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(54) **FOLDING METHOD AND DEVICE**

FALTVERFAHREN UND -VORRICHTUNG

PROCÉDÉ ET DISPOSITIF DE PLIAGE

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Description

TECHNICAL FIELD

[0001] The present invention relates to a folding method and device, in particular for folding a flap of a tag or label, in which the flap is folded against an outer surface of a package of smoking articles, for example a package of cigarettes; the tag or label has a portion that is already applied (glued) to the package and the aforesaid flap is a portion of free tag, which protrudes in a cantilevered manner, and which has thus not yet been applied to the package, and which has to be folded against a surface of the package to complete the application of the tag.

[0002] The present invention is intended, in particular, for use in packaging machines for smoking articles, in which the tag or label to be folded may be the duty stamp that has to be applied to the outside of the package (for example a package).

[0003] In the present description, smoking articles are cigarettes, cigars, filters, refills for electronic cigarettes, tobacco and the like. The tag or label may comprise, in particular, a government or duty stamp.

PRIOR ART

[0004] As known, for certain consumer products, in particular packages of smoking articles (for example, packages of cigarettes), preprinted tags or labels must be applied, such as for example the tax stamps that show that state taxes have been paid. In particular, such tags are generally applied to the packages of cigarettes before making the packages of cigarettes themselves with a transparent wrapping film so as to be visible when the packages are still whole.

[0005] It is known, for example, to apply the tags astride the folding line that acts as a hinge to open the lid of the packages. It is also known to apply the tags entirely to the front rear surface of the package. According to another known method, the tags are folded at an angle with the portion thereof arranged on a side of the package, so as to seal a portion of the incision line that defines the lid of the package, in which the tags have to be provided with a tear line intended to be superimposed on the aforesaid incision line of the package to facilitate the opening thereof. Patent publication US 6,536,587 B2 shows an example of a package of smoking articles provided with a label or adhesive stamp applied to two outer sides of the package.

[0006] One of the problems of the prior art is in fact that of applying the tag to two outer surfaces of the package that are not coplanar and adjacent to one another, for example on two adjacent sides arranged at 90° of a parallelepipedon package, or on at least two adjacent faces that are tilted in relation to one another by an angle other than a right angle.

[0007] For this purpose, it is known to distribute glue on the tag to be applied and then glue, in a first step, a tag portion to a surface of the package, leaving free (not glued) another tag portion that forms a flap protruding in a cantilevered manner or as a flag that subsequently has to be folded against the package to complete applying of the tag.

[0008] Patent publication WO 01/08887 A1 shows the applying of a tax stamp on two sides of a package of cigarettes, in which various packages move in a feed direction, a pushing roller initially applies a first stamp portion to a first wall of a package parallel to the feed direction and thus the roller is moved by a solenoid so as to apply a second portion of stamp to a second package wall that is perpendicular to the advancement direction and arranged behind, with reference to the advancement direction.

[0009] Patent publication EP 0 034 790 A2 shows an apparatus for applying stamps to packages of smoking articles in which the stamps are applied to the packages whilst the packages are conveyed by a rotating conveying carousel; expelling means is provided that expels the packages from the conveying carousel to stationary folding members that fold the protruding flap of the stamp against a package side wall.

[0010] Patent publication US 6,438,927 B1 shows the production of packages of cigarettes in which to the upper wall of each package a band is glued that is pressed by a pressing member through which the heat is also transmitted; the pressing member is carried by a drum that is rotatable around a rotation axis that is perpendicular to an advancement direction of the packages; the pressing member is provided with a folding member that folds by 90° a flap of the band that had remained arranged in a cantilevered manner beyond the upper wall, against a side wall of the package, in particular against the rear wall, where rear is defined with reference to the advancement direction of the package.

[0011] Patent publication WO 2005/120961 A1 shows a method for fixing labels to packages of cigarettes, in which the labels are withdrawn from a conveyor, coated with glue during conveying and glued to a surface of the package with a rolling movement of applying segments in such a manner that two label flaps protrude from opposite sides of the surface of the package; the two flaps are then folded on two side surfaces of the package during a transverse movement of the packages (transverse to the preset conveying direction of the packages) in which the packages are inserted into the receptacles of a conveyor and in which each receptacle has a pair of fixed guides against which the flaps are folded.

[0012] Patent publication WO 2016/124323 A1 shows the applying of a stamp to a package of cigarettes, in which a folding device folds two flaps of the stamp protruding from both the sides of a surface of the package during conveying of the package; the folding device has two freely rotating arms to the ends of which pressing rollers are fitted; the folding device is rotatably supported around a central axis so as to be folded and first press a flap against a front side of the package, with the help of

one of the two arms with pressing rollers, and subsequently another flap against a rear side of the package, with the help of the other of the two arms with pressing rollers, where front and back are defined with reference to the conveying direction of the package.

[0013] Patent publication EP 2 279 955 A1 shows the fixing of tags to packages of cigarettes in which the tags are folded at an angle for a portion thereof on a side of the package, by folding means comprising a belt that has protruding folding members and which is arranged on a vertical plane that is lateral to a conveying line of the packages; the belt of the folding means moves at a constant pitch in the same direction as the advancement direction of the conveying line in phase with the advancement of the packages; the belt is arranged along an axis that is tilted with respect to the conveying line of the packages, the pitch and tilt of the belt being calculated in such a manner that the folding members move along the horizontal direction conveying line at the same speed as the packages, so that corresponding motion is determined of the folding members with respect to the purely vertical packages, to ensure progressive folding of a protruding portion of the tag on the side of the package that has been previously provided with glue.

[0014] Patent publication IT 1 296 555 B1 shows a method for folding clips in which various packages of cigarettes are advanced continuously and transversely to a respective axis through a folding station, each package being provided with a corresponding clip having a free end extending like a flag beyond a corner of the package; a folding element is advanced through the folding station in phase with the package to engage the corner of the package with a folding edge thereof and is rotated around the folding edge to fold square the free clip portion around the corner of the package, behind the advancement direction of the package.

[0015] Patent publication US 5,111,633 shows a device for applying seal clips to packages of cigarettes, comprising an advancement device for advancing the packages to a clip applying station and a rotating conveyor provided with sucking means to retain the clips on a cylindrical surface of the rotating conveyor; the device comprises, associated with each retaining means, a folding member that is movable in a direction that is radial with respect to the rotating conveyor and driven between a position that is retracted with respect to the rotating conveyor and an outer operating position at the application station; the folding member folds a free flap of the stamp along a corner of the package and to the rear with respect to the advancement direction of the package.

[0016] Patent publication GB 2 157 260 A shows a method according to the preamble of claim 1 and a device according to the preamble of claim 4. The method and device shown by GB 2 157 260 A are substantially different from those of the above claims and they do not allow to obtain the same functionality of placing the stamp on different walls that can be reached with the solution proposed by these claims.

[0017] One of the problems of the prior art lies in the fact that the space available outside the package of smoking articles for applying the tax stamp is increasingly limited, or this space is constrained to comprise margin areas such as, in particular, bevel edges or rounded corners, mainly because of the fact that generally the various legislations tend to increase the obligatory space to be dedicated to printing information for the consumer public, according to the regulations of each state.

[0018] The consequent need to decrease the dimensions of the stamp, or to glue the stamp in marginal positions of the package, entails greater difficulty in applying the stamp stably and effectively, with an increased risk of making errors of positioning of the stamp or of causing unsightly creases therein, whilst at the same time having to maintain high productivity.

DESCRIPTION OF THE INVENTION

[0019] The object of the present invention is to provide a folding method, which is absent from the drawbacks disclosed above and, in particular, is simple and cheap to use.

[0020] A further object is to provide a folding method and device of a flap of a tag protruding from an edge of a package of smoking articles, owing to which it is possible to apply the tag to the package with efficacy and with the guarantee that the tag remains applied stably and durably.

[0021] One advantage is to apply the tag in the desired position in the package with significant precision.

[0022] One advantage is applying the tags with high productivity to packages that are fed continuously.

[0023] According to the present invention, a folding method and device as in the attached claims are made available.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The present invention will now be disclosed with reference to the attached drawings that illustrate some embodiments thereof by way of non-limiting example, in which:

- Figure 1 is a frontal view of a vertical elevation of a first embodiment of the folding device according to the invention;
- Figure 2 is a sectioned top view according to a horizontal section plane of the device of Figure 1;
- Figure 3 is a prospective view of the device of Figure 1 with some parts removed to show others better;
- Figure 4 is a frontal view as in Figure 1 with some parts removed to show others better;
- Figures 5 to 10 show six steps in sequence of the operation of the device of Figure 1;
- Figure 11 is a prospective view of a second embodiment of the folding device not forming part of the present invention;

- Figure 12 is a prospective view of the device of Figure 11 with some parts removed to show others better;
- Figure 13 is a sectioned perspective view of a detail of the device of Figure 11;
- Figures 14 to 18 show five steps in sequence of the operation of the device of Figure 11;
- Figure 19 shows a prospective view of a package of smoking articles processed by the folding device of Figure 11.

PREFERRED EMBODIMENTS OF THE INVENTION

[0025] In this description, identical elements, in common with the different embodiments illustrated, are indicated by the same numbering.

[0026] In Figures 1 to 10 a first embodiment is illustrated of a folding device, indicated overall by 1, suitable for folding a flap 2b of a tag 2 applied to a package 3. The package 3 may comprise, as in this particular case, a package in the form of a rectangular parallelepiped, although it is possible to provide other shapes.

[0027] The tag 2 may comprise a tag portion 2a applied previously (for example in known manner) to a first wall 3a of the package 3. The flap 2b to be folded may, as in this embodiment, protrude in a cantilevered manner from the first wall 3a of the package 3. The flap 2b must be folded, in this specific embodiment, on a second wall 3b of the package 3 1180555be-EN not coplanar but transverse (for example orthogonal) and adjacent to the first wall 3a.

[0028] The package 3 may comprise, as in these embodiments, a package of smoking articles, for example a package of cigarettes, in particular a stiff package of the hinged lid type. The tag 2 may comprise, in particular, a tax stamp applied to the package.

[0029] The folding device 1 is suitable for receiving a plurality of packages 3 conveyed in a row, one after the other (with continuous advancement motion), at a constant reciprocal distance (pitch of the packages), in which to a side of each package 3 the tag 2 has been applied (for example in a known manner, in particular by gluing) that has the flap 2b protruding in a cantilevered manner from an edge or corner of the package 3, before reaching the folding device.

[0030] The packages 3 are conveyed along a set advancement path that may comprise at least one straight portion, in particular with a vertical advancement direction F (from top to bottom). In particular, the tag 2 may be applied (before reaching the folding device) to the first wall 3a of the package, which is parallel to the advancement direction F of the package. The free flap 2b (which is not yet folded and applied to the package 3) protrudes in a cantilevered manner beyond the front side of the package 3, i.e. beyond the second wall 3b that is transverse to the first wall 3a and which may be the wall arranged in front or frontally, with reference to the advancement direction F of the package.

[0031] In the specific case, the tag 2 is applied by gluing. The glue had been distributed, before the package reached the folding device, not only on the portion 2a of tag applied to the first wall 3a, but also to a side of the flap 2b that must be folded and glued to the second wall 3b of the package 3.

[0032] After the portion 2a of the tag 2 has been applied to the first wall 3a of the package 3, the protruding flap 2b is initially coplanar with the first wall 3a and is subsequenly intended to be folded (in particular by 90°) and to be glued to the second wall 3b by the folding device. The folding device 1 may comprise, in particular, a closed loop path 4. This path 4 may comprise, as in these embodiments, at least one straight path portion 4a that is parallel to the aforesaid (vertical) straight portion of the advancement path of the packages 3 in the advancement direction F. The path 4 may comprise, in particular, a (closed-loop) path that lies on a (vertical) plane, for example a plane parallel to the advancement direction F of the packages 3.

[0033] The folding device 1 may comprise, in particular, at least one unit 5 that is movable along the aforesaid path 4. In the specific case, the folding device comprises three moving units 5 that are arranged equidistantly along the closed loop path 4.

[0034] The path 4 may be defined, as in these embodiments, by a flexible closed-loop transport element 6 that moves the moving units 5. The transport element 6 may comprise, as in these embodiments, a toothed belt, or other flexible transport element (chain, belt, etc). The path 4 may also be defined, in other embodiments that are not illustrated, by different types of conveying system, for example with conveying rollers, or with sliding guides, or with yet other conveying means.

[0035] The folding device 1 may comprise, as in this particular case, at least three (toothed) pulleys 7 on which the transport element 6 is coupled. The pulleys 7 may comprise, in particular, a drive pulley and at least one pulley that is adjustable with a movable axis for adjusting tensioning. Each pulley 7 may comprise a (horizontal) rotation axis perpendicular to the lying plane of the path 4 and/or that is perpendicular to the advancement direction F of the packages 3.

[0036] Each movable unit 5 may comprise, in particular, a support 8 that is movable along the closed loop path 4. The support 8 may comprise, for example, a body in the shape of a stiff block. The support 8 may be fixed to the transport element 6 by fixing means 9, for example of the screw type, or fixing means of another type.

[0037] The supports 8 are arranged on the transport element 6 at the same distance from one another. This distance may be the same as the pitch of the advancing packages 3, so that each package 3 in transit may be alongside a corresponding support 8 that moves in a controlled manner at zero speed in relation to the package 3 for at least one part of the straight (in particular vertical) path portion 4a of the units 5.

[0038] Each movable unit 5 may comprise, in particular, an arm 10 fitted to the support 8 with the possibility

of movement with respect to the support 8. In particular, the arm 10 is articulated on the support 8 around a first fulcrum 11. For each unit 5, the first fulcrum 11 may comprise, as in this case, a rotation axis that is transverse (in particular, perpendicular) to the lying plane of the path 4 of the units 5. The axis of the first fulcrum 11 may be, in particular, transverse (in particular, perpendicular) to the advancement direction F of the packages 3. The axis of the first fulcrum 11 may be, in particular, transverse (in particular, perpendicular) to the direction of the aforesaid straight path portion 4 that is arranged parallel alongside the path of the packages 3.

[0039] For each unit 5, the arm 10 may be provided, in particular, with a first cam follower 12. The first cam follower 12 may comprise, in particular, at least one revolving body, for example a roller that may in return comprise a rotation axis parallel to the axis of the first fulcrum 11.

[0040] The arm 10 may comprise at least one contact surface 13 intended for the pressing contact against the portion 2a of the tag 2 that had been previously fixed to the first wall 3a of the package. The contact surface 13 may comprise, in particular, a first flat surface.

[0041] Each movable unit 5 may comprise, in particular, a lever 14 fitted to the arm 10 with the possibility of movement with respect to the arm 10. In particular, the lever 14 is articulated on the arm 10 around a second fulcrum 15. The second fulcrum 15 may comprise, as in this case, a rotation axis that is transverse (in particular, perpendicular) to the lying plane of the path 4 of the units 5. The axis of the second fulcrum 15 may be, in particular, transverse (perpendicular) to the advancement direction F of the packages 3. The axis of the second fulcrum 15 may be, in particular, transverse (perpendicular) to the direction of the aforesaid straight path portion 4 that is arranged parallel alongside the path of the packages 3. The axis of the second fulcrum 15 may be, in particular, parallel to the axis of the first fulcrum 11.

[0042] The lever 14 may be provided, in particular, with a second cam follower 16. The second cam follower 16 may comprise, in particular, at least one revolving body, for example a roller that may in turn comprise a rotation axis parallel to the axis of the second fulcrum 15.

[0043] The lever 14 may comprise, as in this embodiment, at least one folding end 17 intended to interact in contact with the free flap 2b to fold the free flap 2b (in particular by about 90°) and make the free flap 2b adhere to the second wall 3b. The folding end 17 may comprise, in particular, a second flat surface intended for contact with the second wall 3b (with the interposition of the flap 2b). The folding end 17 is spaced away from the second fulcrum 15.

[0044] For each unit 5, the respective folding end 17 may comprise, as in this embodiment, a protruding portion, in particular in the shape of a blade, which first acts as a folder for the cantilever flap 2b and thus as a pressure surface that, after folding, maintains the flap 2b pressed against the second wall 3b for a certain period of time, as will be explained better below.

[0045] The folding device 1 may comprise, in particular, a first cam profile 18 coupled with the first cam followers 12 of the various units 5, so as to command, for each unit 5, at least one (rotation) movement of the arm 10 with respect to the support 8 (around the first fulcrum 11) whilst the respective unit 5 moves along at least one part of the path 4. The first cam profile 18 may comprise, as in these embodiments, a profile that is shapingly coupled with the first cam follower 12. In particular, the first cam profile 18 may comprise a pair of shaped cam surfaces, that are connected together and fixed, which are suitable for making a groove which receives in a slidable coupling the first cam follower 12, which in this case is in the shape of a roller. The groove may be obtained, as in these embodiments, on a flat surface of a fixed plate P.

[0046] The folding device 1 may comprise, in particular, a second cam profile 19 coupled, for each unit 5, with the second cam follower 16 to command at least one (rotation) movement of the lever 14 in relation to the arm 10 (around the second fulcrum 15) whereas the unit 5 moves along at least one part of the path 4. The second cam profile 19 may comprise, as in these embodiments, a profile forcibly coupled (by the action of a spring 20) with the second cam follower 16. In particular, the second cam profile 19 may comprise at least one fixed, shaped cam surface, suitable for receiving in sliding coupling the second cam follower 16, which in this case is in the form of a roller. The second cam profile 19 may be made, as in these embodiments, on a block B fixed to the plate P.

[0047] The first cam profile 18 and the second cam profile 19 may be shaped and arranged, as in this embodiment, in such a manner that, whilst one unit 5 is moving along the straight path portion 4 parallel alongside the path of the packages 3 - and at the same time a package 3 moves in fact parallel alongside the unit 5 and at the same advancement speed as the unit -, the contact surface 13 is guided to maintain a pressing contact against the portion 2a of the tag 2 that had already been applied to the first wall 3a of the package 3 and simultaneously the folding end 17 is guided to fold the free flap 2b of the tag 2 against the second wall 3b of the package 3 through the effect of a rotation of the lever 14 around the second fulcrum 15.

[0048] The second cam profile 19 may be configured to control the folding end 17 in such a manner that it adopts at least one position that is retracted (Figure 8) with respect to the arm 10. In this retracted position, the folding end 17 has not yet started to fold the flap of the tag.

[0049] Each unit 5 may comprise, as in these embodiments, elastic means (for example the spring 20) arranged for maintaining the second cam follower 16 in contact with the second cam profile 19 and for rotating the lever 14 around the second fulcrum 15 so as to move the folding end 17 from the aforesaid retracted position to an advanced position (Figure 10) with respect to the arm 10. This advanced position corresponds to the position of the end of folding and of pressing contact of the

flap 2b folded against the wall 3b of the package. The folding device 1 may comprise, in particular, a sensor (not illustrated) arranged for operating on the packages 3 after folding of the flap 2b. The sensor of the packages may comprise a known sensor, for example a sensor of optical type, suitable for detecting defects or irregularities on the packages leaving the folding device 1 (for example to reverse a system for expelling faulty or irregular packages).

[0050] In Figures 5 to 10 an operating sequence of the folding device 1 is illustrated, starting from the configuration of Figure 5 in which one unit 5, which moves along a curvilinear portion of the closed loop path 4, is about to meet a package 3 that has a tag 2 with a cantilever flap 2b to be folded and is approaching the folding device in an advancement direction F. The flap 2b protrudes forwards beyond the package 3 in the advancement direction F. In this step, in which the lever 14 is still far from the package 3, the folding end 17 may be pushed forwards by the spring 20, with the second cam follower 16 not yet engaged with the second cam profile 19.

[0051] In Figure 6, the movable unit 5 is still in the curvilinear path portion 4 and has approached the package 3 in transit; the arm 10 is guided by the first cam profile 18 in such a manner that the first flat surface (contact surface 13) has already adopted a position in which it is parallel to the side wall 3a of the package 3 and the tag 2.

[0052] In Figure 7, whilst the unit 5 continues to approach the package 3 in transit, the folding end 17 has already started to retract through the effect of the rotation of the lever 14 around the second fulcrum 15 guided by the second cam profile 19 counteracting the spring 20. The contact surface 13 is maintained parallel to itself, with respect to Figure 6, and to the first wall 3a, owing to the control exerted by the first cam profile 18 on the first cam follower 12 that is integral with the arm 10.

[0053] In Figure 8, the contact surface 13, which is now very near the contact with the tag 2 and with the first wall 3a, continues to remain parallel to the tag 2 and to the first wall 3a, whereas the folding end 17 - guided by the second cam profile 19 with which the second cam follower 16 is coupled that is integral with the lever 14 - is in the retracted position, very near to but not yet in contact with the flap 2b, ready to start the advancement and folding movement of the flap 2b.

[0054] In Figure 9, the contact surface 13 has been brought into pressing contact against the tag portion 2a and against the first wall 3a, promoting the stability of the tag 2 applied to the wall during folding of the flap 3b, whilst the folding end 17 is advancing, pushed by the spring 20 and guided by the second cam profile 19, such as to start folding of the flap 2b to the second front wall 3b.

[0055] In Figure 10, the contact surface 13 is still in pressing contact against the first wall 3a, whereas the second flat surface arranged on the blade portion of the folding end 17 is in an advanced end of folding position and in pressing contact against the second wall 3b. This situation of pressing contact on the entire tag 2 (on both the portions 2a and 2b) continues for a certain (straight) path portion 4 in which the unit 5 and the package 3 advance together at the same advancement speed, until the path 4 of the unit 5 starts to diverge from the path of the package 3.

[0056] Continuing in the stroke of the unit 5, the folding end 17 may remain in the advanced position until the path of the unit 5 remains far from the path of the packages 3, i.e. in the portion of path 4 that is spaced apart from the path of the packages 3 and in which the unit 5 is not substantially active in relation to the package 3. When the unit 5 again approaches the path of the packages 3, and before folding and applying again the flap 2b of the tag 2 associated with another package 3, the folding end 17 will have to return to the retracted position.

[0057] The second cam profile 19 may be arranged for rotating the lever 14 counteracting the aforesaid elastic means (spring 20) so as to return the folding end 17 from the advanced position to the retracted position before returning to interact with the flap 2b of a new package 3.

[0058] The first flat surface (contact surface 13 of the arm 10) and the second flat surface (blade portion of the folding end 17 of the lever 14) are intended to press, respectively, the portion 2a of the tag 2 that is applied to the first wall 3a of the package and the flap 2b of the tag 2 folded and applied against the second wall 3b transverse (in particular, orthogonal) to the first wall 3a of the package 3.

[0059] The first flat surface of the arm 10 may adopt a position that is parallel to the straight path portion 4 running alongside the path of the packages 3 and may maintain this parallel position for a certain advancement portion whilst the unit 5 travels at least in part along the aforesaid straight path portion 4a.

[0060] The first flat surface and the second flat surface are configured so as to press simultaneously the aforesaid tag portion 2a and the flap 2b folded for at least one non-zero portion of the aforesaid straight path portion 4a running alongside the path of the packages 3.

[0061] Whereas one unit 5 runs at least partially along the straight path portion 4a, the contact surface 13 is commanded to perform a purely translation motion in which, in particular, the arm 10 does not rotate around the first fulcrum 11.

[0062] For each unit 5, the orientation of the arm 10 with respect to the support 8 varies according to the trajectory of the first cam follower 12 guided by the first cam profile 18. In particular, the first cam follower 12 is guided by the first cam profile 18 in such a manner that, in an approach step of the unit 5 to the package 3, a configuration is obtained in which the contact surface 13 of the arm 10 (first flat surface) is arranged with a desired orientation (in particular, parallel) with respect to the surface (first wall 3a of the package 3) to which the portion 2a of the tag or label is applied.

[0063] For each unit 5, the orientation of the lever 14 with respect to the package 3 is the result of the combined motion of the support 8 (along the path 4) and the arm

10 with respect to the support 8 (guided by the first cam follower 12) and, further, of the position of the second cam follower 16 that is guided by the elastic means (spring 20) and by the second cam profile 19. The lever 14 is normally pushed by the spring 20 to a stroke end position, that substantially corresponds to the advanced position of pressing contact against the second wall 3b of the package. At each movement cycle along the closed loop path 4, just before any unit 5 reaches the zone alongside a package 3 in transit (i.e. the zone alongside the portion of path 4 parallel to the path of the packages 3, in which a package 3 and a unit 5 advance alongside, for example in a straight and vertical direction), the second cam follower 16 interferes with the second cam profile 19 (fixed cam) that rotatingly guides the lever 14 around the second fulcrum 15 in such a manner that the folding end 17 is first spaced away from the package 3 (in a retracted position with respect to the arm) and may then be gradually pushed by the spring 20 to the package 3 so that the blade portion of the folding end 17 causes the flap 2b to bend, lastly making the flap 2b coincide with the second wall 3b of the package, i.e. with the front side of advancement of the package 3. The flap 2b, on which glue dots had been previously applied, may then be attached to the package 3. The folding end 17 remains in pressing contact against the flap 2b folded for a certain portion of the (straight) advancement alongside the unit 5 and package 3.

[0064] The folded flap 2b remains attached to the package 3 even when the lever 14, dragged by the support 8 and by the arm 10, moves away from the package 3, i. e. when the trajectory of the closed loop path 4 defined by the transport element 6 (belt), from a certain point on, diverges from the advancement trajectory of the package 3.

[0065] The folding device 1 according to the invention may belong to a folding apparatus which may further comprise a conveying device for conveying a package 3 parallel alongside one unit 5 of the folding device 1 along a straight path portion. The conveying device is suitable for conveying a plurality of packages 3 arranged in a row one after the other.

[0066] The conveying device may be configured to make the packages 3 advance (in the advancement direction F) at a constant speed on a trajectory that is at least partially straight (in these embodiments vertical from top to bottom). The conveying device may comprise, in particular, three transport elements 21 (for example belts) parallel and alongside one another, one central and two lateral.

[0067] Each transport element 21 may comprise, for example, a series of protruding plugs 22 arranged for interacting in contact with the packages 3, in particular in such a manner that each package 3 is engaged in a housing defined by three plugs 22, for example two plugs 22 on the rear side and one plug 22 on the front side of the package 3 (where rear and front are defined with reference to the advancement direction F of the package 3).

[0068] In particular, for each housing of a package 3, the two rear plugs 22 are arranged on the two lateral transport elements 21 and the front plug 22 is arranged on the central transport element 21.

[0069] The conveying device may comprise a guiding and abutting system 36 arranged on one side of the packages 3, on an opposite side to the straight path portion 4a of the folding device 5, against which the packages 3 in transit abut, to counteract the folding device 1 and guide the packages 3 in a correct alignment in the advancement direction F.

[0070] In operation, the folding device 1 disclosed above may actuate a folding method that comprises the following steps: providing at least one package 3 comprising a first wall 3a on which a portion 2a of a tag 2 is applied, in which the tag 2 comprises a flap 2b to be folded that protrudes in a cantilevered manner from the first wall 3a; providing at least one unit 5 comprising a support 8, a movable arm 10 coupled with the support 8 and a movable lever 14 coupled with the arm 10; advancing the unit 5 and the package 3 parallel alongside one another along an advancement portion at the same advancement speed; moving (rotating) the arm 10 with respect to the support 8 so as to take a contact surface 13 of the arm against the tag portion 2a applied to the first wall 3a; during the aforesaid step of advancing the unit 5 and the package 3, with the contact surface 13 already brought into pressing contact against the tag portion 2a, maintaining the contact surface 13 against the 14 tag portion 2a and simultaneously moving (rotating) the lever 14 with respect to the arm 10 in such a manner that an unfolding end 17 of the lever 14 folds the flap 2b against a second wall 3b of the package 3 that is transverse to the first wall 3a.

[0071] As said, the first wall 3a may be a side wall of the package 3 and the second wall 3b may be a front wall of the package 3, where side and front refer to the advancement direction of the unit 5 which is parallel to the advancement direction of the package 3 during the aforesaid step of advancing together the unit 5 and the package 3 alongside one another.

[0072] As said, the packages 3, which are fed one after another to the folding device 1 for folding the free flap 2b, may be packages of cigarettes.

[0073] In particular, the folding device 1 and the conveying device of the packages illustrated above may be part of a machine for packaging smoking articles.

[0074] With reference to Figures 11 to 18, a second embodiment, not forming part of the present invention, of a folding device 31 is disclosed below. In the embodiment in question, the tag 32 or label has at least one first (central) portion 32' affixed to a first wall 33' of a package 33 and at least one second portion 32a that is not affixed to the first wall 33' of the package 33 but which protrudes beyond this first wall. The folding device 31 is suitable for folding at least the second portion 32a (in the form of a free flap) of the tag 32. In this specific embodiment, the

folding device 31 is suitable, in particular, for operating on a package 33 (in particular of smoking articles, for example a package of cigarettes) of relatively complex form, for example a package that has one or more external non flat surfaces, or external surfaces converging in at least one grooved or rounded corner.

[0075] This folding device 31 may also be applied to packages or relatively less complex form, for example a packages of cigarettes of the round corner or bevel edge type, where at least one dimension of the tag or label is greater than the dimension of the initial application surface. In the embodiment in question, the second portion 32a of the tag 32, not affixed to the first wall 33' of the package 33, will have to be folded and pressed against the package 33 (in particular against a second wall 33a of the package 33 that is contiguous with and transverse to the first wall 33') to enable the aforesaid second portion 32a to be applied to the package 33.

[0076] Substantially, the tag 32 may be flat in shape and may have at least one dimension (width) that is greater than the dimension of the first wall 33' of the package to which it is initially applied before reaching the folding device 31, to that there is at least one portion or tag flap (in the specific case at least the second portion 32a) that cannot stick to any of the adjacent walls of the package, which are tilted differently or arranged with respect to the wall 33' of first application of the tag, so that this flap is folded in order to be able to stick.

[0077] In greater detail, the folding device 31, in this second embodiment, may be able to fold and simultaneously apply flaps (i.e. the second portion 32a and a third portion 32b) of the tag, situated on opposite sides of the first portion 32' of tag, for example against two walls (second wall 33a and third wall 33b) that may form the same number of bevel edges or round corners that connect two surfaces of the package.

[0078] Also in this second embodiment, the folding device 31 comprises one unit 5 that moves along a closed loop path 4. The path 4 comprises a straight path portion 4a and is alongside parallel to the path of the packages 33.

[0079] In this embodiment, the movable unit 5 may comprise an element that is counter-shaped with respect to a portion of package 33 that includes the walls 33a and 33b. This counter-shaped element defines, substantially, a die 34 that may be articulated on the arm 10 around the second fulcrum 15. The die 34 is provided with the second cam follower 16. The die 34 may comprise, in particular, a contact surface 35 that is counter-shaped with respect to at least the portion of the package 33 against which the entirety of the tag 32 is applied, in this case, counter-shaped with respect to the first wall 33' on which the first portion 32' of the tag is applied and also with respect to the two walls 33a and 33b on which the second and third portion 32a and 32b (tag portions in the form of free flaps) have to be applied.

[0080] The contact surface 35 may comprise at least one first (central) portion 35' and at least one second (side) portion 35a that are contiguous and tilted with respect to one another (in this case transverse but not orthogonal to one another). The first portion 35' is intended for contact against the first portion 32' of tag that is already applied (glued) to the first wall 33' of the package 33. The second portion 35a is intended to fold the second portion 32a of the tag, by bringing the tag into contact against a second wall (the wall 33a) of the package 33 tilted with respect to the first wall 33' to which the first first portion 32' of tag is applied. As said, this second wall 33a has, in particular, a bevel edge or round corner connecting two walls or surfaces of the package 33.

[0081] The contact surface 35 of the die 34 may comprise, as in this embodiment, a third portion 35b that is contiguous and tilted with respect to the first portion 35' and arranged on a side opposite the second portion 35a. The third portion 35b is intended to fold the third portion 32b of the tag, bringing the tag into contact against the third wall 33b of the package 33 tilted with respect to the first wall 33' to which the first portion 32' of tag is applied. This third wall 33b of the package may constitute, in particular, a bevel edge or round corner connecting two walls or surfaces of the package 33.

[0082] The various portions of the contact surface 35 (the first portion 35' and/or the second portion 35a and/or the third portion 35b) may be integral with one another, for example integrated into a single contact surface 35. The die 34 may be made, in particular, of a single block.

[0083] Also in this case the first cam profile 18 is coupled with the first cam follower 12 to command the arm 10 around the first fulcrum 11 whereas the unit 5 moves along at least one part of its own path 4.

[0084] The second cam profile 19 is coupled with the second cam follower 16 to command the die 34 around the second fulcrum 15 whereas the unit 5 moves along at least one part of its own path 4.

[0085] The sequence illustrated in Figures 14 to 18 shows some movement steps of the die 34, starting with Figure 14 in which, at the top, one unit 5 is about to approach a package 33 in transit, in a configuration in which the contact surface 35 of the die 34 is still far and very tilted with respect to the corresponding portion of package on which the tag 32 is applied and with respect to which it is counter-shaped.

[0086] In Figure 15, the die 34 has arrived in front of the front wall of the package 33, which is now near to contact with the package, and the counter-shaped contact surface 35 is still tilted with respect to the corresponding portion of package.

[0087] In Figure 16, the contact has started of the die 34 with the package 33 and the tag 32, in a limited contact zone, in practice with a contact in a limited portion of tag 32. The contact surface 35 is tilted, so the contact starts in an end zone of the contact surface 35 (end zone that is near the front side of the package 33, where frontal is defined with reference to the advancement direction F of the package).

[0088] In Figure 17, the die 34, by continuing to rotate

around the second fulcrum 15, has arrived at the complete contact position with the corresponding portion of package 33, in which the first portion 32' of tag and the two side flaps (second portion 32a and third portion 32b, both folded) are pressed against respective walls of the package 33 (the walls 33', 33a, 33b, see Figure 19). It is noted that, in the transition from the configuration of Figure 16 to that of Figure 17, the completion of the contact occurs gradually, by varying progressively the tilt of the die 34, so that the contact zone gradually increases from one end of the tag to the opposite end. In this embodiment, the gradual contact proceeds from a forward or front end of the tag to the opposite end. It is possible to envisage other embodiments that are not illustrated in which the progression occurs in the opposite manner, i. e. from a rear end of the tag to the front end.

[0089] This graduality ensures stable and precise gluing of the tag 32, without risk of undesired shifts of the tag 32 and/or errors in the final set position of the tag 32 on the package 33.

[0090] The pressing contact configuration of Figure 17 is maintained substantially unaltered for a certain portion of the (straight) advancement of the package and of the unit alongside one another at the same speed, for example as far as the situation of Figure 18, in which the unit 5 is taken to the portion of path that diverges from the path of the package 33.

[0091] The unit 5 may comprise, also in this embodiment, a spring (similar to the spring 20) that in this case is arranged for rotating the die 34 around the second fulcrum 15 so as to move the contact surface 35 to a contact position in which the die 34 may interact in contact with the package 33 that advances parallel alongside the unit 5 along a straight path portion. The second cam profile 19 may be arranged for commanding rotation of the die 34 around the second fulcrum 15 to counteract the spring so as to make the die 34 retract before the die 34 resumes interacting in contact with another package 33 after performing a complete revolution of the closed loop path 4 thereof.

[0092] Whilst the unit 5 moves along the straight path portion 4a and the package 33 moves parallel alongside and at the same advancement speed as the unit 5, the die 34 is maintained for a certain portion of path in pressing contact against the tag 32 already applied to the package 33, in particular the first portion 35' of die acts against the first portion 32' of tag applied to the first wall 33' of the package, the second portion 35a of die acts against the second portion 32a folded and applied to the second wall 33a of the package and the third portion 35b of die acts against the third portion 32b folded and applied to the third wall 33b of the package.

[0093] Whilst the unit 5 runs at least partially along the aforesaid portion of straight path alongside the path of the packages 33, the die 34 performs a pure translation motion, in particular without performing any rotation around the second fulcrum 15.

[0094] Also in this second embodiment the unit 5 and the package 33 are conveyed parallel alongside one another along a (non-zero) portion of (straight) advancement at the same advancement speed and at the same reciprocal distance for a certain (non-instantaneous) period of time.

[0095] The die 34 is rotated around the second fulcrum 15, pushed by the aforesaid spring, so that the first portion 35' of the contact surface comes into contact against the first portion 32' of the tag, during the advancement step alongside at the same speed as the unit 5 and package 33. Simultaneously, at least one portion (35a and 35b) of the contact surface folds at least one flap (second portion 32a and/or third portion 32b) of the tag and the door in contact against at least one wall (second wall 33a and/or third wall 33b) of the package.

[0096] In this specific embodiment, as has been seen, the tag 32 comprises at least one third portion 32b to be folded that protrudes in a cantilevered manner from the first wall 33' of the package 33 on a side opposite the second portion 32a. Whilst the second portion 35a of the contact surface folds the second portion 32a of the tag 32 and brings the tag 32 into contact against the second wall 33a, the third portion 35b of the contact surface, that is contiguous and tilted with respect to the first portion 35a, folds the third portion 32b and brings the third portion 32b into contact against a third wall 35b of the package tilted with respect to the first wall. The third wall 35b comprises a bevel end or round corner that connects two walls of the package 33.

[0097] It is observed that the die 34 reproduces negatively the shape of a portion of the package 33 so as not to cause any shift or variation of the setting of the tag 32 during the corresponding coupling motion between the die 34 and package 33, as this corresponding coupling is, approximately, pure crushing, without corresponding sliding motion or with an insignificant component of such motion.

[0098] It is observed that for both the embodiments disclosed above, applying a free flap of the tag, to a surface of the package that advances with a continuous feed speed, is made by gradual movement in a direction that is substantially orthogonal to the motion of the package, by a unit that moves advancing parallel alongside the package for a set (straight) portion of the feed path of the package, in the same direction and at the same advancement speed.

[0099] Further, the tag portion or label, which was already stuck to the package before reaching the folding device, is pressed in position during the entire folding step of the free flap protruding in a cantilevered manner and also, for a certain time, after completion of folding.

[0100] Further, after the actual step of folding the free flap, the flap itself, which is no longer free but applied to the package, is also pressed in position for a set portion of advancement of the package, before the trajectories of the unit and the package diverge from one another.

Claims

1. Folding method for folding at least one flap (2b) of a tag (2), the folding method comprising the steps of:

   providing at least one package (3) of smoking articles comprising a first wall (3a) to which a portion (2a) of a tag (2) is applied, the tag comprising at least one flap (2b) to be folded which protrudes out of the first wall (3a);
   providing at least one moving unit (5) comprising at least one contact surface (13) and at least one folding end (17);
   feeding the moving unit (5) and the package (3) side by side along a feed section at the same feed speed and at the same mutual distance;
   bringing the contact surface (13) against the portion (2a) of tag applied to the first wall (3a);
   during the step of feeding the moving unit and the package, maintaining the contact surface (13) against the portion (2a) of tag applied to the first wall (3a) and simultaneously moving the folding end (17) to fold the flap (2b) against a second wall (3b) of the package that is transverse to the first wall (3a);
   characterized in that:

      the moving unit (5) comprises a support (8) and an arm (10) articulated on the support (8) around a first fulcrum (11), the arm (10) comprising the contact surface (13), the method comprises the step of rotating the arm (10) around the first fulcrum (11) to bring the contact surface (13) against the portion (2a) of tag;
      the moving unit (5) comprises a lever (14) articulated on the arm (10) around a second fulcrum (15), the lever comprising the folding end (17), the method comprises the step of rotating the lever (14) around the second fulcrum (15) so that the folding end (17) folds the flap (2b).

2. Method according to claim 1, wherein the first wall (3a) is a side wall of the package (3) and the second wall (3b) is a front wall of the package (3), where side and front is intended with reference to a feed direction (F) of the package (3) during the step of feeding the moving unit (5) and the package (3).

3. Method according to claim 1 or 2, wherein the moving unit (5) is moved along a closed loop path (4) comprising at least one straight path portion (4a).

4. Folding device (1) for folding a flap (2b) of a tag (2), in particular for implementing a method according to any one of the preceding claims, wherein the tag comprises a 1180555be-EN portion (2a) applied to a first wall (3a) of a package (3) of smoking articles, the flap (2b) to be folded protruding out of the first wall (3a), the folding device (1) comprising:

   a closed loop path (4) comprising at least one straight path portion (4a);
   at least one moving unit (5) that is movable along the path (4),
   characterized in that:

      the moving unit (5) comprises a support (8), an arm (10) articulated on the support (8) around a first fulcrum (11) and a lever (14) articulated on the arm (10) around a second fulcrum (15), the arm (10) is provided with a first cam follower (12), the lever (14) is provided with a second cam follower (16), the arm (10) comprises at least one contact surface (13) with the tag (2), the lever (14) comprises at least one folding end (17) to fold the flap (2b), the folding end (17) is distant from the second fulcrum (15);
      the folding device comprises a first cam profile (18) coupled with the first cam follower (12) for controlling the arm (10) around the first fulcrum (11) while the moving unit (5) moves along at least a part of the path (4);
      the folding device comprises a second cam profile (19) coupled with the second cam follower (16) for controlling the lever (14) around the second fulcrum (15) while the moving unit (5) moves along at least a part of the path (4).

5. Device according to claim 4, wherein the first cam profile (18) and the second cam profile (19) are configured and arranged so that while the moving unit (5) moves along the straight path portion (4a) and the package (3) moves parallel beside and at the same feed speed as the moving unit (5), the contact surface (13) can maintain a pressing contact against the portion (2a) of tag applied to the first wall (3a) of the package and simultaneously the folding end (17) can fold the flap (2b) of the tag against a second wall (3b) of the package that is transverse to the first wall (3a) by a rotation of the lever (14) around the second fulcrum (15).

6. Device according to claim 4 or 5, wherein the path (4) is defined by a closed loop flexible conveyor element (6) which moves the moving unit (5); the device comprising, in particular, at least three pulleys (7) on which the conveyor element (6) is coupled; the three pulleys (7) comprising, in particular, a drive pulley and an adjustable pulley with movable axis for adjusting the tension.

7. Device according to any one of claims 4 to 6, wherein the second cam profile (19) is configured to control the folding end (17) so that the folding end (17) takes at least one back position with respect to the arm (10), in which the folding end (17) has not yet begun the folding of the flap (2b) of the tag, and a forward position with respect to the arm (10), in which the folding end (17) has already folded the flap (2b) of the tag.

8. A device according to claim 7, wherein the moving unit (5) comprises a spring (20) arranged to rotate the lever (14) around the second fulcrum (15) in such a way as to move the folding end (17) from the back position to the forward position, the second cam profile (19) being arranged to rotate the lever (14) in opposition to the action of the spring (20) to bring the folding end (17) back from the forward position to the back position before folding again the flap (2b) of another tag.

9. Device according to any one of claims 4 to 8, wherein the contact surface (13) comprises a first flat surface and the folding end (17) comprises a second flat surface, the first flat surface and the second flat surface being intended for pressing respectively, the portion (2a) of tag applied to the first wall (3a) of the package and the already folded flap (2b) against a second wall (3b) of the package that is transverse to the first wall (3a); the first flat surface being able to adopt, in particular, a position parallel to the straight path portion (4a) and to maintain this parallel position while the moving unit (5) passes at least partially the straight path portion (4a); the first flat surface and the second flat surface being configured, in particular, to press simultaneously the portion (2a) of tag and the folded flap (2b) for at least one non-nil portion of the straight path portion (4a).

10. Device according to any one of claims 4 to 9, wherein while the moving unit (5) passes at least partially along the straight path portion (4a), the contact surface (13) is commanded to perform a motion of pure translation, it being in particular provided that the arm (10) does not rotate around the first fulcrum (11).

11. Folding apparatus, comprising:

    a folding device (1) according to any one of the claims 4 to 10;
    a conveyor device configured to convey at least one package (3) of smoking articles parallel to and beside the moving unit (5) of the folding device (1) along the straight path portion (4a).

12. A packaging machine for packaging smoking articles, comprising a folding apparatus according to claim 11, wherein the folding device (1) is configured to fold a flap (2b) of a tag applied to each package of smoking articles.

Patentansprüche

1. Faltverfahren zum Falten mindestens einer Lasche (2b) eines Etiketts (2), wobei das Faltverfahren die folgenden Schritte aufweist:

    Bereitstellen von mindestens einer Packung (3) von Rauchartikeln mit einer ersten Wand (3a), an der ein Teil (2a) eines Etiketts (2) angebracht ist, wobei das Etikett mindestens eine zu faltende Lasche (2b) aufweist, die von der ersten Wand (3a) herausragt;
    Bereitstellung mindestens einer Bewegungseinheit (5) mit mindestens einer Kontaktfläche (13) und mindestens einem Faltungsende (17);
    Zuführen der Bewegungseinheit (5) und der Packung (3) nebeneinander entlang eines Zuführabschnitts mit der gleichen Zuführgeschwindigkeit und mit dem gleichen gegenseitigen Abstand;
    Bringen der Kontaktfläche (13) gegen den Teil (2a) des Etiketts, der an der ersten Wand (3a) angebracht ist;
    während des Schritts des Zuführens der Bewegungseinheit und der Packung, Aufrechterhalten der Kontaktfläche (13) gegen den Teil (2a) des Etiketts, der an der ersten Wand (3a) angebracht ist, und gleichzeitiges Bewegen des Faltungsendes (17), um die Lasche (2b) gegen eine zweite Wand (3b) der Packung zu falten, die quer zur ersten Wand (3a) steht;
    dadurch gekennzeichnet, dass:
    die Bewegungseinheit (5) einen Träger (8) und einen Arm (10) umfasst, der an dem Träger (8) um einen ersten Drehpunkt (11) herum gelenkig gelagert ist, wobei der Arm (10) die Kontaktfläche (13) aufweist, wobei das Verfahren den Schritt des Drehens des Arms (10) um den ersten Drehpunkt (11) umfasst, um die Kontaktfläche (13) gegen den Abschnitt (2a) des Etiketts zu bringen;
    die Bewegungseinheit (5) einen Hebel (14) aufweist, der an dem Arm (10) um einen zweiten Drehpunkt (15) herum angelenkt ist, wobei der Hebel das Faltungsende (17) umfasst, wobei das Verfahren den Schritt des Drehens des Hebels (14) um den zweiten Drehpunkt (15) umfasst, so dass das Faltungsende (17) die Lasche (2b) faltet.

2. Verfahren nach Anspruch 1, wobei die erste Wand (3a) eine Seitenwand der Packung (3) ist und die zweite Wand (3b) eine Vorderwand der Packung (3), wobei Seite und Vorderseite in Bezug auf eine Vor-

schubrichtung (F) der Packung (3) während des Schritts des Vorschubs der Bewegungseinheit (5) und der Packung (3) gemeint sind.

3. Verfahren nach Anspruch 1 oder 2, wobei die Bewegungseinheit (5) entlang einer geschlossenen Kreislaufbahn (4) bewegt wird, die mindestens einen geraden Bahnabschnitt (4a) aufweist.

4. Faltvorrichtung (1) zum Falten einer Lasche (2b) eines Etiketts (2), insbesondere zur Durchführung ein Verfahren gemäß einem der vorstehenden Ansprüche, wobei das Etikett einen Teil (2a) umfasst, der an einer ersten Wand (3a) einer Packung (3) von Rauchartikeln angebracht ist, wobei die zu faltende Lasche (2b) von der ersten Wand (3a) herausragt, wobei die Faltvorrichtung (1) Folgendes aufweist:

eine geschlossene Kreislaufbahn (4) mit mindestens einem geraden Bahnabschnitt (4a);
mindestens eine Bewegungseinheit (5), die entlang der Bahn (4) beweglich ist,
dadurch gekennzeichnet, dass
die Bewegungseinheit (5) einen Träger (8) aufweist, sowie einen an den Träger (8) angelenkten Arm (10) um einen ersten Drehpunkt (11), und einen Hebel (14), der an dem Arm (10) um einen zweiten Drehpunkt (15) angelenkt ist, wobei der Arm (10) mit einem ersten Nockenstößel (12) versehen ist, und der Hebel (14) mit einem zweiten Nockenstößel (16) versehen ist, wobei der Arm (10) mindestens einen Kontaktfläche (13) mit dem Etikett (2) aufweist, der Hebel (14) mindestens ein Faltungsende (17) zum Falten der Lasche (2b) aufweist, wobei das Faltungsende (17) vom zweiten Drehpunkt (15) entfernt ist;
die Faltvorrichtung ein erstes Nockenprofil (18) aufweist, das mit dem ersten Nockenstößel (12) gekoppelt ist, um den Arm (10) um den ersten Drehpunkt (11) zu steuern, während sich die Bewegungseinheit (5) entlang mindestens eines Teils der Bahn (4) bewegt;
die Faltvorrichtung ein zweites Nockenprofil (19) aufweist, das mit dem zweiten Nockenstößel (16) gekoppelt ist, um den Hebel (14) um den zweiten Drehpunkt (15) zu steuern, während sich die Bewegungseinheit (5) zumindest entlang eines Teils der Bahn (4) bewegt.

5. Vorrichtung nach Anspruch 4, bei der das erste Nockenprofil (18) und das zweite Nockenprofil (19) so konfiguriert und angeordnet sind, dass, während sich die Bewegungseinheit (5) entlang des geraden Bahnabschnitts (4a) bewegt und sich die Packung (3) parallel neben und mit derselben Vorschubgeschwindigkeit bewegt wie die Bewegungseinheit (5), die Kontaktfläche (13) einen Druckkontakt gegen den Teil (2a) des Etiketts, der an der ersten Wand (3a) der Packung angebracht ist, aufrechterhalten kann, und gleichzeitig das Faltungsende (17) die Lasche (2b) des Etiketts gegen eine zweite Wand (3b) der Packung, die quer zur ersten Wand (3a) liegt, falten kann, und zwar durch eine Drehung des Hebels (14) um den zweiten Drehpunkt (15).

6. Vorrichtung nach Anspruch 4 oder 5, bei der die Bahn (4) durch ein flexibles Förderelement (6) in geschlossenem Kreislauf definiert ist, das die Bewegungseinheit (5) bewegt; die Vorrichtung insbesondere mindestens drei Rollen (7) aufweist, an die das Förderelement (6) gekoppelt ist; die drei Rollen (7) insbesondere eine Antriebsrolle und eine verstellbare Rolle mit beweglicher Achse zur Einstellung der Spannung aufweisen.

7. Vorrichtung nach einem der Ansprüche 4 bis 6, bei der das zweite Nockenprofil (19) zur Steuerung des Faltungsendes (17) so konfiguriert ist, dass das Faltungsende (17) mindestens eine hintere Position in Bezug auf den Arm (10) einnimmt, in der das Faltungsende (17) noch nicht mit der Faltung der Lasche (2b) des Etiketts begonnen hat, und eine vordere Position in Bezug auf den Arm (10), in der das Faltungsende (17) die Lasche (2b) des Etiketts bereits gefaltet hat.

8. Vorrichtung nach Anspruch 7, wobei die Bewegungseinheit (5) eine Feder (20) umfasst, die so angeordnet ist, dass sie den Hebel (14) um den zweiten Drehpunkt (15) so dreht, dass das Faltungsende (17) aus der hinteren Position in die vordere Position bewegt wird, wobei das zweite Nockenprofil (19) so angeordnet ist, um den Hebel (14) gegen die Wirkung der Feder (20) zu drehen, um das Faltungsende (17) von der vorderen Position in die hintere Position zurück zu bringen, bevor wieder die Lasche (2b) eines anderen Etiketts gefaltet wird.

9. Vorrichtung nach einem der Ansprüche 4 bis 8, bei der die Kontaktfläche (13) eine erste ebene Fläche und das Faltungsende (17) eine zweite ebene Fläche aufweist, wobei die erste ebene Fläche und die zweite ebene Fläche jeweils dazu bestimmt sind, den auf die erste Wand (3a) der Packung aufgebrachten Teil (2a) des Etiketts und die bereits gefaltete Lasche (2b) gegen eine zweite Wand (3b) der Packung, die quer zur ersten Wand (3a) liegt, zu drücken; wobei die erste ebene Fläche insbesondere in der Lage ist, eine Position parallel zu dem geraden Bahnabschnitt (4a) einzunehmen und diese parallele Position beizubehalten, während die Bewegungseinheit (5) zumindest teilweise an dem geraden Bahnabschnitt (4a) vorbeiläuft; wobei die erste ebene Fläche und die zweite ebene Fläche insbesondere so konfiguriert sind, dass sie gleichzeitig

den Abschnitt (2a) des Etiketts und die gefaltete Lasche (2b) für mindestens einen von Null verschiedenen Abschnitt des geraden Bahnabschnitts (4a) drücken.

10. Vorrichtung nach einem der Ansprüche 4 bis 9, bei der, während die Bewegungseinheit (5) zumindest teilweise den geraden Bahnabschnitt (4a) durchläuft, die Kontaktfläche (13) eine reine Translationsbewegung ausführen soll, insbesondere unter der Voraussetzung, dass sich der Arm (10) nicht um den ersten Drehpunkt (11) dreht.

11. Faltapparatur, aufweisend:

eine Faltvorrichtung (1) nach einem der Ansprüche 4 bis 10;
eine Fördervorrichtung, die so konfiguriert ist, dass sie mindestens eine Packung (3) von Rauchartikeln parallel zu und neben der Bewegungseinheit (5) der Faltvorrichtung (1) entlang des geraden Bahnabschnitts (4a) befördert.

12. Verpackungsmaschine zum Verpacken von Rauchartikeln, mit einer Faltapparatur nach Anspruch 11, wobei die Faltvorrichtung (1) so konfiguriert ist, dass sie eine Lasche (2b) eines an jeder Packung von Rauchartikeln angebrachten Etiketts faltet.

Revendications

1. Procédé de pliage pour plier au moins une patte (2) d'une étiquette (2), le procédé de pliage comprenant les étapes suivantes:

prévoir au moins un emballage (3) d'articles à fumer comprenant une première paroi (3a) sur laquelle une partie (2a) d'une étiquette (2) est appliquée, l'étiquette comprenant au moins une patte (2b) à plier qui dépasse de la première paroi (3a) ;
prévoir au moins une unité mobile (5) comprenant au moins une surface de contact (13) et au moins une extrémité de pliage (17) ;
amener l'unité mobile (5) et l'emballage (3) côte à côte le long d'une section d'amenée à la même vitesse d'amenée et à la même distance mutuelle ;
mettre la surface de contact (13) contre la partie (2a) de l'étiquette appliquée contre la première paroi (3a) ;
pendant l'étape d'amenée de l'unité mobile et de l'emballage, maintenir la surface de contact (13) contre la partie (2a) de l'étiquette appliquée sur la première paroi (3a) et déplacer simultanément l'extrémité de pliage (17) pour plier la patte (2b) contre une deuxième paroi (3b) de l'emballage qui est transversale par rapport à la première paroi (3a) ;
caractérisé en ce que :

l'unité mobile (5) comprend un support (8) et un bras (10) articulé sur le support (8) autour d'un premier point de levier (11), le bras (10) comprenant la surface de contact (13), le procédé comprend l'étape de rotation du bras (10) autour du premier point de levier (11) pour mettre la surface de contact (13) contre la partie (2a) de l'étiquette ;
l'unité mobile (5) comprend un levier (14) articulé sur le bras (10) autour d'un deuxième point de levier (15), le levier comprenant l'extrémité de pliage (17), le procédé comprend l'étape de rotation du levier (14) autour du deuxième point de levier (15) de sorte que l'extrémité de pliage (17) plie la patte (2b).

2. Procédé selon la revendication 1, dans lequel la première paroi (3a) est une paroi latérale de l'emballage (3) et la deuxième paroi (3b) est une paroi avant de l'emballage (3), latérale et avant devant être compris en référence à une direction d'amenée (F) de l'emballage (3) pendant l'étape d'amenée de l'unité mobile (5) et de l'emballage (3).

3. Procédé selon la revendication 1 ou 2, dans lequel l'unité mobile (5) est déplacée le long d'une trajectoire en boucle fermée (4) comprenant au moins une partie de trajectoire rectiligne (4a).

4. Dispositif de pliage (1) pour plier une patte (2b) d'une étiquette (2), en particulier pour mettre en œuvre un procédé selon l'une quelconque des revendications précédentes, dans lequel l'étiquette comprend une partie (2a) appliquée sur une première paroi (3a) d'un emballage (3) d'articles à fumer, la patte (2b) à plier dépassant de la première paroi (3a), le dispositif de pliage (1) comprenant :

une trajectoire en boucle fermée (4) comprenant au moins une partie de trajectoire rectiligne (4a) ;
au moins une unité mobile (5) qui est mobile le long de la trajectoire (4) ;
caractérisé en ce que l'unité mobile (5) comprend un support (8), un bras (10) articulé sur le support (8) autour d'un premier point de levier (11), et un levier (14) articulé sur le bras (10) autour d'un deuxième point de levier (15), le bras (10) est pourvu d'un premier galet suiveur (12), le levier (14) est pourvu d'un deuxième galet suiveur (16), le bras comprend au moins une surface de contact (13) avec l'étiquette (2), le levier (14) comprend au moins une extrémité de pliage

(17) pour plier la patte (2b), l'extrémité de pliage (17) est distante du deuxième point de levier (15) ;

le dispositif de pliage comprend un premier profil de came (18) couplé au premier galet suiveur (12) pour commander le bras (10) autour du premier point de levier (11) pendant que l'unité mobile (5) se déplace le long d'une partie au moins de la trajectoire (4) ;

le dispositif de pliage comprend un deuxième profil de came (19) couplé au deuxième galet suiveur (16) pour commander le levier (14) autour du deuxième point de levier (15) pendant que l'unité mobile (5) se déplace le long d'une partie au moins de la trajectoire (4).

5. Dispositif selon la revendication 4, dans lequel le premier profil de came (18) et le deuxième profil de came (19) sont configurés et arrangés de sorte que pendant que l'unité mobile (5) se déplace le long de la partie de trajectoire rectiligne (4a) et que l'emballage (3) se déplace parallèlement, à côté et à la même vitesse d'amenée que l'unité mobile (5), la surface de contact (13) puisse maintenir un contact de pression contre la partie (2a) de l'étiquette appliquée sur la première paroi (3a) de l'emballage et que simultanément l'extrémité de pliage (17) puisse plier la patte (2b) de l'étiquette contre une deuxième paroi (3b) de l'emballage qui est transversale par rapport à la première paroi (3a), par une rotation du levier (14) autour du deuxième point de levier (15).

6. Dispositif selon la revendication 4 ou 5, dans lequel la trajectoire (4) est définie par un élément transporteur flexible à boucle fermée (6) qui déplace l'unité mobile (5) ; le dispositif comprenant en particulier au moins trois poulies (7) sur lesquelles l'élément transporteur (6) est couplé ; les trois poulies (7) comprenant en particulier une poulie motrice et une poulie réglable, avec un axe mobile pour régler la tension.

7. Dispositif selon l'une quelconque des revendications 4 à 6, dans lequel le deuxième profil de came (19) est configuré pour commander l'extrémité de pliage (17) de sorte que celle-ci adopte au moins une position arrière par rapport au bras (10), dans laquelle l'extrémité de pliage (17) n'a pas encore commencé le pliage de la patte (2b) de l'étiquette, et une position avant par rapport au bras (10), dans laquelle l'extrémité de pliage (17) a déjà plié la patte (2b) de l'étiquette.

8. Dispositif selon la revendication 7, dans lequel l'unité mobile (5) comprend un ressort (20) arrangé pour tourner le levier (14) autour du deuxième point de levier (15) de manière à déplacer l'extrémité de pliage (17) de la position arrière à la position avant, le deuxième profil de came (19) étant arrangé pour tourner le levier (14) en opposition à l'action du ressort (20) pour ramener l'extrémité de pliage (17) de la position avant à la position arrière avant que la patte (2b) d'une autre étiquette ne soit à nouveau pliée.

9. Dispositif selon l'une quelconque des revendications 4 à 8, dans lequel la surface de contact (13) comprend une première surface plate, et l'extrémité de pliage (17) comprend une deuxième surface plate, la première surface plate et la deuxième surface plate étant destinées à presser respectivement la partie (2a) de l'étiquette appliquée sur la première paroi (3a) de l'emballage et la patte (2b) déjà pliée contre une deuxième paroi (3b) de l'emballage qui est transversale par rapport à la première paroi (3a) ; la première surface plate pouvant adopter en particulier une position parallèle à la partie de trajectoire rectiligne (4a) et maintenir cette position parallèle pendant que l'unité mobile (5) passe au moins partiellement sur la partie de trajectoire rectiligne (4a) ; la première surface plate et la deuxième surface plate étant configurées en particulier pour presser simultanément la partie (2a) de l'étiquette et la patte pliée (2b) pour au moins une partie non nulle de la partie de trajectoire rectiligne (4a).

10. Dispositif selon l'une quelconque des revendications 4 à 9, dans lequel pendant que l'unité mobile (5) passe au moins partiellement le long de la partie de trajectoire rectiligne (4a), la surface de contact (13) est contrainte de décrire un mouvement de pure translation, étant prévu en particulier que le bras (10) ne tourne pas autour du premier point de levier (11).

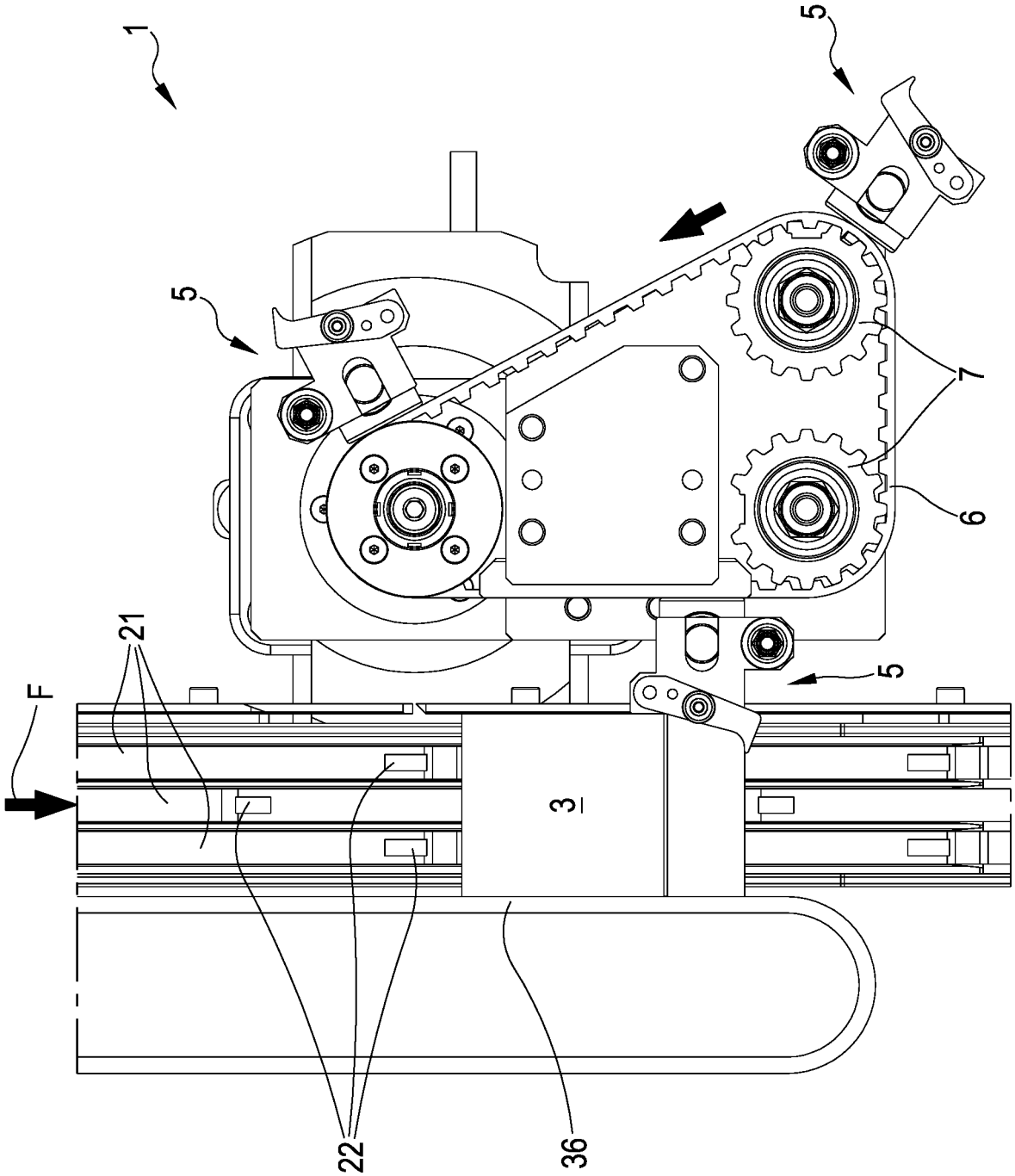
11. Appareil de pliage comprenant :

un dispositif de pliage (1) selon l'une quelconque des revendications 4 à 10 ;

un dispositif transporteur configuré pour transporter au moins un emballage (3) d'articles à fumer parallèlement à l'unité mobile (5) du dispositif de pliage (1) et à côté de celle-ci le long de la partie de trajectoire rectiligne (4a).

12. Machine d'emballage pour emballer des articles à fumer, comprenant un appareil de pliage selon la revendication 11, dans lequel le dispositif de pliage (1) est configuré pour plier une patte (2b) d'une étiquette appliquée sur chaque emballage d'articles à fumer.

FIG.1



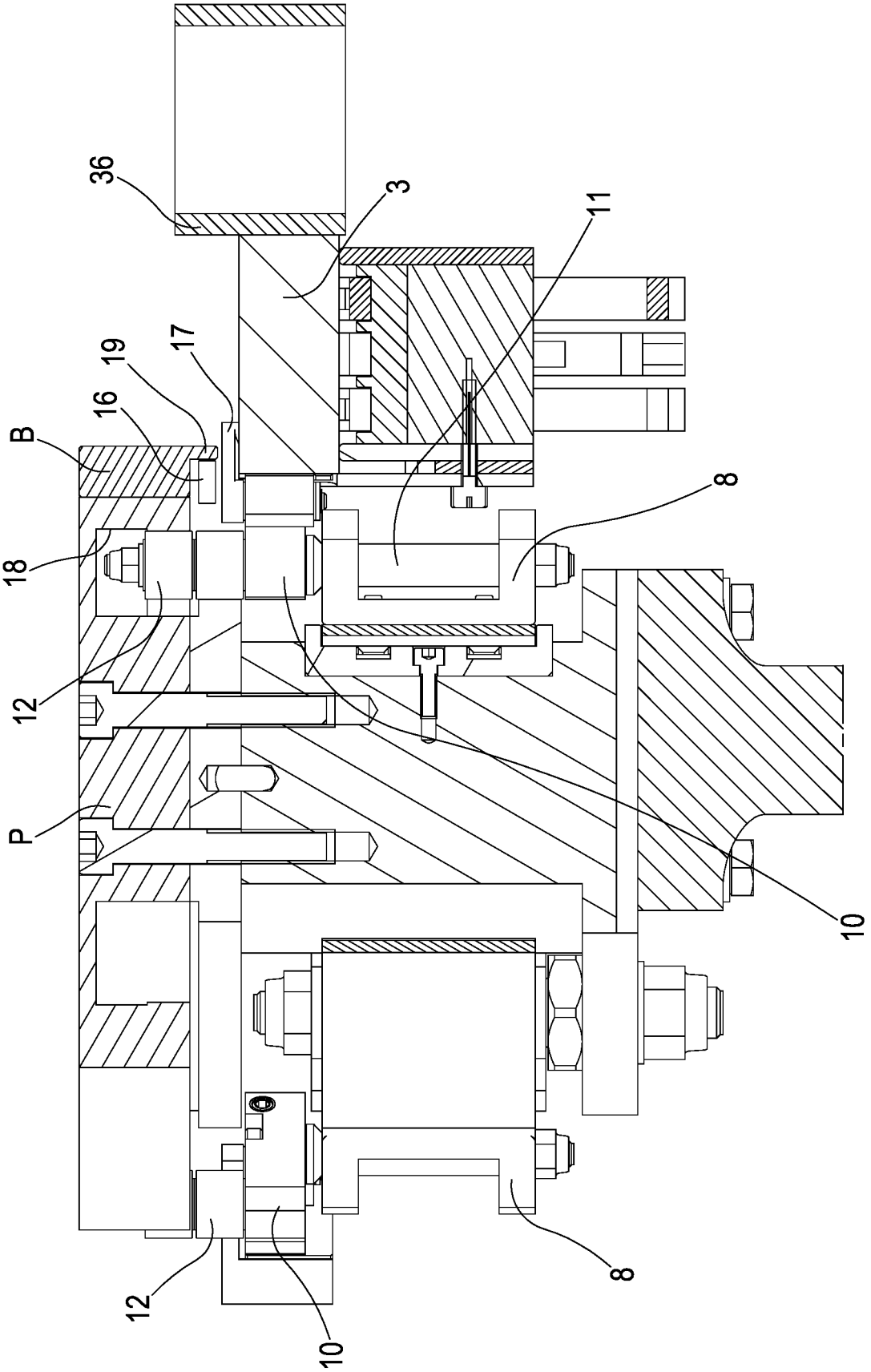


FIG.2

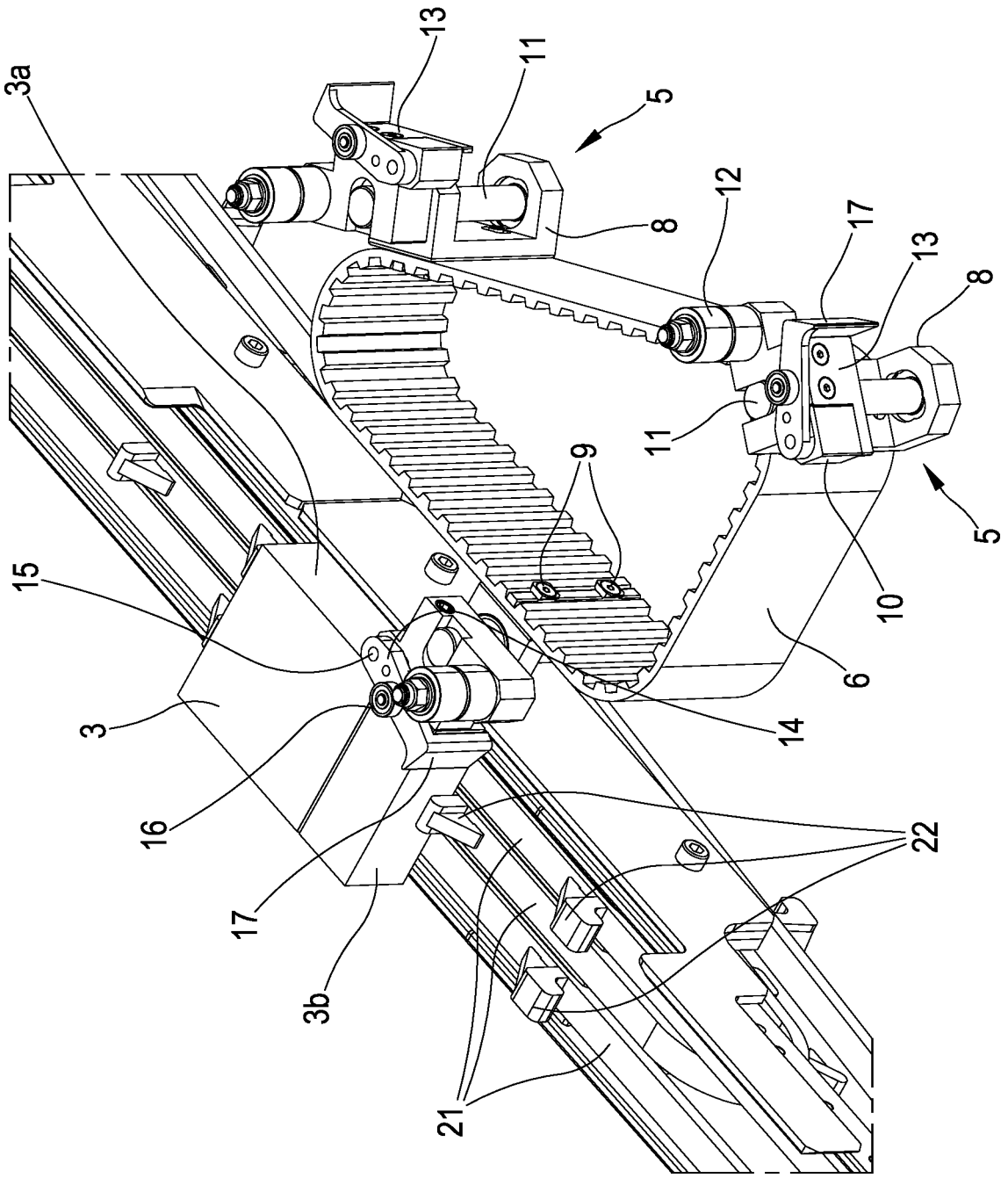


FIG.3

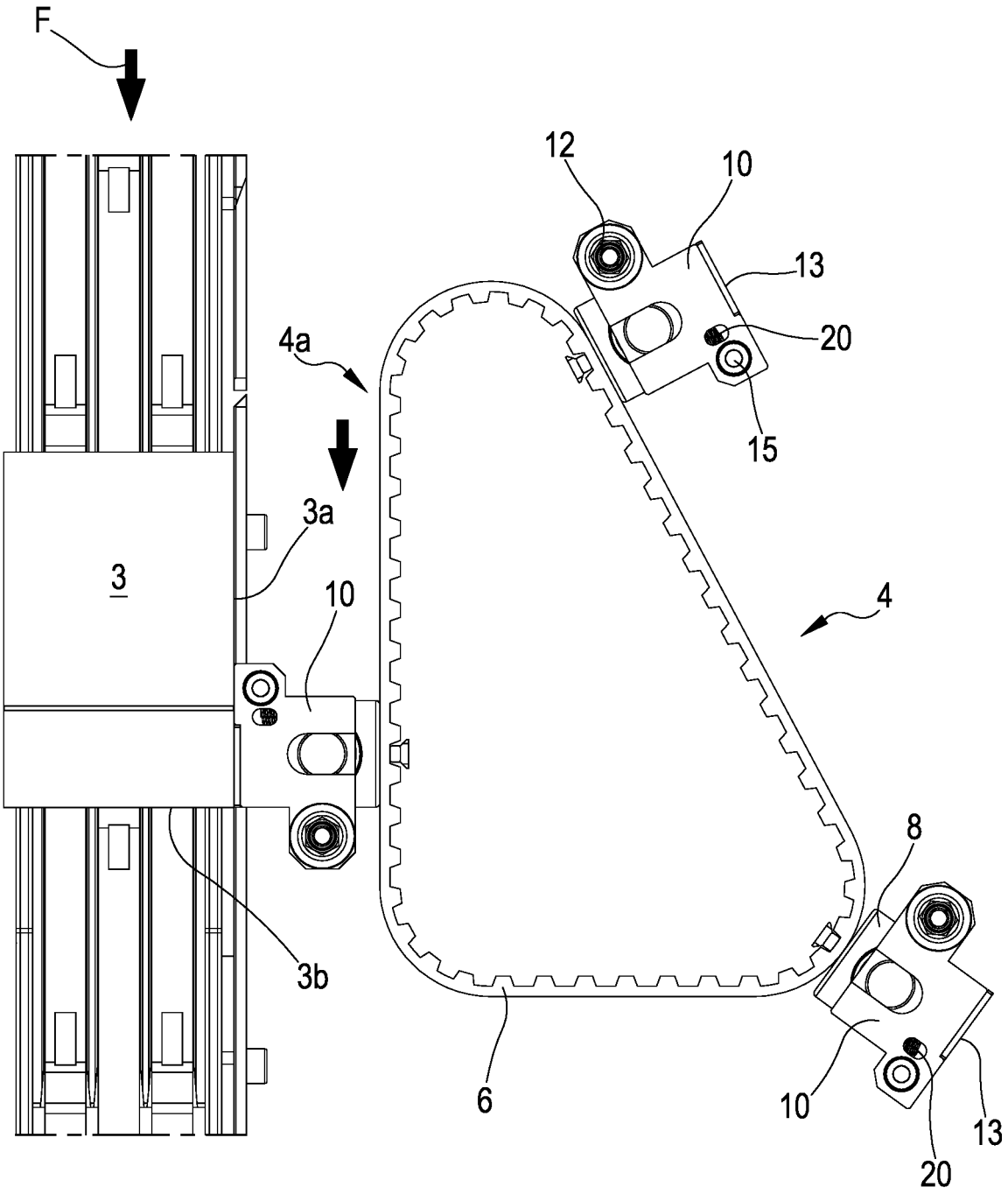


FIG.4

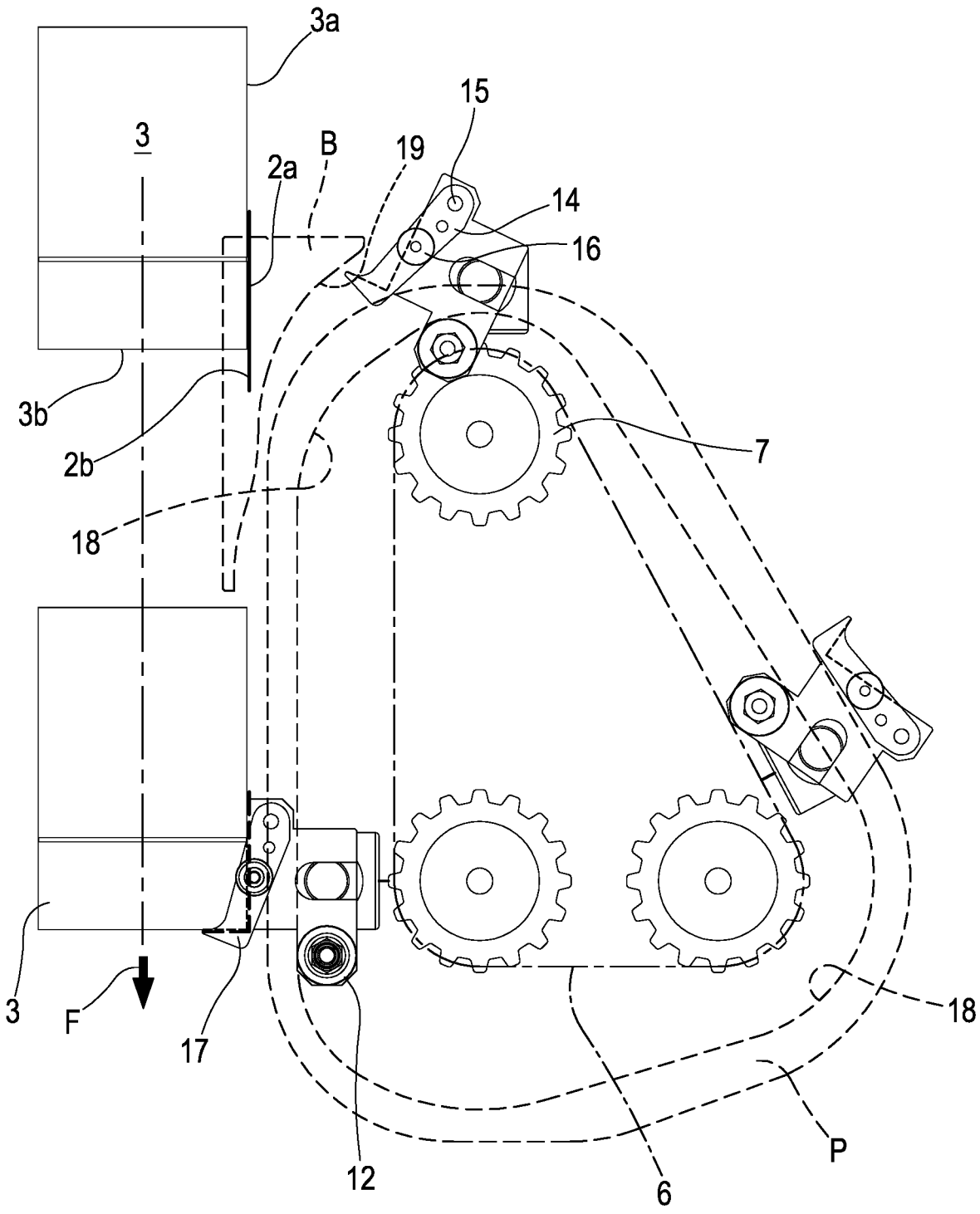


FIG.5

FIG.6

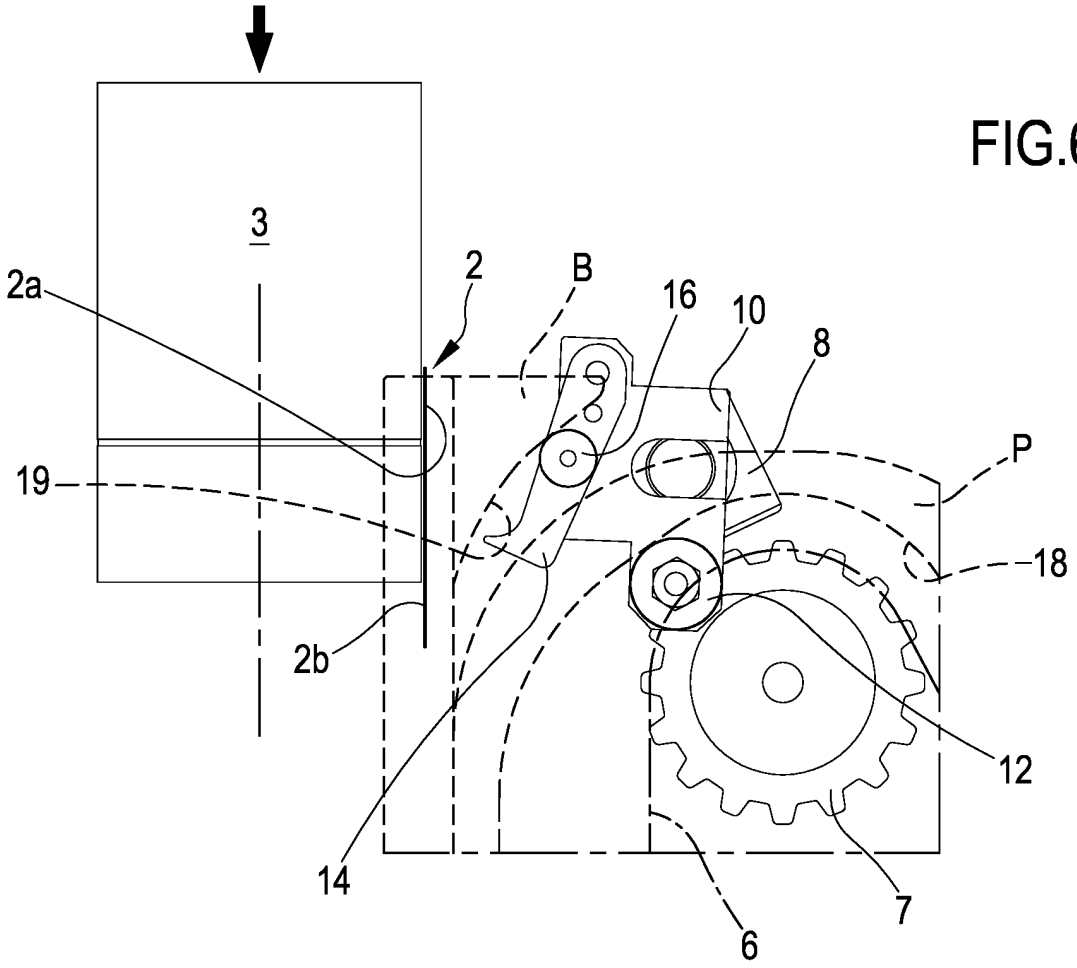
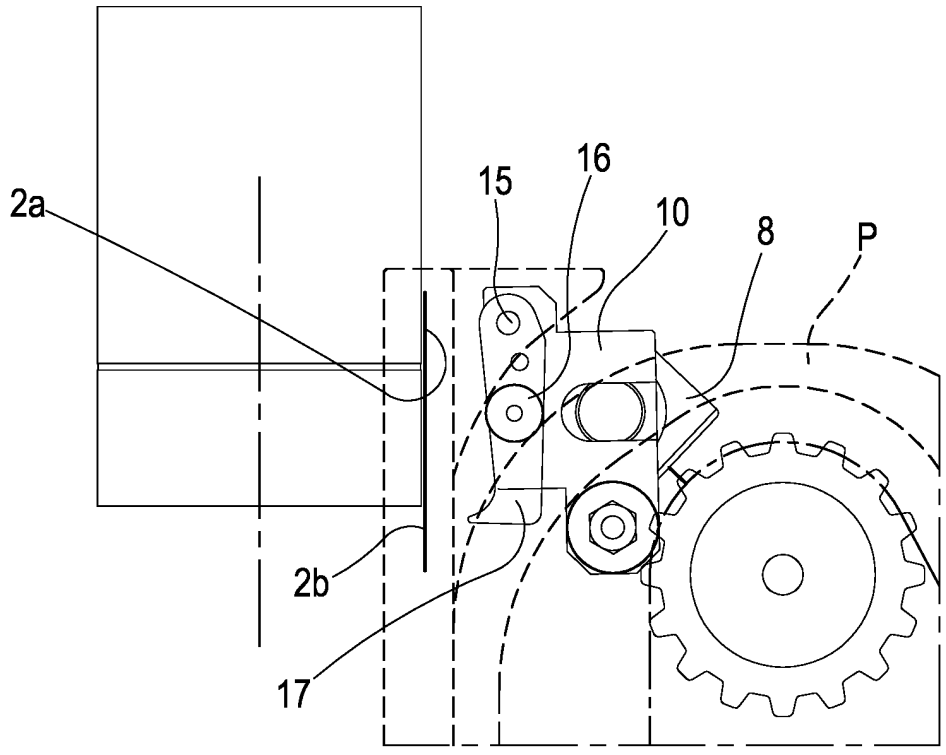


FIG.7



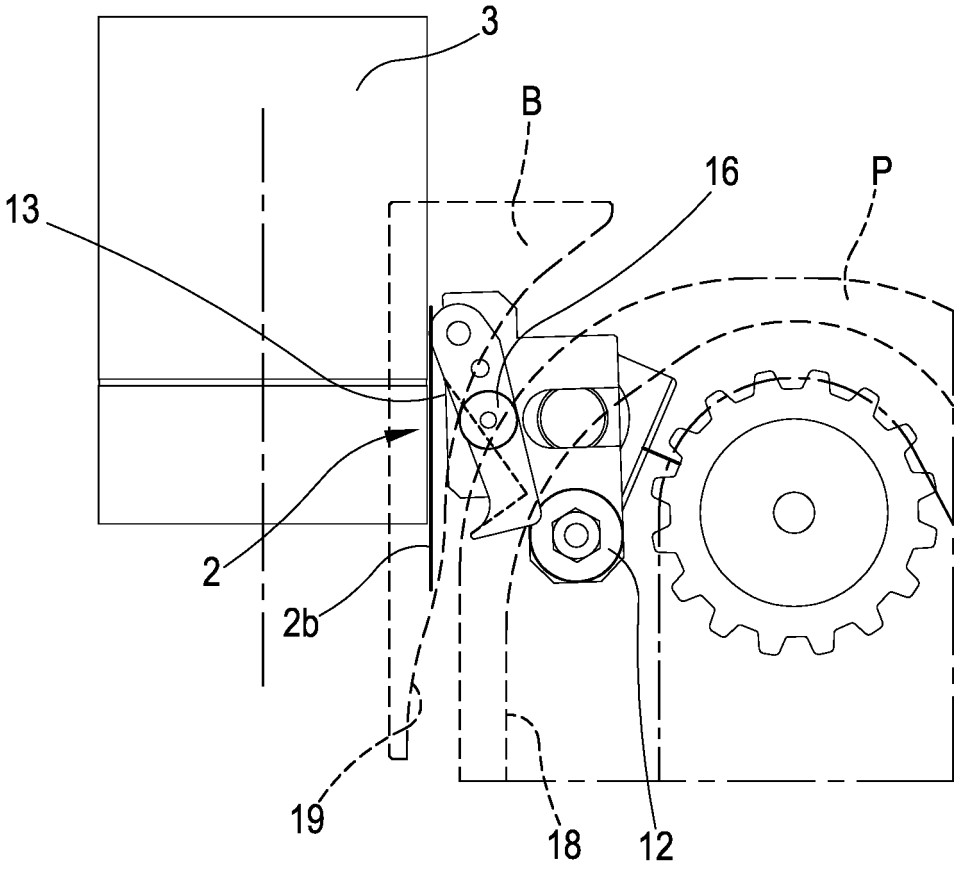


FIG.8

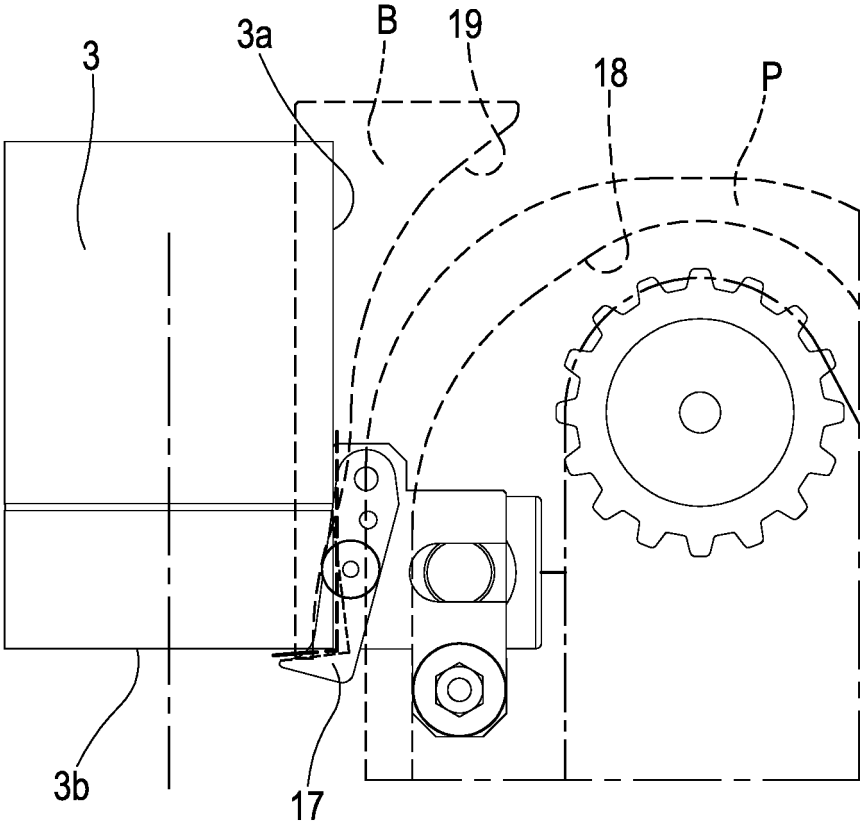


FIG.9

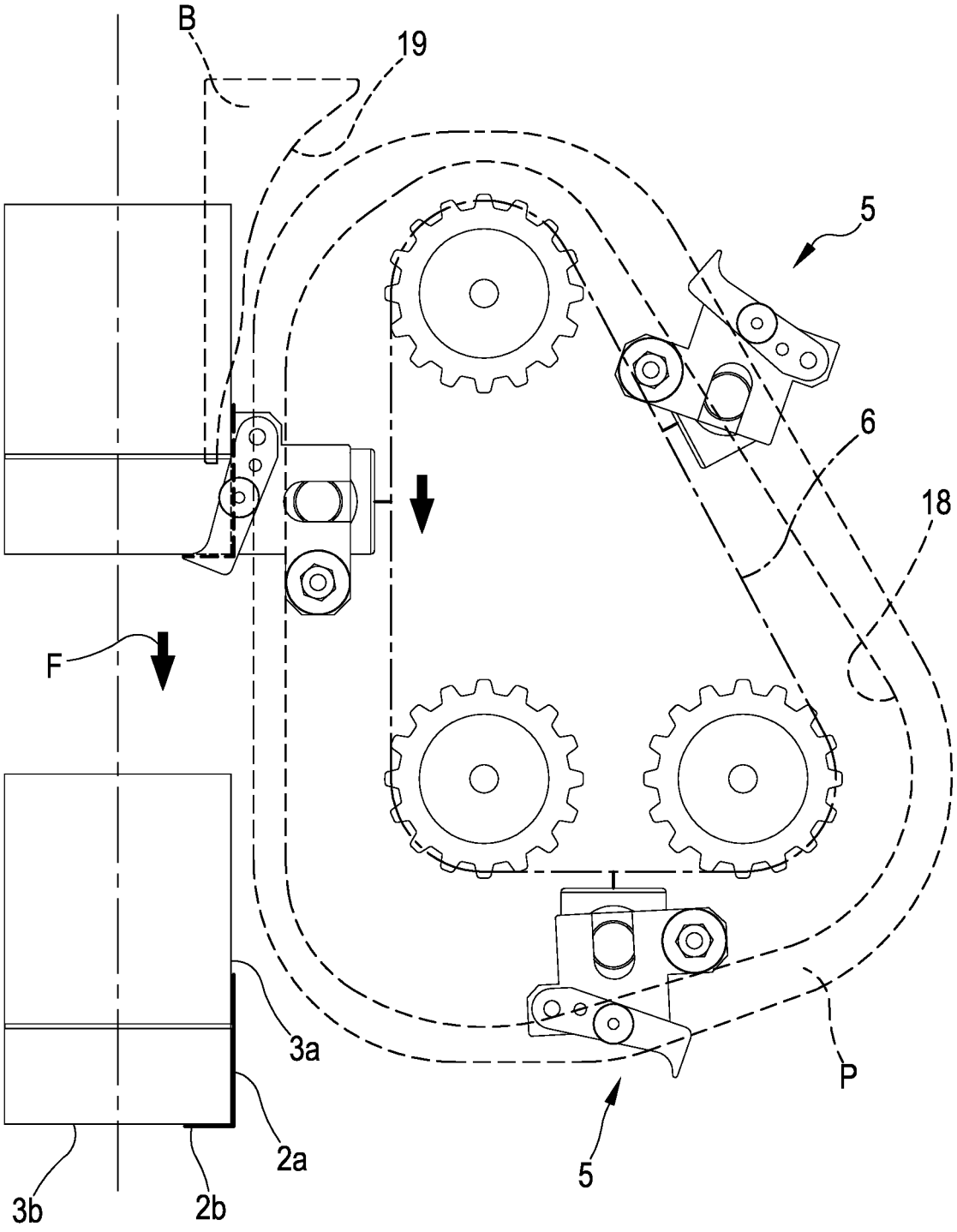


FIG.10

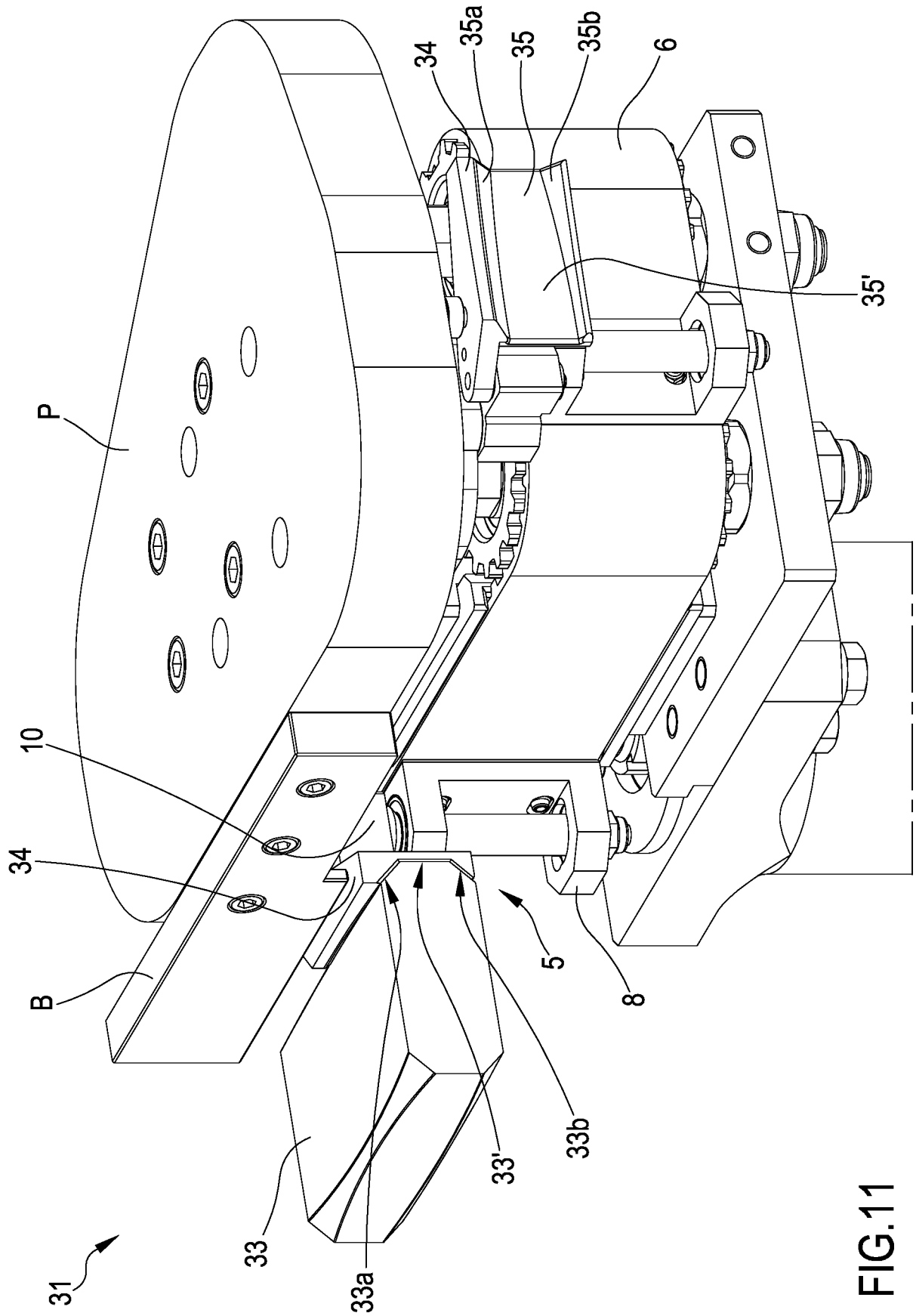


FIG.11

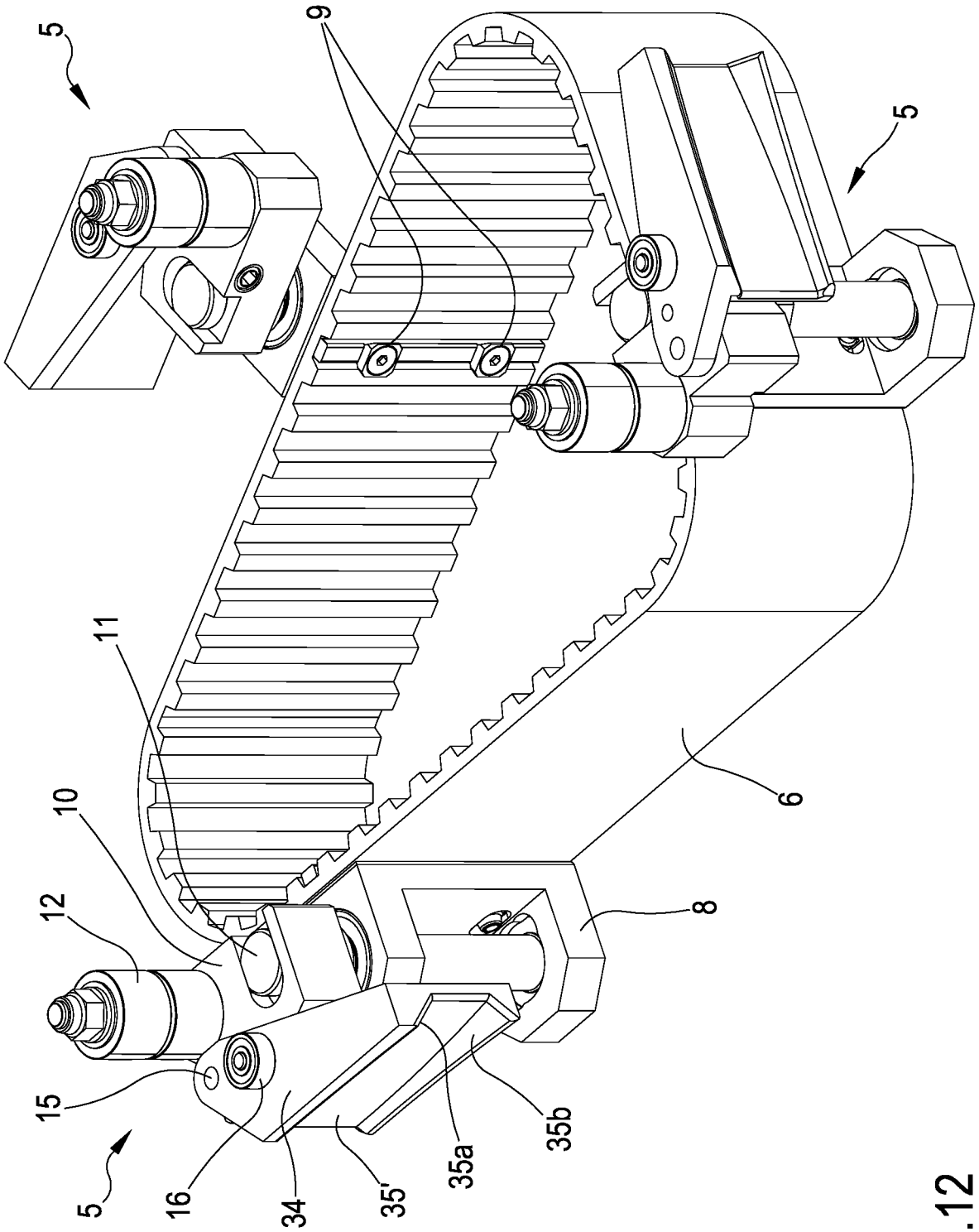
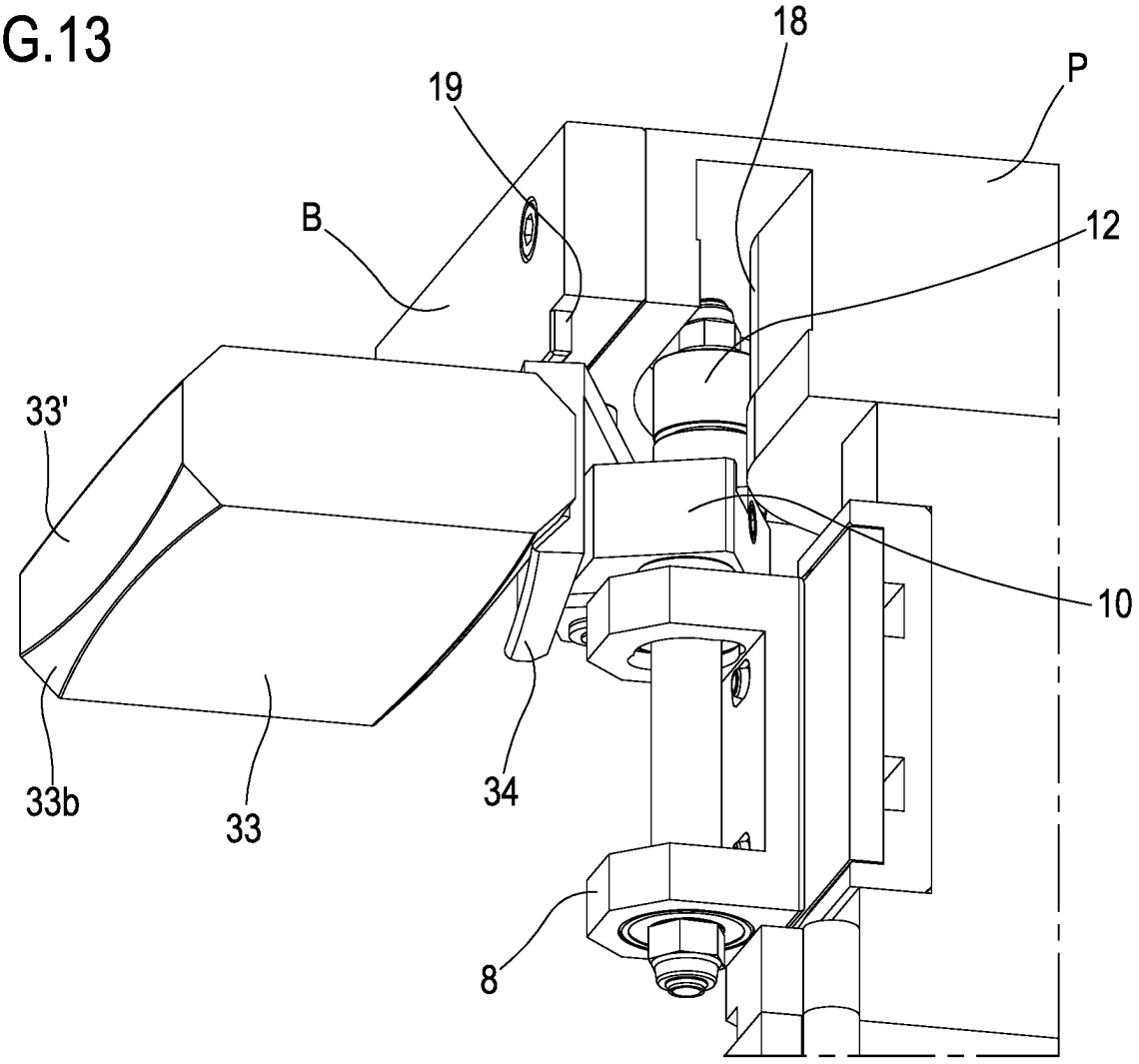


FIG.12

FIG.13



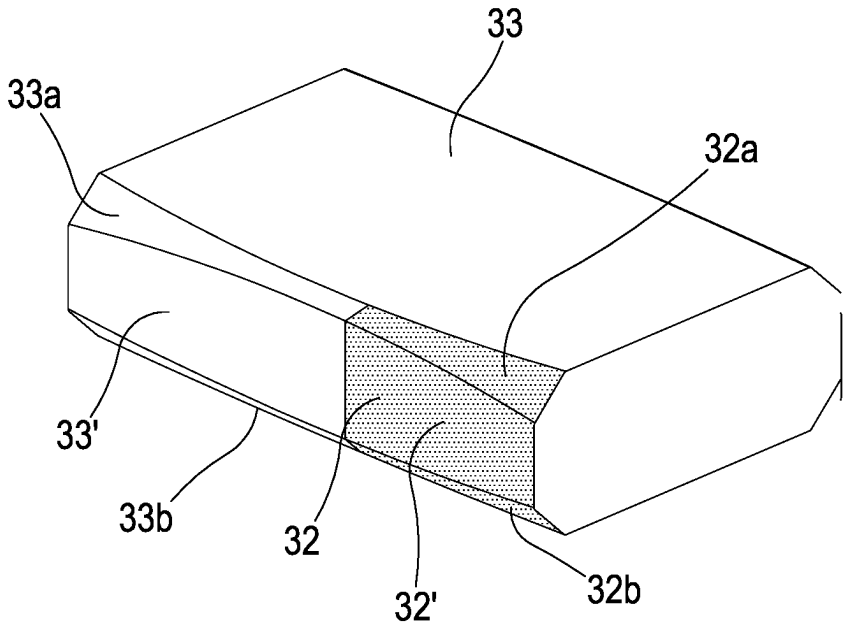


FIG.19

FIG.14

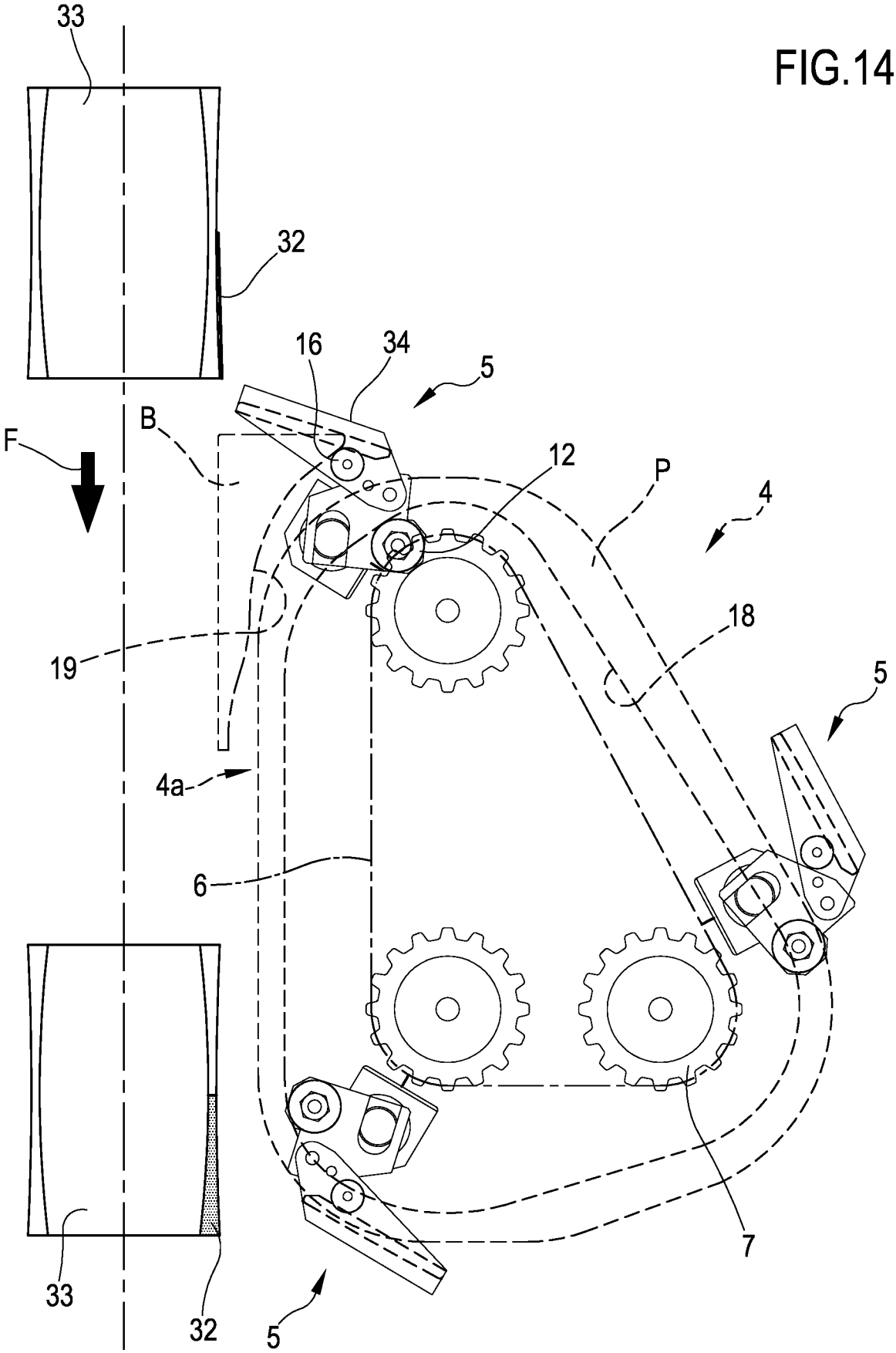
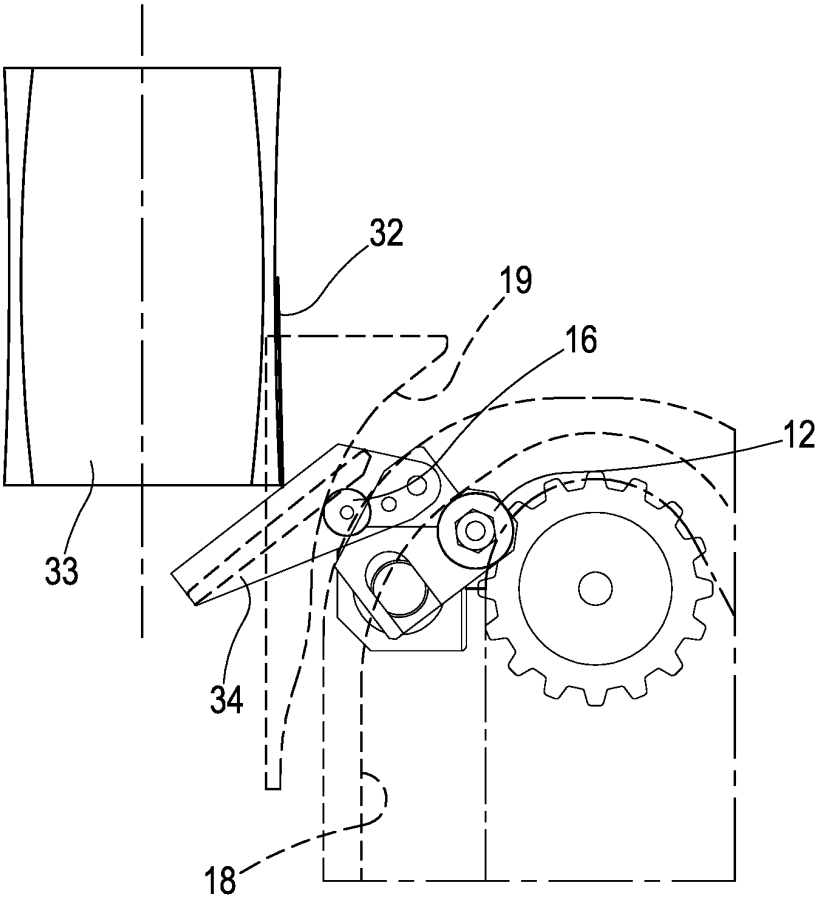


FIG.15



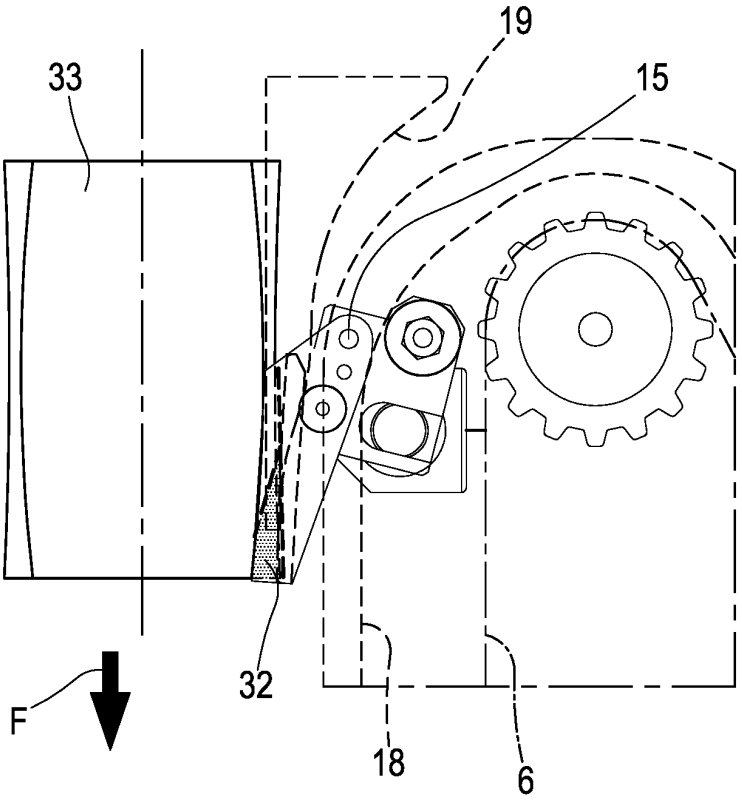


FIG.16

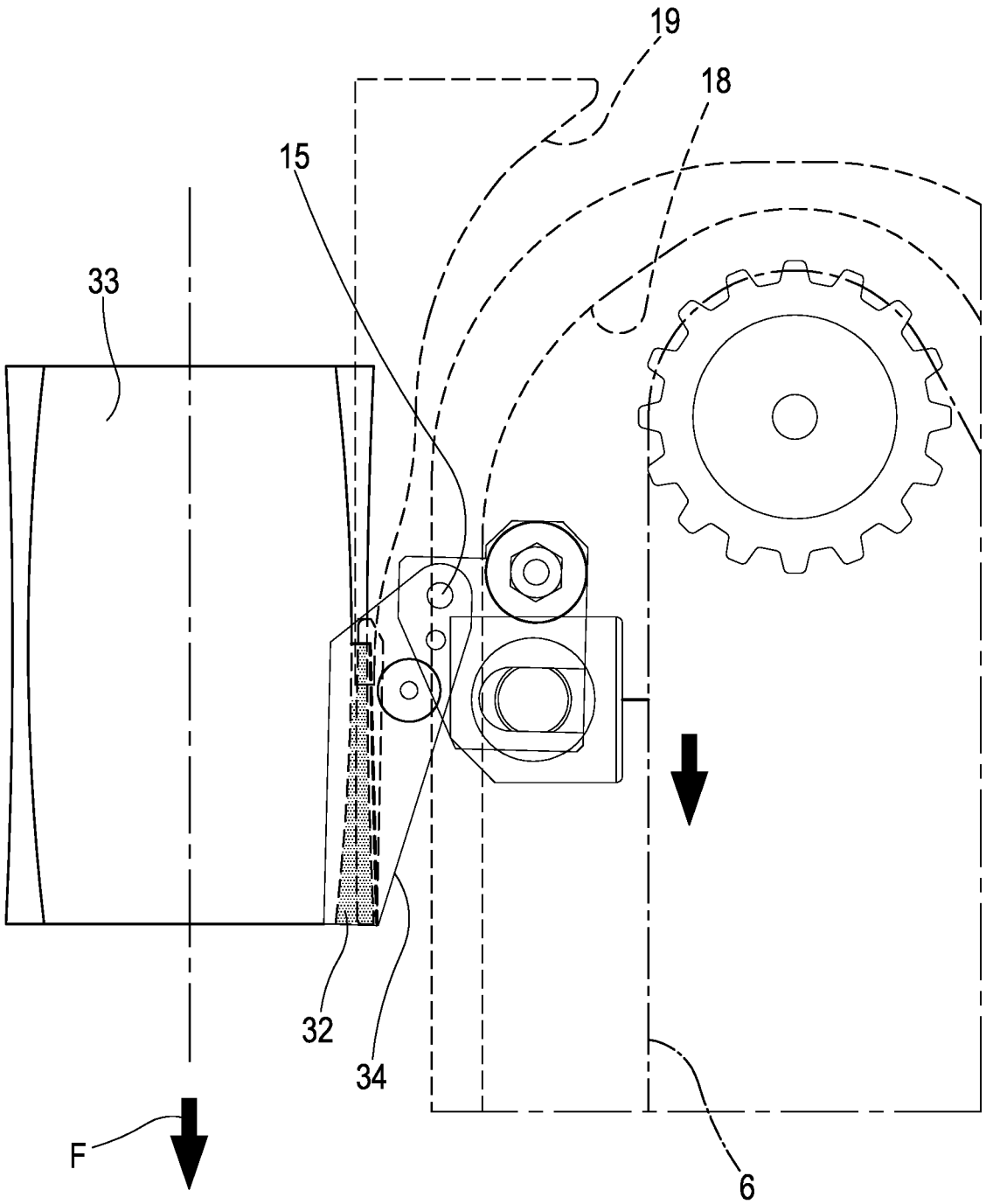


FIG.17

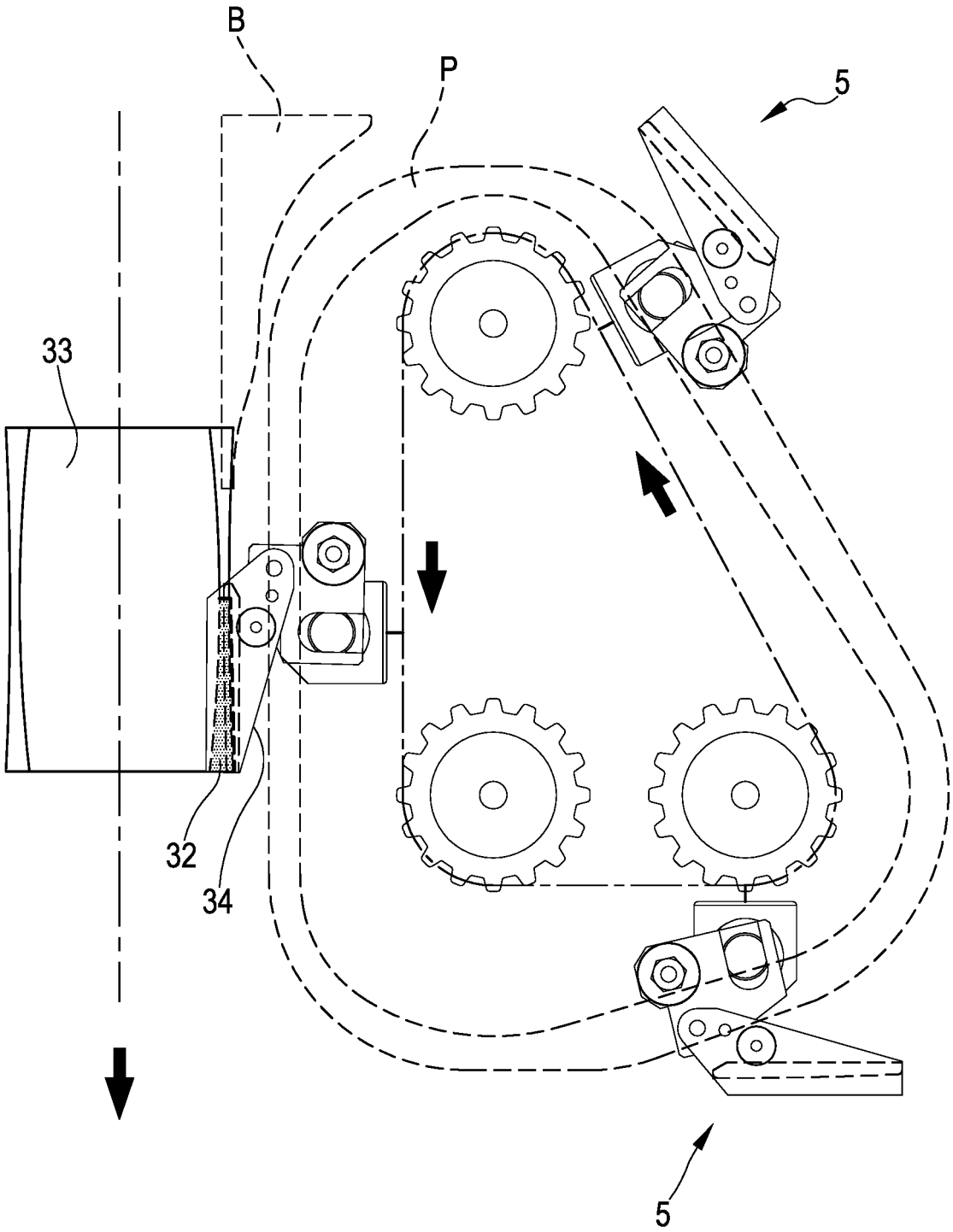


FIG.18

REFERENCES CITED IN THE DESCRIPTION

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