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(54) **UNWINDER AND OPERATING METHOD FOR UNWINDING WEB MATERIALS FROM PARENT REELS**

ABWICKELVORRICHTUNG UND BETRIEBSVERFAHREN ZUM ABWICKELN VON BAHNMATERIALIEN VON MUTTERROLLEN

DÉROULEUR ET PROCÉDÉ DE FONCTIONNEMENT PERMETTANT DE DÉROULER DES MATÉRIAUX EN BANDE À PARTIR DE BOBINES MÈRES

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Description

[0001] The present invention relates to an unwinder and an operating method for unwinding web materials from parent reels. Such unwinders and methods are known from e.g. US 2009/114757 A1.

[0002] In particular, although not exclusively, the present invention can be applied to the unwinding of paper webs from parent reels in processing plants for the production of paper rolls such as toilet paper rolls, rolls of so-called "kitchen towels" and similar products, in which the feeding of the paper webs to the converting machines located downstream takes place continuously in order not to interrupt the production even when an exhausted parent reel is replaced by a new parent reel.

[0003] It is known that, in general, the production of products such as toilet paper rolls, paper towels and the like, involves winding a predetermined length of a paper web on a tubular core to make rolls, commonly called "logs", intended to be subdivided into shorter elements by transversal cut. Said web unwinds from a large diameter reel, commonly known as "parent reel". The parent reels are positioned in suitable equipment, commonly known as "unwinders", configured to allow the unwinding of the paper web fed to the machines, arranged downstream of the unwinders, that use the for producing the logs. When a parent roll runs out, it must be replaced with a new parent roll. Current production requirements require the reel change "on the fly", i.e. without interrupting the feeding of paper to the machines arranged downstream of the unwinders. For this purpose, the unwinders are generally provided with devices which allow to join the end part of the paper material unwound from the parent reel being exhausted with the initial part of the paper material wound on the new parent reel.

[0004] The present invention relates, in fact, to the operations connected to the joining of the end part of the web material unwound from the parent reel in the exhaustion phase with the initial part of the web material wound on the new parent reel, i.e. the replacement of an exhausted parent reel reel with a new parent reel, without interrupting the feeding of the paper material to the machines arranged downstream of the unwinder.

[0005] The present invention aims to simplify the structure, operation and operative use of the unwinders used in paper roll production plants.

[0006] This result has been achieved, in accordance with the present invention, by adopting the idea of making an apparatus and implementing an operating method having the characteristics indicated in the independent claims. Other characteristics of the present invention are the subject of the dependent claims.

[0007] Thanks to the present invention, it is possible to simplify the structure of the traditional unwinders and, consequently, to simplify their operation. It is also possible to simplify the use of the unwinders by the personnel responsible for running the plants that use them, since no special preparation operations are required for the initial part of the material wound on the new reel.

[0008] These and further advantages and characteristics of the present invention will be better understood by every person skilled in the art thanks to the following description and the attached drawings, provided by way of example but not to be considered in a limiting sense, in which:

- Figs.1-8 show schematic side views of an unwinder according to the present invention in different operating configurations, in which some parts are not shown in order to better highlight others;
- Fig.9 is a diagram illustrating the unwinding, waiting and reel removal positions;
- Figs. 10-11 schematically show a mobile support (5) in two different operating positions;
- Fig.12 represents a detail of Fig. 1;
- Fig.13 represents a possible embodiment of a guiding surface (41);
- Fig.14 schematically represents a plant which uses an unwinder according to the present invention;
- Fig.15 represents a schematic side view of an unwinder according to the present invention according to a further embodiment in a configuration similar to that of Fig.2;
- Figs.16 and 17 are two views relating to the guide (6) with the front side lowered (Fig.16) and with the front side raised (Fig.17);
- Figs. 18 and 19 are two perspective views of an unwinder according to the present invention.

[0009] Reduced to its essential structure and with reference to the attached drawings, an apparatus according to the present invention is an unwinder according to claim 8.

[0010] With reference to the example shown in the attached drawings, said structure comprises a base platform (3) with two sides (30) between which a first motorized belt (31) is positioned, arranged along a corresponding first closed path around a plurality of guide rollers (32, 33, 34), one of which (33) is controlled by an electric motor (3M). Preferably, a guide roller (34) is mounted transversely on two front arms (37) of the platform (3), which arms (37) are hinged with horizontal axis "H" each to a respective side (30) and are connected to an actuator (not visible in the drawings) which allows said arms to be rotated around said axis (H) as the diameter of the first parent reel (1) present in the first position (P1) decreases. In this way, an upper section (310) of the motorized belt (31) can always be brought into contact with the first parent reel (1) even if its diameter is reduced due to its unwinding. In practice, the arms (37) are belt-tightening arms for the first motorized belt (31) and are progressively rotated towards the first position (P1) as the diameter of the first reel (1) decreases. In a position in front of the guide roller (34) there is a blade (B), the function of which is described below, which extends transversely between said arms (37).

[0011] The motorized belt (31) has an upper section (310), a lower section (311) and lateral sections which close the circuit followed by the motorized belt itself, whose direction of movement is indicated by the arrows " C" in the attached drawings. As further described below, the motorized belt (31) acts as a driving member for the parent reel (1) in its operating position (P1), that is, in the position normally occupied by the parent reel (1) until it is exhausted. The motorized belt (31) can be doubled, in the sense that it can be realized as a double belt composed of two belts placed side by side as shown in Figs. 18-19. In the drawings, the reference "N1" indicates the paper web which unwinds from the parent reel (1) and the arrows "F1" indicate the direction followed by the paper web (N1). With reference to the example shown in the drawings, the operating position (P1) is defined by a support (35) formed on an upper side of the platform (3). The support (35), arranged on both sides (30) of the platform (3), is preferably a concave support, with the concavity turned upwards, to receive the pins (10) normally inserted in the central core of the reel (1), from which the same pins project axially both to be engaged by the bridge crane (CP) described below, and to allow the reel (1) to rotate around its own axis when it is placed on the support (35). A lever (36) for locking/unlocking the respective pin (10) is associated with the support (35). In practice, the lever (36) defines, in cooperation with the concavity of the support (35), a seat with a substantially circular cross-section in which the pin (10) is free to rotate but cannot translate, said seat being open or closed according to the position of the lever (36): when the seat of the pin (10) is open, a parent reel can be positioned on the support (35) and can be removed from the support itself, while when said seat is closed, a parent reel positioned on the support (35) is locked in the operating position (P1) but is free to rotate around its own axis, that is, around the axis of the pins (10).

[0012] Mounted on a fixed front appendage (A3) of the platform (3) is an arm (4) which supports a second motorized belt (41) arranged along a second path closed around a plurality of guide rollers (42, 43), one of which (43) is motorized. The reference "M43" in Fig. 18 and Fig.19 indicates an electric motor that drives the roller (43). The arm (4) is linked to the front appendix (A3) of the platform (3) by means of a hinge with axis (X) perpendicular to the appendix (A3) itself. The arm (4), with the second motorized belt (41) supported by this arm, can be made to rotate around the said axis (X) by means of a respective actuator (M4) from and towards the area above the operating position (P1) of the parent reel (1) as schematically shown by the arrow "K" in Fig.12. For example, the arm (4) can be made to rotate by a motorized pinion (4P) meshing with an arcuated rack (4C) applied on the arm (4). The arm (4) also supports a third motorized belt (44) closed in a ring on a motorized roller (43) of the second belt (41), from which its motion derives, and on further guide rollers (45). The third motorized belt (44) constitutes an extension of the second belt (41) which reaches the nip (PN) of a ply-bonding unit. The latter is formed by a plurality of a ply-bonding wheels (M1) and a counter-roller (M2) oriented transversely with respect to the direction (F1) followed by the web (N1) which unwinds from the parent reel (1) placed in the operating position (P1). The ply-bonding unit is designed to mechanically join the paper webs (N1, N2) which unwind from the first and second parent reels in a step of replacing the first parent reel with the second parent reels further described below. In the drawings, the reference "410" denotes the internal side of the second motorized belt, that is, the side of the latter facing the inside of the unwinder (U), while the reference "440" denotes the internal side of the third motorized belt, i.e. the side of the latter facing the nip (PN) of the ply-bonding unit. The ply-bonding wheels have a knurled surface or are in any way machined so as to exhibit reliefs in correspondence with predetermined parts of their surface and, in known ways, in cooperation with the counter-roller (M2) they determine the mechanical joining of two paper webs which transit simultaneously through the nip (PN) while the ply-bonding wheels are pushed towards the counter-roller. According to an operating scheme known per se, the ply-bonding wheels (M1) are normally spaced from the counter-roller (M2) by elastic members arranged in the ply-bonding unit and are pushed towards the counter-roller (M2) by a pneumatic actuator (MP) for obtaining the ply-bonding of the webs that pass through the nip (PN).

[0013] The ply-bonding unit described above constitutes an example of realization of a zone for joining the paper webs (N1, N2) unwound from the parent reels (1, 2), arranged in correspondence with an exit (H) of the webs (N1, N2) from the unwinder.

[0014] The second and third motorized belts constitute a guiding surface (41, 44) which guides the second paper web towards said joining zone.

[0015] Preferably, an idle or motorized roller (RG) is arranged immediately upstream of the nip (PN), oriented parallel to the nip itself, which supports the web (N1) unwound from the first parent reel (1).

[0016] Above the operating unwinding position (P1) a second position (P2) is formed in which a second parent reel (2) can be placed, intended to replace the first parent reel (1) which is in the operating position (P1) when the diameter of the first parent reel reaches a predetermined minimum value.

[0017] Between the second position (P2) and the first position (P1) transfer means are arranged and acting, for transferring the second parent reel (2) from the second position (P2) to the first position (P1).

[0018] For example, with reference to the enclosed exemplary drawings, said transfer means comprise two concave supports (5) with the concavity facing upwards, each of which is arranged on a carriage (50) which can be moved along a respective guide column (51) placed next to a corresponding side (30) of the platform (3). The carriages (50) are moved along the columns (51) by respective ball screws or driving screws operated by

an electric motor (not visible in the drawings). The supports (5) are mounted horizontally sliding on an upper side of the respective carriages (50). The horizontal movement (5M) of the supports (5) is controlled by corresponding actuators (51) also arranged on the upper side of the supports (5). In practice, the supports (5) are in the extracted position, as in Fig. 10, in the descent of the second reel (2) from position (P2) to position (P1) after which, after a further downward stroke of the carriages (50) sufficient to disengage the supports (5) from the pins (20) of the reel (2) transferred to the second position (P2), the supports (5) are arranged in a retracted position, as in Fig. 11, so that, in the following lifting stroke of the carriages (50), the supports (5) do not interfere with the pins (20) of the reel brought to position (P1). At the end of the lifting stroke, which ends at the position (P1), the supports (5) are extracted again to be again in a suitable configuration for receiving the pins of a new parent reel.

[0019] Therefore, when the parent reel (1) must be replaced by the second reel (2), the pins (20) of the second parent reel (2) can be guided on the first support (35) which, in the meantime, has been freed from the first parent reel (1) as further described below. The first position (P1) is in correspondence with the front side of a guide (6) on which a carriage (60) is mounted which can be moved along the same guide (6) by means of a chain (6B) controlled by a corresponding actuator (6M), as indicated by the double arrow "F6". The guide (6) is formed by two plates (61) each placed on the side of a respective side (30) of the platform (3). The plates (61) have a front side, in correspondence of said first position (P1), and a rear side in correspondence of said third position (P3). Furthermore, the plates (61) are hinged on a horizontal axis (K) formed in the rear side of the same plates (61) in such a way that the guide (6) can rotate around the axis (K) under the control of a corresponding rotation mechanism. For example, this rotation mechanism of the guide (6) comprises two pneumatic actuators (6A), each placed on a respective side (30) and each of which activates a cam (6C) intended to interact with a roller (6D) mounted on a corresponding side of the plate (61). In practice, when the actuator stems are extracted, so that the cams (6C) advance, the sliding of the cams under the wheels (6D) of the plates (61) determines the rotation of the same plates around the axis (K), with the lowering of their front side (clockwise rotation in the drawings). Vice versa, the retraction of the actuator (6A) determines the retraction of the cams (6C) and the rotation of the plates (61) around the axis (K) with the lifting of their front side (anticlockwise rotation in the drawings). In this way, at the first unwinding position (P1) the carriage (60) can pass freely under the reel pin (1), when the front side of the plates (61) is lowered, and can engage and lift the pin of reel (1) when the front side of the plates (61) is raised. In Fig. 16 the arrow "F6" indicates the clockwise rotation of the guide (6) around the axis (K), while the arrow "G6" indicates the stroke of the carriage (60) towards the front side of the same guide. Similarly, in Fig.17 the arrow "H6" indicates the anticlockwise rotation of the guide (6) while the arrow (L6) represents the stroke of the carriage (60) towards the rear side of the guide itself. The actuators (6A) control the rotation of the plates (61), i.e. of the guide (6), around the axis (K), while the belts (6B) control the stroke of the carriage (60) along the same guide. The carriage (60) is formed by two plates, each of which is constrained to a respective chain (6B) of the guide (6). Each of the plates forming the carriage (60) is provided with sliding pads (not visible in the drawings) able to slide in a rectilinear guide (6E) arranged on a respective plate (61) of the guide (6). A concave seat (63) is formed on the upper side of the plates (62), with the concavity facing upwards, for receiving a pin of a parent reel arranged in the operating unwinding position (P1). The carriage (60) therefore allows to engage the parent reel present in position (P1) and transport it to the rear side (P3) of the guide (6) when the parent reel present in position (P1) must be replaced with the one set in the waiting position (P2). Preferably, said guide (6) is inclined, with the front side lower than the rear side, in such a way that its rear side is more raised, facilitating the gripping of the exhausted parent reel (1) by the bridge crane (CP) in position (P3).

[0020] As shown in Fig. 18 and Fig. 19, with respect to the center line of the unwinder (U), the supports (35) are the outermost elements and the levers (36) are each arranged next to the respective support (35), on the inside of the latter (side facing the double belt 31). The plates (61) of the guide (6) are mounted on the external sides of the sides (30), i.e. on the side of these facing the respective levers (36). The plates forming the carriage (60) and the belts (6B) are mounted on the internal side of the plates (61), i.e. on the side of these facing the double belt (31). The carriages (50) consist of plates mounted on guides (52) formed on the internal side of the columns (51), i.e. on the side of these facing the double belt (31). Each carriage (50) moves, on the respective column (51), in a space comprised between a respective plate of the carriage (60) and the corresponding arm (37). The latter is more internal, i.e. closer to the central part of the unwinder, part which is occupied by the double belt (31). Therefore, starting from the outside of the unwinder and proceeding inwards, in correspondence with the position (P1) there are, for each side of the unwinder: the support (35), the lever (36), the plate (61) of the guide (6), the carriage plate (60) and the arm (37); and the space between the plate of the trolley (60) and the arm (37) is crossed by the carriage (50).

[0021] In accordance with the present invention, the unwinder (U) comprises pneumatic means adapted to approach the web (N2) of the reel arranged in the waiting position (P2) to the inner side (410) of the second motorized belt (41). For example, as illustrated in Fig.2, said pneumatic means can consist of nozzles (7) fed with compressed air, arranged on the platform (3) and oriented towards the second motorized belt (41). In this

configuration, the free edge (L2) of the ribbon (N2) wound on the reel (2) is pushed by the compressed air delivered by the nozzles (7) towards the second motorized belt (41) and the third (44). In an alternative machine configuration, said pneumatic means can consist of a suction box (8) arranged on the rear side of the second motorized belt (41), i.e. on the side of the latter opposite the internal side (410), as schematically shown in Fig. 15 where the dashed arrows represent an air flow directed from the internal side of the second motorized belt towards the outside. The machine illustrated in Fig. 15 differs from that illustrated in Figs. 1-8 only in the different embodiment of the pneumatic means which determine the adhesion of the web (N2) to the guiding surface (41, 44).

[0022] In this way, the free edge of the web (N2) can be pneumatically made to adhere to the second motorized belt (41) in the exchange phase of the parent reels (1, 2), i.e. when the reel set in position (P2) must replace the reel present in position (P1).

[0023] Preferably, the second motorized belt (41) consists of a plurality of side-by-side belts (400) of reduced width with respect to the length of the reels (1, 2), i.e. of reduced width with respect to the width of the paper webs (N1, N2), spaced along the guide rollers (42, 43) so as to leave a free space (401) between one belt (400) and the other, as schematically represented in Fig. 13. The free space (401) between the belts (400) favors the action of the pneumatic means used to obtain the adhesion of the web (2) to the guiding surface (41, 44).

[0024] The third motorized belt (44) can also be realized as a plurality of side-by-side belts of reduced width with respect to the width of the belts (N1, N2) similarly to what has been said for the second motorized belt (41).

[0025] As previously mentioned, the second motorized belt (41) and the third motorized belt (44) constitute an example of embodiment of a guiding surface for the web (N2) in the phase of insertion of the latter in the joining area of the webs (N1 , N2) which, in the example described above, consists of the ply-bonding unit (M1, M2). At the same time, the pneumatic means (7, 8) assist the action of the guiding surface (41, 44) allowing the web (N2) to adhere to the same surface when the reel set in position (P2) has to replace the present reel in position (P1).

[0026] A possible exchange cycle of the parent reels (1, 2) in an unwinder according to the present invention is as follows.

[0027] While a parent reel (1) is in the unwinding operating position (P1) and feeds the respective web material (N1) to the machines that use it, another parent reel (2) is led to the above waiting position (P2) by the bridge crane (CP) which deposits the respective pins (20) on the supports (5) arranged in this position by the carriage (50) and subsequently releases the pins (20) and moves away from the unwinder. The parent reel (2) is oriented in such a way as to present the free edge (L2) of the respective web (N2) facing forward, so that this edge is in front of the second motorized belt (41) when the bridge crane positions the new parent reel (2) on the supports (5). In this phase, the rotation of the parent reel (1) is determined by the first motorized belt (31). When the diameter of the parent reel (1) reaches a predetermined minimum value, the rotation speed of the same is reduced, with a consequent reduction in the feeding speed of the respective web and, with known methods, the speed of the machines using that web is also reduced. Then, the supply of compressed air from the nozzles (7) is activated as schematically illustrated in Fig. 2 and Fig. 3 where the dotted lines represent the flow of air exiting the nozzles (7) and directed towards the second motorized belt (41). Then, the second motorized belt (41) is activated and the arm (4) is rotated to bring the second motorized belt (41) into contact with the parent reel (2) arranged on the supports (5) in the waiting position (P2) . Therefore, due to the contact with the second motorized belt (41), the reel (2) present on the supports (5) is rotated, as indicated by the arrow "R2" in Fig. 3, and, due to the thrust exerted from the air supplied by the nozzles (7) or from the suction exerted by the suction box (8), the free edge (L2) of the belt (N2) adheres to the second motorized belt which guides it towards the third motorized belt (44) and the ply-bonding unit (M1, M2). In the meantime, the web (N1) which unwinds from the reel (1) in the run-out phase continues to cross the space between the ply-bonding wheels and the counter-roller (M1, M2) and the carriage (60) is brought to the position (P1). Then, the ply-bonding wheels and the counter-roller (M1, M2) are brought against each other, so as to join the webs (N1, N2) unwound simultaneously from the reels (1, 2), after which the web (N1) of the reel (1) is cut. For this purpose, the blade (B) which intervenes on the web (N1) to cut it in this phase is arranged in a predetermined position along the path of the web (N1) upstream of the ply-bonding unit (M1, M2), as schematically shown in Fig.4 where the references "T1" and "L1" represent the tail of the paper web (N1) directed towards the ply-bonding unit and respectively the edge of the paper web which remains on the exhausted reel (1). The blade (B) is advantageously mounted on the arms (37) because, in this way, its position varies with the rotation of these arms and, therefore, varies with the diameter of the first reel (1). In Fig.4 the paper web that comes out from the ply-bonding unit (M1, M2) is identified by both references "N1" and "N2" because in this phase both the webs come out from the unwinder. After joining the webs (N1, N2) and cutting the web (N1), from the unwinder comes out only the web (N2) of the reel (2) that has not yet been placed in the operating unwinding position (P1), as schematically represented in Fig. 5. Subsequently, the carriage (60), which has been brought under the exhausted reel (1), engages the latter and transports it to the third position (P3) along the guide (6) by performing the movements (F6, G6, H6, L6) previously described, and the arms (37) are rotated to distance them from the first position (P1), as shown in Fig.6 and Fig.7. The carriage (50) transports the reel (2) on the supports (35) in the operative position

(P1), as shown in Fig.8 (in which for graphic simplification the carriage 50 and the columns 51 are not shown). When the parent reel (2) reaches the operating position (P1), the first motorized belt (31) determines its rotation, after which the arm (4) is returned to its initial position. Previously, the ply-bonding wheels (M1), once their function is no longer required, have been returned to their starting configuration spaced from the counter-roller (M2). The exhausted parent reel is picked up by the bridge crane (CP) and transported out of the unwinder. The process described above is repeated cyclically. The replacement of the exhausted parent reel (1) with the parent reel (2) which takes its place takes place without interrupting the feeding of paper to the machines that use it.

[0028] For example, with reference to the diagram in Fig. 14, the machines that use the material (N1; N2) coming out of the unwinder (U) are an embosser (E) and a rewinder (RW) that receives the material (N1, N2) processed by the embosser (E) and uses it to produce logs of paper material from which rolls of toilet paper are obtained according to a plant and functional configuration known per se.

[0029] If the suction box (8) is used, the adhesion of the web (N2) to the second motorized belt (41) is determined by the suction operated through the suction box.

[0030] An unwinder and a method according to the present invention are equally applicable to the case of non-paper web materials, such as for example non-woven webs. From the foregoing description it is evident that an unwinder according to the present invention allows to implement a method for unwinding web materials (N1, N2) from two corresponding parent reels (1, 2), wherein a first parent reel (1) in a depletion phase is replaced by a second parent reel (2) which takes the place of the first parent reel at the end of the replacement, wherein during said replacement a first and a second web material (N1, N2) is unwound from both parent reels, wherein before the completion of said replacement the first web material (N1) is joined to the second web material (N2) and then it is cut, wherein the joining of said web-like materials (N1, N2) is preceded by a step of inserting the second web material (N2) in an area where the two web materials (N1, N2) are joined, wherein during the step of inserting the second web material (N2) in said joining area the second web material (N2) is guided on a guide surface (41, 44) which guides it towards said joining area, characterized in that, in said insertion step, the second web material (N2) adheres pneumatically to said guide surface.

[0031] In accordance with the embodiment described above, before carrying out said replacement, the second parent reel (2) can be placed in a temporary waiting and unwinding position (P2) above another position (P1) occupied by the first reel (1). Furthermore, in accordance with the embodiment described above, the first reel (1) is rotated by a motorized belt (31) acting by contact on the first reel in the position (P1) occupied by the latter.

[0032] As previously described, the guiding surface (41, 44) can be constituted by motorized belts which, while guiding the second web (N2) towards the said joining area, determine the rotation of the second reel (2) around its own axis.

[0033] In accordance with the process described above, the adhesion of the second web (N2) to the guiding surface (41, 44) can be carried out by means of compressed air supplied by nozzles (7) oriented towards this surface or by suction operated through the guiding surface itself by means of a suction box (8).

[0034] The unwinder described above is an unwinder comprising:

- a structure on which support members adapted to support a first parent reel (1) and a second parent reel (2) in different positions are formed, said support members being configured for supporting the parent reels (1, 2) during rotation of the same about respective longitudinal axes;
- motorized dragging means configured to control the rotation of said parent reels (1, 2) with a predetermined angular speed around the respective longitudinal axes;
- joining means for joining together the web materials (N1, N2) unwound from the parent reels (1, 2) when one of them, in a phase of depletion, must be replaced with the other;
  means for transferring a parent reel from a waiting position (P2) to an operating position (P1) when the diameter of a parent reel arranged in the operating position (P1) reaches a predetermined minimum value;
- means for transferring a parent reel from the operating position (P1) to a removal position (P3) when the other parent reel is transferred from the waiting position (P2) to the operating position (P1);
- a guide surface (41, 44) configured to guide the web (N2) unwound from the reel (2) of the waiting position (P2) towards said joining means;
- pneumatic means (7; 8) that can be activated to produce, on the web material (N2) unwound from the reel (2) of the waiting position (P2), a pressure or suction directed towards the guide surface (41, 44) while the latter guides it towards the joining means.

[0035] In a possible embodiment, exemplified above, said guide surface (41, 44) is a movable surface supported by an arm (4) controlled to arrange the same guide surface (41, 44) in contact with the reel (2) present in the waiting position (P2) to drag it into rotation around its axis.

[0036] In accordance with the embodiments described above, said positions (P1, P2, P3) are formed by concave supports with the concavity facing upwards, a support (5) is formed on a carriage (50) which can be moved alternatively between the waiting position (P2) and the operating position (P1), and a support is formed on another carriage (60) which can be moved alternately between the removal position (P3) and the operating position (P1).

[0037] In accordance with the embodiment examples

described above, said pneumatic means are formed by nozzles (7) fed with compressed air and oriented towards said guide surface (41, 44) or by a suction box (8) placed on a rear side of the guide surface (41, 44).

[0038] In accordance with the embodiment examples described above, said means for joining the web-like materials comprise a ply-bonding unit (M1, M2). Furthermore, in accordance with the described embodiments, the unwinder comprises cutting means suitable for cutting the web unwound from the reel (1) which occupies the operating position (P1).

Claims

1. Method for unwinding web materials (N1, N2) from two corresponding parent reels (1, 2), wherein a first parent reel (1) in a depletion phase is replaced by a second parent reel (2) which takes the place of the first parent reel at the end of the replacement, wherein during said replacement a first and a second web material (N1, N2) are unwound from both parent reels, **characterized in that**, before the completion of said replacement the first web material (N1) is joined to the second web material (N2) and then it is cut, the joining of said web materials (N1, N2) is preceded by a step of inserting the second web material (N2) in an area where the two web materials (N1, N2) are joined, and during the step of inserting the second web material (N2) in said joining area the second web material (N2) is guided on a guide surface (41, 44) which guides it towards said joining area, and in said insertion step, the second web material (N2) adheres pneumatically to said guide surface.

2. Method according to claim 1 **characterized in that**, before carrying out said replacement, the second parent reel (2) is placed in a waiting and temporary unwinding position (P2) above another position (P1) occupied by the first parent reel (1).

3. Method according to claim 1 **characterized in that** the first parent reel (1) is rotated by a motorized belt (31) acting on it by contact in a position (P1) occupied by the latter.

4. Method according to claim 1 **characterized in that** the guide surface (41, 44) consists of motorized belts which, while guiding the second web material (N2) towards said joining area, cause the rotation of the second parent reel (2) around a respective axis of rotation.

5. Method according to claim 1 **characterized in that** the adhesion of the second web material (N2) to the guide surface (41, 44) is carried out by means of compressed air supplied by nozzles (7) oriented towards said surface or by suction operated through the guide surface itself by means of a suction box (8).

6. Method according to any one of the preceding claims **characterized in that** said web-like materials are made of paper.

7. Method according to any one of the preceding claims **characterized in that** said web-like materials are non-woven fabric webs.

8. Unwinder **characterized by** being configured for unwinding web materials (N1, N2) from respective parent reels (1, 2) according to any of the preceding claims, the unwinder comprising:

   - a structure on which support members adapted to support a first parent reel (1) and a second parent reel (2) in different positions are formed, said support members being configured for supporting the parent reels (1, 2) during rotation of the same about respective longitudinal axes;
   - motorized dragging means configured to control the rotation of said parent reels (1, 2) with a predetermined angular speed around the respective longitudinal axes;
   - joining means for joining together the web materials (N1, N2) unwound from the parent reels (1, 2) when one of them, in a phase of depletion, must be replaced with the other;
   means for transferring a parent reel from a waiting position (P2) to an operating position (P1) when the diameter of a parent reel arranged in the operating position (P1) reaches a predetermined minimum value;
   - means for transferring a parent reel from the operating position (P1) to a removal position (P3) when the other parent reel is transferred from the waiting position (P2) to the operating position (P1);
   - a guide surface (41, 44) configured to guide the web (N2) unwound from the reel (2) of the waiting position (P2) towards said joining means; and
   - pneumatic means (7; 8) that can be activated to produce, on the web material (N2) unwound from the reel (2) of the waiting position (P2), a pressure or suction directed towards the guide surface (41, 44) while the latter guides it towards the joining means.

9. Unwinder according to claim 8 **characterized in that** said guide surface (41, 44) is a movable surface supported by an arm (4) controlled to arrange the same guide surface (41, 44) in contact with the reel (2) of the waiting position (P2) to drag it into rotation around its own axis.

10. Unwinder according to claim 8 **characterized in that** said positions (P1, P2, P3) are formed by concave supports with the concavity facing upwards, a support (5) is formed on a carriage (50) which can be moved alternatively between the waiting position (P2) and the operating position (P1), and a support is formed on another carriage (60) which can be moved alternately between the removal position (P3) and the operating position (P1).

11. Unwinder according to claim 8 **characterized in that** said pneumatic means are formed by nozzles (7) fed with compressed air and oriented towards said guide surface (41, 44) or by a suction box (8) placed on a rear side of the guide surface (41, 44).

12. Unwinder according to claim 8 **characterized in that** said means for joining the web-like materials comprise a ply-bonding unit (M1, M2).

13. Unwinder according to claim 8 **characterized in that** it comprises cutting means suitable for cutting the web material unwound from the reel (1) which occupies the operating position (P1).

Patentansprüche

1. Verfahren zum Abwickeln von Bahnmaterialien (N1, N2) von zwei entsprechenden Mutterrollen (1, 2), wobei eine erste Mutterrolle (1) in einer Erschöpfungsphase durch eine zweite Mutterrolle (2) ersetzt wird, die den Platz der ersten Mutterrolle an dem Ende der Ersetzung einnimmt, wobei während der Ersetzung ein erstes und ein zweites Bahnmaterial (N1, N2) von beiden Mutterrollen abgewickelt werden, **dadurch gekennzeichnet, dass**

vor dem Abschluss der Ersetzung das erste Bahnmaterial (N1) mit dem zweiten Bahnmaterial (N2) verbunden wird und es dann geschnitten wird, dem Verbinden der Bahnmaterialien (N1, N2) ein Schritt des Einführens des zweiten Bahnmaterials (N2) in einem Bereich, in dem die zwei Bahnmaterialien (N1, N2) verbunden sind, vorausgeht und
während des Schrittes des Einführens des zweiten Bahnmaterials (N2) in dem Verbindungsbereich das zweite Bahnmaterial (N2) auf einer Führungsfläche (41, 44) geführt wird, die es zu dem Verbindungsbereich führt, und
in dem Einführungsschritt das zweite Bahnmaterial (N2) pneumatisch an der Führungsfläche haftet.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** vor dem Durchführen der Ersetzung die zweite Mutterrolle (2) in einer Warte- und temporären Abwickelposition (P2) über einer anderen Position (P1), die durch die erste Mutterrolle (1) eingenommen wird, platziert ist.

3. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste Mutterrolle (1) durch einen motorisierten Riemen (31) gedreht wird, der durch Kontakt auf sie einwirkt, in einer Position (P1), die durch die letztere eingenommen wird.

4. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Führungsfläche (41, 44) aus motorisierten Riemen besteht, die, während das zweite Bahnmaterial (N2) zu dem Verbindungsbereich geführt wird, die Drehung der zweiten Mutterrolle (2) um eine jeweilige Drehachse bewirken.

5. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** die Haftung des zweiten Bahnmaterials (N2) an der Führungsfläche (41, 44) mittels Druckluft, die durch Düsen (7) zugeführt wird, die zu der Fläche ausgerichtet sind, oder durch Sog, der durch die Führungsfläche selbst mittels eines Sogkastens (8) betrieben wird, durchgeführt wird.

6. Verfahren nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die bahnartigen Materialien aus Papier hergestellt sind.

7. Verfahren nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die bahnartigen Materialien Vliesstoffbahnen sind.

8. Abwickelvorrichtung, **dadurch gekennzeichnet, dass** sie zum Abwickeln von Bahnmaterialien (N1, N2) von jeweiligen Mutterrollen (1, 2) nach einem der vorhergehenden Ansprüche konfiguriert ist, wobei die Abwickelvorrichtung Folgendes umfasst:

- eine Struktur, auf der Stützelemente, die ausgelegt sind, um eine erste Mutterrolle (1) und eine zweite Mutterrolle (2) in verschiedenen Positionen zu stützen, gebildet sind, wobei die Stützelemente konfiguriert sind, um die Mutterrollen (1, 2) während Drehung derselben um jeweilige Längsachsen zu stützen;
- motorisierte Schleppmittel, die konfiguriert sind, um die Drehung der Mutterrollen (1, 2) mit einer vorbestimmten Winkelgeschwindigkeit um die jeweiligen Längsachsen zu steuern;
- Verbindungsmittel um die Bahnmaterialien (N1, N2), die von den Mutterrollen (1, 2) abgewickelt werden, miteinander zu verbinden, wenn eine davon in einer Phase der Erschöpfung durch die andere ersetzt werden muss;
Mittel zum Überführen einer Mutterrolle von einer Warteposition (P2) in eine Betriebsposition (P1), wenn der Durchmesser einer Mutterrolle,

die in der Betriebsposition (P1) angeordnet ist, einen vorbestimmten Mindestwert erreicht;
- Mittel zum Überführen einer Mutterrolle von der Betriebsposition (P1) in eine Entnahmeposition (P3), wenn die andere Mutterrolle von der Warteposition (P2) in die Betriebsposition (P1) überführt wird;
- eine Führungsfläche (41, 44), die konfiguriert ist, um die Bahn (N2), die von der Rolle (2) der Warteposition (P2) abgewickelt wird, zu den Verbindungsmitteln zu führen; und
- pneumatische Mittel (7; 8), die aktiviert werden können, um auf dem Bahnmaterial (N2), das von der Rolle (2) der Warteposition (P2) abgewickelt wird, einen Druck oder Sog zu produzieren, der zu der Führungsfläche (41, 44) gerichtet ist, während letztere es zu den Verbindungsmitteln führt.

9. Abwickelvorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** die Führungsfläche (41, 44) eine bewegbare Fläche ist, die durch einen Arm (4) gestützt wird, der gesteuert wird, um die gleiche Führungsfläche (41, 44) in Kontakt mit der Rolle (2) der Warteposition (P2) anzuordnen, um sie in Drehung um ihre eigene Achse zu ziehen.

10. Abwickelvorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** die Positionen (P1, P2, P3) durch konkave Stützen mit der nach oben gerichteten Konkavität gebildet sind, eine Stütze (5) an einem Schlitten (50) gebildet ist, der abwechselnd zwischen der Warteposition (P2) und der Betriebsposition (P1) bewegt werden kann, und eine Stütze an einem anderen Schlitten (60) gebildet ist, der abwechselnd zwischen der Entnahmeposition (P3) und der Betriebsposition (P1) bewegt werden kann.

11. Abwickelvorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** die pneumatischen Mittel durch Düsen (7), die mit Druckluft versorgt werden und zu der Führungsfläche (41, 44) ausgerichtet sind, oder durch einen Sogkasten (8), der an einer Rückseite der Führungsfläche (41, 44) platziert ist, gebildet sind.

12. Abwickelvorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** die Mittel zum Verbinden der bahnartigen Materialien eine Lagenbindungseinheit (M1, M2) umfassen.

13. Abwickelvorrichtung nach Anspruch 8, **dadurch gekennzeichnet, dass** sie Schneidmittel umfasst, die zum Schneiden des Bahnmaterials, das von der Rolle (1), welche die Betriebsposition (P1) einnimmt, abgewickelt wird, geeignet sind.

Revendications

1. Procédé permettant de dérouler des matériaux en bande (N1, N2) à partir de deux bobines mères (1, 2) correspondantes, une première bobine mère (1) dans une phase d'épuisement étant remplacée par une seconde bobine mère (2) qui prend la place de la première bobine mère à la fin du remplacement, pendant ledit remplacement un premier et un second matériau en bande (N1, N2) étant déroulés à partir des deux bobines mères, ledit procédé étant **caractérisé en ce que**, avant la fin dudit remplacement, le premier matériau en bande (N1) est joint au second matériau en bande (N2), puis est coupé, la jonction desdits matériaux en bande (N1, N2) est précédée d'une étape d'insertion du second matériau en bande (N2) dans une zone où les deux matériaux en bande (N1, N2) sont joints, et pendant l'étape d'insertion du second matériau en bande (N2) dans ladite zone de jonction, le second matériau en bande (N2) est guidé sur une surface de guidage (41, 44) qui le guide vers ladite zone de jonction, et pendant ladite étape d'insertion, le second matériau en bande (N2) adhère pneumatiquement à ladite surface de guidage.

2. Procédé selon la revendication 1, **caractérisé en ce que**, avant la réalisation dudit remplacement, la seconde bobine mère (2) est placée dans une position d'attente et de déroulement temporaire (P2) au-dessus d'une autre position (P1) occupée par la première bobine mère (1).

3. Procédé selon la revendication 1, **caractérisé en ce que** la première bobine mère (1) est entraînée en rotation par une courroie motorisée (31) agissant sur elle par contact dans une position (P1) occupée par cette dernière.

4. Procédé selon la revendication 1, **caractérisé en ce que** la surface de guidage (41, 44) est constituée de courroies motorisées qui, tout en guidant le second matériau en bande (N2) vers ladite zone de jonction, provoquent la rotation de la seconde bobine mère (2) autour d'un axe de rotation respectif.

5. Procédé selon la revendication 1, **caractérisé en ce que** l'adhésion du second matériau en bande (N2) à la surface de guidage (41, 44) est réalisée au moyen d'air comprimé fourni par des buses (7) orientées vers ladite surface ou par aspiration effectuée à travers la surface de guidage elle-même au moyen d'une boîte d'aspiration (8).

6. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits matériaux en bande sont en papier.

7. Procédé selon l'une quelconque des revendications précédentes, **caractérisé en ce que** lesdits matériaux en bande sont des bandes de tissu non tissé.

8. Dérouleur, **caractérisé en ce qu'**il est configuré pour dérouler des matériaux en bande (N1, N2) à partir de bobines mères (1, 2) respectives selon l'une quelconque des revendications précédentes, le dérouleur comprenant :

- une structure sur laquelle des éléments de support conçus pour supporter une première bobine mère (1) et une seconde bobine mère (2) dans différentes positions sont formés, lesdits éléments de support étant configurés pour supporter les bobines mères (1, 2) pendant la rotation de celles-ci autour d'axes longitudinaux respectifs ;
- des moyens de traînée motorisés, configurés pour commander la rotation desdites bobines mères (1, 2) avec une vitesse angulaire prédéterminée autour des axes longitudinaux respectifs ;
- des moyens de jonction, permettant de joindre ensemble les matériaux en bande (N1, N2) déroulés à partir des bobines mères (1, 2) lorsque l'un d'entre eux, en phase d'épuisement, doit être remplacé par l'autre ;

des moyens permettant de transférer une bobine mère d'une position d'attente (P2) à une position de fonctionnement (P1) lorsque le diamètre d'une bobine mère agencée dans la position de fonctionnement (P1) atteint une valeur minimale prédéterminée ;

- des moyens permettant de transférer une bobine mère de la position de fonctionnement (P1) à une position de retrait (P3) lorsque l'autre bobine mère est transférée de la position d'attente (P2) à la position de fonctionnement (P1) ;
- une surface de guidage (41, 44), configurée pour guider la bande (N2) déroulée de la bobine (2) de la position d'attente (P2) vers lesdits moyens de jonction ; et
- des moyens pneumatiques (7 ; 8) qui peuvent être activés pour produire, sur le matériau en bande (N2) déroulé de la bobine (2) de la position d'attente (P2), une pression ou une aspiration dirigée vers la surface de guidage (41, 44) tandis que cette dernière le guide vers les moyens de jonction.

9. Dérouleur selon la revendication 8, **caractérisé en ce que** ladite surface de guidage (41, 44) est une surface mobile supportée par un bras (4) commandé pour agencer la même surface de guidage (41, 44) en contact avec la bobine (2) de la position d'attente (P2) pour l'entraîner en rotation autour de son propre axe.

10. Dérouleur selon la revendication 8, **caractérisé en ce que** lesdites positions (P1, P2, P3) sont formées par des supports concaves avec la concavité tournée vers le haut, un support (5) est formé sur un chariot (50) qui peut être déplacé alternativement entre la position d'attente (P2) et la position de fonctionnement (P1), et un support est formé sur un autre chariot (60) qui peut être déplacé alternativement entre la position de retrait (P3) et la position de fonctionnement (P1).

11. Dérouleur selon la revendication 8, **caractérisé en ce que** lesdits moyens pneumatiques sont formés par des buses (7) alimentées en air comprimé et orientées vers ladite surface de guidage (41, 44) ou par une boîte d'aspiration (8) placée sur un côté arrière de la surface de guidage (41, 44).

12. Dérouleur selon la revendication 8, **caractérisé en ce que** lesdits moyens permettant de joindre les matériaux en bande comprennent une unité de liaison de couches (M1, M2).

13. Dérouleur selon la revendication 8, **caractérisé en ce qu'**il comprend des moyens de coupe appropriés pour couper le matériau en bande déroulé de la bobine (1) qui occupe la position de fonctionnement (P1).

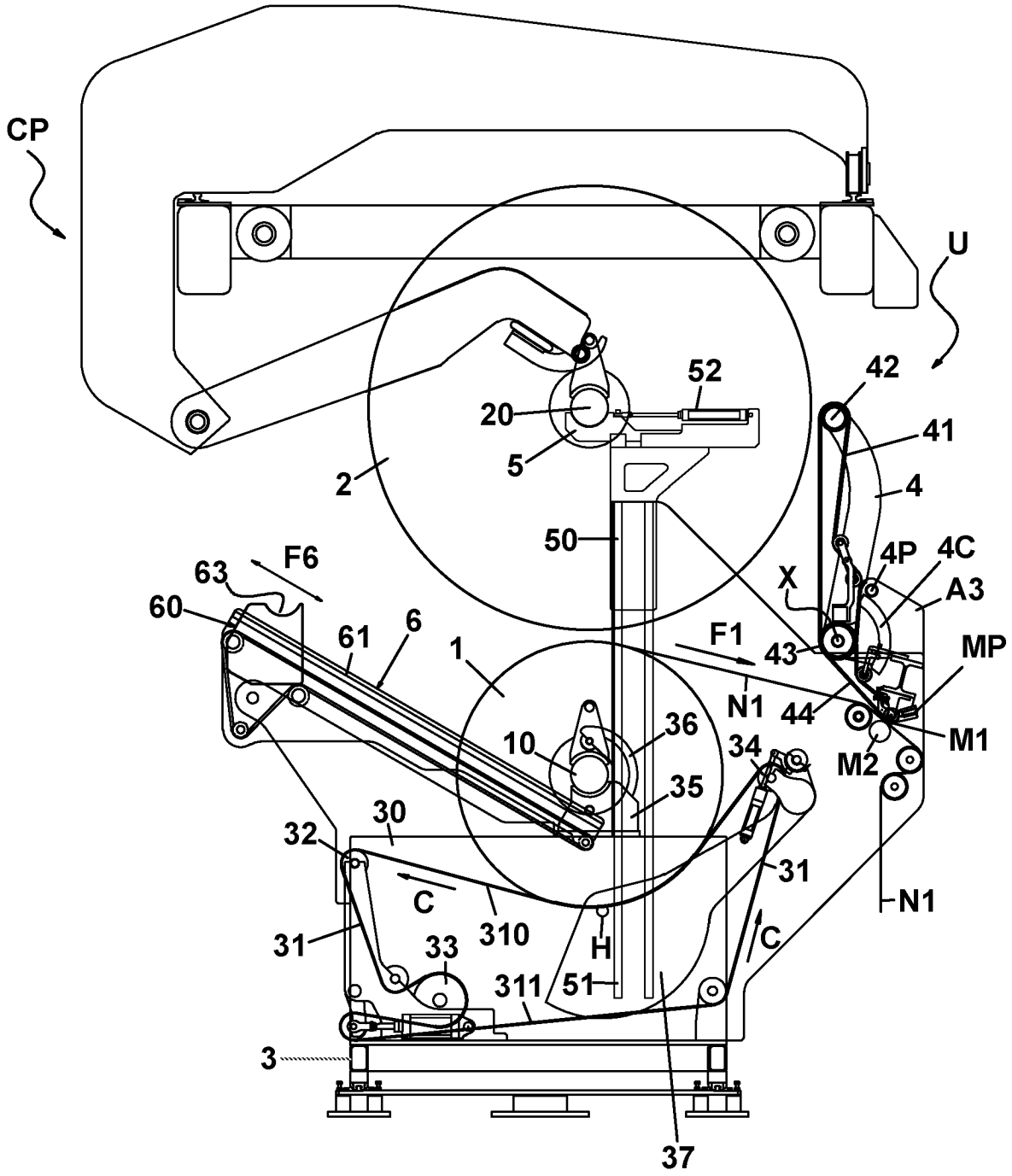
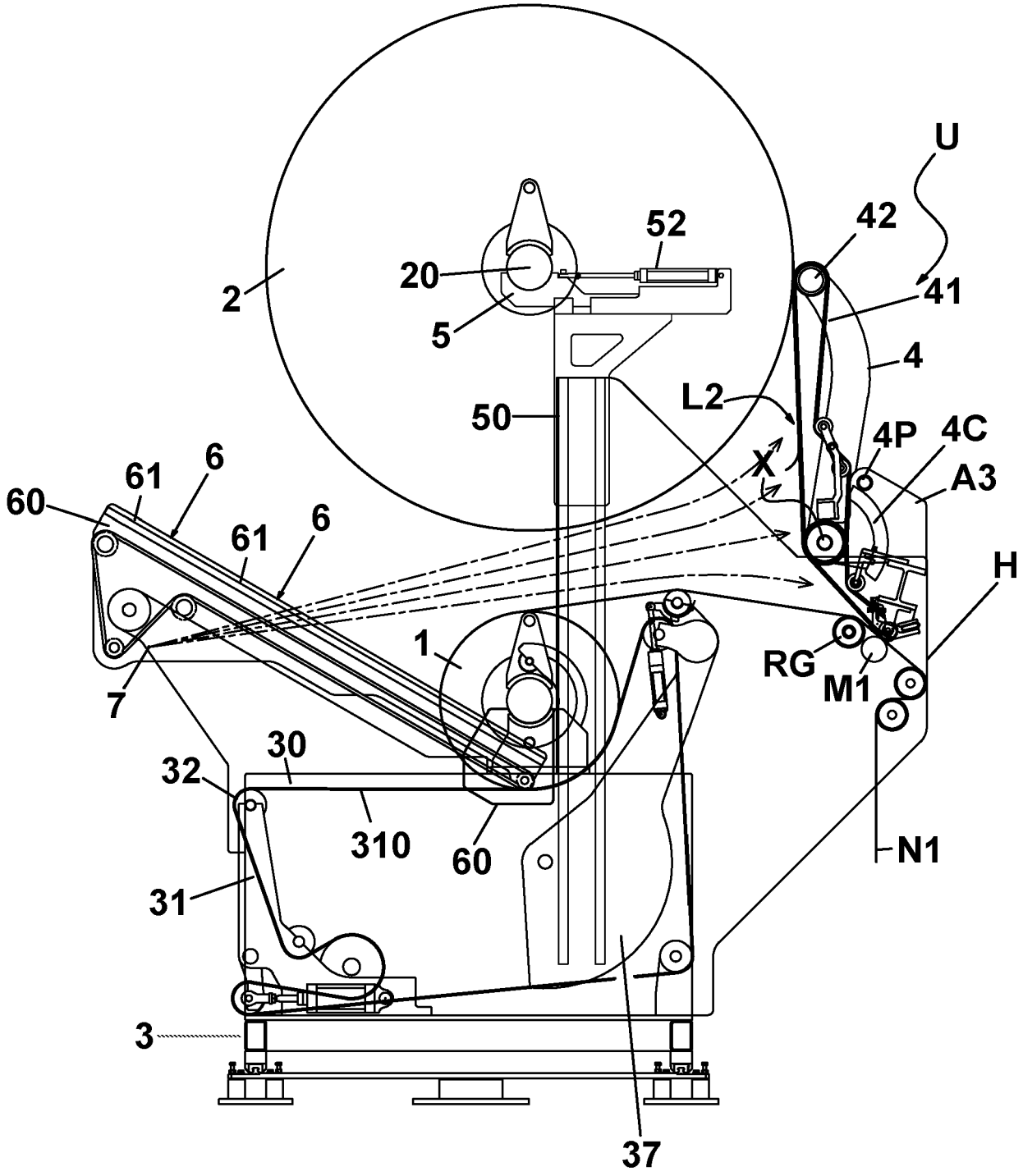

CP
U
52
42
20
41
5
4
2
50
4P
4C
63
F6
X
A3
60
61
6
1
F1
43
MP
N1
44
M1
10
36
34
M2
35
30
32
31
C
N1
310
H
C
31
33
311
51
3
37

FIG.1


U
42
52
20
2
41
5
4
50
L2
4P
4C
X
A3
61
6
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6
H
1
RG
M1
7
30
32
310
60
N1
31
3
37

FIG.2

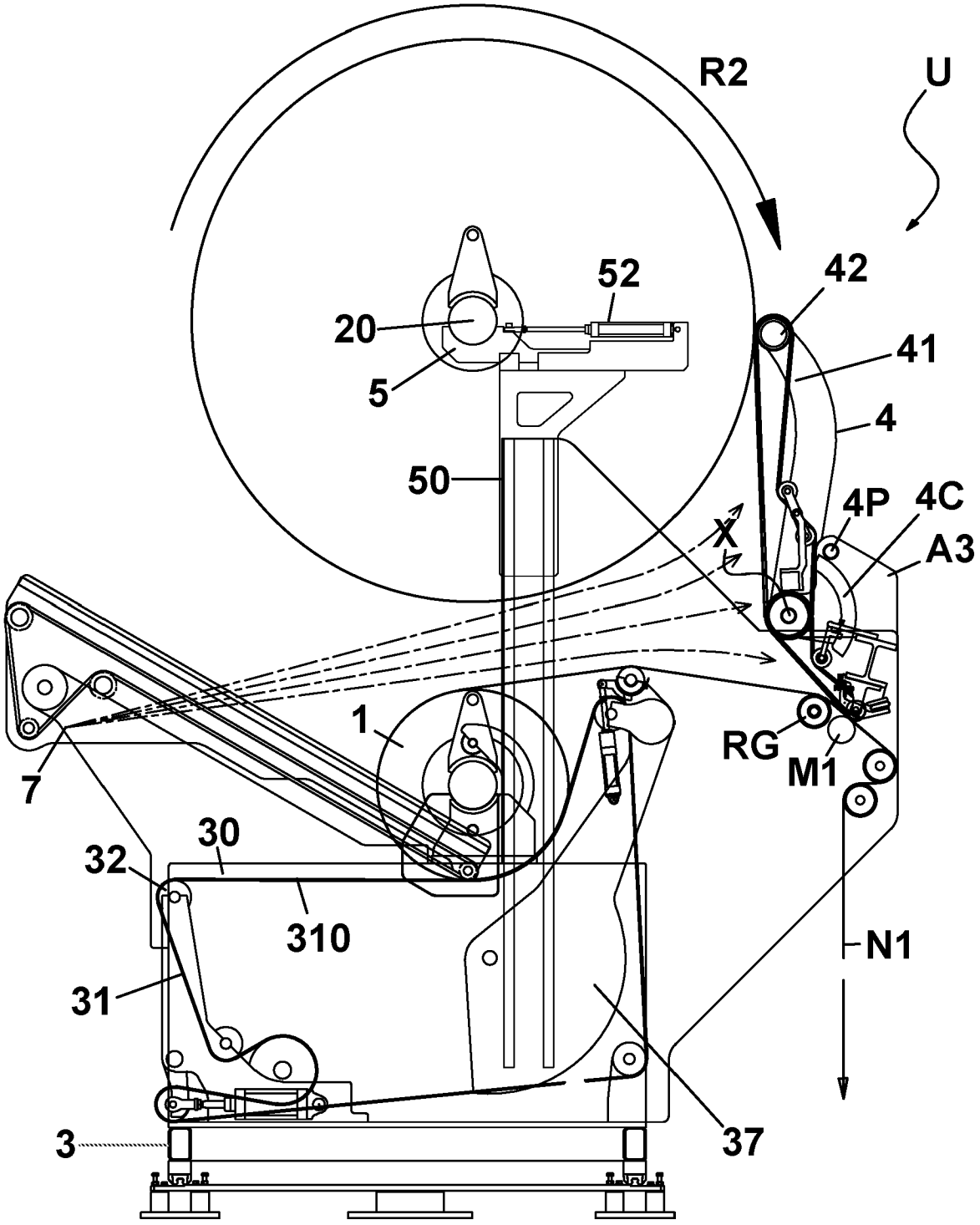

FIG.3

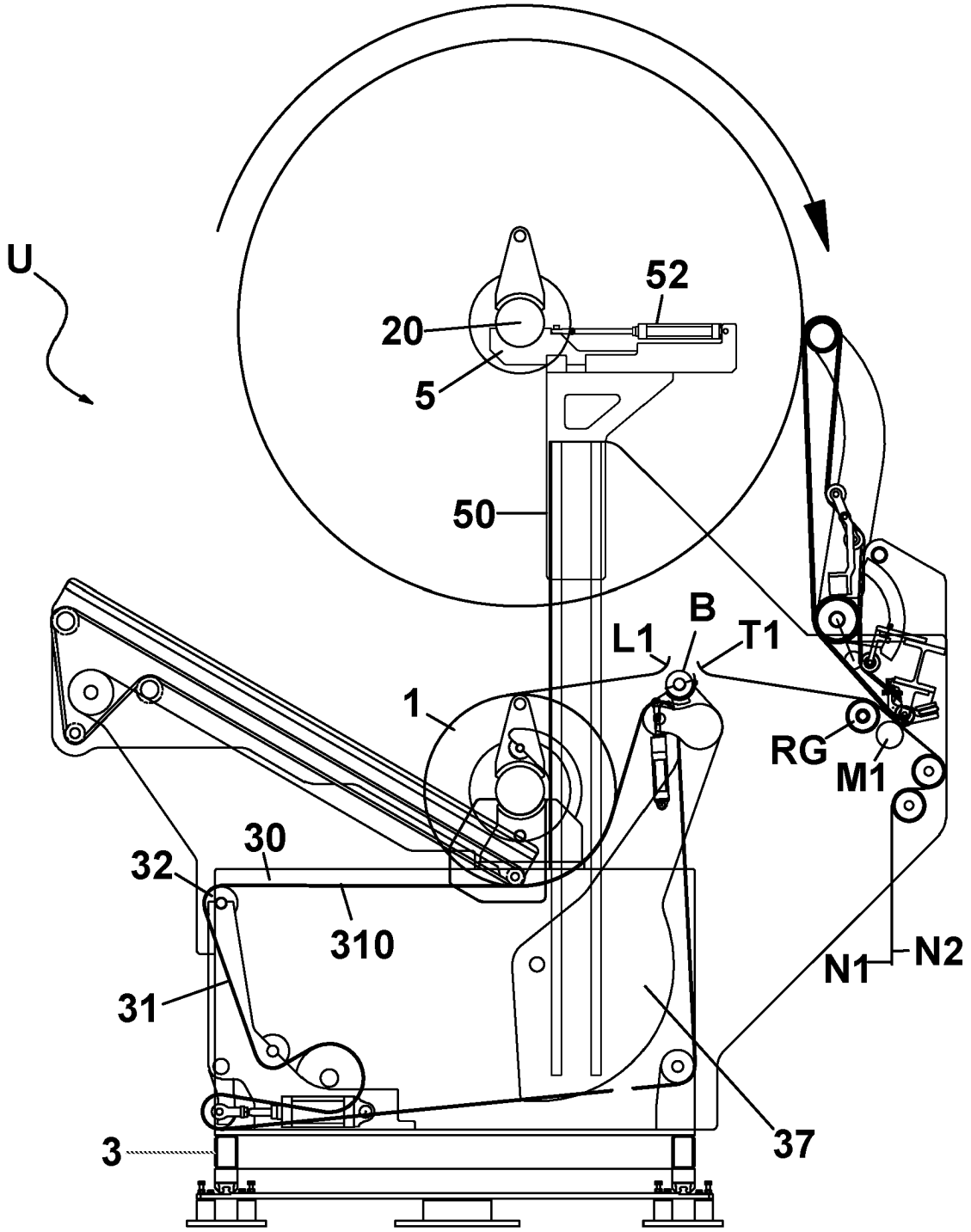

FIG.4

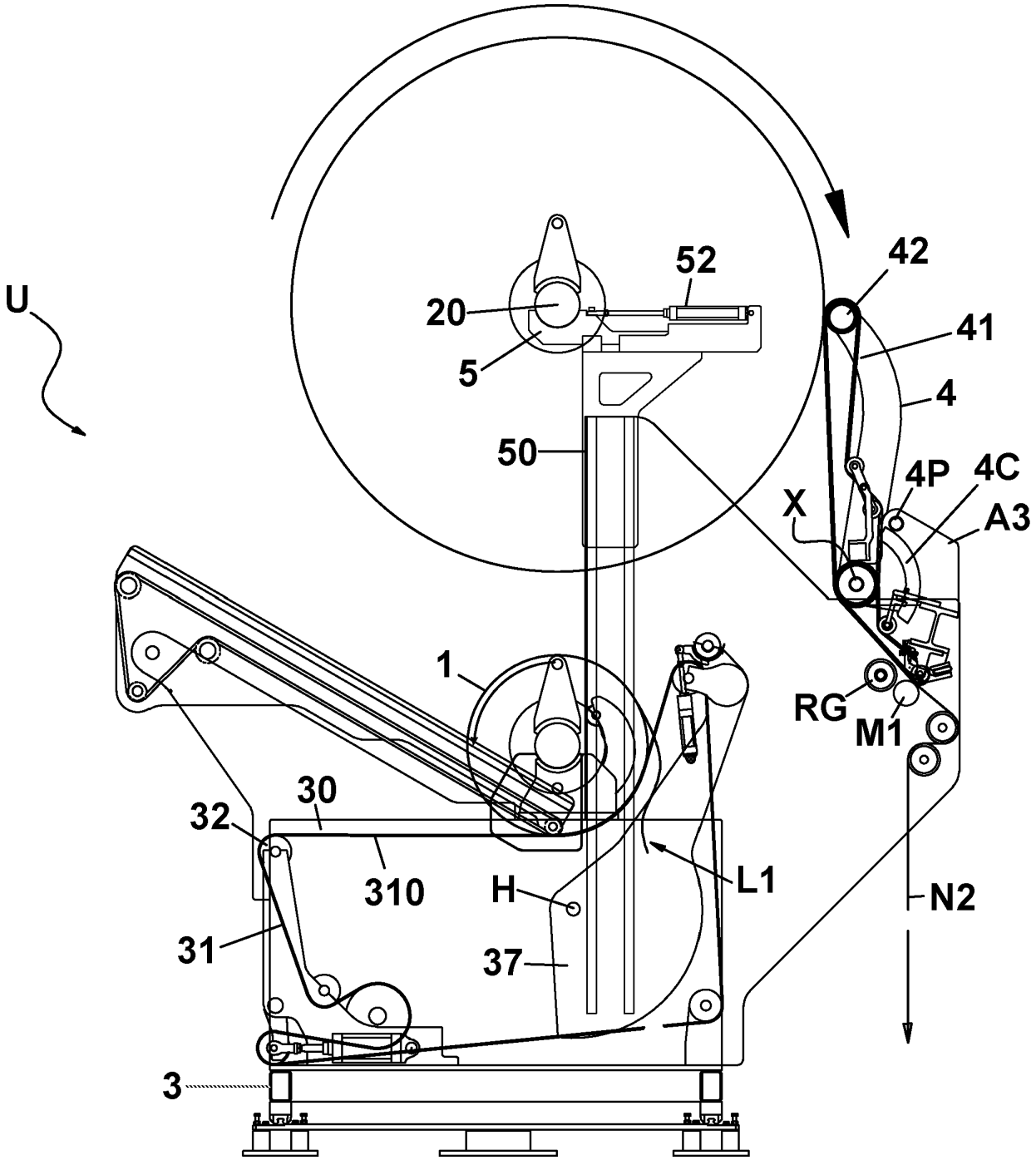

FIG.5

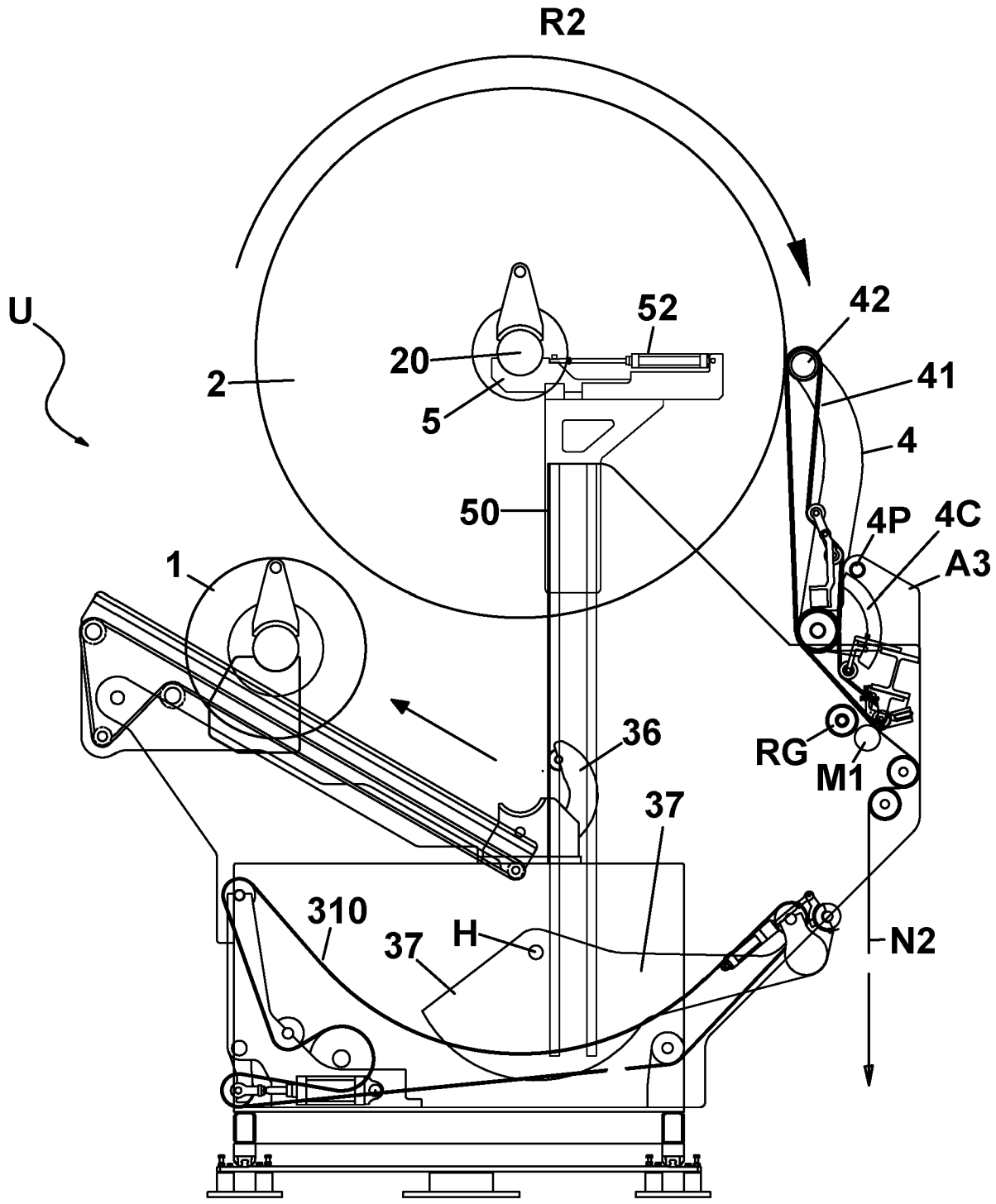

FIG.6

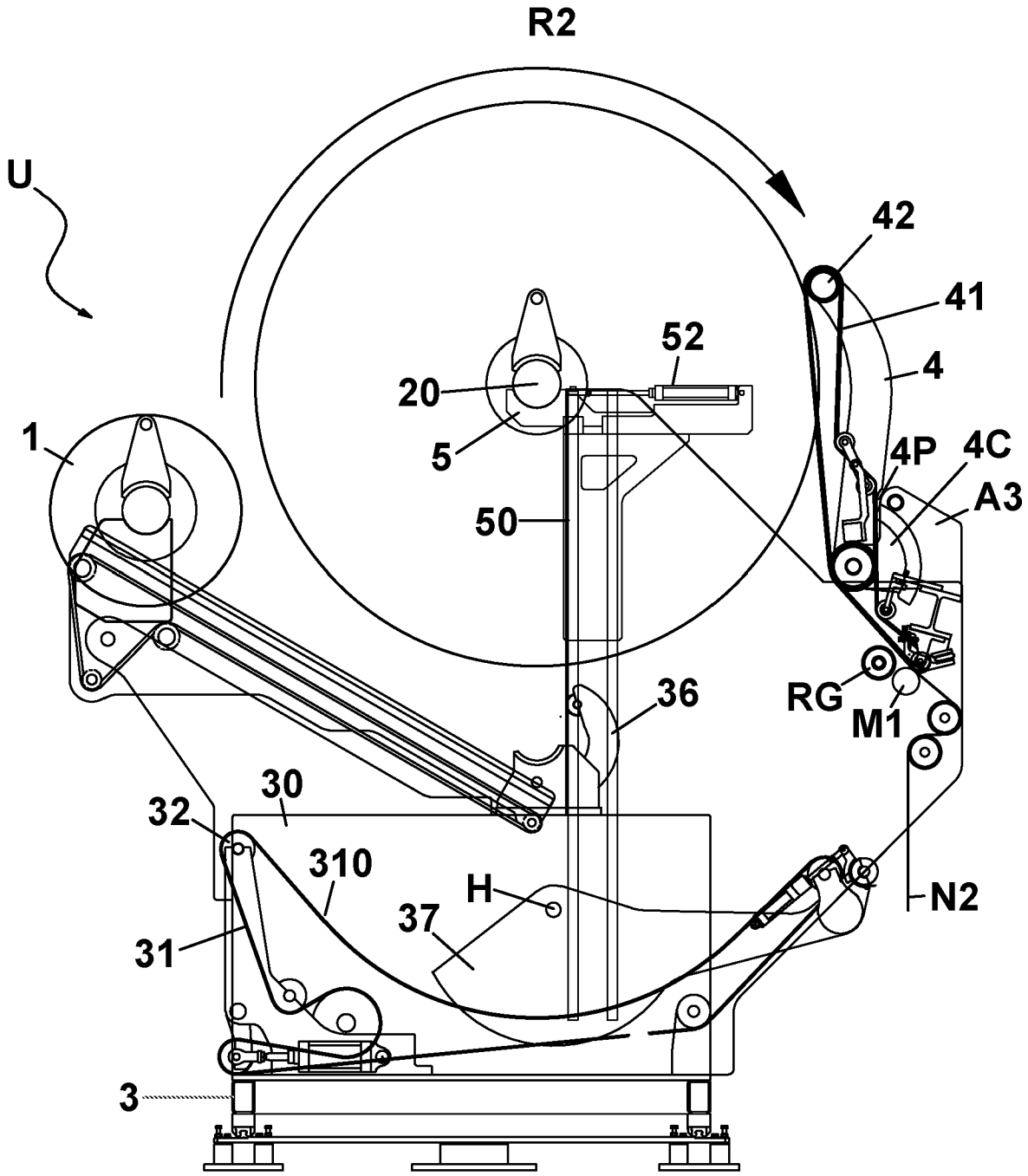

FIG.7

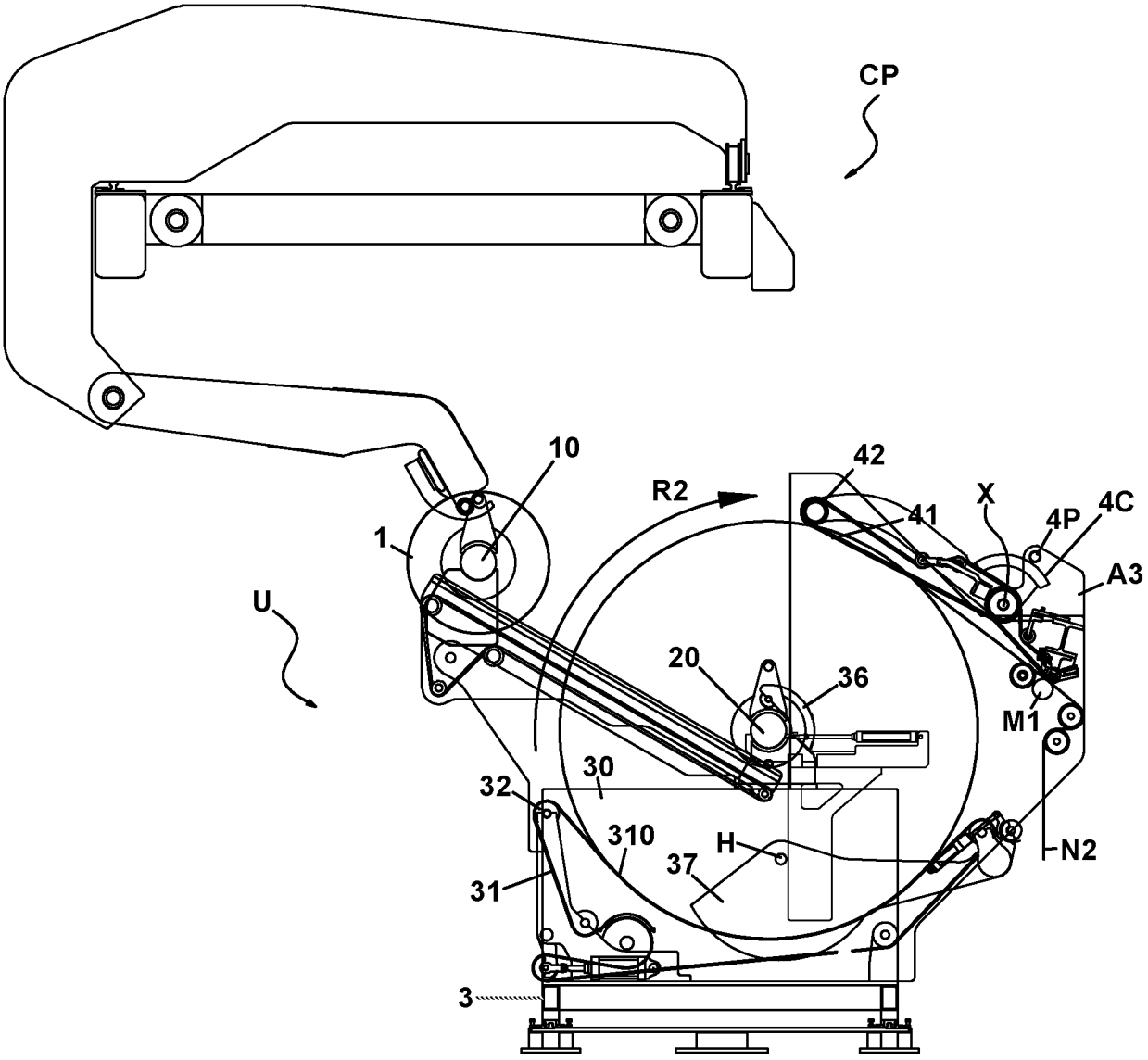

FIG.8

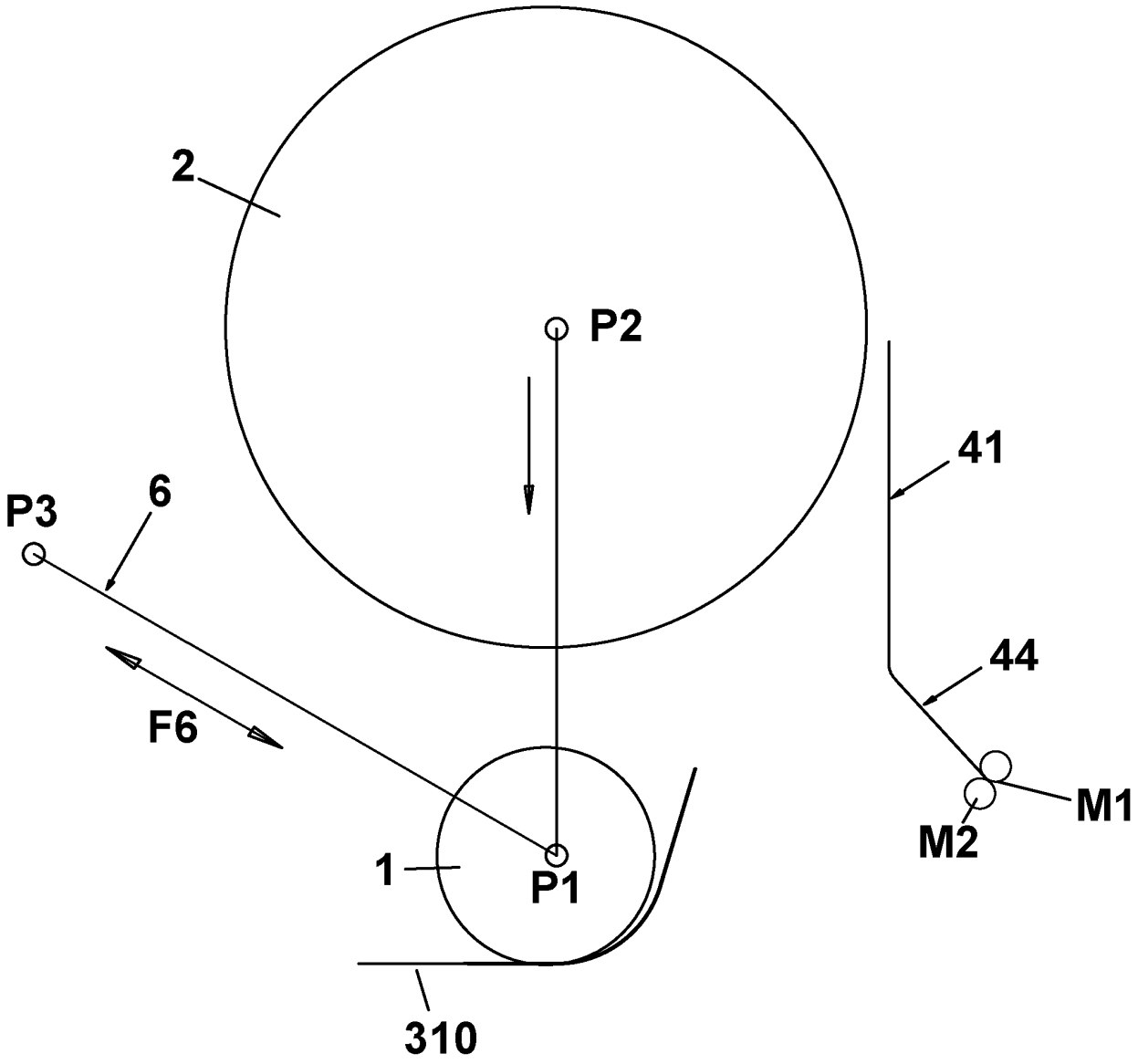

FIG.9

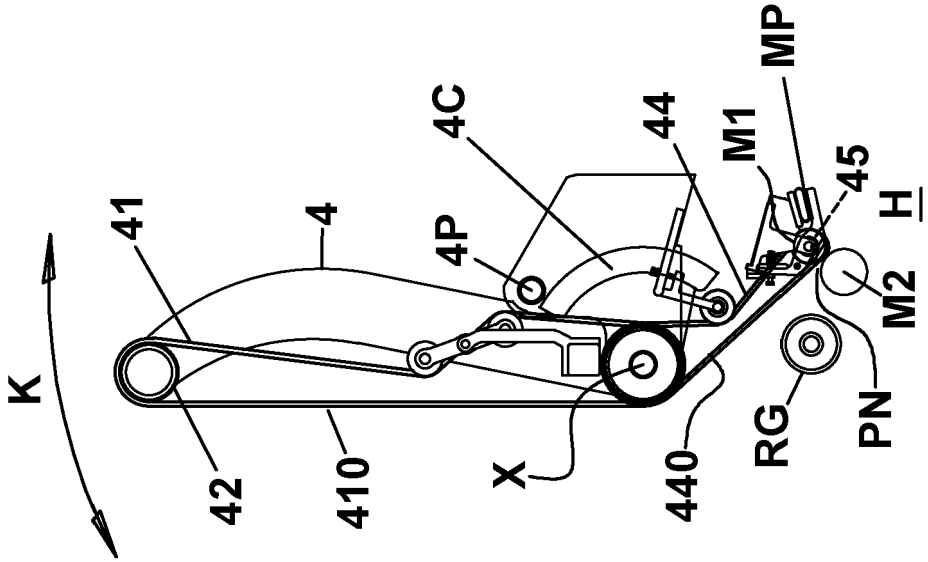

FIG.12

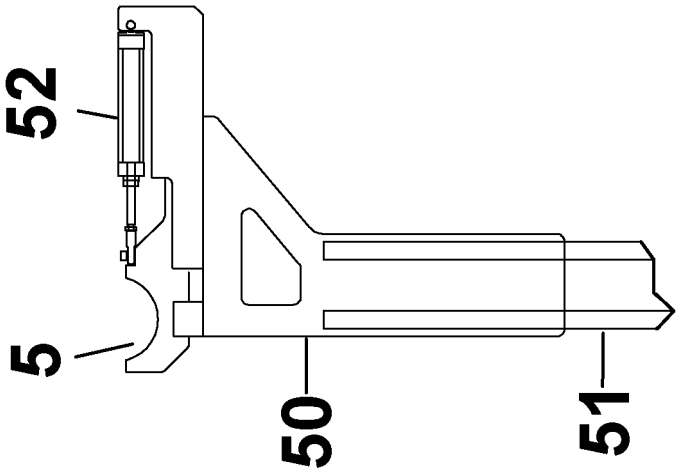

FIG.11

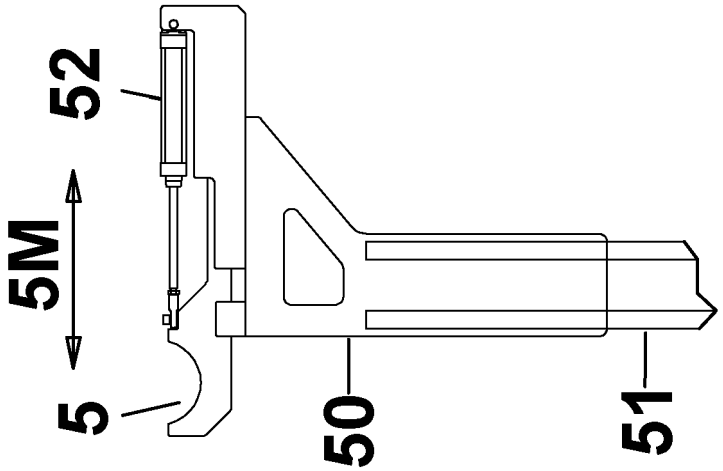

FIG.10

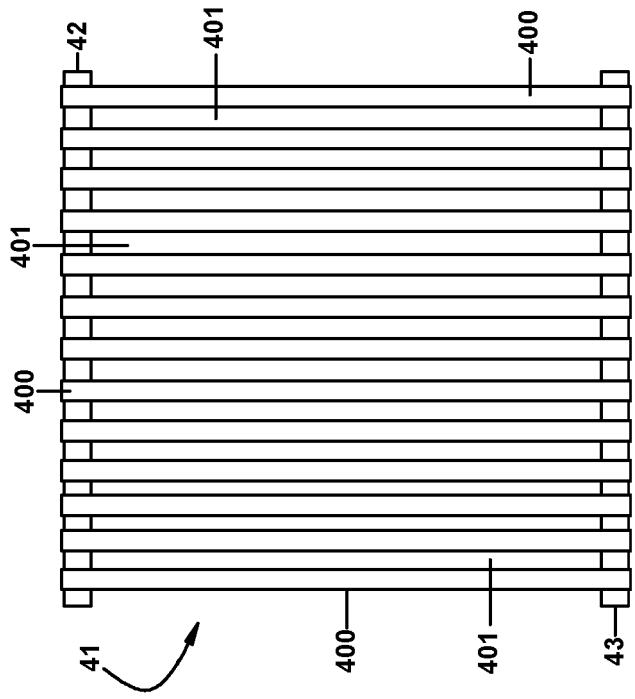

FIG.13

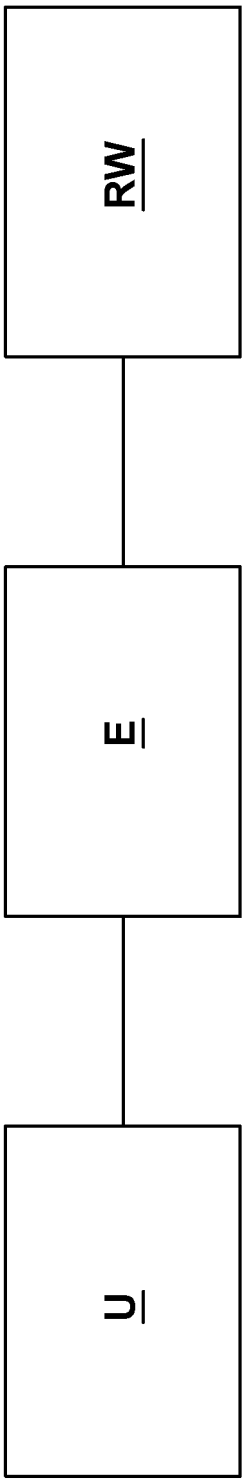

FIG.14

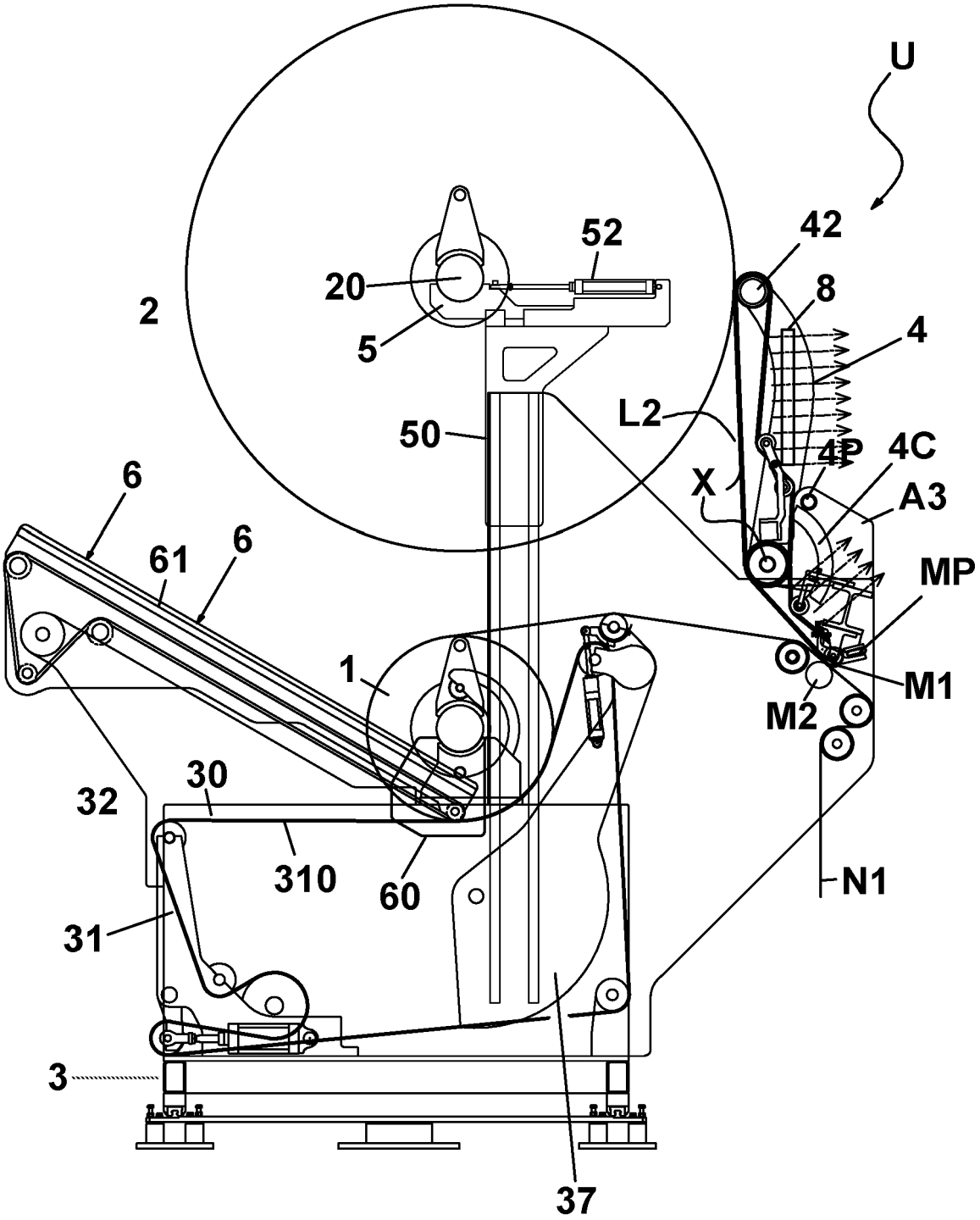

FIG.15

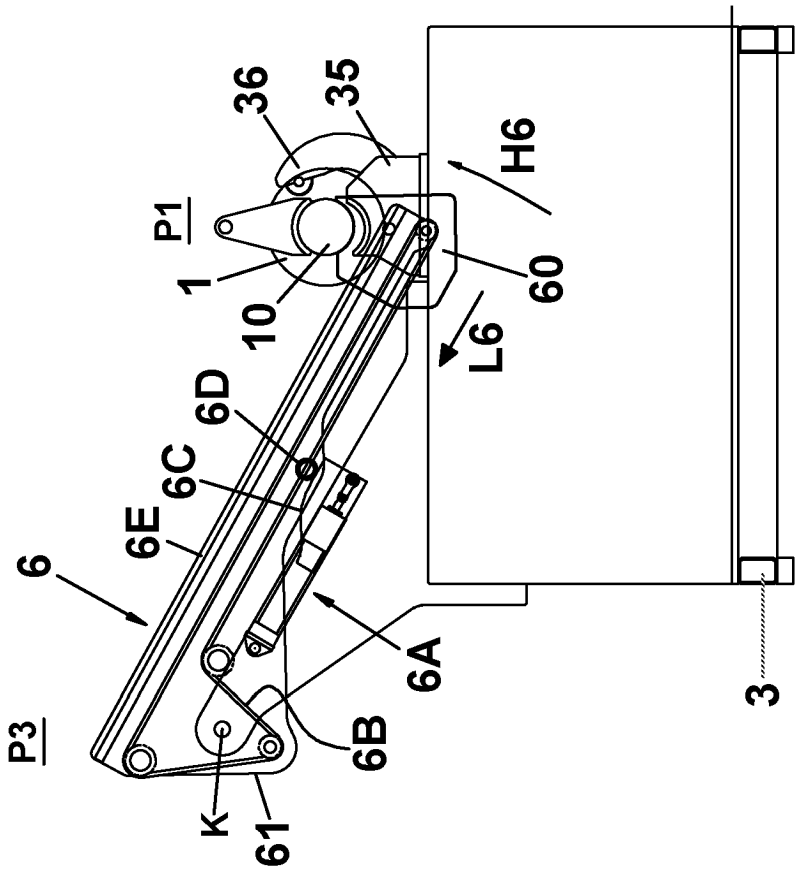
36
35
H6
P1
1
10
60
L6
6D
6C
6E
6
6A
P3
6B
K
61
3

FIG.17

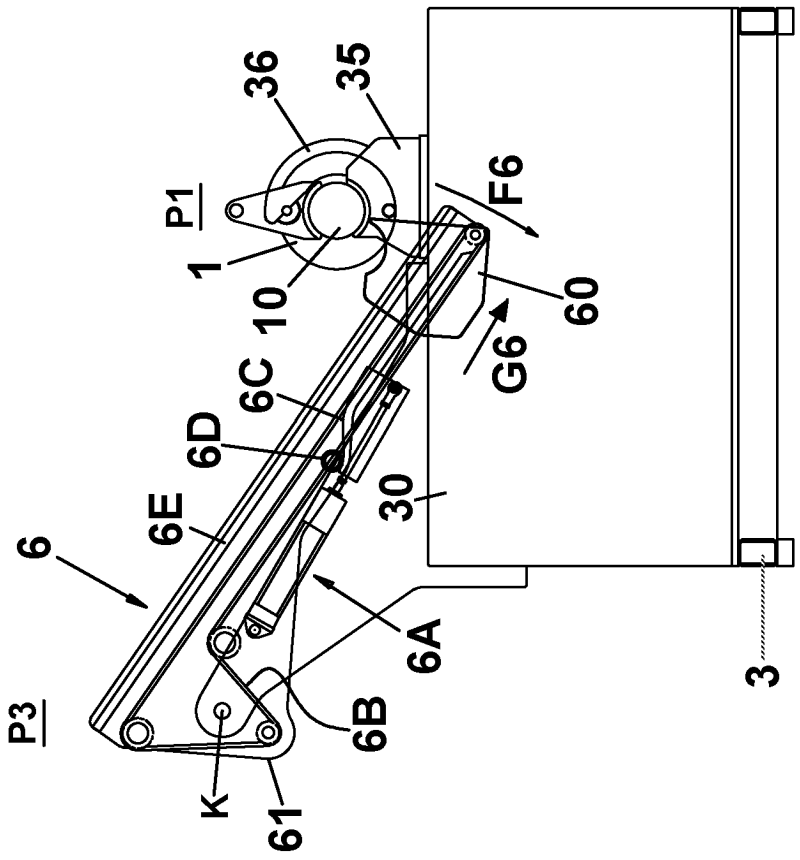
36
35
P1
F6
1
10
60
G6
6C
6D
30
6E
6
6A
P3
6B
K
61
3

FIG.16

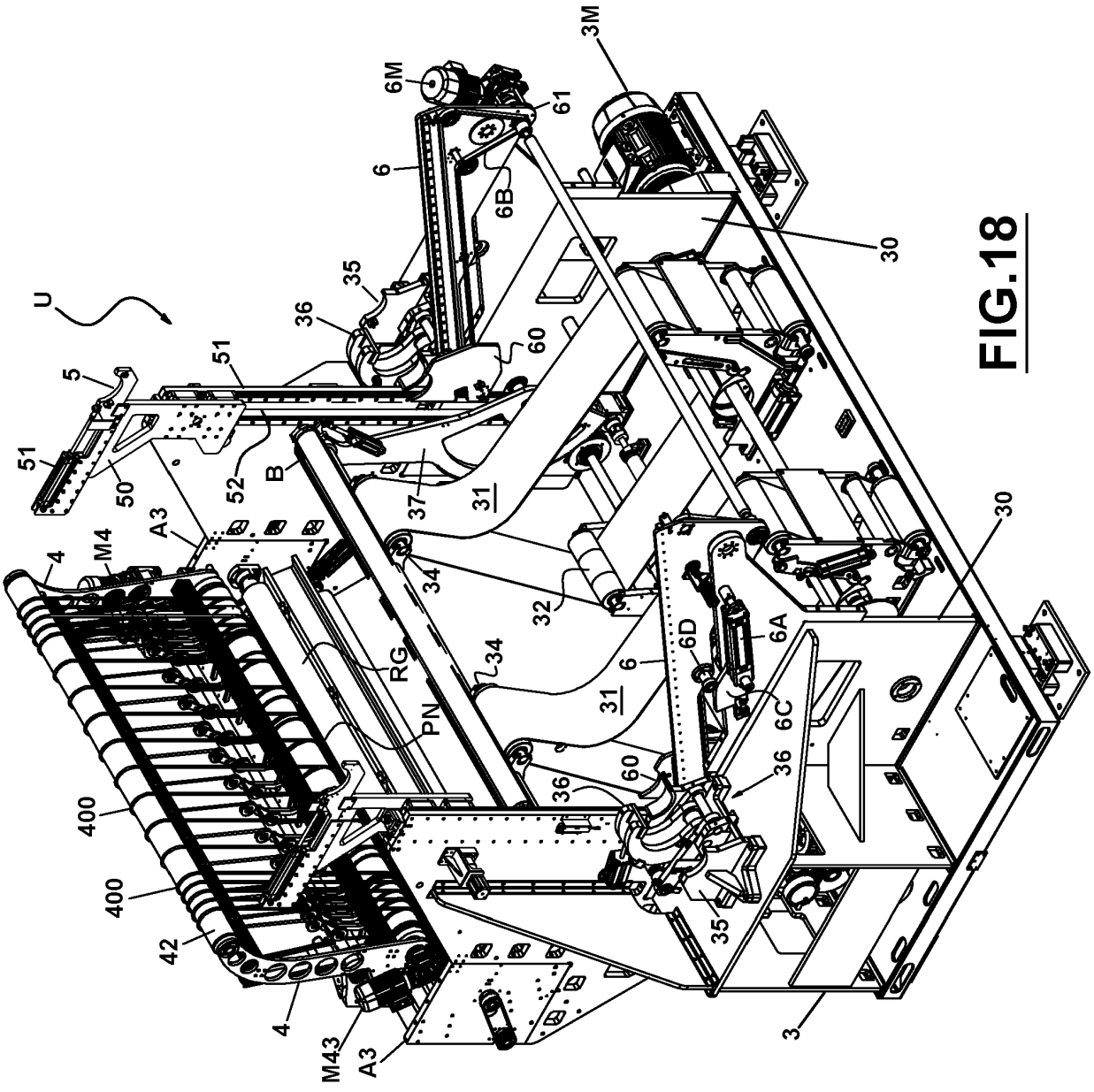
U
5
51
50
52
B
A3
M4
4
400
400
42
4
M43
A3
51
36
35
6
6M
61
6B
60
3M
30
37
31
34
32
RG
PN
6
6D
6A
6C
36
60
35
3
30
31

FIG.18

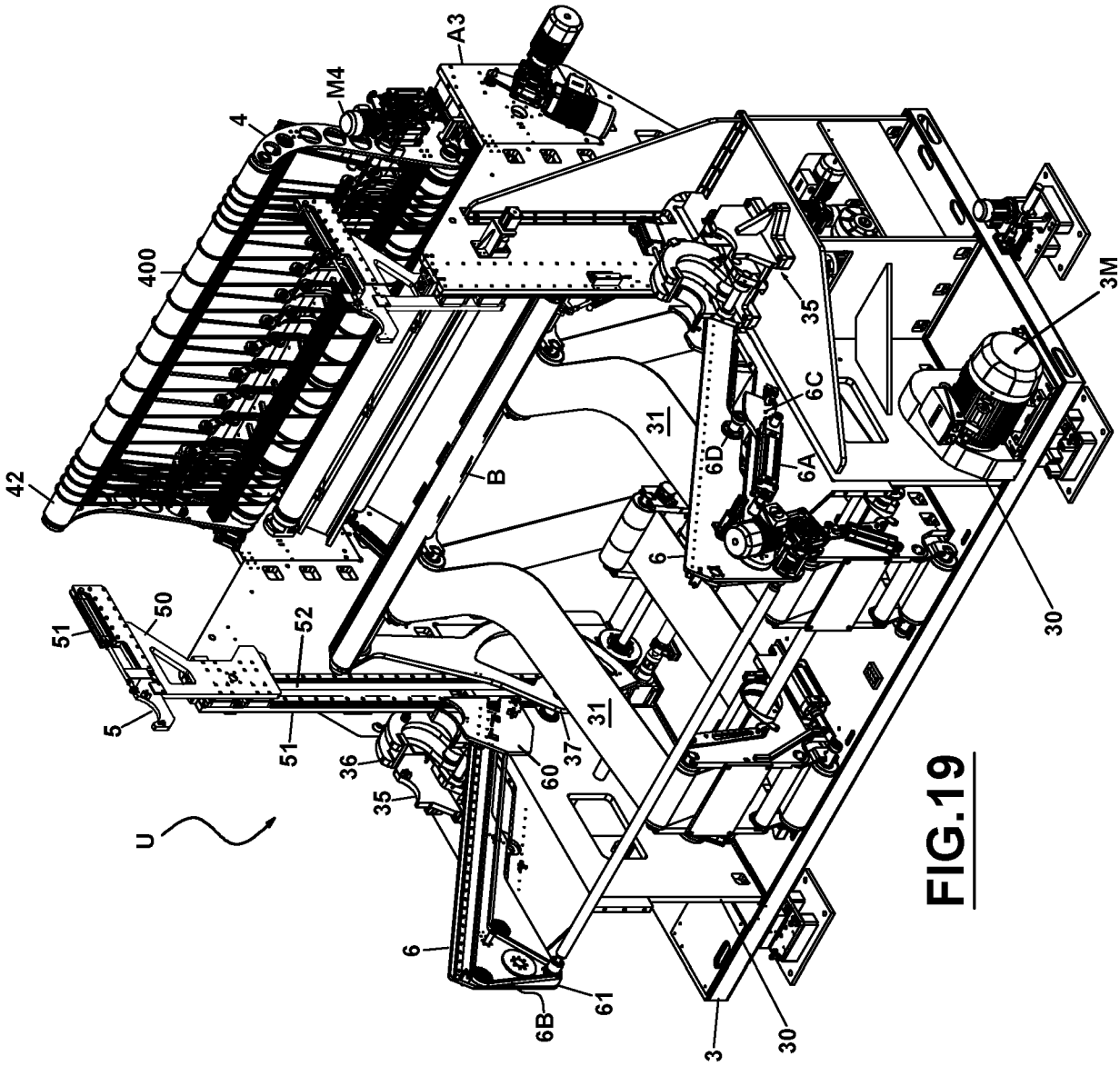
A3
M4
4
400
42
51
50
52
5
51
36
35
U
60
37
31
6
6B
61
B
31
6D
6C
6A
6
35
3M
30
3
30

FIG.19

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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