

(19)



(11)

EP 4 552 855 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.05.2025 Bulletin 2025/20

(51) International Patent Classification (IPC):
B42C 9/00 ^(2006.01) **B42C 11/04** ^(2006.01)

(21) Application number: **24204412.1**

(52) Cooperative Patent Classification (CPC):
B42C 9/0025; B42C 9/0037; B42C 11/04

(22) Date of filing: **03.10.2024**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

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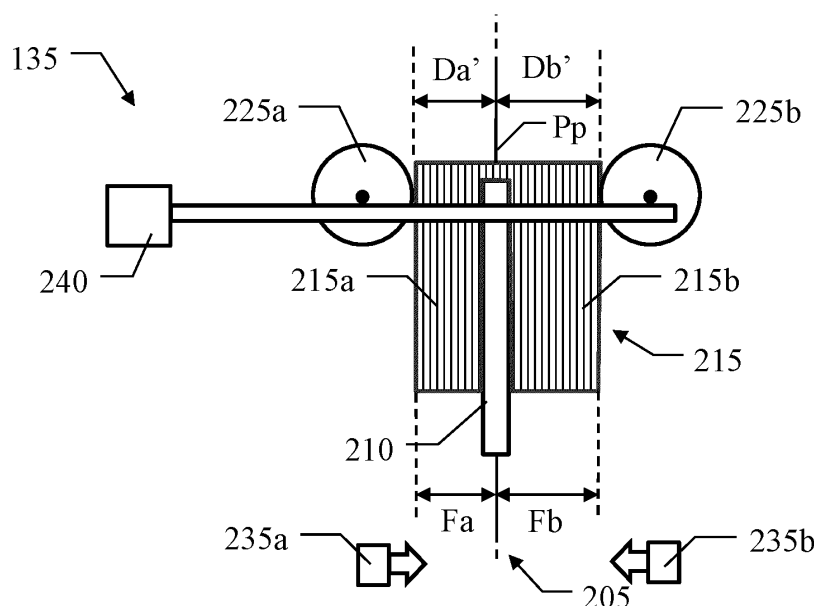
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(30) Priority: **07.11.2023 IT 202300023409**

(54) **GLUE APPLICATION DEVICE FOR BOOKBINDING CASE-IN MACHINE WITH ADJUSTMENT OF ROLLERS DISTANCE FROM BOOK BLOCKS**

(57) A solution is proposed for applying covers to book blocks. A corresponding bookbinding case-in machine (100) comprises means (235a,235b;110,165) for determining corresponding thicknesses of portions (215a,215b) of each book block (215) that is transported astride a support blade (210) between two rollers (225a,225b) for applying at least one layer of glue on a front and a back of the book block (215). An adjusting system (240) adjusts corresponding distances of the

rollers (225a,225b) from a passage position (Pp) of the support blade (210) between the rollers (225a,225b) according to the thicknesses of the portions of the book block (215). A bookbinding plant comprising one or more of such case-in machines (100) is also proposed. Moreover, a corresponding method for applying covers to book blocks (215), a computer program for implementing the method and a corresponding computer program product are proposed.

**FIG.2B**

Description

Technical field

[0001] The present invention relates to the bookbinding field. More specifically, this invention relates to case-in bookbinding machines.

Background

[0002] The background of the present invention is introduced hereinafter with the discussion of techniques relating to its context. However, even when this discussion refers to documents, acts, artifacts and the like, it does not suggest or represent that the discussed techniques are part of the prior art or are common general knowledge in the field relevant to the present disclosure. Particularly, possible corresponding drawbacks mentioned herein should not be considered to have been previously recognized in the prior art.

[0003] Bookbinding machines of various types are commonly used in bookbinding plants for producing books on an industrial scale. Particularly, (bookbinding) case-in machines are used for applying covers (usually of hard type) to book blocks, each formed by a block of signatures/sheets being joined together (for example, sewn).

[0004] For this purpose, each case-in machine comprises several processing stations that perform different operations on the book blocks. Particularly, the book blocks being supplied horizontally from an input belt are overturned vertically (with a spine facing upwards) and transported to a coupling station. The coupling station comprises a closed-loop transport system (for example, of paternoster type), which transports support blades of the book block in a circuit. Each book block is loaded astride a support blade; the support blade drives the book block through the coupling station, which applies corresponding layers of glue to a front and to a back of the book block and then glues the cover (extracted from a corresponding stack) to the front and to the back of the book block.

[0005] Generally, the layers of glue are applied to the front and to the back of the book block by corresponding (application) rollers opposite each other that are fed with the glue, for example, by other corresponding (feeding) rollers. Each support blade makes the book block astride it pass through the application rollers, which then apply the corresponding layers of glue to the front and to the back of the book block. A distance between the application rollers is adjustable so as to adapt it to a thickness of the book blocks, taking into account a thickness of the support blade and of the layers of glue to be applied to the book blocks.

[0006] Particularly, the application rollers may also be provided with corresponding recesses that extend longitudinally. The recesses are arranged so that when each book block passes between the application rollers, cor-

responding shoulders formed by the recesses fit into folds of the book block that are present at the sides of its spine, so as to apply the desired amount of glue in this area as well.

[0007] In this context, US-A-2007/0092356 proposes using separate driving devices coupled with the transport system and the application rollers for varying a relative position of the support blades and of the shoulders of the application rollers during their rotation; at least the driving device of the application rollers comprises a controllable driving element for regulating the rotation of the application rollers (manually or by program). Moreover, the four application/feeding rollers are mounted on a carriage, which may translate transversely to the application/feeding rollers for removing the corresponding assembly from a frame of the case-in machine. In turn, each pair of application and feeding rollers is mounted on a corresponding plate; the plates may be moved transversely along the carriage for adapting their distance to the thickness of the book blocks.

[0008] In any case, the application of the layers of glue to the book blocks is a rather critical operation, which may adversely affect a hold of the covers and therefore a quality of the corresponding books.

[0009] Particularly, it is important to control a thickness of the layers of glue that are applied to each book block with relative precision. In fact, if the layers of glue are too thin, this may affect the gluing of the corresponding cover, with the risk of its detachment. On the contrary, if the layers of glue are too thick, this may cause a leakage of the glue during the application of the cover, with the risk of damaging the corresponding book and anyhow with the need to clean the case-in machine. In any case, differences between the thicknesses of the layers of glue that are applied on the front and on the back of the book block may compromise the correct operation of the coupling station, with a negative effect on the quality of the books.

Summary

[0010] The present invention is defined in the appended claims.

[0011] A simplified summary of the present invention is herein presented in order to provide a basic understanding thereof; however, the sole purpose of this summary is to introduce some concepts of the invention in a simplified form as a prelude to its following more detailed description, and it is not to be interpreted as an identification of its key elements nor as a delineation of its scope.

[0012] In general terms, the present invention is based on the idea of adjusting a distance between the rollers and a passage position of each book block between them.

[0013] Particularly, an aspect provides a bookbinding case-in machine for applying covers to book blocks. The bookbinding case-in machine comprises means for determining corresponding thicknesses of portions of each book block that is transported astride a support blade

between two rollers for applying at least one layer of glue on a front and a back of the book block. An adjusting system adjusts corresponding distances of the rollers from a passage position of the support blade between the rollers according to the thicknesses of the portions of the book block.

[0014] A further aspect provides a bookbinding plant comprising one or more of such case-in machines.

[0015] A further aspect provides a corresponding method.

[0016] A further aspect provides a (software) computer program for implementing the method.

[0017] A further aspect provides a corresponding software program product.

[0018] More specifically, one or more aspects of the present invention are set forth in the independent claims and advantageous features thereof are set forth in the dependent claims, with the text of all the claims that is incorporated herein by reference (with any advantageous features set forth with respect to each specific aspect that apply *mutatis mutandis* to any other aspect).

Brief description of the figures

[0019] The solution of the present invention, as well as further features and the respective advantages, will be better understood with reference to the following detailed description thereof, provided purely by way of a non-restrictive indication, to be read in conjunction with the accompanying drawings (wherein, for the sake of simplicity, corresponding elements are denoted with equal or similar references and their explanation is not repeated, and the name of each entity is generally used to denote both its type and its attributes, like value, content and representation). In this respect, it is expressly understood that the drawings are not necessarily drawn to scale (with some details that may be exaggerated and/or simplified) and that, unless otherwise indicated, they are merely used to illustrate the structures and procedures described herein conceptually. In addition, orientations and related position references (such as front, rear, upper, lower, lateral and so on) are to be intended in relation to a condition of use of the corresponding entities. Particularly:

FIG. 1 shows a block diagram of a bookbinding case-in machine wherein the solution according to an embodiment of the present invention may be implemented,

FIG.2A-FIG.2D show the general principles of the solution according to an embodiment of the present invention,

FIG.3 shows a schematic representation of a cover glue application device according to an embodiment of the present invention, and

FIG.4 shows a schematic representation of an engagement station according to an embodiment of the present invention.

Detailed description

[0020] With reference now to FIG. 1, a block diagram is shown of a bookbinding case-in machine 100 wherein the solution according to an embodiment of the present invention may be implemented.

[0021] The (bookbinding) case-in machine 100 is used for the production of books on an industrial scale in a bookbinding plant, and particularly for processing book blocks by applying corresponding covers (not shown in the figure). Each book block comprises a block of signatures or sheets that are bound together (for example, sewn). Typically, corresponding endpapers, each formed by a sheet that is folded in two parts so as to define corresponding flaps with the same sizes of the book block, are glued at the beginning and at the end of the book block, and a fastening lining is glued to embrace a binding of the book block. The book block has a front defined by its first page, a back defined by its last page, a spine between the front and the back corresponding to the binding and a lip opposite the spine. Each cover covers the corresponding book block externally allowing it to be opened. Particularly, in the case of a cover of hard type it comprises an upper plate, a spine and a lower plate that cover the front, the spine and the back, respectively, of the book block. Corresponding hinges connect the upper plate and the lower plate to the spine so as to allow the rotation of the upper/lower plates with respect to the spine for opening the book. Particularly, in the following reference will be made to the making of books with a squared spine, wherein the spine of the cover is flat and extends perpendicularly to the upper plate and to the lower plate (with similar considerations that apply to books with a rounded spine).

[0022] For example, the casing-in machine 100 comprises the following components. An infeed belt 105 receives the book blocks to be processed in succession. Particularly, the book blocks are placed onto the infeed belt 105 horizontally with their front facing forwards (for example, manually by an operator of the case-in machine 100 or automatically by a conveyor belt that provides the book blocks being made by one or more preceding bookbinding machines, such as sewing machines, not shown in the figure). A thickness gauge 110 measures a thickness (between the back and the front) of each book block. Particularly, the thickness gauge 110 is arranged above the infeed belt 105 for measuring the thickness of each book block that passes beneath it. A hopper 115 is instead used to load a stack of covers to be applied to corresponding book blocks (for example, manually by the operator of the case-in machine 100). A book block infeed station 120 overturns each book block vertically (with its spine facing upwards). The lip of the book block 105 rests on a plate (not shown in the figure), which is adjustable vertically so as to maintain the spine of the book block at a fixed height (regardless of its format). A transport system (not shown in the figure) transports the book block, for example, by means of a pair of belts that grip it near the

spine, through a squaring station 125 (which squares the spine of the book block). Moreover, the transport system transports the book block through a hinge glue application station 130 (which applies corresponding strips of glue to the front and to the back of the book block near its spine for the corresponding hinges of the cover). A coupling station 135 couples the corresponding cover to the book block. Particularly, the coupling station 135 comprises (not shown in the figure) a transport system of paternoster type, wherein a series of support blades of the book block (for example, three, arranged at regular intervals) are transported continuously along a closed loop that extends vertically. An engagement station 140 loads the book block (received from the transport system of the stations 125, 130) astride a support blade of the coupling station 135 that passes through it (as described in detail in the following). Concurrently, a cover loading station 145 extracts each cover in succession from the hopper 115, forms the hinges of the cover and feeds the (formed) cover horizontally to the coupling station 135, in synchrony with the corresponding book block. In the coupling station 135, the support blade that has received the book block transports it through a cover glue application device (not shown in the figure), which applies corresponding layers of glue to the front and/or to the back of the book block (as described in detail in the following). The support blade then transports the book block towards the corresponding cover (steady horizontally awaiting for it); the book block is inserted into the cover, and its upper and lower plates are folded down and pressed against the front and the back, respectively, of the book block. An unloading station 150 removes the book block with the applied cover from the support blade of the coupling station 135. The unloading station 150 supplies the book block to a pressing station 155, which presses the cover against the book block, so as to complete its gluing thereto. The books thus obtained are output in succession from the case-in machine 100 by placing them horizontally onto an output belt 160 (for example, to be shipped to corresponding customers). A control system, for example, a computer 165 (such as based on an industrial PC) controls the operation of the case-in machine 100. The computer 165 comprises (not shown in the figure) a processor or more providing its logic capability, a volatile working memory (RAM), a non-volatile mass memory (for example, a Flash E²PROM) for storing programs and data, and several input-output units (for example, a touchscreen for entering data/commands and displaying information, drivers for the various components of the case-in machine, a USB port for reading/writing removable storage devices such as a memory pen, and so on).

[0023] Referring now to FIG.2A-FIG.2D, the general principles are shown of the solution according to an embodiment of the present invention.

[0024] Starting from FIG.2A, a partial view of the coupling station 135 is shown in schematic form. Particularly, there is visible a part of the transport system 205 (of

paternoster type in the example at issue) with a (current) one of its support blades 210. A (current) book block 215 is placed onto the support blade 210 astride it; in this way, a (first) portion 215a and a (second) portion 215b of the book block 215 (*i.e.*, its pages with the possible endpapers) are arranged at a (first) side and at a (second) side, respectively, of the support blade 210, with the binding between the portion 215a and the portion 215b of the book block 215 (with the possible fastening lining) that rests onto a (horizontal) upper edge of the support blade 210 so as to be supported by it. Moreover, there is visible a part of the cover glue application device, indicated with the reference 220, which comprises a (first) roller 225a and a (second) roller 225b for applying the glue. The (application) rollers 225a and 225b are opposite each other (transversely), with their rotation axes 230a and 230b being parallel (for example, arranged horizontally at the same height). The transport system 205 repeatedly transports each support blade 210 with its book block 215 in succession between the roller 225a and the roller 225b (vertically upwards in the example at issue); particularly, the transport blade 210 passes between the roller 225a and the roller 225b, in parallel to their rotation axes 230a and 230b, respectively, at a passage position Pp defined by the transport system 205. The rollers 225a and 225b are separated from each other (horizontally, transversely to their rotation axes 230a and 230b) according to a thickness of the book block 215, taking into account a thickness of the transport blade 210 and of the layers of glue to be applied to the book block 215.

[0025] Ideally, the book block 215 is halved by the blade 210, so that its portions 215a and 215b are equal to each other. Therefore, the rollers 225a and 225b are symmetrical to the passage position Pp, *i.e.*, at a same (first) distance Da and (second) distance Db, respectively, therefrom (with Da=Db). The distances Da, Db are equal to half the total thickness of the book block (Ft) plus a predefined value (such as extracted from a configuration variable) given by half the thickness of the support blade 210 (Fs) plus the thickness of the layers of glue (Fg), *i.e.*, $Da = Db = Ft/2 + Fs/2 + Fg$. In this way, while the book block passes between the roller 225a and the roller 225b, they apply layers of glue (not shown in the figure) onto corresponding ends (front/back) of the book block 215. However, the inventors have found that in practice the book block 215 is rarely halved exactly by the blade 210. In fact, very often the blade 210 splits the book block 215 into more or less different portions 215a and 215b. Therefore, the portions 215a and 215b have thicknesses Fa and Fb, respectively, which are different from each other. For example, as shown in an exaggerated way in the figure, the thickness Fb of the portion 215b is greater than the thickness Fa of the portion 215a (similar considerations apply in the opposite case).

[0026] In the solution according to an embodiment of the present invention, the thickness Fa of the portion 215a and the thickness Fb of the portion 215b are de-

terminated. For example, for this purpose a (first) thickness gauge 235a and a (second) thickness gauge 235b measure the thickness F_a of the portion 215a and the thickness F_b of the portion 215b, respectively, of each book block 215 (such as in the engagement station, not shown in the figure). The cover application device 220 then comprises an adjustment system 240 for adjusting the distance D_a of the roller 225a and the distance D_b of the roller 225b from the passage position P_p (through a relative movement thereof) according to the thicknesses F_a, F_b of the portions 215a, 215b of each book block 215 that is transported by the support blade 210 between the rollers 225a and 225b.

[0027] The above described solution makes the application of the layers of glue to the book blocks 215 more effective, with a positive effect on the application of the covers and therefore on the quality of the corresponding books.

[0028] Particularly, in this way it is possible to control a thickness of the layers of glue that are applied to each book block 215 with relative precision. This substantially improves the gluing of the corresponding cover, reducing the risk of its detachment. At the same time, this substantially avoids any leakage of glue during the application of the cover, reducing the risk of damaging the book and of dirtying the case-in machine.

[0029] For example, as shown in FIG. 2B, it is possible to center the book block 215 between the rollers 225a and 225b, so that they are at the same distance from the corresponding ends (front/back) of the book block 215 (with the passage position P_p of the support blade 210, and then the transport system 205, accordingly off-axis with respect to the rollers 225a and 225b). For this purpose, the thickness gauges 235a and 235b transmit the measured thicknesses F_a and F_b , respectively, to the computer of the case-in machine (not shown in the figure). Once a previous book block (not shown in the figure) has cleared the rollers 225a and 225b, the computer then controls the adjustment system 240 so as to bring the rollers 225a and 225b to a distance D_a' and to a distance D_b' , respectively, from the passage position P_p corresponding to the thicknesses F_a and F_b , respectively (such as by moving them accordingly with respect to their distances for the preceding book block or to their ideal distances to which they have been returned in the meantime).

[0030] For example, the computer calculates a common displacement ΔD , equal to half the absolute value of the difference of the thicknesses F_a and F_b ($\Delta D = |F_b - F_a|/2$). Particularly, in the case shown in the figure wherein the thickness F_b of the portion 215b is greater than the thickness F_a of the portion 215a ($F_b > F_a$), the computer commands the adjustment system 240 so as to bring the roller 225b to a distance $D_b' = D_b + \Delta D$ from the passage position P_p (farther) and to bring the roller 225a to a distance $D_a' = D_a - \Delta D$ from the passage position P_p (closer).

[0031] In this way, it is possible to apply the layers of

glue to the front and to the back of each book block 215 with substantially equal thicknesses, regardless of how the book block 215 has been loaded onto the support blade 210; this improves the operation of the coupling station 135, with a positive effect on the quality of the books.

[0032] Advantageously, the thickness gauge of the book block (for example, arranged above the infeed belt of the case-in machine), not shown in the figure, measures the (total) thickness F_t of each book block 215 and supplies it to the computer. Once the computer has received the thicknesses F_a and F_b of the portions 215a and 215b, respectively, of each book block 215 it calculates the distances D_a' and D_b' of the rollers 225a and 225b, respectively, from the passage position P_p by increasing or decreasing the (theoretical) distance $D_a = D_b$, calculated as above on the basis of the thickness of the book block 215 (F_t), the thickness of the support blade 210 (F_s) and the thickness of the layers of glue (F_g), by the displacement ΔD ($|F_b - F_a|/2$). Particularly, in the case shown in the figure the distance $D_a' = F_t/2 + F_s/2 + F_g - (F_b - F_a)/2$ and the distance $D_b' = F_t/2 + F_s/2 + F_g + (F_b - F_a)/2$ are obtained.

[0033] In this way, the case-in machine may be adapted dynamically to the different thicknesses of the book blocks 215; this is particularly useful in the case of production of the book blocks 215 in small batches, for example, on-demand.

[0034] As a further improvement, the case-in machine also receives an indication of the thickness of the layers of glue to be applied to each book block 215, either in common for the front/back or individually for each of them; this information may be provided in general (for example, by means of the touchscreen of the computer) or for each book block 215 (for example, by means of a barcode reader arranged above the infeed belt of the case-in machine, not shown in the figure, which reads a barcode present on each book block 215 and provides it to the computer that extracts therefrom the thickness of the layers of glue or an identification code with which it accesses a descriptor from which it extracts the thickness of the layers of glue).

[0035] This adds further flexibility to the case-in machine.

[0036] In a specific embodiment of the present invention, the adjustment system 240 is configured for moving the rollers 225a, 225b with respect to the passage position P_p of the support blade 210 and then to the transport system 205 (instead in a fixed position with respect to a frame of the case-in machine, not shown in the figure). This implementation allows obtaining the desired result (i.e., the relative movement between the rollers 225a, 225b and the passage position P_p) in a simpler way from a mechanical point of view.

[0037] Passing to FIG. 2C, preferably the adjustment system comprises a (first) adjustment element 240a and a (second) adjustment element 240b for moving the roller 225a and the roller 225b, respectively, independently of

each other with respect to the passage position Pp of the support blade 210 and then to the transport system 205.

[0038] This allows controlling the distance of the rollers 225a and 225b from each book block 215 with higher precision, further improving the operation of the coupling station 135 and thus the quality of the books.

[0039] Particularly, in this case the computer calculates the distances Da' and Db' of the rollers 225a and 225b, respectively, from the passage position Pp starting from the corresponding thicknesses Fa and Fb, respectively (instead of from half the thickness of the book block 215). For example, the distances Da' and Db' are obtained by adding half the thickness of the support blade 210 (Fs) and the thickness of the layers of glue (Fg) to the thicknesses Fa and Fb, respectively, i.e., $Da' = Fa + Fs/2 + Fg$ and $Db' = Fb + Fs/2 + Fg$. In fact, in practice the thicknesses Fa, Fb may differ from half the thickness of the book block (Ft) by different amounts, so that their sum is not necessarily equal to the thickness of the book block ($Fa + Fb < > Ft$). This is due to the fact that the thicknesses Fa, Fb do not depend linearly on the number of sheets in an exact way (for example, because of possible air present between the sheets, their elasticity and so on).

[0040] Moving to FIG.2D, in this way it is also possible to move a selected one of the rollers 225a or 225b to a distance from the passage position Pp strictly greater than the thickness Fa of the portion 215a or the thickness Fb of the portion 215b, respectively, of the book block 215. The distance of the selected roller 225a, 225b from the passage position Pp is such as to ensure that the selected roller 225a, 225b does not come into contact with the book block 215 when it passes between the roller 225a and the roller 225b (taking into account the thicknesses of the support blade 210 and of the layers of glue). For example, the distance of the selected roller 225a, 225b from the passage position Pp is greater than the corresponding thickness Fa, Fb by a value Mp equal to a multiple of the sum of half the thickness of the support blade 210 (Fs) and the thickness of the layers of glue (Fg), i.e., $Mp = k (Fs/2 + Fg)$, with $k = 2-5$; generally, this value Mp is equal to 1-10 mm, preferably 3-8 mm and still more preferably 4-9, such as 5 mm. In this way, there is avoided applying any layer of glue to the corresponding end (front/back) of the book block 215. For example, in the case shown in the figure the roller 225a is brought to a distance $Da' = Fa + Mp$ from the passage position Pp (while the roller 225b is still brought to the distance Db' from the passage position Pp).

[0041] This adds flexibility to the case-in machine. For example, it is possible to produce books with Swiss-type paperback wherein the cover is glued only to the back of each book block 215, while the corresponding plate is left free from the front of the book block 215 for allowing it to open almost flat (lay flat).

[0042] With reference now to FIG.3, a schematic representation is shown of a cover glue application device 200 according to an embodiment of the present invention.

[0043] The cover glue application device 220 comprises (application) rollers 225a and 225b for applying corresponding layers of glue to the book blocks passing between them (not shown in the figure); the rollers 225a and 225b are mounted on rotation shafts that define their rotation axes, indicated with the same references 230a and 230b, respectively. The cover glue application device 220 further comprises the following components. A (first) roller 303a and a (second) roller 303b are used to feed the glue to the roller 225a and to the roller 225b, respectively. The (feeding) rollers 303a and 303b are mounted on rotation shafts that define their rotation axes, both indicated with the references 306a and 306b, respectively. The rotation axis 306a, 306b of each roller 303a, 303b is parallel to the rotation axis 230a, 230b of the corresponding roller 225a, 225b (horizontally, for example, at the same height), at a distance substantially equal to the sum of their radii so that the roller 303a, 303b is approximately tangent to the roller 225a, 225b along a corresponding (horizontal) contact line. A (first) feeder 309a and a (second) feeder 309b feed the pairs of rollers 225a-303a and 225b-303b, respectively, at corresponding feeding zones over their contact lines.

[0044] A (glue) reservoir 312 contains the glue to be applied to the book blocks, for example, a cold PVA glue that is continuously stirred by an agitator (not shown in the figure). A pump 315 forces the glue from the reservoir 312 to the feeders 309a and 309b via a (glue) feeding circuit 318. The feeding circuit 318 comprises a tube 321 extending from the reservoir 312 to a T-fitting 324, and two tubes 327a and 327b provided with shut-off valves 330a and 330b, respectively, extending from the T-fitting 324 to the feeders 309a and 309b, respectively.

[0045] A (water) reservoir 333 contains water for rinsing the pairs of rollers 225a-303a and 225b-303b. A pump 336 forces the water from the reservoir 333 to the feeders 309a and 309b via a (water) feeding circuit 339. The feeding circuit 339 comprises a tube 342 extending from the reservoir 333 to a T-fitting 345, and two tubes 348a and 348b provided with shut-off valves 351a and 351b, respectively, extending from the T-fitting 345 to the feeders 309a and 309b, respectively.

[0046] A (first) (collection) tray 354a and a (second) (collection) tray 354b are arranged beneath the pairs of rollers 225a-303a and 225b-303b, respectively, for collecting the glue and the water being discharged therefrom. A (collection) tank 357 is used to collect the discharged water. A (glue/water) collection circuit 360 selectively conveys the discharged glue or water from the trays 354a and 354b to the tanks 312 or 357, respectively. The collection circuit 360 comprises two tubes 363a and 363b extending from the trays 354a and 354b, respectively, to a T-fitting 366, a tube 369 extending from the T-fitting 366 to another T-fitting 372, and two tubes 375g and 375w provided with shut-off valves 378g and 378w, respectively, extending from the T-fitting 372 to the tanks 312 and 357, respectively.

[0047] In operation, the shut-off valves 330a, 330b,

and 378g are open and the pump 315 is on, while the shut-off valves 351a, 351b, and 378w are closed and the pump 336 is off. The pump 315 forces the glue from the reservoir 312 through the feeding circuit 318 to the feeders 309a and 309b, which feed it to the feeding zones over the pairs of rollers 225a-303a and 225b-303b, respectively. The rollers 225a-225b and 303a-303b rotate in opposite directions towards their feeding zones from above; particularly, the roller 225a rotates counterclockwise and the roller 303a rotates clockwise, whereas the roller 225b rotates clockwise and the roller 303b rotates counterclockwise. In this way, the rollers 303a and 303b apply a predefined amount of glue to the rollers 225a and 225b, respectively (for its application to the book blocks passing between them). The rest of the glue being fed by the feeders 309a and 309b instead falls into the trays 354a and 354b, respectively. The collection circuit 360 returns the glue from the trays 354a and 354b to the tank 312, wherein it is filtered and collected for its reuse.

[0048] Whenever necessary (for example, when the case-in machine is turned off, periodically and so on), the cover glue application device 220 is rinsed. For this purpose, the shut-off valves 330a, 330b, and 378g are closed and the pump 315 is turned off, whereas the shut-off valves 351a, 351b, and 378w are opened and the pump 336 is turned on. The pump 336 forces the water from the reservoir 333 through the feeding circuit 339 to the feeders 309a and 309b, which feed it to the feeding zones over the pairs of rollers 225a-303a and 225b-303b, respectively. The water removes the glue from the rollers 225a-225b and 303a-303b, and the (dirty) water with the removed glue falls into the trays 354a and 354b, respectively. The collection circuit 360 conveys the dirty water from the trays 354a and 354b to the tank 357 (from which it is then discharged).

[0049] In the solution according to an embodiment of the present invention, a (first) assembly formed by the shaft 230a (with the roller 225a), the shaft 306a (with the roller 303a), the feeder 309a and the tray 354a is mounted on a (first) runner 381a, and a (second) assembly formed by shaft 230b (with roller 225b), the shaft 306b (with the roller 303b), the feeder 309b and the tray 354b is mounted on a (second) runner 381b. The runners 381a and 381b are slidable (horizontally) on a (first) guide 384a and on a (second) guide 384b, respectively (for example, each implemented by a pair of rails). A (first) servomotor 387a and a (second) servomotor 387b move the runners 381a and 381b, respectively (and then the corresponding assemblies as well), along the guides 384a and 384b, respectively. For this purpose, at least part of the feeding circuit 318, part of the feeding circuit 360 and part of the collection circuit 339 are flexible to allow the corresponding movement of the feeders 309a, 309b and of the trays 354a, 354b with respect to the reservoir 312, the reservoir 333 and the reservoir 357, respectively.

[0050] In this way, it is possible to adjust the position of the rollers 225a, 225b with high precision in a relatively simple way.

[0051] With reference now to FIG.4, a schematic representation is shown of the engagement station 140 according to an embodiment of the present invention.

[0052] The engagement station 140 comprises the following components. A corresponding transport system is used to transport the book blocks 215 received in succession from the preceding transport system of the case-in machine (not shown in the figure). Particularly, in an embodiment of the present invention a gripper formed by a (first) jaw 405a and a (second) jaw 405b is used to grip each book block 215 (arranged vertically with the spine facing upwards) at the spine. The jaws 405a and 405b are mounted on a (first) runner 410a and on a (second) runner 410b, respectively. The runners 410a and 410b are slidable (horizontally) along a transport direction of the book blocks 215 on a (first) guide 415a and on a (second) guide 415b, respectively. In turn, the jaws 405a and 405b are movable (horizontally) with respect to the runners 410a and 410b, respectively, transversely to the guides 410a and 410b, respectively, for closing/opening the gripper 405a-405b. Alternatively, not shown in the figure, a channel (adjustable in width according to the thickness of the book blocks) is used to house each book block 215 (still vertically with its spine facing upwards); a chain with push pins pushes the book block 215 along the same transport direction.

[0053] An opener 420 for opening each book block 215 substantially in half is arranged centrally between the guides 415a and 415b (in parallel thereto). The opener 420 comprises a (first) plate 420a and a (second) plate 420b that extend vertically, facing each other in parallel. The plates 420a and 420b are separated from each other by a distance slightly greater than the thickness of the support blades 210 (only one shown in the figure), so as to define a channel 425 between them for their passage (in vertical). The plates 420a and 420b are cut at their upper entrance edge (along the transport direction of the book blocks 215), so as to define a rear lead-in face for each book block 215. A wedge 420i connects the plates 420a and 420b at this rear lead-in face, so as to close (at least partially) the channel 425.

[0054] In operation, for each book block 215 provided by the preceding transport system, the jaws 405a and 405b (initially opened at a distance strictly greater than the thickness of the book block 215) are brought closer to each other so as to close the gripper 405a-405b for gripping the book block 215 (which is then released from the preceding transport system). The runners 410a and 410b (with the jaws 405a and 405b, respectively) slide along the guides 410a and 410b, respectively, towards the opener 420. Consequently, the book block 215 engages over the opener 420, particularly with the wedge 420i at first and with the plates 420a, 420b later on that insert into it. In this way, the opener 420 substantially splits the book block 215 in half, with its portion 215a alongside the plate 420a and its portion 215b alongside the plate 420b (outside the channel 425). In the solution according to an embodiment of the present invention, the

gripper 405a-405b firmly holds the book block 215 during this operations, thereby improving their precision. At this point, the jaws 405a and 405b are moved apart from each other so as to open the gripper 405a-405b for releasing the book block 215; the runners 410a, 410b (with the jaws 405a, 405b) then slide along the guides 410a, 410b in the opposite direction for returning the gripper 405a-405b towards the preceding transport system. At the same time, the transport system 205 transports each transport blade 210 in succession repeatedly through the channel 425 (vertically upwards); in this way, the support blade 210 passes inside the book block 215 (opened at the opener 420), reaches its spine (with the book block 215 that arranges astride the support blade 210) and then lifts the book block 215 away from the opener 420.

[0055] In the solution according to an embodiment of the present invention, the thickness gauges 235a and 235b are of mechanical type. In this case, the measurement of the thicknesses of the portions 215a and 215b of the book block 215 is obtained by compressing each of them between two mechanical elements (movable relatively to each other). This improves the precision of the measurement of the thicknesses of the portions 215a and 215b of the book block 215, since it prevents it from being distorted by an opening of the corresponding pages of the book block 215 if left free. For example, the thickness gauges 235a and 235b are mounted on the runners 410a and 410b, respectively. The thickness gauges 235a and 235b are provided with movable elements 430a and 430b, respectively (such as pistons), which are movable vertically transversely to the guides 415a and 415b, respectively; the movable elements 430a and 430b measure the thickness of the portions 215a and 215b, respectively, of the book block 215 by pressing the corresponding ends (front/back) thereof against the plates 420a and 420b, respectively. In this way, there are leveraged the plates 420a and 420b already present in the case-in machine; moreover, this further improves the precision of the measurement of the thicknesses of the portions 215a and 215b of the book block 215, as they are referred to the plates 420a and 420b, respectively, which act as fixed stops.

Modifications

[0056] In order to satisfy local and specific requirements, a person skilled in the art may apply many logical and/or physical modifications to the present invention, provided that it remains within the scope of the claims. Particularly, the present invention may be practiced even without the specific details (such as the numerical values) set forth in the preceding description to provide a more thorough understanding thereof; conversely, well-known features may have been omitted or simplified in order not to obscure the description with unnecessary particulars. Moreover, it is expressly understood that specific elements and/or method steps described in connection with any embodiment of the present invention may be incor-

porated in any other embodiment as a matter of general design choice. Moreover, items presented in a same group and different embodiments, examples or alternatives are not to be construed as *de facto* equivalent to each other (but they are separate and autonomous entities). In any case, each numerical value should be read as modified according to the applicable tolerances; particularly, unless otherwise indicated, the terms "substantially", "about", "approximately" and the like should be intended as within 10%, preferably 5% and still more preferably 1%. Moreover, each range of numerical values should be intended as expressly specifying any possible number along the *continuum* within the range (comprising its end points). Ordinal or other qualifiers are merely used as labels to distinguish elements with the same name but do not by themselves connote any priority, precedence or order. The terms include, comprise, have, contain, involve and the like should be intended with an open, non-exhaustive meaning (*i.e.*, not limited to the recited items), the terms based on, dependent on, in agreement with, according to, function of and the like should be intended as a non-exclusive relationship (*i.e.*, with possible further variables involved), the term a/an should be intended as one or more items (unless expressly indicated otherwise), and the term means for (or any means-plus-function formulation) should be intended as any structure adapted or configured for carrying out the relevant function. More specifically, each of the following modifications may be applied (alone or in combination with any other modification) to all the corresponding features described above (wherein, in general, the features described in each complete sentence may be implemented independently of the features described in the other sentences, except for those strictly necessary functionally).

[0057] For example, an embodiment provides a bookbinding case-in machine for applying covers to book blocks. However, the bookbinding case-in machine may be used to apply covers of any type (for example, hard or soft, and so on) to book blocks of any type (for example, of sewn, glued, stapled signatures/sheets, and so on).

[0058] In an embodiment, the bookbinding case-in machine comprises one or more support blades for supporting each current one of the book blocks astride a current one of the support blades with a first portion and a second portion of the current book block arranged at a first side and at a second side, respectively, of the current support blade. However, the support blades may be in any number and of any shape/size.

[0059] In an embodiment, the bookbinding case-in machine comprises a cover glue application device having a first roller and a second roller facing each other. However, the cover glue application device may be of any type (for example, with the rollers of any size and orientation, with lateral surfaces being uniform or provided with longitudinal recesses, fed by other corresponding rollers or by drawing the glue directly from corresponding trays,

with the glue being supplied to the feeding zones of the pairs of application/feeding rollers by corresponding feeders or directly by corresponding tubes, with or without glue collection trays, with or without a rinsing system, and so on).

[0060] In an embodiment, the bookbinding case-in machine comprises a transport system for transporting the current support blade to a passage position between the first roller and the second roller. However, the transport system may be of any type (for example, based on belts, chains and the like, operating at any fixed or variable speed, and so on).

[0061] In an embodiment, the current support blade is transported to the passage position between the first roller and the second roller for applying at least one of a first layer of glue on a front and a second layer of glue on a back, respectively, of the current book block. However, the layers of glue may be of any type (for example, material, thickness, temperature and so on) and applied in any way (for example, to both the front and the back, only one of them, on corresponding endpapers of the book block, on a first and a last sheet/signature of the book block, and so on).

[0062] In an embodiment, the bookbinding case-in machine comprises determining means for determining a first thickness of the first portion and a second thickness of the second portion of the current book block. However, the determining means may be implemented with any structure (for example, two thickness gauges for measuring the corresponding thicknesses, a single thickness gauge for measuring one thickness with the other thickness being determined according to a total thickness of the book block, and so on).

[0063] In an embodiment, the bookbinding case-in machine comprises an adjusting system for adjusting a first distance of the first roller and a second distance of the second roller from the passage position of the current support blade according to the first thickness and the second thickness of the current book block. However, the adjustment system may be of any type (for example, one or more motors, mechanical/hydraulic actuators and the like, which move the rollers and/or the support blades, and so on) and it may adjust the distances between the rollers and the passage position in any way (for example, for equalizing the distances of the rollers from the book block, for avoiding applying the layer of glue on the front or the back of the book block, by calculating only the displacements of the rollers with respect to the theoretical common distance from the passage position or the distances of the rollers from the passage position, and so on).

[0064] Further embodiments provide additional advantageous features, which may however be omitted at all in a basic implementation. In this respect, it is expressly understood that the features of each of the following embodiments may be combined with the above features either alone or in combination with the features of any number of the other following embodiments.

[0065] For example, in an embodiment the adjusting system is configured for moving the first roller and the second roller with respect to the passage position of the current support blade. However, the rollers may be moved in any way (for example, together with each other, independently of each other, alone or in conjunction with any other corresponding component of the cover glue application device, and so on).

[0066] In an embodiment, the adjusting system comprises a first adjusting element and a second adjusting element for moving the first roller and the second roller with respect to the passage position of the current support blade independently. However, the adjustment elements may be of any type (for example, separate motors/actuators, a single motor/actuator with separate driving systems, and so on).

[0067] In an embodiment, the adjusting system is adapted to moving a selected one between the first roller and the second roller to a distance from the passage position of the current support blade higher than the first thickness or the second thickness, respectively, of the current book block to avoid applying the first layer of glue to the front or the second layer of glue to the back, respectively, of the current book block. However, the selected roller may be of any type (for example, fixed or variable, corresponding to the front or to the back of the book blocks, and so on) and it may be moved to any distance that allows not applying the corresponding layer of glue (for example, depending on the thickness of the support blade and of the layers of glue, fixed, and so on).

[0068] In an embodiment, the bookbinding case-in machine comprises an input unit for receiving an indication of a thickness of the first layer of glue and of the second layer of glue. However, the input unit may be of any type (for example, a touchscreen, a keyboard, a barcode reader for reading barcodes present on each book block, on worksheets or on handling trays of each processing batch of the book blocks, and so on) for receiving the indication of the thickness of the layers of glue in any way (for example, manually or automatically, at the level of processing batches or of single book blocks, directly or to be derived from a descriptor, and so on).

[0069] In an embodiment, the adjusting system is adapted to adjusting the first distance of the first roller and the second distance of the second roller from the passage position of the current support blade further according to the thickness of the first layer of glue and of the second layer of glue, respectively. However, the distances may be adjusted in any way (for example, for a common thickness of the layers of glue, for independent thicknesses of the layers of glue, and so on).

[0070] In an embodiment, the determining means comprise a first thickness gauge and a second thickness gauge for measuring the first thickness of the first portion and the second thickness of the second portion, respectively, of the current book block. However, the thickness gauges may be of any type (for example, mechanical,

optical and so on) and arranged at any position (for example, in the engagement station, the coupling station and so on).

[0071] In an embodiment, the determining means comprise means for providing an indication of a total thickness of the current book block. However, these means may be implemented in any way (for example, for providing the total thickness manually or automatically, at the level of processing batches or of single book blocks, directly or to be derived from a descriptor, and so on); particularly, it is possible to use a thickness gauge for measuring the total thickness of each book block of any type, such as mechanical, optical and the like, a barcode reader for reading a barcode present on each book block, on worksheets or on handling trays of each processing batch of the book blocks, the input unit of the case-in machine for entering the total thickness manually for each processing batch of book blocks, and so on.

[0072] In an embodiment, the determining means comprise one between a first thickness gauge and a second thickness gauge for measuring a measured thickness between the first thickness of the first portion and the second thickness of the second portion, respectively, of the current book block. However, the thickness gauge may be any one of the thickness gauges of above (of any type and arranged at any position).

[0073] In an embodiment, the determining means comprise means for determining another one between the first thickness of the first portion and the second thickness of the second portion according to the total thickness and the measured thickness. However, these means may be implemented with any structure (for example, the control unit of the case-in machine, a dedicated device and so on).

[0074] In an embodiment, the first thickness gauge and the second thickness gauge are of mechanical type. However, the mechanical thickness gauges may be of any type (for example, spring-based, of pressure type, based on single moving element or on two opposed moving elements, and so on).

[0075] In an embodiment, the bookbinding case-in machine comprises an engagement station having an opener with a first plate and a second plate facing each other to define a channel for a passage of the current support blade. However, the plates may be of any shape and size, and they may be at any distance from each other.

[0076] In an embodiment, the bookbinding case-in machine comprises a loader for loading the current book block astride the opener with the first portion and the second portion of the current book block arranged alongside the first plate and the second plate, respectively, outside the channel. However, the loader may be of any type (for example, with a device that holds the book block and a system that moves it, a channel into which the book block is inserted with elements that push it therealong, and so on).

[0077] In an embodiment, the transport system is

adapted to transporting the current support blade through the channel thereby bringing the current book block astride the current support blade. However, the support blades may cross the channel in any way (for example, with any clearance, speed and so on).

[0078] In an embodiment, the first thickness gauge and the second thickness gauge comprise a first movable element and a second movable element. However, the movable elements may be of any type (for example, pistons, rollers and so on).

[0079] In an embodiment, the first movable element and the second movable element are for measuring the first thickness of the first portion and the second thickness of the second portion, respectively, of the current book block astride the opener against the first plate and against the second plate, respectively. However, the movable elements may act against the opener in any way (for example, mounted on runners of the jaws or fixed with respect to the frame, acting at any position and with any force, and so on). In any case, the first movable element and the second movable element may also act against corresponding fixed abutments of another type (for example, functional parts of the bookbinding case-in machine, dedicated elements of the thickness gauges, and so on).

[0080] In an embodiment, the loader comprises a holding device for holding the current book block arranged vertically with a spine facing upwards in condition of use. However, the holding device may be of any type (for example, a gripper, a pair of belts, and so on).

[0081] In an embodiment, the loader comprises a moving system for moving the holding device with respect to the opener. However, the moving system may be of any type (for example, corresponding guides/runners, transport chains and so on).

[0082] In any case, the engagement station of above (with the opener and the loader comprising the holding device and the movement system) lends itself to be used in a bookbinding case-in machine even without the determination of the thicknesses and the adjustment of the distances of the rollers according thereto. Particularly, an embodiment provides a bookbinding case-in machine for applying covers to book blocks. In an embodiment, the bookbinding case-in machine comprises one or more support blades for supporting each current one of the book blocks astride a current one of the support blades with a first portion and a second portion of the current book block arranged at a first side and at a second side, respectively, of the current support blade. In an embodiment, the bookbinding case-in machine comprises an engagement station. In an embodiment, the engagement station comprises an opener with a first plate and a second plate facing each other for defining a channel for a passage of the current support blade. In an embodiment, the engagement station comprises a loader for loading the current book block astride the opener with the first portion and the second portion of the current book block arranged alongside the first plate and the second

plate, respectively, outside the channel. In an embodiment, the transport system is adapted to transporting the current support blade through the channel thereby bringing the current book block astride the current support blade. In an embodiment, the loader comprises a holding device for holding the current book block arranged vertically with a spine facing upwards in condition of use. In an embodiment, the loader comprising a moving system for moving the holding device with respect to the opener. However, the same considerations pointed out above with respect to the preceding embodiment of the case-in machine also apply to this further embodiment thereof.

[0083] In an embodiment, the bookbinding case-in machine is for applying covers of hard type to the book blocks. However, the hard covers may be of any type (for example, of squared spine, rounded spine, and so on).

[0084] An embodiment provides a bookbinding plant comprising one or more instances of such bookbinding case-in machine. However, the bookbinding plant may comprise any number of bookbinding case-in machines, together with any number and type of other bookbinding machines, down to none (for example, one or more machines for providing the book blocks, such as sewing machines, combined machines for folding flat sheets and opening signatures, perfect-binding machines and the like, one or more machines for performing operations following the application of the covers, such as three-knife trimming machines and the like, and so on).

[0085] Generally, similar considerations apply if the bookbinding case-in machine and the bookbinding plant each has a different structure, comprises equivalent components or has other operative characteristics, provided that it remains within the scope of the claims. In any case, every component thereof may be separated into more elements, or two or more components may be combined together into a single element; moreover, each component may be replicated to support the execution of the corresponding operations in parallel. Moreover, unless specified otherwise, any interaction between different components generally does not need to be continuous, and it may be either direct or indirect through one or more intermediaries.

[0086] An embodiment provides a method for applying covers to book blocks in a bookbinding case-in machine. In an embodiment, the method comprises supporting each current one of the book blocks astride a current one of one or more support blades with a first portion and a second portion of the current book block arranged at a first side and at a second side, respectively, of the current support blade. In an embodiment, the method comprises transporting the current support blade to a passage position between a first roller and a second roller facing each other of a cover glue application device for applying at least one of a first layer of glue on a front and a second layer of glue on a back, respectively, of the current book block. In an embodiment, the method comprises determining a first thickness of the first portion and a second thickness of the second portion of the current book block.

In an embodiment, the method comprises adjusting a first distance of the first roller and a second distance of the second roller from the passage position of the current support blade according to the first thickness and the second thickness of the current book block. However, the same considerations pointed out above with respect to the features of the bookbinding case-in machine apply to the corresponding steps of the method as well.

[0087] An embodiment provides a method for applying covers to book blocks in a bookbinding case-in machine. In an embodiment, the method comprises loading each current one of the book blocks astride an opener, having a first plate and a second plate facing each other for defining a channel, with a first portion and a second portion of the current book block arranged alongside the first plate and the second plate, respectively, outside the channel. In an embodiment, the method comprises transporting a current one of one or more support blades through the channel thereby bringing the current book block astride the current support blade with the first portion and the second portion of the current book block arranged at a first side and at a second side, respectively, of the current support blade. In an embodiment, said step of loading the current book block comprises holding the current book block arranged vertically with a spine facing upwards by means of a holding device. In an embodiment, said step of loading the current book block comprises moving the holding device with respect to the opener. However, the same considerations pointed out above with respect to the features of the bookbinding case-in machine apply to the corresponding steps of the method as well.

[0088] Generally, similar considerations apply if the same solution is implemented with equivalent methods, provided that they remain within the scope of the claims (by using similar steps with the same functions of more steps or portions thereof, removing some non-essential steps or adding further optional steps); moreover, the steps may be performed in a different order, concurrently or in an interleaved way (at least in part).

[0089] An embodiment provides corresponding computer programs configured to cause a bookbinding case-in machine to perform the steps of each of the methods of above when the computer program is executed on a control system of the bookbinding case-in machine. An embodiment provides corresponding computer program products each comprising one or more non-transitory computer-readable storage media having program instructions collectively stored in the computer-readable storage media, the program instructions being readable by the control system for causing the bookbinding case-in machine to perform the steps of each of the same methods. However, each (computer) program may be of any type (for example, software, firmware and so on) and it may be used on any control system (such as a computer, a microcontroller and so on).

Claims

1. A bookbinding case-in machine (100) for applying covers to book blocks (215), wherein the bookbinding case-in machine (100) comprises:
 - one or more support blades (210) for supporting each current one of the book blocks (215) astride a current one of the support blades (210) with a first portion (215a) and a second portion (215b) of the current book block (215) arranged at a first side and at a second side, respectively, of the current support blade (210),
 - a cover glue application device (220) having a first roller (225a) and a second roller (225b) facing each other,
 - a transport system (205) for transporting the current support blade (210) to a passage position (Pp) between the first roller (225a) and the second roller (225b) for applying at least one of a first layer of glue on a front and a second layer of glue on a back, respectively, of the current book block (215),
 - determining means (235a, 235b; 110; 165) for determining a first thickness of the first portion (215a) and a second thickness of the second portion (215b) of the current book block (215), and
 - an adjusting system (240) for adjusting a first distance of the first roller (225a) and a second distance of the second roller (225b) from the passage position (Pp) of the current support blade (210) according to the first thickness and the second thickness of the current book block (215).
2. The bookbinding case-in machine (100) according to claim 1, wherein the adjusting system (240) is configured for moving the first roller (225a) and the second roller (225b) with respect to the passage position (Pp) of the current support blade (210).
3. The bookbinding case-in machine (100) according to claim 2, wherein the adjusting system (240) comprises a first adjusting element (240a) and a second adjusting element (240b) for moving the first roller (225a) and the second roller (225b) with respect to the passage position (Pp) of the current support blade (210) independently.
4. The bookbinding case-in machine (100) according to claim 3, wherein the adjusting system (240a, 240b) is adapted to moving a selected one between the first roller (225a) and the second roller (225b) to a distance from the passage position (Pp) of the current support blade (210) higher than the first thickness or the second thickness, respectively, of the current book block (215) to avoid applying the first layer of glue to the front or the second layer of glue to the back, respectively, of the current book block (215).
5. The bookbinding case-in machine (100) according to any claim from 1 to 4, wherein the bookbinding case-in machine (100) comprises an input unit (165) for receiving an indication of a thickness of the first layer of glue and of the second layer of glue, the adjusting system (240) being adapted to adjusting the first distance of the first roller (225a) and the second distance of the second roller (225b) from the passage position (Pp) of the current support blade (210) further according to the thickness of the first layer of glue and of the second layer of glue, respectively.
6. The bookbinding case-in machine (100) according to any claim from 1 to 5, wherein the determining means (235a, 235b) comprise a first thickness gauge (235a) and a second thickness gauge (235b) for measuring the first thickness of the first portion (215a) and the second thickness of the second portion (215b), respectively, of the current book block (215).
7. The bookbinding case-in machine (100) according to any claim from 1 to 5, wherein the determining means (235a, 235b, 110, 165) comprise means (110; 165) for providing an indication of a total thickness of the current book block (215), one between a first thickness gauge (235a) and a second thickness gauge (235b) for measuring a measured thickness between the first thickness of the first portion (215a) and the second thickness of the second portion (215b), respectively, of the current book block (215), and means (165) for determining another one between the first thickness of the first portion (215a) and the second thickness of the second portion (215b) according to the total thickness and the measured thickness.
8. The bookbinding case-in machine (100) according to claim 6 or 7, wherein the first thickness gauge (235a) and the second thickness gauge (235b) are of mechanical type.
9. The bookbinding case-in machine (100) according to claim 8, wherein the bookbinding case-in machine (100) comprises an engagement station (140) having an opener (420) with a first plate (420a) and a second plate (420b) facing each other to define a channel (425) for a passage of the current support blade (210), and a loader (410a-415a, 410b-415b) for loading the current book block (215) astride the opener (420) with the first portion and the second portion of the current book block (215) arranged alongside the first plate (420a) and the second plate (420b), respectively, outside the channel (425), the transport system (205) being adapted to transporting

the current support blade (210) through the channel (425) thereby bringing the current book block (215) astride the current support blade (210), and wherein the first thickness gauge (235a) and the second thickness gauge (235b) comprise a first movable element (430a) and a second movable element (430b), respectively, for measuring the first thickness of the first portion (215a) and the second thickness of the second portion (215b), respectively, of the current book block (215) astride the opener (420a, 420b) against the first plate (420a) and against the second plate (420b), respectively.

10. The bookbinding case-in machine (100) according to any claim from 1 to 9, wherein the bookbinding case-in machine (100) comprises an engagement station (140) having an opener (420) with a first plate (420a) and a second plate (420b) facing each other to define a channel (425) for a passage of the current support blade (210), and a loader (410a-415a, 410b-415b) for loading the current book block (215) astride the opener (420) with the first portion and the second portion of the current book block (215) arranged alongside the first plate (420a) and the second plate (420b), respectively, outside the channel (425), the transport system (205) being adapted to transporting the current support blade (210) through the channel (425) thereby bringing the current book block (215) astride the current support blade (210), and wherein the loader (410a-415a, 410b-415b) comprises a holding device (410a, 410b) for holding the current book block (215) arranged vertically with a spine facing upwards in condition of use and a moving system (415a, 415b) for moving the holding device (410a, 410b) with respect to the opener (420).
11. The bookbinding case-in machine (100) according to any claim from 1 to 10, wherein the bookbinding case-in machine (100) is for applying covers of hard type to the book blocks (215).
12. A bookbinding plant comprising one or more bookbinding machines (100) according to any claim from 1 to 11.
13. A method for applying covers to book blocks (215) in a bookbinding case-in machine (100), wherein the method comprises:

supporting each current one of the book blocks (215) astride a current one of one or more support blades (210) with a first portion (215a) and a second portion (215b) of the current book block (215) arranged at a first side and at a second side, respectively, of the current support blade (210),
transporting the current support blade (210) to a passage position (Pp) between a first roller

(225a) and a second roller (225b) facing each other of a cover glue application device (220) for applying at least one of a first layer of glue on a front and a second layer of glue on a back, respectively, of the current book block (215),
determining a first thickness of the first portion (215a) and a second thickness of the second portion (215b) of the current book block (215), and
adjusting a first distance of the first roller (225a) and a second distance of the second roller (225b) from the passage position (Pp) of the current support blade (210) according to the first thickness and the second thickness of the current book block (215).

14. A computer program configured to cause the bookbinding case-in machine (100) according to any claim from 1 to 11 to perform a method for applying covers to book blocks (215) when the computer program is executed on a control system (165) of the bookbinding case-in machine (100), wherein the method comprises:

receiving an indication of the first thickness of the first portion (215a) and of the second thickness of the second portion (215b) of the current book block (215), and
adjusting the first distance of the first roller (225a) and the second distance of the second roller (225b) from the passage position (Pp) of the current support blade (210) according to the first thickness and the second thickness of the current book block (215).

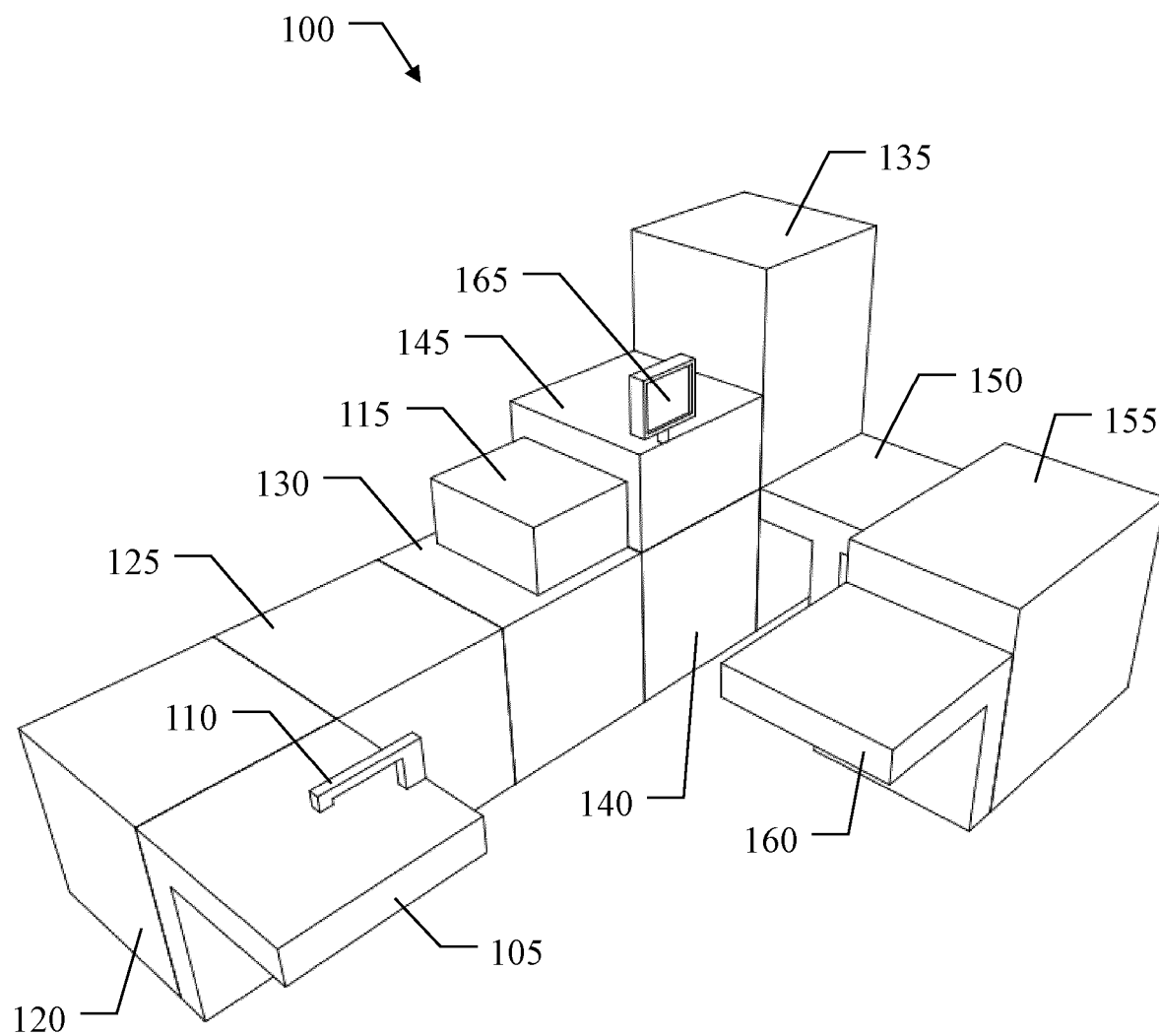


FIG.1

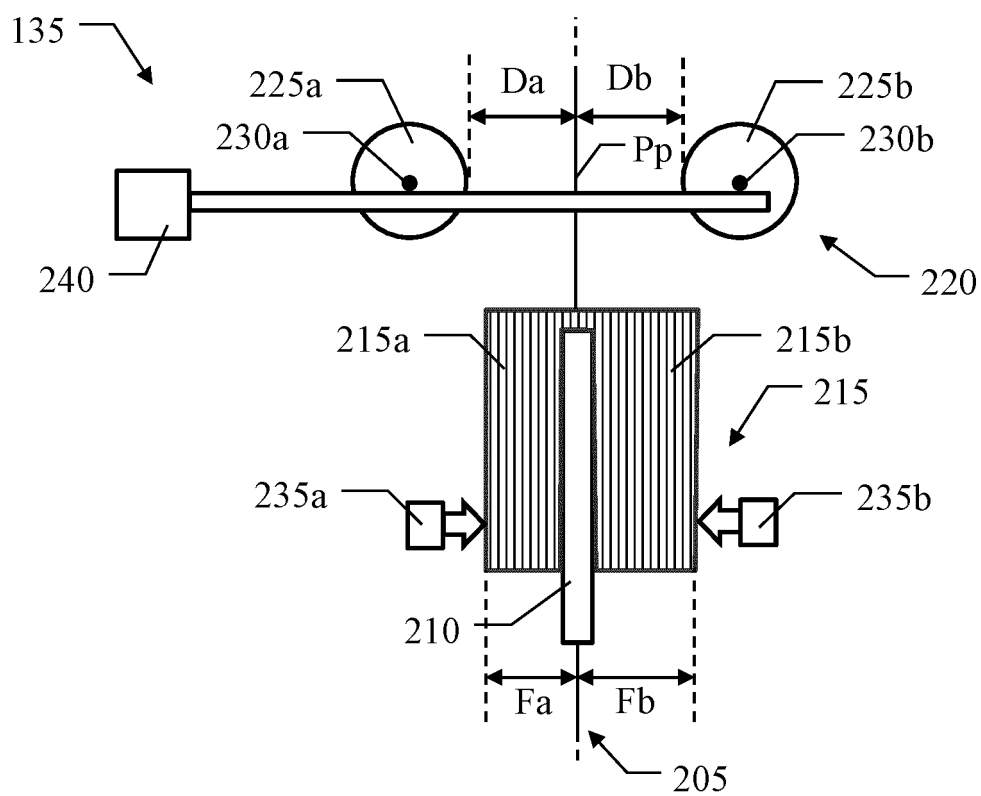


FIG.2A

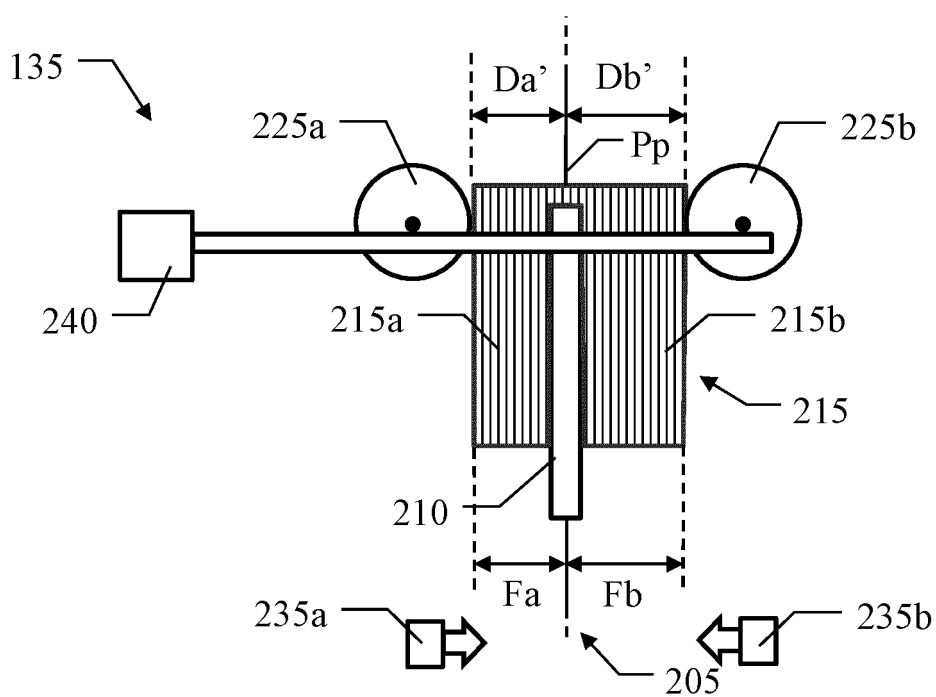


FIG.2B

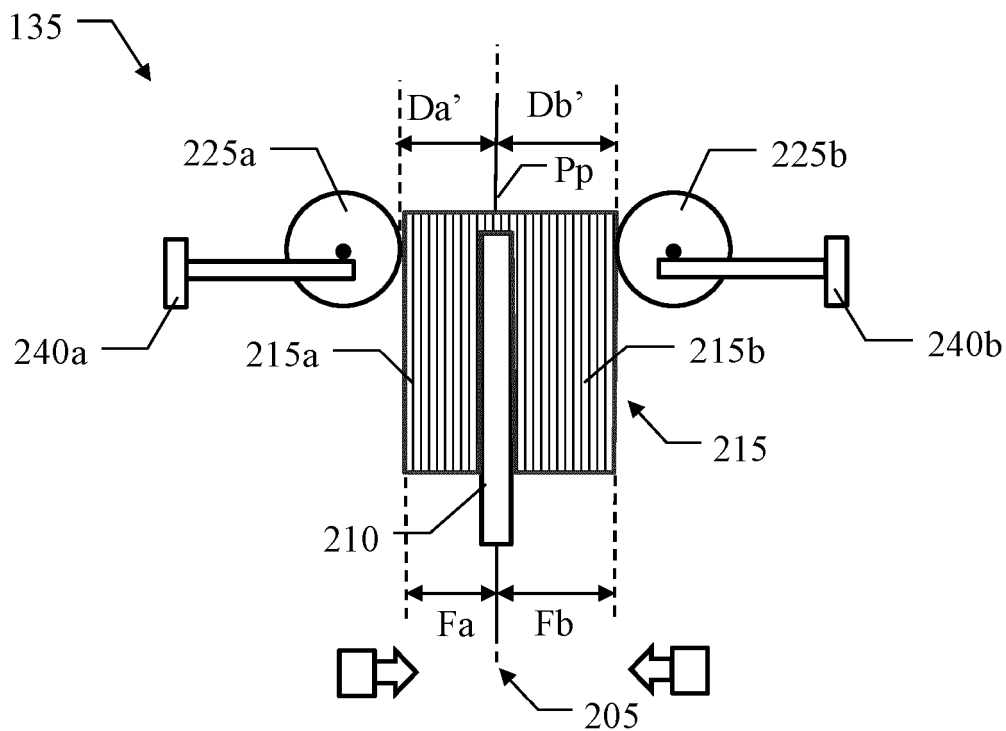


FIG. 2C

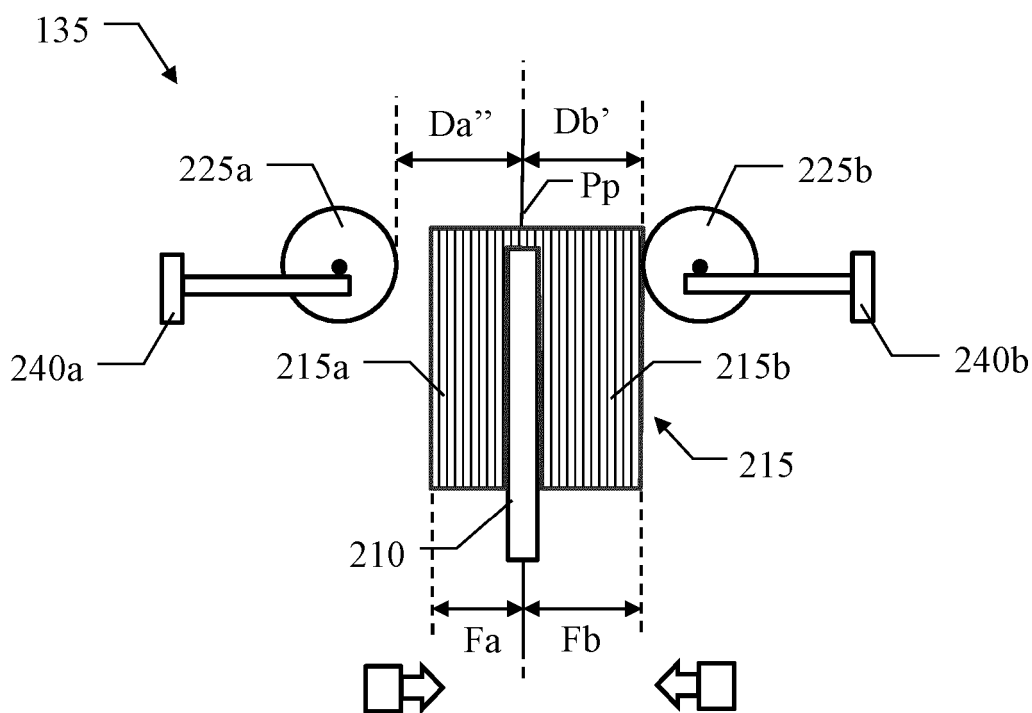


FIG. 2D

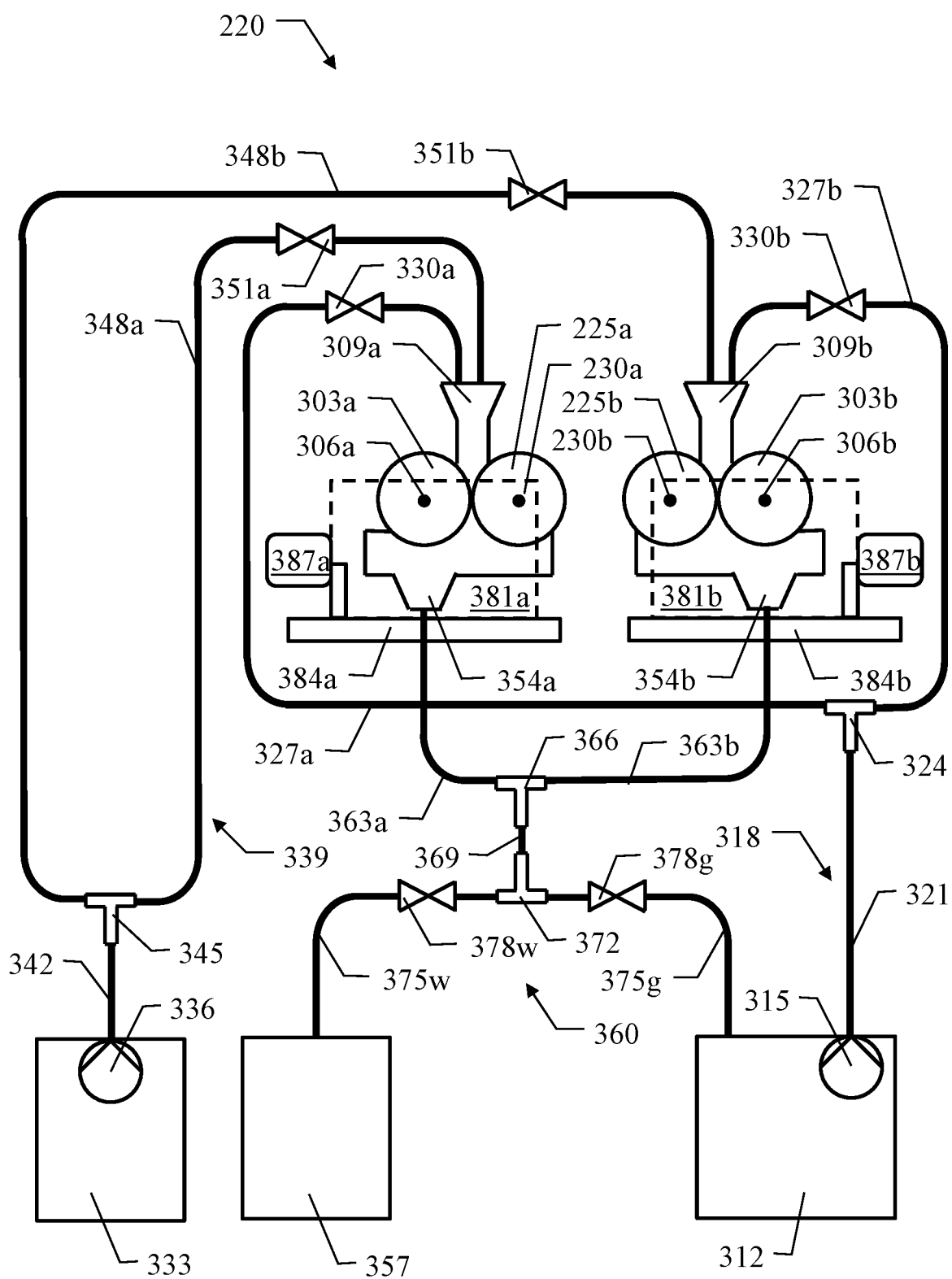


FIG.3

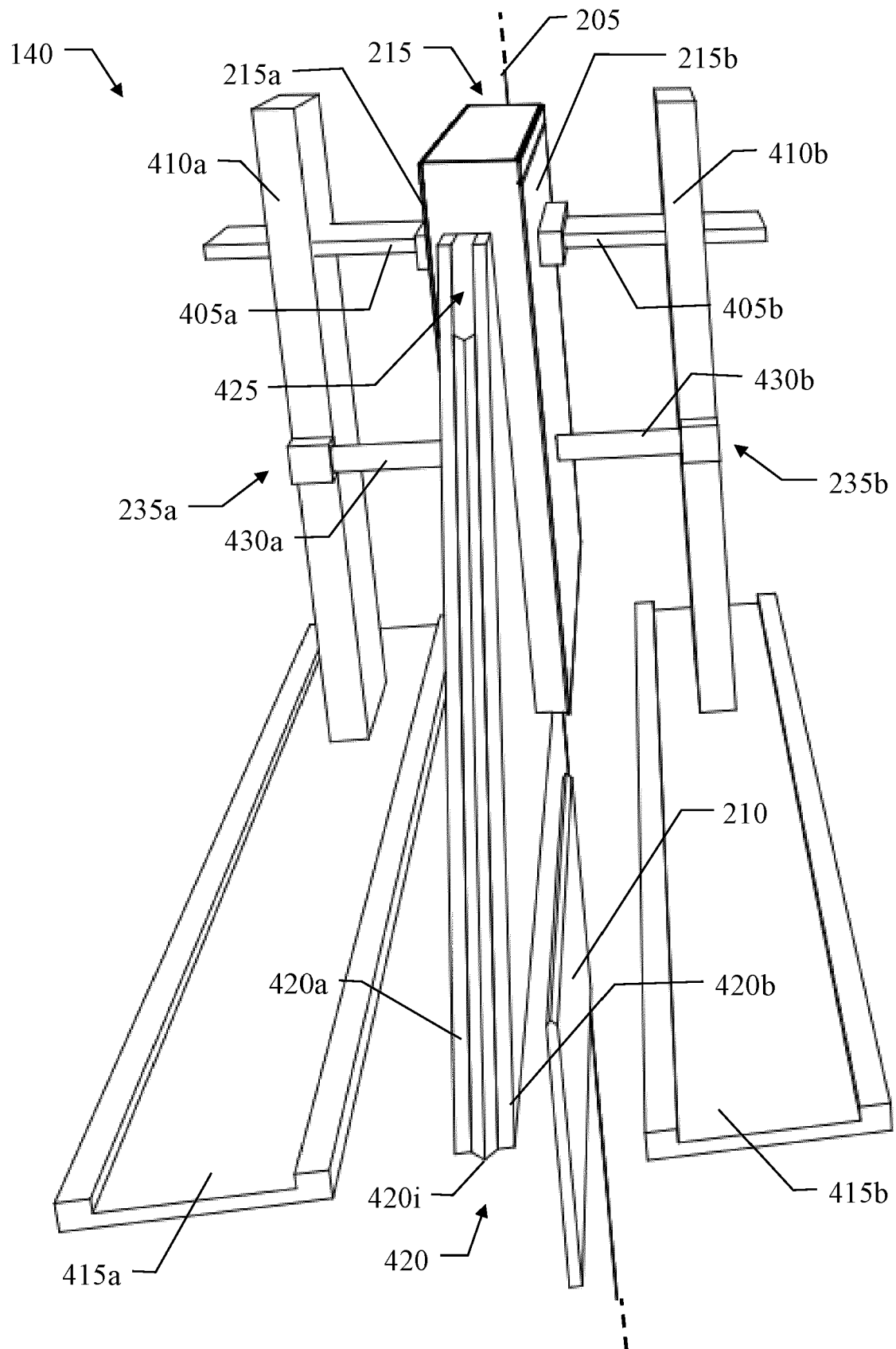


FIG.4



EUROPEAN SEARCH REPORT

Application Number

EP 24 20 4412

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