As illustrated on figure 2, the casing 101 of the transport mechanism comprises, at its entrance, a flat surface 102 on which a security booklet document 1 can slide in this case a security booklet document 1 faces up and slides on its back.

[0042] Preferably, a security booklet document 1 can slide on the flat surface 102 with help of at least one set of at least one roller 105 which grips said document.

[0043] In one embodiment, a single flat surface 102 and a single set of at least one roller 105 can be implemented. In that case, the set of rollers 105 is preferably located above the flat surface 102. In that case, the flat surface can be plain. Alternatively, the set of rollers 105 can be located underneath the flat surface, in which case said flat surface comprises a set of at least one through holes 104, i.e. one through hole 104 per roller 105. One roller 105 protrudes through its respective through hole 104 so as to grip the back of the security booklet document 1.

[0044] In one embodiment, a single flat surface 102 and two sets of at least one roller 105 can be implemented. This embodiment is the same as the previous one, with the second set of at least one roller 105 located opposite to the first set of at least one roller 105 with reference to the flat surface 102. This way, the first set of at least one roller 105 can grip the back of the security booklet document 1 and the second set of at least one roller 105 can grip the front (i.e. the pages to be printed) of the security booklet document 1.

[0045] Preferably, the transport mechanism comprises at its entrance a first set of at least one roller 105 located on top of the flat surface, and a second set of at least one roller 105 located underneath the flat surface. The first set and the second set of rollers 105 are arranged such that a roller 105 of the first set faces a roller 105 of the second set though a through hole 104 of the flat surface. Rollers 105 are operated by an electric motor (not shown).

[0046] Preferably, the first set and the second set each comprises two rollers 105. The position of the rollers 105 is chosen such that each roller 105 faces a page that is to be printed. Alternatively, only one roller 105 per set can be used and positioned either side of the seam of the security booklet document 1.

[0047] Preferably, rollers 105 located on top of the flat surface are secured to an end of a spring 112 that applies a vertical force so that said roller(s) can grip a security booklet document 1 (see figure 8).

[0048] The axis of rotation of the rollers 105, called X axis, is perpendicular the Y axis direction, as illustrated on figure 3 which represents a front view of the entrance of the printer illustrated on figure 2, viewed slightly from above.

Rollers 105 of the first set and rollers 105 of the second set rotate in opposite directions. A roller 105 is designed to be in contact with security booklet document 1 trough a respective through hole 104. When activated, a roller 105 grips the security booklet document 1 and its rotation slides the security booklet document 1 along the Y axis on the flat surface 102.

[0049] Accordingly, the flat surface preferably comprises at least one through hole 104.

The first set of rollers 105 is located above the flat surface, and the second set of rollers 105 is located underneath the flat surface. A roller 105 of the second set is capable of being in contact with the back of a security booklet document 1 that is to be printed through said set of at least one through hole 104.

[0050] In one embodiment, the printer 10 comprises a second flat surface 103, which advantageously also com-

prises a set of at least one through hole 104, i.e. one through hole 104 per roller 105. The first set of rollers 105 is located above the second flat surface 103. One rollers 105 of the first set protrudes in a corresponding through hole 104 of the second flat surface 103 and is capable of being in contact with the page of a security booklet document 1 that is to be printed through said set of at least one through hole 104.

[0051] Flat surface 102 and second flat surface 103 are advantageously of a similar shape and size but non parallel, and present a cross section having a V shape so as to ease the entrance of a security booklet document 1 on the transporting belts described here under.

[0052] The transport mechanism comprises a first transporting belt 106 and a second transporting belt 107, positioned downstream of the rollers 105 in the Y axis direction. Each belt is elongated along the Y axis direction and is positioned such that a security booklet document 1 slides from the flat surface on top of the transporting belts, each belt being positioned on a respective side of the security booklet document 1. First transporting belt 106 and a second transporting belt 107 are activated by a motor 111, preferably one motor shared for both belts.

[0053] Preferably, the transporting belts each comprise a set of (longitudinal) abutments or indexes 108. The distance between two consecutive abutments 108 is preferably equal to or slightly greater than the length of the security booklet document 1, and the distance between the two transporting belts is substantially equal to the width of the security booklet document 1. By "slightly greater than" it is understood strictly greater than a predetermined value.

[0054] Preferably, the transport mechanism comprises a first covering rail 109 and a second covering rail 110, each covering rail located above a respective transporting belt and having preferably a cross section of an L, C or a U shape. Each covering rail comprises a flat portion, or lip, parallel to the Y axis direction, and configured to cover a lateral edge of the security booklet document 1 when said security booklet document 1 slides within the transport mechanism on the transporting belts.

[0055] A printable page of a security booklet document 1 comprises a non printable portion located at its periphery. Preferably, the width of each lip is chosen so as to be inferior or equal to the width of said non printable portion.

[0056] Since the back of the security booklet document 1 is maintained by both the flat surface of the transport mechanism and the transporting belts, and its lateral edges are maintained underneath the covering rails, the security booklet document 1 is maintained substantially flat during its transport within the transport mechanism.

[0057] The rotation of the transporting belts moves the security booklet document 1 from the entrance of the transport mechanism to its exit, through a flattening mechanism.

Flattening mechanism

[0058] A security booklet document 1 comprises multiple pages secured together along a seam, dividing the booklet in two sides. Because pages that are to be printed are generally among the first ones of the booklet, when a security booklet document 1 is open on these pages, one side of the security booklet document 1 is usually thicker than the other one.

[0059] A flattening mechanism is designed to come underneath a security booklet document 1 so as to compensate this difference of thickness such that both pages to be printed on are substantially comprised in a same horizontal plane.

[0060] Preferably, the flattening mechanism is stand still, secured to the chassis 11 and is independent from the movement of the printing bridge.

[0061] Alternatively, the flattening mechanism can be integral in translation with the printing bridge but the construction is then more complex.

[0062] The flattening mechanism is located between the transporting belts and comprises two pistons; a first piston 201 and a second piston 202. Each piston comprises a flat surface that can move vertically between an up position and a down position, and whose height is adjustable, in this case with a piston drive 204 and a spring 205 (figure 7 and figure 8). Figure 7 illustrates a zoomed view of the entrance of the printer of figure 6 where the first flat surface 102, the second flat surface 103 and the first set of rollers located on top of second flat surface 103 are omitted to better illustrate the transporting belt 106 and its abutments 108 within the casing 101.

[0063] The flat surface of a piston that comes into contact with the back of the security booklet document 1 is designed to fit the design of that security booklet document 1 and acts as a support for a side of the booklet.

[0064] The flattening mechanism has two sensors (not shown): one for the up-position of the piston and one for the down-position of the piston. These position sensors are in this case optical sensors. These two sensors control the piston drive 204. Both pistons, also called flatteners, are spring loaded with a spring 205 to compensate the thickness of the security booklet document.

[0065] Advantageously, the flattening mechanism can be triggered by the mere position of the printing bridge or, as it is the case here, by the position of the security booklet document on the transporting belt 106, which is detected by a position sensor, in this case an optical sensor (not shown) which detects the position of the security booklet document and stops the forward movement of the transporting belt 106.

[0066] At the entrance of the printer 10, the back of a security booklet document 1 is in contact with both the transporting belts and the flat surface. When the printer 10 is operated, the transporting belts drag along the security booklet document 1 which slides along the flat surface from the entrance of the printer 10 to the top of the

pistons of the flattening mechanism where it reaches a printing position. The transporting belts then stop so that the security booklet document 1 remains in a stand still position for the printing operation.

[0067] Preferably, the transport mechanism comprises, at its entrance, a flat cover that is located over the flat surface on which security booklet document 1 are placed, such that at least a part of a security booklet document 1 lying on the flat surface is covered by the flat cover.

[0068] Here, the flat cover is the second flat surface 103 described here above.

[0069] The flat cover has one straight edge that is perpendicular to the Y axis direction and is designed to cover at least part of the non printable zone of a security booklet document 1.

[0070] Preferably, the flat cover enables a security booklet document 1 to slide underneath.

[0071] Preferably, the flattening mechanism also comprises a flap 203, which is located opposite to the straight edge of the flat cover and approximately at the same height, and has a straight edge that is perpendicular to the Y axis direction.

[0072] The flap 203 is movable in a translation or a rotation movement between a resting position and the printing position where the printing operation that is described here after can occur.

[0073] In the resting position, the flap 203 is open and the security booklet document 1 is transported underneath the flap 203 by the transporting belts.

[0074] In the printing position, the flap 203 is operated in its closed position to cover the non printable part of an edge of the booklet.

[0075] Assuming that a security booklet document 1 is introduced into the printer 10 with its seam parallel to the Y axis and its top first, then the straight edge of the flat cover covers the non printable bottom of the pages to be printed, covering rails cover the non printable lateral edges of the booklet and the flap 203 covers the non printable top of the pages to be printed.

[0076] The two pistons of the flattening mechanism exert an upward force, and the straight edge of the flat cover, the covering rails and the flap 203 covers all exert a downward force, acting as vertical abutments.

[0077] The booklet is then maintained in a stand still position, called printing position, for the printing operation that is operated with help of a printing bridge 301.

Printing bridge

[0078] The chassis 11 also supports at least one printing bridge 301, which comprises a printing head 315 and a set of at least one ink cartridge 302 (see figure 5).

[0079] The printing bridge 301 comprises a pair of sliding members each sliding member 303 being design to slide along a respective bridge guiding rail, the shape of each sliding member 303 cooperating with the shape of its respective guiding rail, the guiding rails extend in a direction parallel to the Y axis.

[0080] Accordingly, the printing bridge 301 is movable over the security booklet document 1 longitudinally along the Y axis thanks to a pair of guiding rails; i.e. a first bridge guiding rail 304 and a second bridge guiding rail 305. The movement along the Y axis is controlled thanks to a first toothed wheel 311 which cooperates with a toothed rail 312 as described later.

[0081] A caterpillar 306 having one end secured to the chassis 11 and another end secured to the bridge enables to cover the electronic cables that come from the printing bridge down to the electronic cardboards that located within the chassis of the printer. This way, electric cables are protected, sheathed, when the printing bridge moves along the Y axis. Preferably, the end of the caterpillar 306 that is secured to the bridge is secured to the top of a lateral flank 307 of the bridge, said caterpillar 306 being exterior to the bridge.

[0082] The printing bridge 301 can comprise a printing bridge 301 shaft 308 on which the printing head is mounted and along which it can slide in both directions. The printing bridge 301 shaft 308 is orientated in an X axis direction, perpendicular the Y axis direction. The length of the bridge shaft is greater or equal to the width of a security booklet document 1.

[0083] The printing bridge 301 can comprise a first housing 309, which is secured to one edge of the printing shaft and which comprises one sliding member 303 that can slide along one guiding rail of the chassis 11. The first housing 309 comprises electronic circuits for the printing head. Preferably, the movable printing head also stands in an opening of the first housing whilst in the resting position, i.e. not in use.

[0084] The printing bridge 301 can comprise a second housing 310 which is secured to the other edge of the printing shaft and which comprises another sliding member 303 that can slide along the other guiding rail of the chassis 11. The second housing 310 comprises a set of a least a first toothed wheel 311, which is mounted on a driving shaft 313.

[0085] The first toothed wheel is designed to cooperate with a toothed rail 312 that is secured to the casing 101 and that is parallel to the Y axis direction. Accordingly, the movement of the casing 101 along the Y axis causes the first toothed wheel to turn.

[0086] Advantageously, the driving shaft comprises an encoding disk 314 on the opposite side of the first toothed wheel, said encoding disk enabling to locate the actual position of the printing head along the Y axis.

[0087] In addition, the second casing 101 may comprise a set of toothed wheels, possibly gears and an electric motor, configured to drive the movement of the pistons of the flattening mechanism, acting as an eccentric drive.

[0088] Figure 5 illustrates the printer of figure 1 viewed from its left side, and figure 4 illustrates the printer of figure 5 where the printing bridge is omitted. Similarly, figure 6 illustrates the printer of figure 5 where several

components of the printing bridge are omitted, to better illustrate the first toothed wheel 311, the toothed rail 312 and the encoding disk 314.

[0089] As can be seen on figure 4 or figure 5, an electric motor (not shown) drives in rotation the driving shaft 313 and the first toothed wheel 311, which is rotationally connected to the driving shaft 313. Because the toothed rail 312 cooperates with first toothed wheel 311 and is secured to the printing bridge 301, the rotation of the first toothed wheel 311 about the X axis drives the printing bridge 301 to move along the first and second bridge guiding rails 304, 305 along the Y axis direction. Because the encoding disk 314 is rotationally fixed to the first toothed wheel 311, the position of the printing bridge 311 along the Y axis is known.

[0090] This way, it is also possible to use the mere position of the printing bridge 301 along the Y axis to trigger a position of the pistons of the flattening mechanism, through the piston(s) drive.

[0091] In another embodiment, the printing bridge 301 can comprise a stand still printing head provided such printing head is wide enough to cover the page or the pages of booklet that must be printed.

Printing operation

[0092] For the printing operation, the printing bridge 301 moves along the Y axis between an initial position and an end position.

[0093] In the printing operation, the security booklet document 1 is maintained in a standstill position along the Y axis, typically by stopping the rotation of the transporting belts.

[0094] The pistons of the flattening mechanism are maintained in their up position such that the pages of the security booklet document 1 to be printed offer a flat horizontal surface.

[0095] The flap 203 is operated in its closed position and the covering rails act also as abutments against the vertical pressure of the pistons.

[0096] This way, the security booklet document 1 is maintained in a standstill position both vertically and horizontally.

[0097] For the printing to occur, the bridge moves along the Y axis direction thanks to the first toothed wheel 311 as described earlier, and the printing head moves along the X axis direction to print on the pages of the security booklet document 1.

[0098] Once the printing is finished, the end position of the bridge is detected by the encoding disk which in turn releases the pistons of the flattening mechanism, driving them in their down position and the flap 203 is operated to open.

[0099] Preferably, once the printing operation is finished, the bridge goes back into its initial position, the clamping device opens and the booklet is transported to another side (the rear) of the printer 10, through the same transport means. Accordingly, the transporting belts are activated to move the security booklet document 1 along the Y axis in the feeding direction. This way, the security booklet document 1 can exit the printing bridge 301 away from the input stacker.

[0100] The security booklet document 1 can then be transported with help of the transporting belts along the Y axis direction to another area.

[0101] The chassis 11 can support a second printing bridge 301 in another area. The second bridge may be similar to the first bridge described above, located along the same guiding rails or along a second pair of guiding rails which are collinear to the first pair of guiding rails described above.

[0102] At least one of the first printing bridge 301 and the second printing bridge may comprise a set of marking heads. By "marking head" it is understood a device whose use marks the security booklet document 1 by altering locally its structure and which comprises e.g.:

- needles for micro perforation,
- a laser engraving device (where the laser heat is used to burn some information in plastic, metal or treated paper of the security booklet document),
- a laser ablation device (where the laser is used to produce some additional personalization information such as photo micro perforation on the security booklet document), or
- a thermal sublimation device.

One of the first printing bridge 301 and the second printing bridge may also comprise a set of at least one ink cartridge 302, said ink cartridge(s) being different than the ink cartridge(s) of the other one of the first printing bridge 301 and the second printing bridge. For instance, the first printing bridge 301 can support visible ink cartridge(s) and the second printing bridge 301 can support non visible ink cartridge(s) or needles.

[0103] For instance, the first bridge comprises a first set of cartridges comprising visible inks (cyan, yellow, magenta and black), and the second bridge comprises a second set of cartridges comprising invisible ink (e.g. UV ink) or needles etc.

[0104] Both first and second bridges are configured to print in series on the same pages of the booklet, the bridge from the second printer 10 being advantageously independent from the first bridge.

[0105] In one embodiment, both first and second bridges are comprised in one printer 10. Alternatively, the first bridge is comprised in a first printer 10, and second bridge is comprised in a second printer 10, which works in series with the first printer 10.

[0106] Preferably, the printer 10 comprises two electronic circuits. A first electronic circuit controls the movement of the security booklet document 1 along the Y axis direction from the input stacker to the rear end of the printer 10 through to printing position; and a second electronic circuit controls the movement of the printing bridge 301 and the printing head.

[0107] The present invention is not limited to the described embodiments. For instance, the flat cover can also be a movable flap. Transporting belts can be replaced with a succession of rollers or any other transporting means.

Nomenclature

[0108]

1 - security booklet document
2 - seam

10 - printer
11 - chassis
12 - legs

Transport mechanism:

[0109]

101 - casing of the transport mechanism
102 - first flat surface
103 - second flat surface / flat cover
104 - through hole of the flat surface
105 - roller
106 - first transporting belt
107 - second transporting belt
108 - abutment of a transporting belt
109 - first covering rail
110 - second covering rail
111 - motor for the first / second transporting belt
112 - spring for roller

Flattening mechanism:

[0110]

201 - first piston
202 - second piston
203 - flap
204 - piston(s) drive
205 - spring for piston drive

Printing mechanism:

[0111]

301 - printing bridge
302 - ink cartridge
303 - sliding member
304 - first bridge guiding rail for moving the printing device along the longitudinal axis
305 - second bridge guiding rail for moving the printing device along the longitudinal axis
306 - caterpillar
307 - lateral flank of the bridge
308 - printing bridge shaft
309 - first housing
310 - second housing
311 - first toothed wheel
312 - toothed rail
313 - driving shaft
314 - encoding disk
315 - printing head

Claims

1. Automatic desktop printer (10) for security booklet documents (1), comprising:

- a chassis (11),
- a security booklet document transport mechanism, configured to automatically transport a security booklet document (1) along a Y axis linear direction, from an entrance to an exit of the printer (10) through a printing position,
Characterized in that
said transport mechanism further comprising:

  - a first set of at least one roller (105);
  - a casing (101) comprising a first flat surface (102) on which a security booklet document can slide when being gripped with said first set of at least one roller;

And **in that** the printer (10) further comprises:

- a flattening mechanism (201, 202, 203, 204, 205),
- a pair of transporting belts (106, 107), positioned downstream of the rollers (105) in the Y axis direction, each belt being elongated along the Y axis direction and being positioned such that a security booklet document (1) slides from the flat surface (102) on top of the transporting belts (106, 107) when rollers (105) are activated and grips said security booklet document (1), each belt being positioned on a respective side of the security booklet document; said transporting belts being configured to move the security booklet document from the entrance of the printer (10) to its exit, through said flattening mechanism; wherein the entrance of the printer (10) is different to its exit,
- at least one printing bridge (301), which can move longitudinally along a pair of guiding rails (304, 305) and which comprises a set of at least one ink cartridge (302), a printing shaft (308) and a printing head,
wherein said printing head is

  - a movable printing head (315) which can slide over said security booklet document (1) along an X axis direction, which is per-

pendicular the Y axis direction, or
- a standstill printing head, said standstill printing head having a printing width that is sufficient to cover the width of the page or the pages of said security booklet document (1).

2. Automatic desktop printer according to claim 1, wherein the chassis (11) comprises a set of legs (12) having an adjustable height.

3. Automatic desktop printer according to any of the preceding claims,
further comprising an input stacker wherein security booklet documents (1) are stacked at least partially open on the page(s) that is(are) to be printed.

4. Automatic desktop printer according to any of the preceding claims,
further comprising a detection sensor to detect the entrance of a security booklet document into the transport mechanism.

5. Automatic desktop printer according to any of the preceding claims,
wherein the transport mechanism comprises a first set of at least one roller (105) located on top of the flat surface (102), a roller being designed to be in contact with the page of a security booklet document that is to be printed such that when activated, said roller grips that page and slides the security booklet document along the Y axis direction on the flat surface.

6. Automatic desktop printer according to any of claim 5,
further comprising a second set of rollers (105),
in which the first set and the second set of rollers are arranged such that a roller of the first set faces a roller of the second set though a through hole (104) of the flat surface (102).

7. Automatic desktop printer according to any of the preceding claims,
wherein the security booklet document transport mechanism is configured to transport automatically the security booklet document from the printing position to the exit of the printer along the Y axis linear direction.

8. Automatic desktop printer according to any of the preceding claims,
in which the transporting belts (106, 107) each comprise a set of abutments (108), the distance between two consecutive abutments preferably being equal to the length of the security booklet document.

9. Automatic desktop printer according to any of the preceding claims,
wherein said security booklet document (1) comprises a seam,
said automatic desktop printer (10) further comprising a flattening mechanism designed to come underneath the security booklet document (1) so as to compensate a difference in thickness between thickness of said security booklet document (1) on one side of its seam and thickness of said security booklet document (1) on the other side of its seam, such that both pages to be printed on are substantially comprised in a same horizontal plane.

10. Automatic desktop printer according to claim 9, wherein the flattening mechanism further comprises a flap (203) which is movable between a resting position and the printing position wherein,

- in the resting position, the flap is open and the security booklet document can be transported underneath the flap by the transporting belts; and
- in the printing position, the flap is operated to cover a non printable part of an edge of the security booklet document.

11. Automatic desktop printer according to any of the preceding claims,
Wherein the transport mechanism comprises a pair of covering rails (109, 110), each covering rail being located above a respective transporting belt (106, 107) and comprising a flat portion which is parallel to the Y axis direction, and configured to cover a lateral edge of the security booklet document when said security booklet document is transported by the transporting belts.

12. Automatic desktop printer according to any of the preceding claims,
Further comprising a second printing bridge located along said pair of guiding rails.

13. Automatic desktop printer according to claim 12,
Wherein one of the first printing bridge and the second printing bridge comprises a first set of cartridges comprising visible inks, and the other of the first printing bridge and the second bridge comprises a second set of cartridges comprising invisible ink or set of at least one marking heads.

14. Automatic desktop printer according to any of the preceding claims,
Comprising a first electronic circuit that controls the movement of the security booklet document along the Y axis direction from the entrance to the exit of the printer; and a second electronic circuit that controls both the movement of the printing bridge and the printing head.

15. Automatic desktop printer according to any of the preceding claims,
Further comprising a laminator, configured to laminate said security booklet document once printed.

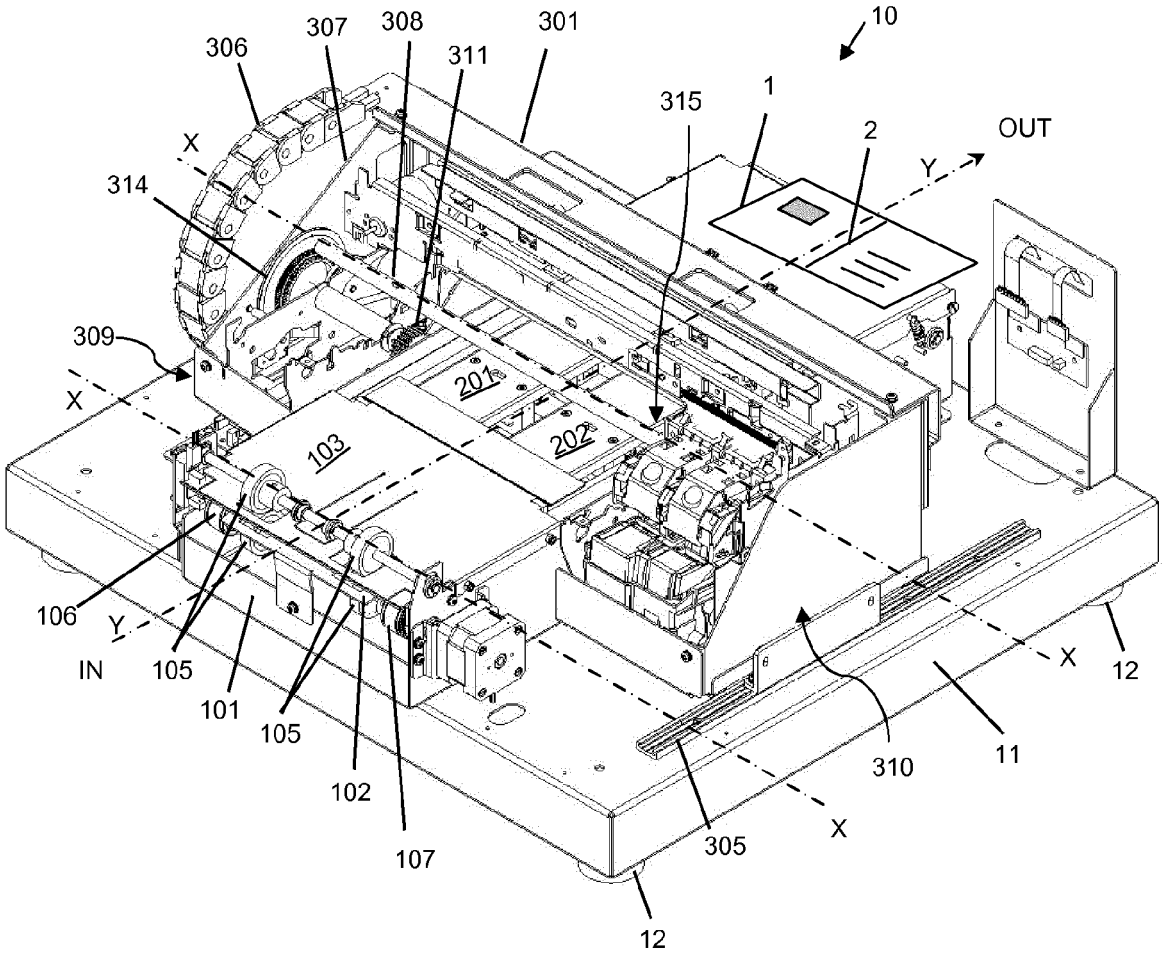
10
306
307
308
311
301
315
1
2
OUT
Y
X
314
309
201
202
103
106
Y
IN
105
101
105
102
107
X
305
310
11
X
12
12

FIGURE 1

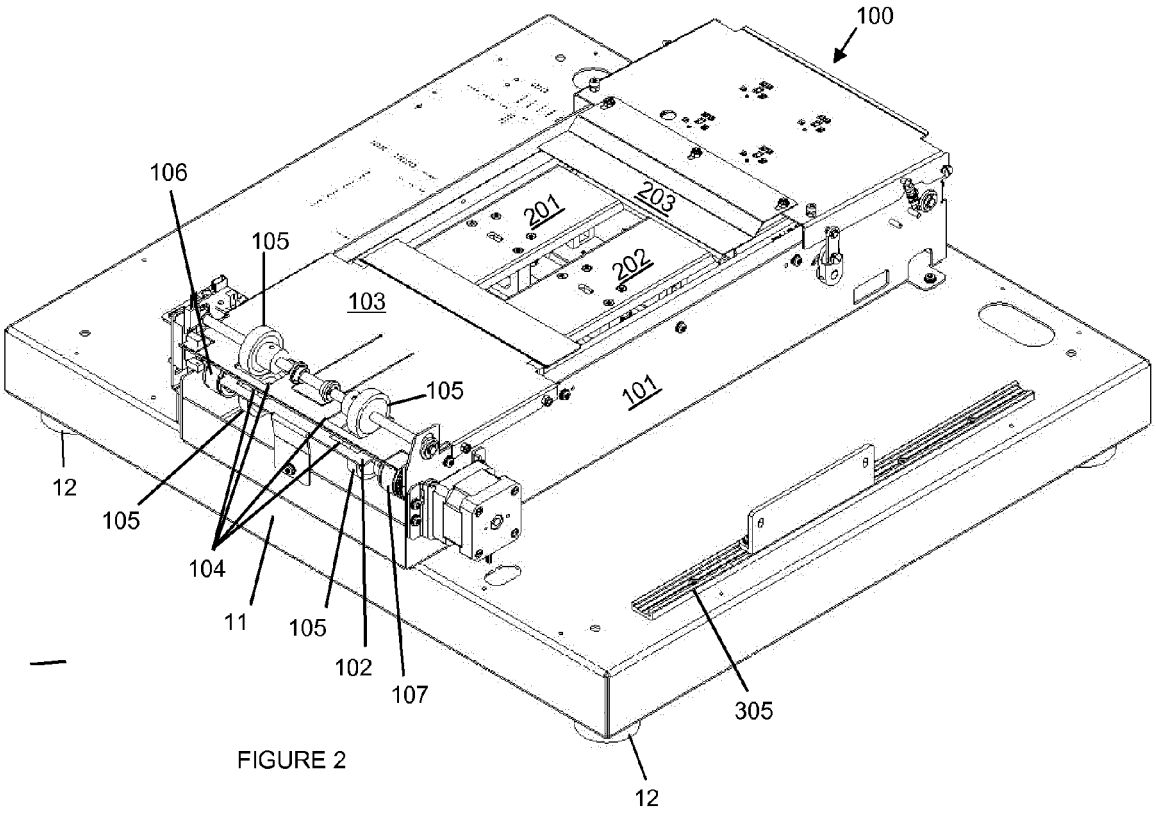
100
106
105
201
203
202
103
105
101
12
105
104
11
105
102
107
305
12

FIGURE 2

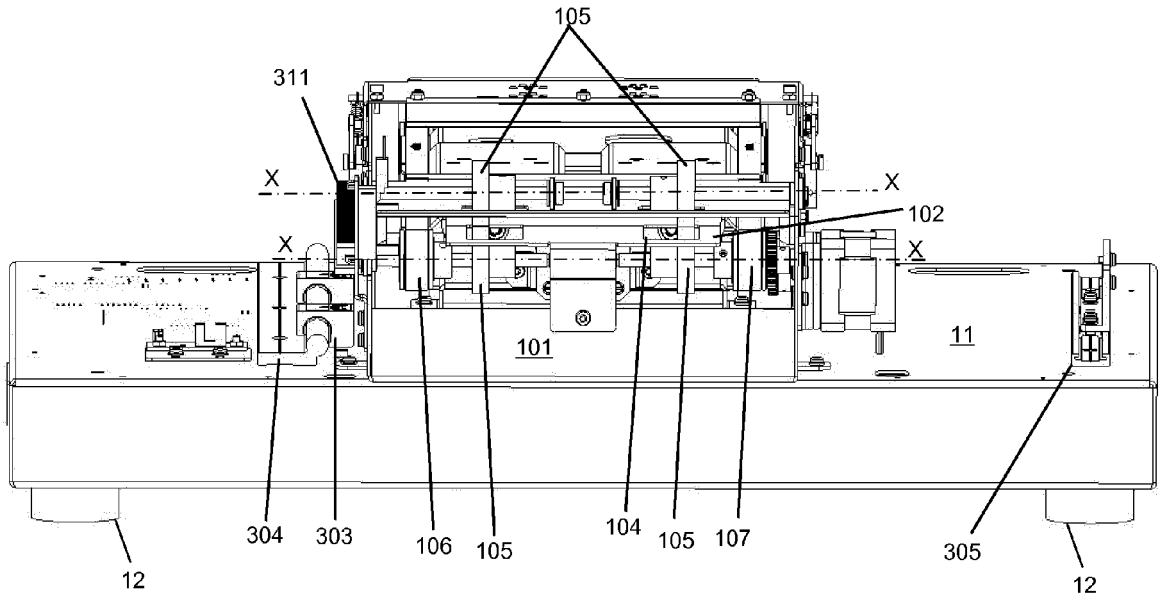

FIGURE 3

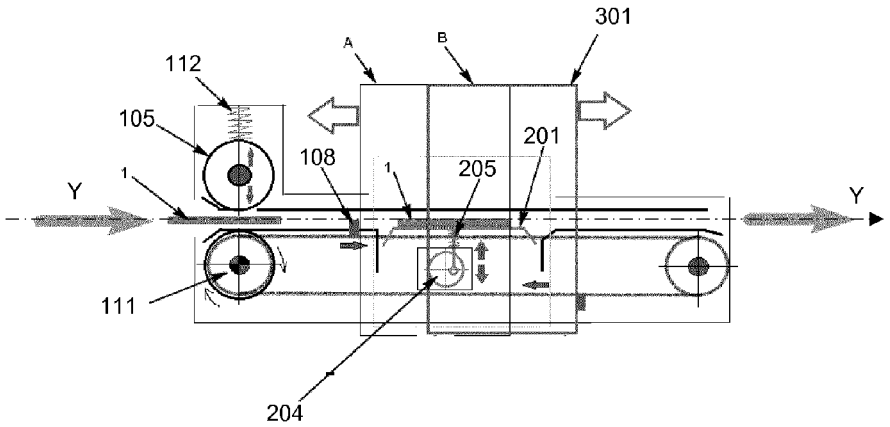

FIGURE 8

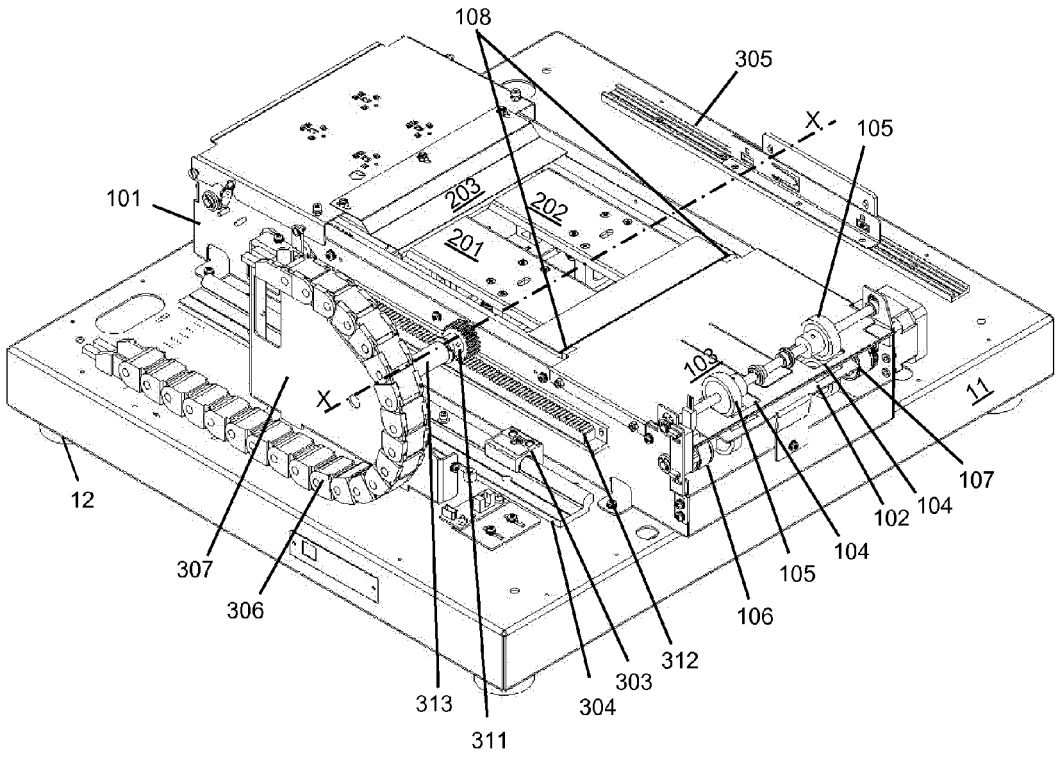
108
305
105
101
203
202
201
103
11
12
107
104
102
104
105
106
307
306
312
303
304
313
311

FIGURE 4

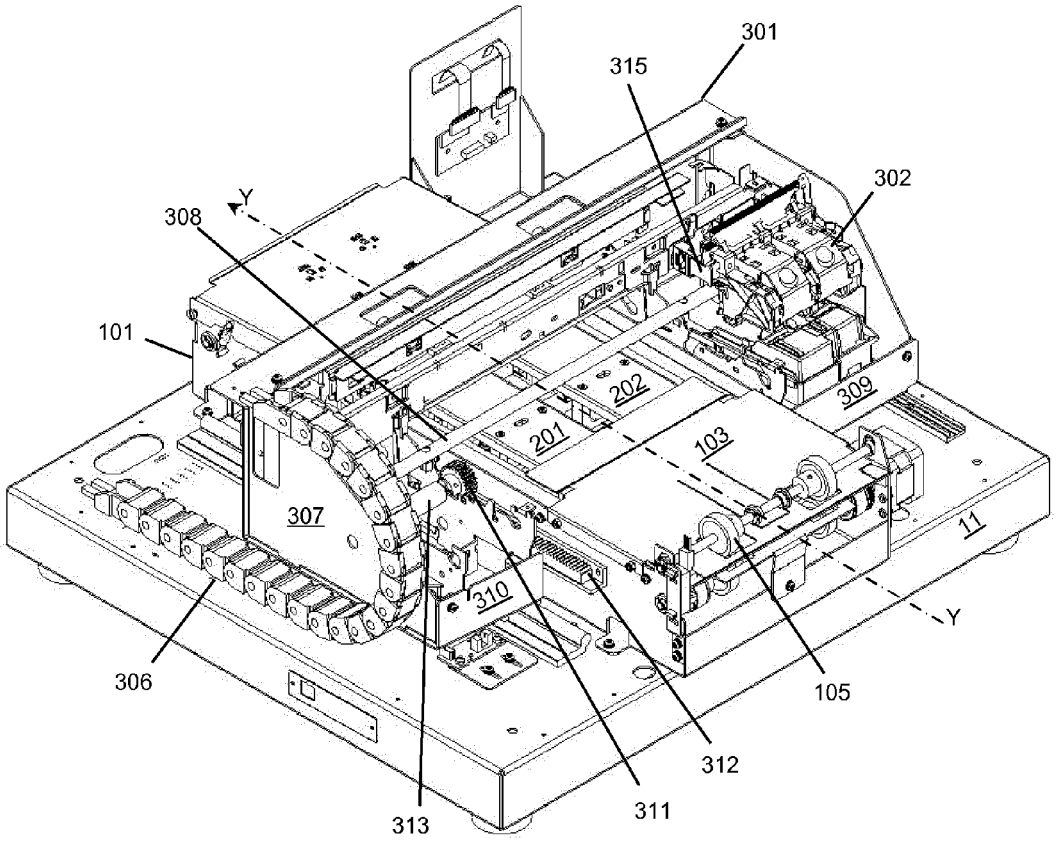
301
315
302
308
Y
101
202
309
201
103
307
11
310
Y
306
105
312
313
311

FIGURE 5

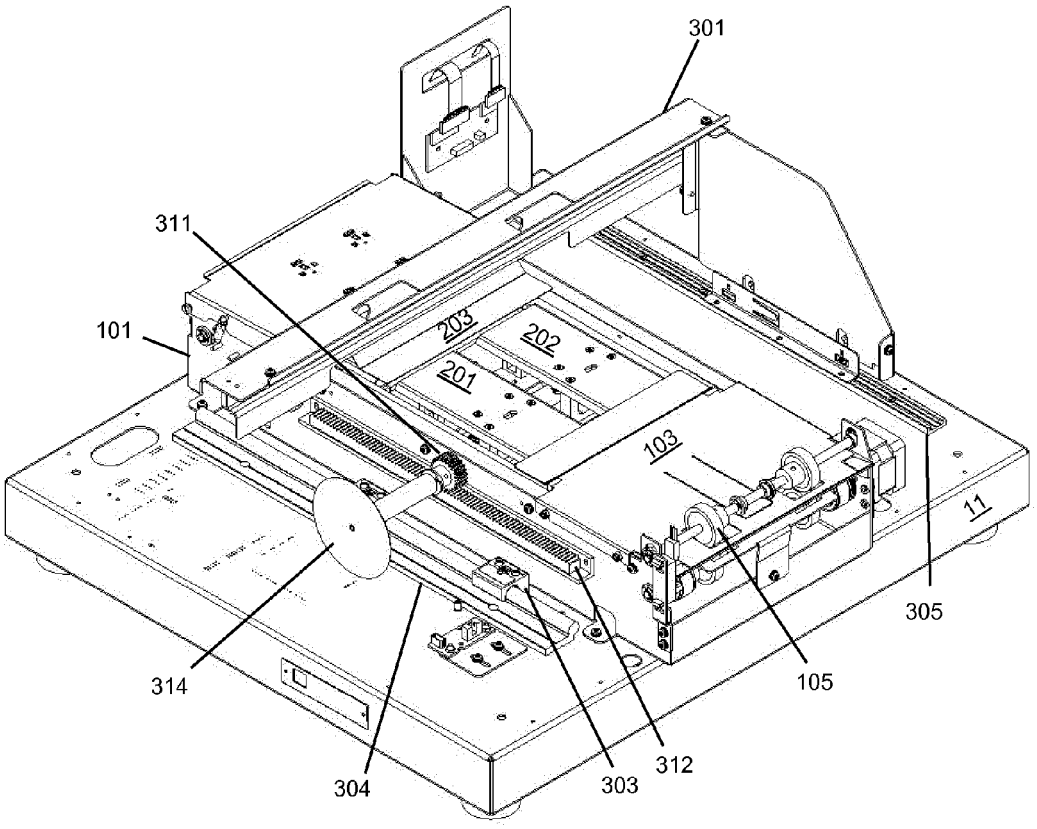

FIGURE 6

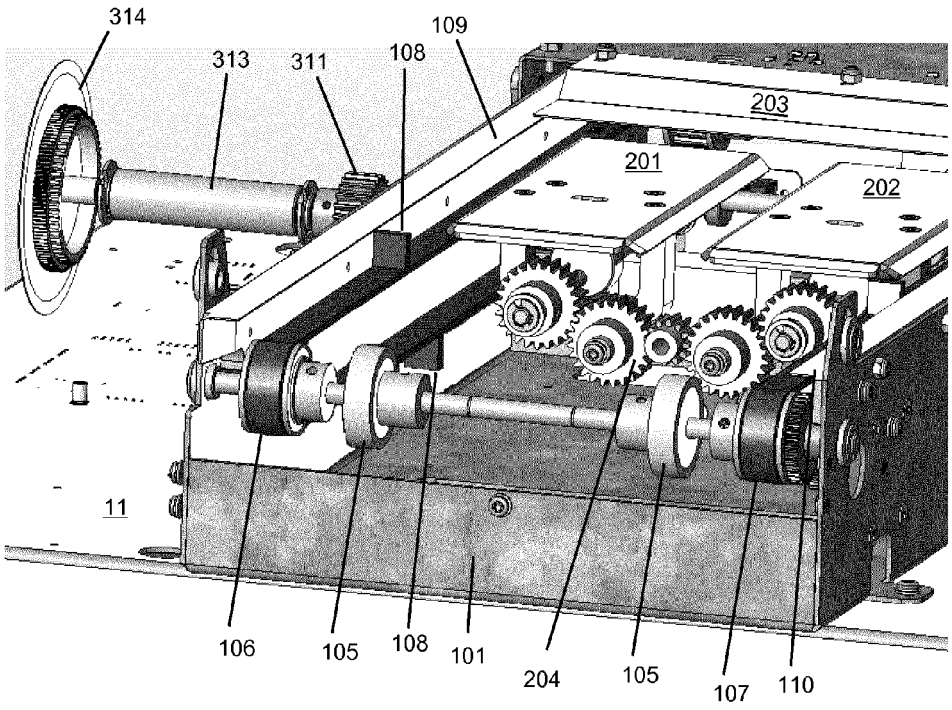
314
313
311
108
109
203
201
202
11
106
105
108
101
204
105
107
110

FIGURE 7

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EUROPEAN SEARCH REPORT

Application Number
EP 14 19 1363

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B41J
B65H
B42D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 April 2015	Curt, Denis

CATEGORY OF CITED DOCUMENTS

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