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(54) PAPER SHEET BINDING APPARATUS

(57) According to one embodiment, a paper sheet binding apparatus includes a pressing member(1) that presses object to be bound (T') with a plurality of paper sheets stacked in a stacking direction of the paper sheets to move the object to be bound in the stacking direction, a feed unit(20) that feeds a binding belt(f) in a direction orthogonal to the stacking direction ahead of a moving direction of the object to be bound, a press member(3,4) that folds the binding belt along a back end in the moving direction of the object to be bound which is pressed by the pressing member and around which the binding belt is wound while pressing the back end of the object to be bound, and a welding and cutting unit(7) that welds the folded binding belts with each other and cuts the same.

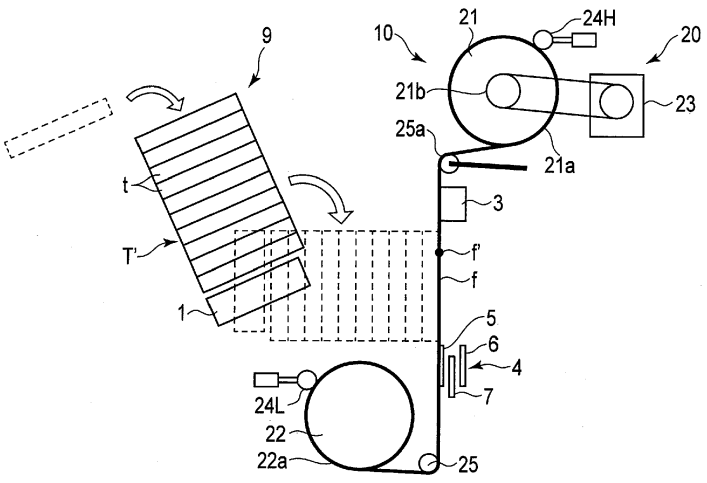

FIG. 2

EP 3 296 218 A1

Description

FIELD

[0001] Embodiments described herein relate generally to a paper sheet binding apparatus that stacks and binds a plurality of paper sheets.

BACKGROUND

[0002] Conventionally, as a paper sheet binding apparatus that stacks and binds a plurality of paper sheets, for example, an apparatus that stacks and binds a plurality of paper bills by a belt-shape film is known. This apparatus is configured to, for example, move a plurality of bills, which are stacked in a vertical direction, to a horizontal direction while being compressed in the vertical direction, press the bills between conveyor belts while winding around the bills a film fed ahead of the moving direction, and weld the film together behind the bills to bind them.

[0003] However, in the aforementioned conventional apparatus, the stacking direction and the pressing direction of the bills are different, and thus there is a possibility that a form of the bills may collapse when the stacked bills are pressed between the conveyor belts, and the bills cannot be bound neatly.

[0004] Therefore, there is a demand for a paper sheet binding apparatus which is capable of binding a plurality of stacked paper sheets neatly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005]

FIG. 1 is a block diagram of a bill processing apparatus according to an embodiment.

FIG. 2 is a schematic view showing a stacking mechanism of a binding processor incorporated into the bill processing apparatus of FIG. 1.

FIG. 3 is a schematic view showing a binding mechanism of the binding processor incorporated into the bill processing apparatus of FIG. 1.

FIGS. 4-11 are diagrams for explaining an operation of the binding mechanism of FIG. 3.

FIG. 12 is a diagram for explaining operations of a pressing member and an upper gripper of the binding mechanism of FIG. 3.

FIG. 13 is a perspective view showing the stacking mechanism of FIG. 2.

DETAILED DESCRIPTION

[0006] According to one embodiment, the paper sheet binding apparatus comprises: a pressing member that presses object to be bound with a plurality of paper sheets stacked in a stacking direction of the paper sheets to move the object to be bound in the stacking direction, a feed unit that feeds a binding belt in a direction orthogonal to the stacking direction ahead of a moving direction of the object to be bound, a press member that folds the binding belt along a back end in the moving direction of the object to be bound which is pressed by the pressing member and around which the binding belt is wound while pressing the back end of the object to be bound, and a welding and cutting unit that welds the folded binding belts with each other and cuts the same.

[0007] Various Embodiments will be described hereinafter with reference to the accompanying drawings.

[0008] FIG. 1 is a block diagram of a bill processing apparatus 100 according to an embodiment.

[0009] The bill processing apparatus 100 includes a chassis 100a, and includes a conveyance path 101 extending substantially horizontally across an upper portion of the chassis 100a. This conveyance path 101 separates bills (paper sheets) (not shown), which were received from a feed device 110 provided (on the right side in the figure) separately from the bill processing apparatus 100, one by one, and conveys the bills. The feed device 110 sends a plurality of bills in a stacked state to the conveyance path 101 one by one.

[0010] The bill processing apparatus 100 includes two detection devices 102 and 102 along the conveyance path 101. In the present embodiment, two detection devices 102 facing with each other are provided on both sides (an upper side and a lower side in the figure) of the conveyance path 101. The number of the detection devices 102 may be set appropriately. Each of the detection devices 102 is located at a center of the conveyance path 101. The two detection devices 102 detect characteristics of both sides of the bills conveyed through the conveyance path 101.

[0011] The detection device 102 may be, for example, a device using an ultraviolet light for detecting stains of bills, or a device using fluorescence and/or phosphorescence. In any case, the detection device 102 detects real or fake bills, stains or damage, denomination, and other bill characteristics.

[0012] The bills that have passed through the detection devices 102 are respectively allocated to predetermined processors 103 to 106 through the conveyance path 101 based on the detected characteristics. Provided on the conveyance path 101 is a gate (not shown) and a conveyance guide (not shown) for conveying the bills to desired destinations.

[0013] A processor 104 provided furthest upstream of the conveyance path 101 is a reject stacking unit 104 that stacks bills suspected of having been counterfeited, bills determined to need reexamination, or bills output by two in a stacked manner and that could not be separated, and skewed bills output in an offset manner that exceeds a detectable limit.

[0014] A processor 105 on the downstream side of the reject stacking unit 104 is a shredder 105 that counts and shreds bills that are authentic bills but have a high degree of stains and damage, and were thus determined as not

being reusable.

[0015] In addition, two processors 106 and 106 provided on the downstream side of the shredder 105 are binding processors 106 and 106 that stack bills of a particular denomination by a predetermined number and bind the bills. The number of the binding processors 106 may be set appropriately, and the processor may be provided for every denomination, and multiple processors may be provided for one denomination.

[0016] Furthermore, a processor 103 provided at an end of the conveyance path 101 is an end stacking unit 103 that stacks bills that were not assigned to any of the processors 104, 105, and 106, and is, for example, a stacking unit that counts and stacks not-bound normal bills.

[0017] The bill processing apparatus 100 includes a control device 108 that controls an operation of each unit of the bill processing apparatus 100. The control device 108, for example, controls a detecting operation in the detection device 102, controls various operations in each of the processors 103 to 106, such as stacking, shredding, and binding, and designates destinations of the bills to be conveyed through the conveyance path 101. The control device 108 may be a single processing device, or may include multiple processors.

[0018] Moreover, the bill processing apparatus 100 includes a storage medium (for example, memory or storage device) that stores a computer code used for controlling the control device 108, and the like. The control device 108 reads out programs from such an accessible memory to execute various steps. The control device 108 includes a dedicated generic computer, a computer processor such as RISC or CISC, a digital signal processor (DSP), and the like.

[0019] The aforementioned binding processors 106 respectively include device configurations for bundling a plurality of bills into an easy-to-handle size. For example, in the present embodiment, each binding processor 106 includes a sealing mechanism (not shown) that seals a predetermined number of bills (100 bills in the present embodiment) by a small belt. In addition, each binding processor 106 includes a binding mechanism 10 (see, for example, FIG. 3) that stacks and binds a plurality (10 bundles in the present embodiment) of bundles of bills that were sealed by the sealing mechanism.

[0020] The binding mechanism 10 is an example of the paper sheet binding apparatus of the present invention. The sealing mechanism not shown here is not an essential configuration to the present invention, and loose bills may be stacked by a predetermined number (1000 in the present embodiment) to be bound by the binding mechanism 10. Note that in the present embodiment, each binding mechanism 10 produces a bunch T of 1000 bills by stacking and bundling 10 bundles t, but the number of bills included in one bundle and the number of bundles t included in one bunch may be changed appropriately.

[0021] As shown in FIG. 2, a stacking mechanism 9 of the bundles t is disposed on the upstream side of the binding mechanism 10, and receives and stacks the bundles t ejected from the sealing mechanism (not shown) on the pressing member 1 in order. Upon completion of the stacking, the stacking mechanism 9 is rotated by a rotating mechanism (not shown) in an arrow direction to a position at which the stacked upper-end bundle t neighbors the binding film f, and the stacked bundle T' is rotationally moved. In this state (a state shown by dashed lines in FIG. 2), each bundle t included in the stacked bundle T' becomes a standing state in which its short-length direction is oriented in a vertical direction, and will be in a state in which a bottom end is supported by a supporting member (not shown).

[0022] As shown in FIG. 3, the binding mechanism 10 includes the pressing member 1 that presses 10 bundles t in a stacking direction (the right direction in the figure) to move this stacked bundle T' (the object to be bound) in the right direction in the figure. The pressing member 1 includes a flat pressing surface 1a to be in contact with a bundle t (the bundle at the left end in the figure) present at an end in the stacking direction of the stacked bundle T', and is moved to a direction (the right direction in the figure) to press the stacked bundle T' by a moving mechanism (not shown).

[0023] In addition, the binding mechanism 10 includes a feed device 20 (a feed unit) for feeding a belt-shape binding film f (a binding belt) ahead of the moving direction of the stacked bundle T'. The feed device 20 feeds the binding film f in a direction orthogonal to the stacking direction of the stacked bundle T' on the side opposite to the pressing member 1 relative to the stacked bundle T'. In the present embodiment, the binding film f is wound along the short-length direction of the stacked bundle T', and thus the feed device 20 feeds the binding film f along the vertical direction.

[0024] Specifically, the feed device 20 includes two upper and lower film rolls 21 and 22 around which the binding film f is wound. The film rolls 21 and 22 include rotation axes extending in a direction orthogonal to the stacking direction of the bundle t and orthogonal to the long-length direction of the binding film f. The two film rolls 21 and 22 are wound by the binding film f of the same material and the same width, and distal ends of the binding film f are welded with each other at a welded portion f' to be connected in one belt-shape. A motor 23 is connected to a rotation axis 21b of the upper film roll 21 via a belt, and a predetermined torque is given to the rotation axis 21b in a direction of winding the binding film f.

[0025] In addition, the feed device 20 includes a plurality of guide rollers 25 and 25a that wind and guide the binding film f. The guide rollers 25 and 25a set a running position of the binding film f so that a part of the binding film f is provided to extend in the vertical up-and-down direction orthogonal to the stacking direction of the stacked bundle T' on the side of the stacked bundle T' opposite to the pressing member 1. In addition, the guide roller 25a is a tension roller that gives a predetermined tension to the binding film f.

[0026] The two film rolls 21 and 22 have brake rollers 24H and 24L mounted thereto, respectively. The brake rollers 24H and 24L are respectively pressed against outer peripheral surfaces 21a and 22a of the film rolls 21 and 22 so as to function to apply brakes to the rotation of the film rolls 21 and 22.

[0027] For example, one brake roller 24H is selectively moved to a position where it is pressed against the outer peripheral surface 21a of the upper film roll 21, and to a position where it is separated from the outer peripheral surface 21a, by an actuator, such as a solenoid. In addition, another brake roller 24L is selectively moved to a position where it is pressed against the outer peripheral surface 22a of the lower film roll 22, and to a position where it is separated from the outer peripheral surface 22a, by an actuator, such as a solenoid.

[0028] The binding mechanism 10 also includes an upper gripper 3 and a lower gripper 4. The two grippers 3 and 4 are respectively provided to extend in a direction (a direction orthogonal to a paper surface) orthogonal to the stacking direction of the stacked bundle T' and orthogonal to the feeding direction of the binding film f, and to have a length at least exceeding the width of the binding film f.

[0029] The stacked bundle T' is pressed by the pressing member 1, and is pressed between the upper gripper 3 and the lower gripper 4 while pressing the binding film f fed by the feed device 20. Thereby, in a state of pressing the stacked bundle T' in the stacking direction, the binding film f is gradually wound around the stacked bundle T'.

[0030] The upper gripper 3 and the lower gripper 4 function so as to fold the binding film f along the back end in the moving direction of the stacked bundle T' around which the binding film f is wound. At this time, the two grippers 3 and 4 function so as to press the back end in the moving direction of the stacked bundle T'. Namely, the upper gripper 3 and the lower gripper 4 function as press members that press the back end of the stacked bundle T' so that the stacked bundle T' pressed in the stacking direction does not move in the reverse direction. The upper gripper 3 and the lower gripper 4 are capable of moving in the vertical direction, in which they separate from and contact with each other, by an actuator (not shown).

[0031] The upper gripper 3, at least its lower surface side facing the lower gripper 4, is made of rubber. The lower gripper 4 includes two pressing blades 5 and 6 pinching the binding films f with the upper gripper 3. In explanations below, the pressing blade 5 on the upstream side along the moving direction of the stacked bundle T' may be referred to as the upstream blade 5, and the pressing blade 6 on the downstream side along the moving direction may be referred to as the downstream blade 6. The two pressing blades 5 and 6 are respectively capable of being driven independently by the aforementioned actuator (for example, a cam mechanism,), and the like.

[0032] Furthermore, a heater blade 7 is provided projectably/retractably between the two pressing blades 5 and 6. The heater blade is also driven in a direction of contacting with/separating from the upper gripper 3, by an actuator (not shown), such as a cam mechanism. The heater blade 7 is connected to a heat source (not shown), and functions as a welding and cutting unit that welds (binds) and cuts the binding films f pressed by the two pressing blades 5 and 6 against the upper gripper 3.

[0033] A table 31 that supports the stacked bundle T' pressed out by the pressing member 1 includes a movable guide plate 32 that arranges the longitudinal direction of the stacked bundle T' as shown in FIG. 13. When the stacked bundle T' is pressed out by the pressing member 1, there is a possibility that the stacked bundle T' may deform into a fan form due to the compressing force being applied, and the bound form may collapse. The guide plate 32 has moved to a position that is slightly away from the stacked bundle T' along the longitudinal direction of the bills in advance, thereby preventing the stacked bundle T' from collapsing.

[0034] An operation of the aforementioned binding mechanism 10 will now be described with reference to FIGS. 3 to 12.

[0035] From the state shown in FIG. 3, as the pressing member 1 is moved in arrow F direction as shown in FIG. 4 and the stacked bundle T' is pressed between the two grippers 3 and 4 while pressing the binding film f, the binding film f is gradually wound around the stacked bundle T' from the distal end surface of the moving direction of the stacked bundle T' to the upper and lower surfaces.

[0036] At this time, brake forces to suppress rotation are given to the upper film roll 21 and the lower film roll 22 of the feed device 20 respectively by the brake rollers 24H and 24L, and the binding film f is wound around the stacked bundle T' while being pulled in the direction of arrows S1 and S2.

[0037] Thus, the stacked bundle T', the left end thereof in the figure, is pressed by the pressing member 1, and the right end thereof in the figure is pressed by the binding film f, thereby being compressed in its stacking direction. At this time, the compressing force of the stacked bundle T' can be changed by changing the brake forces given to the film rolls 21 and 22 by the brake rollers 24H and 24L.

[0038] The compressing force of the stacked bundle T' can also be added by a tension mechanism, not by the brake rollers 24H and 24L. For example, as a configuration that is capable of oscillating the tension roller 25a, it is possible to energize by a spring, detect a position of a tensioner by a sensor (not shown), and obtain a compressing force by driving the motor 23 by a signal of the sensor. In addition, it is possible to switch between a weak tension for performing a film fusion cutting to be described later and a strong tension for applying the compressing force by providing a plurality of sensors and two kinds of strong and weak energizing springs.

[0039] Then, as shown in FIG. 5, when the stacked bundle T' moves to a position where the back end of the stacked bundle T' in the moving direction passes the two

upper and lower grippers 3 and 4, the movement of the stacked bundle T' is stopped at this position, and as shown in FIG. 6, the two grippers 3 and 4 are moved slightly in a direction of approaching each other along the back end of the stacked bundle T' in the moving direction.

[0040] Thus, the binding film f wound around the upper and lower surfaces of the stacked bundle T' is slightly folded along the back end of the stacked bundle T' in the moving direction. In addition, by this, the back end of the stacked bundle T' in the moving direction is pressed near its corners by the two grippers 3 and 4. In this state, the stacked bundle T' is compressed in the stacking direction as described above, and thus the binding film f fastens the stacked bundle T'.

[0041] In FIG. 5, the pressing member 1, being present between the upper gripper 3 and the lower gripper 4 in this state, needs to retreat to avoid interfering with the grippers 3 and 4, but the stacked bundle T' is being pulled in a direction of being pressed back by the film. Thus, a means for pressing the stacked bundle T' is necessary before retracting the pressing member 1.

[0042] As shown in FIG. 12, the pressing member 1 comprises a sliding portion 3a (a movable pressing member) and a fixed portion 1a (a fixed pressing member). The sliding portion 3a slides in a vertical direction. When the upper gripper 3 operates to descend, the upper gripper 3 is inserted into the side surface of the stacked bundle T' while pressing down the portion 1a. Accordingly, there is no concern that the stacked bundle T' may collapse due to the winding of the binding film f.

[0043] The lower surface of the stacked bundle T' comes into a state of FIG. 6 as the lower gripper 4 rises. When the pressing member 1 retreats in this state, since the upper and lower edges of the stacked bundle T' are caught by the upper gripper 3 and the lower gripper 4, the pressing member 1 can retreat without the stacked bundle T' moving back.

[0044] The sliding portion 3a returns to an original state by a spring upon becoming a state of not being pressed by the upper gripper 3. It is possible to have an appropriate catching amount by making the descending amount of the upper gripper 3 variable, depending on the height of the stacked bundle T' in accordance with the kind of bills. After the pressing member 1 has completely retreated, the upper gripper 3 further descends while pressing the back end of the stacked bundle T' until abutting the lower gripper 4, and pinches the binding film f in a stacked state.

[0045] In a state where the two upper and lower binding films f are pinched in a stacked state by the upper gripper 3 and the lower gripper 4 as shown in FIG. 7, the heater blade 7 is raised from between the two pressing blades 5 and 6 to be pressed against the upper gripper 3, as shown in FIG. 8. At this time, the two binding films f are pinched between the upstream blade 5 and the upper gripper 3, and between the downstream blade 6 and the upper gripper 3, and thus the two binding films f are welded between the upstream blade 5 and the downstream blade 6 in a state where both sides of the welding position are securely held.

[0046] After that, as shown in FIG. 9, the brake roller 24H is separated from the outer peripheral surface 21a of the upper film roll 21, and the brake roller 24L is separated from the outer peripheral surface 22a of the lower film roll 22, and the tension of the binding film f is loosened once. Then, the upper film roll 21 is wound slightly by a weak force to give a weak tension to the binding film f.

[0047] From this state, as shown in FIG. 10, when the upstream blade 5 is caused to descend to be separated from the upper gripper 3, the binding films f on the film rolls 21 and 22 sides are pulled by a weak force, and are cut and separated at the welded position. In this state, the binding films f on the stacked bundle T' side are pinched and bound by the downstream blade 6 and the upper gripper 3.

[0048] Thereafter, the heater blade 7 is caused to descend to be separated from the upper gripper 3, and the welded portion is cooled so as to be securely bound. After both ends of the binding film f are bound as such, the downstream blade 6 is caused to descend to be separated from the upper gripper 3. Thereby, a bunch T is formed.

[0049] Finally, as shown in FIG. 11, the upper gripper 3 is caused to rise in an arrow direction in the figure to wait for a stacked bundle T' to bind next. In the present embodiment, from the state shown in FIG. 6, the upper gripper 3 is caused to descend so as to be pressed against the lower gripper 4, and the welded position of the binding film f is thus close to the lower gripper 4. Thus, in order to make the film consumption amount of the upper film roll 21 and the lower film roll 22 the same, the upper film roll 21 is slightly rolled to move the welded portion f' of the binding film f to the upper film roll 21 side.

[0050] As above, according to the present embodiment, the stacked bundle T' is pressed in the stacking direction by the pressing member 1, the stacked bundle T' is pressed against the binding film f, and the binding film f is folded on the back end side of the stacked bundle T' to support the back end. Accordingly, the binding film f can be wound around the stacked bundle T' firmly, and a plurality of stacked bills can be bound neatly.

[0051] In addition, according to the present embodiment, the members (corresponding to the pressing member 1 and the upper and lower grippers 3 and 4 of the present embodiment) that compress the stacked bundle T' for binding are arranged outside the binding film f, and thus would never be obstructive to the binding of the binding film f. For this reason, according to the present embodiment, the binding film f having substantially the same width as that of the stacked bundle T' can be wound around the stacked bundle T', and the bound state of the bunch T can be stabilized significantly.

[0052] According to the present embodiment, the pressing member 1 and the upper gripper 3 can be arranged in a nested manner, and thus the end portion of

the stacked bundle T' in a state of being pressed by the pressing surface 1a of the pressing member 1 can be pressed by the plate-like protrusion 3a of the upper gripper 3, thereby preventing the stacked bundle T' from disturbing its stacked orientation when winding the binding film f.

[0053] According to the present embodiment, in a state where the back end corner portion of the stacked bundle T' in the moving direction is pressed by the lower gripper 4, when the upper gripper 3 is moved toward the lower gripper 4, the upper gripper 3 can be slid while the end portions of a plurality of plate-like protrusions 3a are pressed against the stacked bundle T', and the binding film f can be wound while being pressed on the back end surface of the stacked bundle T'. At this time, since a plurality of plate-like protrusions 3a include end portions provided to extend in the moving direction of the upper gripper 3, a contact area with the stacked bundle T' can be reduced and the movement of the upper gripper 3 can be made smooth.

[0054] According to the present embodiment, since a movable range of the upper gripper 3 is made larger than the lower gripper 4, and the moving distance of the upstream blade 5, the downstream blade 6, and the heater blade 7 of the lower gripper 4 is made short, these three blades 5, 6, and 7 can be moved independently by using the cam mechanism. Thus, the actuator that moves each of the blades 5, 6, and 7 of the lower gripper 4 can be simplified, and minute motion can be realized.

[0055] According to the present embodiment, in a state where the binding film f is pinched and bound between the upstream blade 5 and the downstream blade 6 of the lower gripper 4 and the upper gripper 3, the binding film f is welded by the heater blade 7 arranged between these two blades 5 and 6, and thus the binding film f can be securely welded at the welded portion f'.

[0056] According to the present embodiment, after welding the binding film f at the welded portion f', in a state where a weak tension is given to the binding film f, the upstream blade 5 on the film rolls 21 and 22 side is separated from the upper gripper 3, so that the binding film f is cut at the welded portion f', and thus the binding film f can be cut cleanly.

[0057] Furthermore, according to the present embodiment, after cutting the binding film f at the welded portion f', in a state where the binding film f on the bunch T side is pinched and bound between the downstream blade 6 and the upper gripper 3, the heater blade 7 is separated from the upper gripper 3, and thus the welded portion f' can be sufficiently cooled and securely bound.

[0058] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the methods described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

[0059] For example, in the aforementioned embodiment, the case where the present invention is applied to an apparatus that binds a plurality of bills is explained; however, not being limited thereto, the present invention can be applied to an apparatus that binds paper sheets, such as various tickets and cards.

Claims

1. A paper sheet binding apparatus, comprising:

a pressing member that presses an object to be bound with a plurality of stacked paper sheets in a stacking direction of the paper sheets to move the object to be bound in the stacking direction;
a feed unit that feeds a binding belt in a direction orthogonal to the stacking direction ahead of a moving direction of the object to be bound;
a press member that folds the binding belt along a back end of the moving direction of the object to be bound which is pressed by the pressing member and around which the binding belt is wound, and presses the back end of the object to be bound; and
a welding and cutting unit that welds the folded binding belts with each other and cuts the binding belts.

2. The paper sheet binding apparatus of claim 1, wherein
the pressing member comprises a fixed pressing member and a movable pressing member movable with respect to the fixed pressing member, and the movable pressing member is arranged so as to be pressed down by the pressing member in a state of pressing the back end.

3. The paper sheet binding apparatus of claim 1, wherein
the welding and cutting unit is provided in the press member.

4. The paper sheet binding apparatus of claim 3, wherein
the welding and cutting unit comprises two pressing members separately arranged along the binding belt and a welding member that welds the binding belts with each other between the two pressing members.

5. The paper sheet binding apparatus of claim 1, wherein
a supporting member that supports the object to be bound is provided with a movable guide, and is ar-

ranged so as to be capable of holding a side surface of the object to be bound.

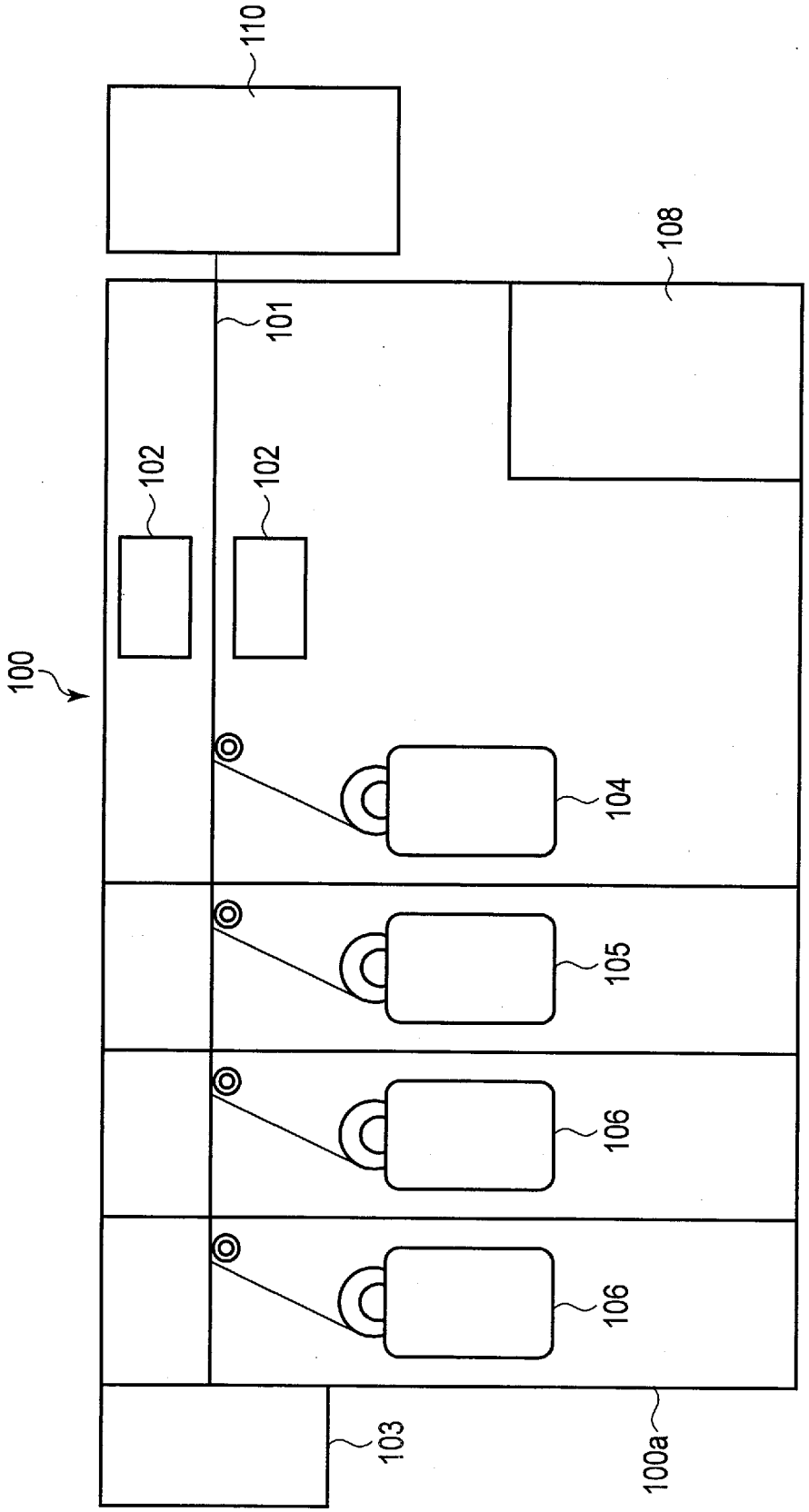

FIG. 1

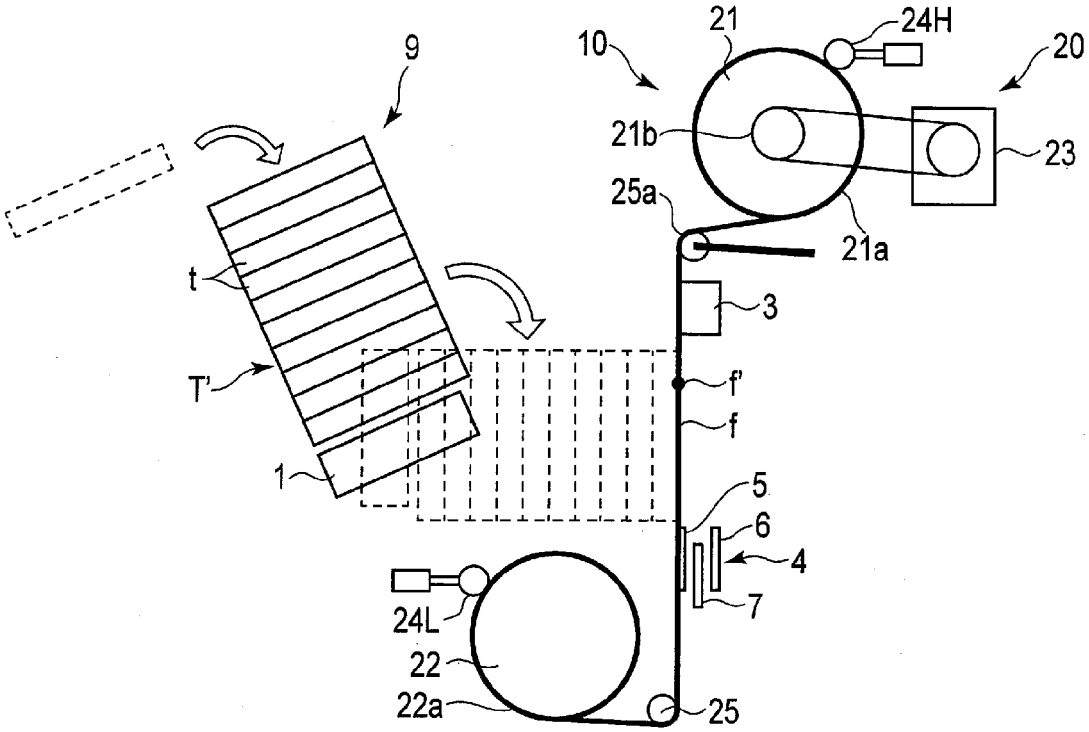
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FIG. 2

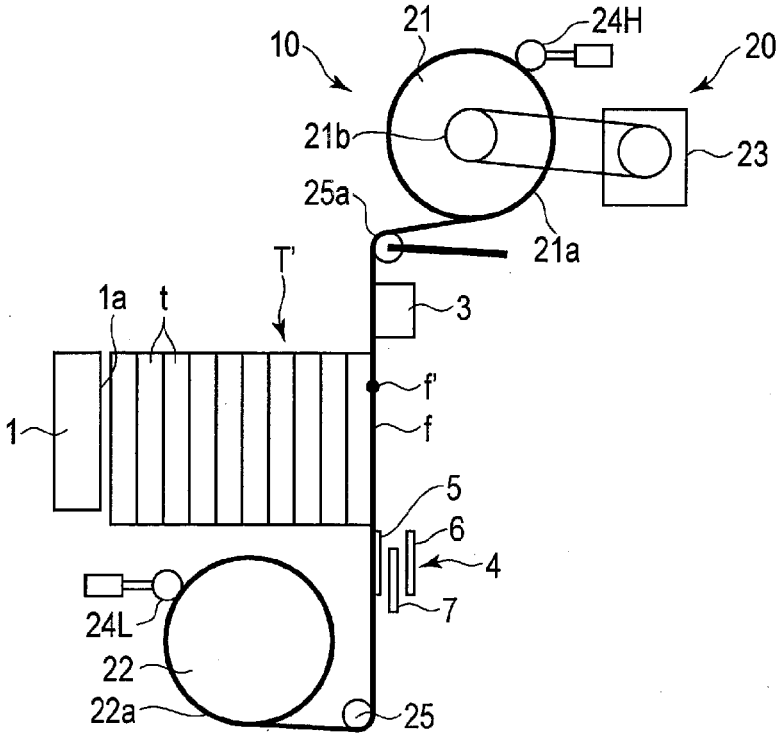
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FIG. 3

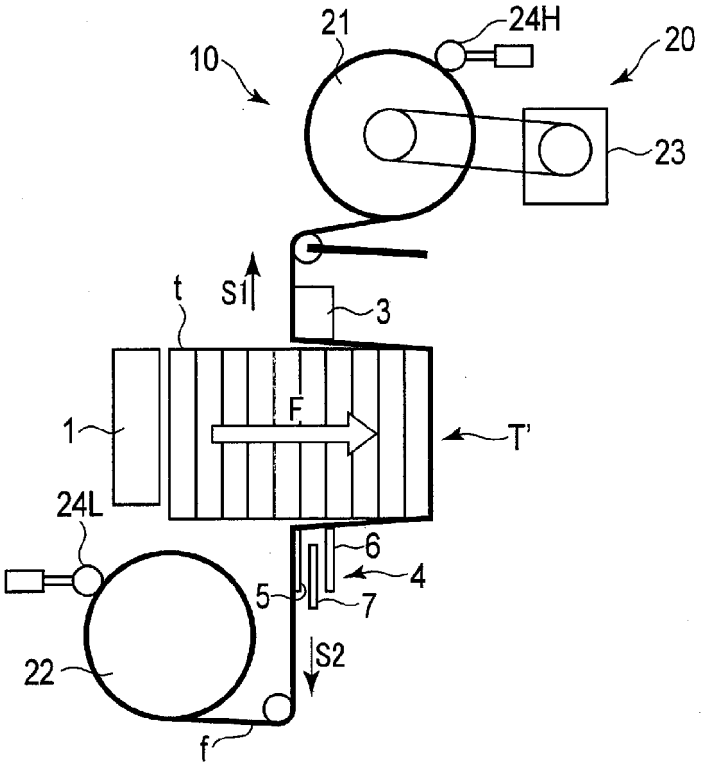
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FIG. 4

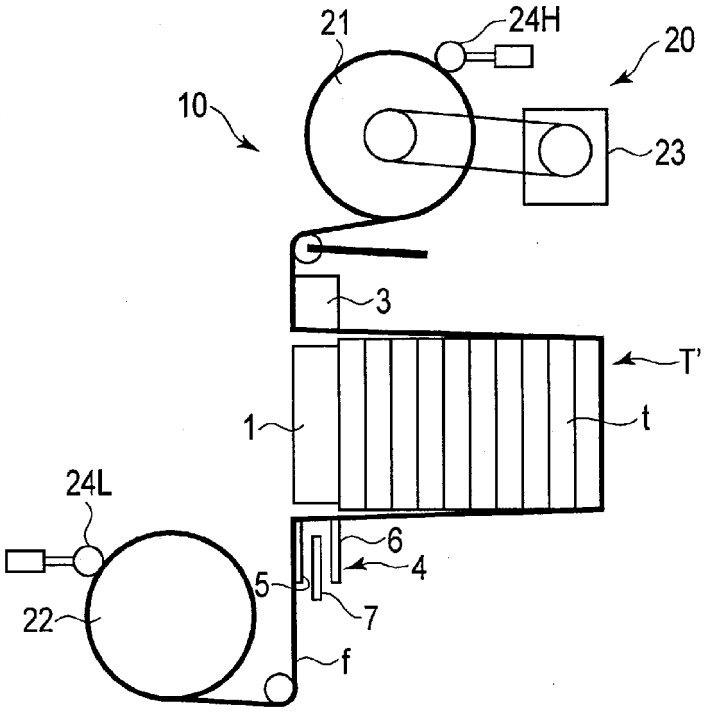
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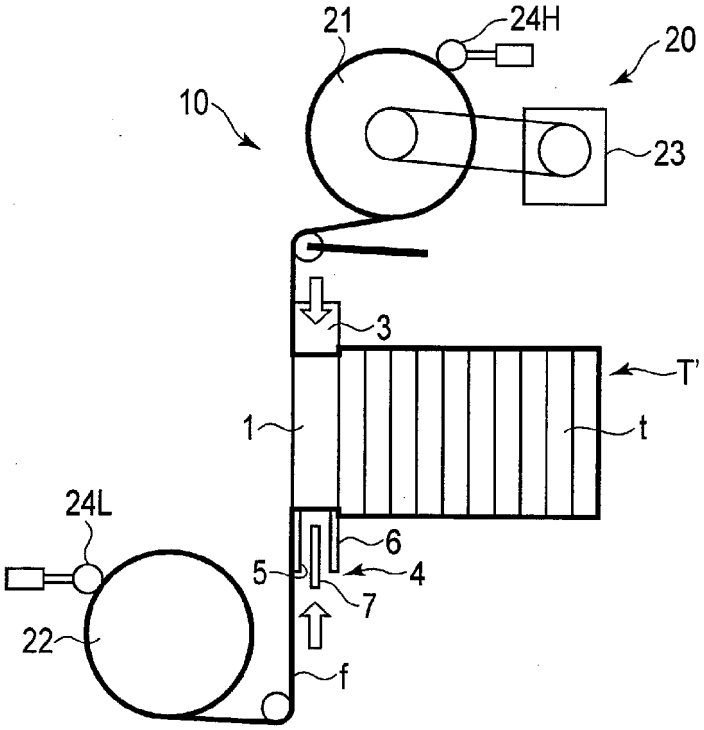
FIG. 5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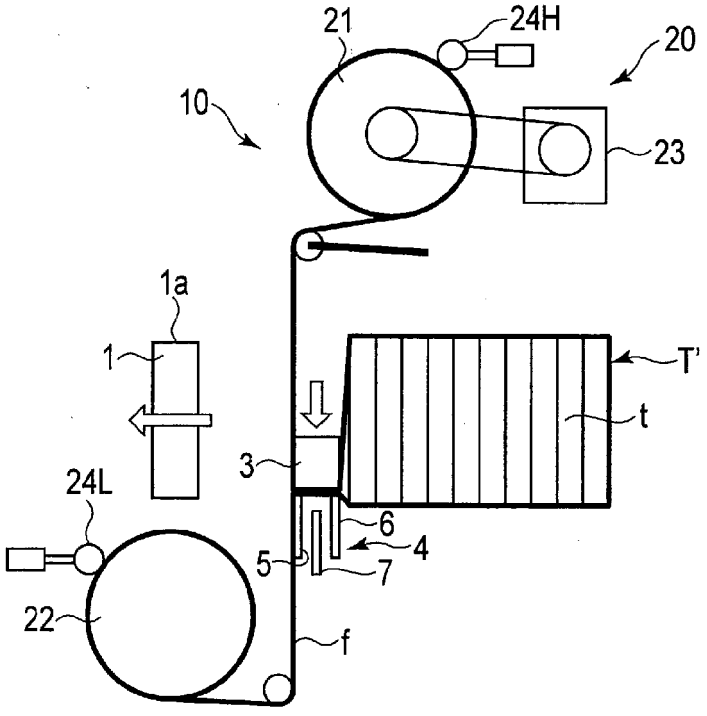
10
23
3
T'
1
t
24L
6
5
4
7
22
f

FIG. 6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20
10
23
1a
1
T'
t
3
24L
6
5
4
7
22
f

FIG. 7

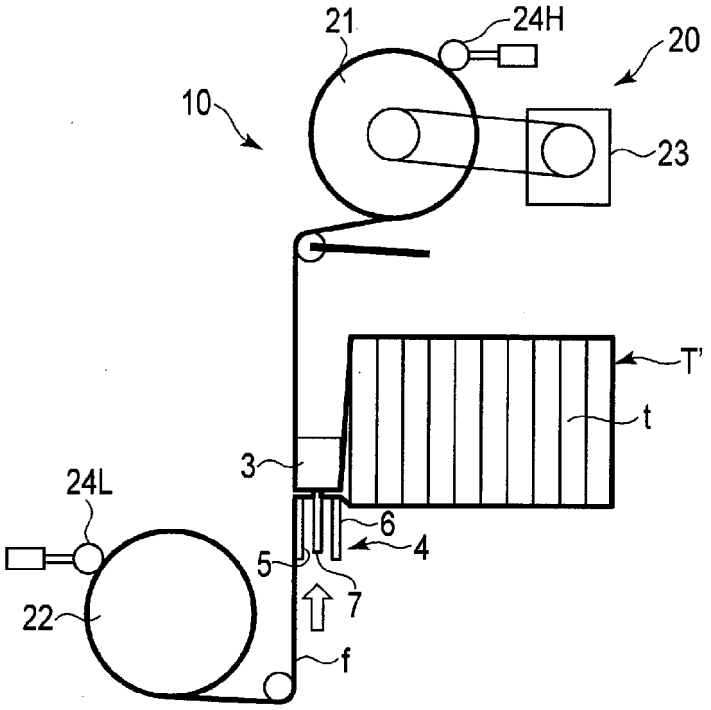


FIG. 8

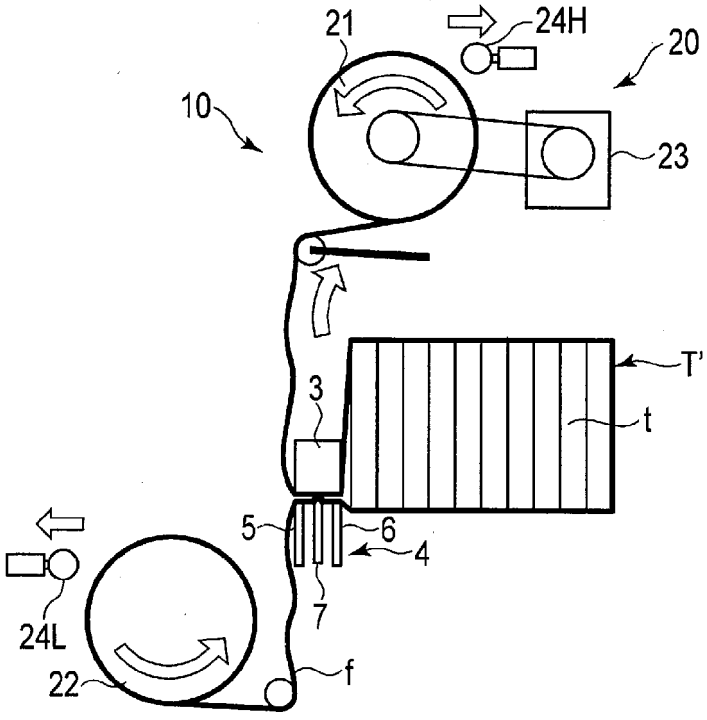
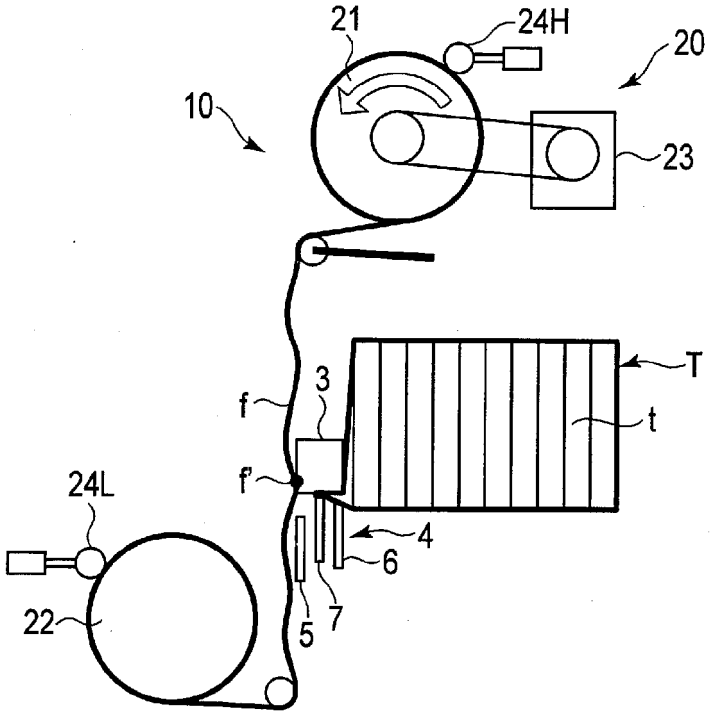


FIG. 9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24H
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10
23
T
3
f
t
f'
24L
4
6
22
5
7

FIG. 10

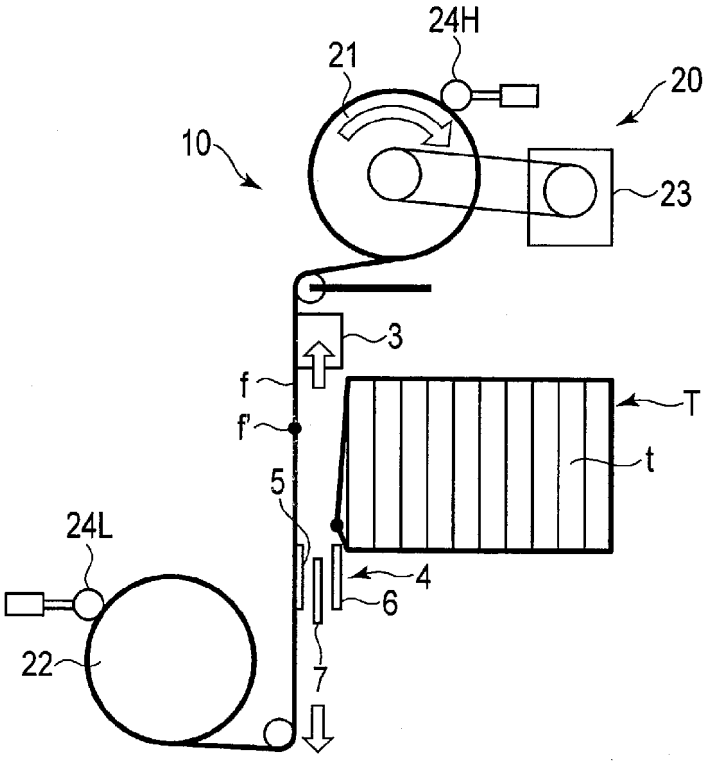
24H
21
20
10
23
3
f
T
f'
t
5
24L
4
6
22
7

FIG. 11

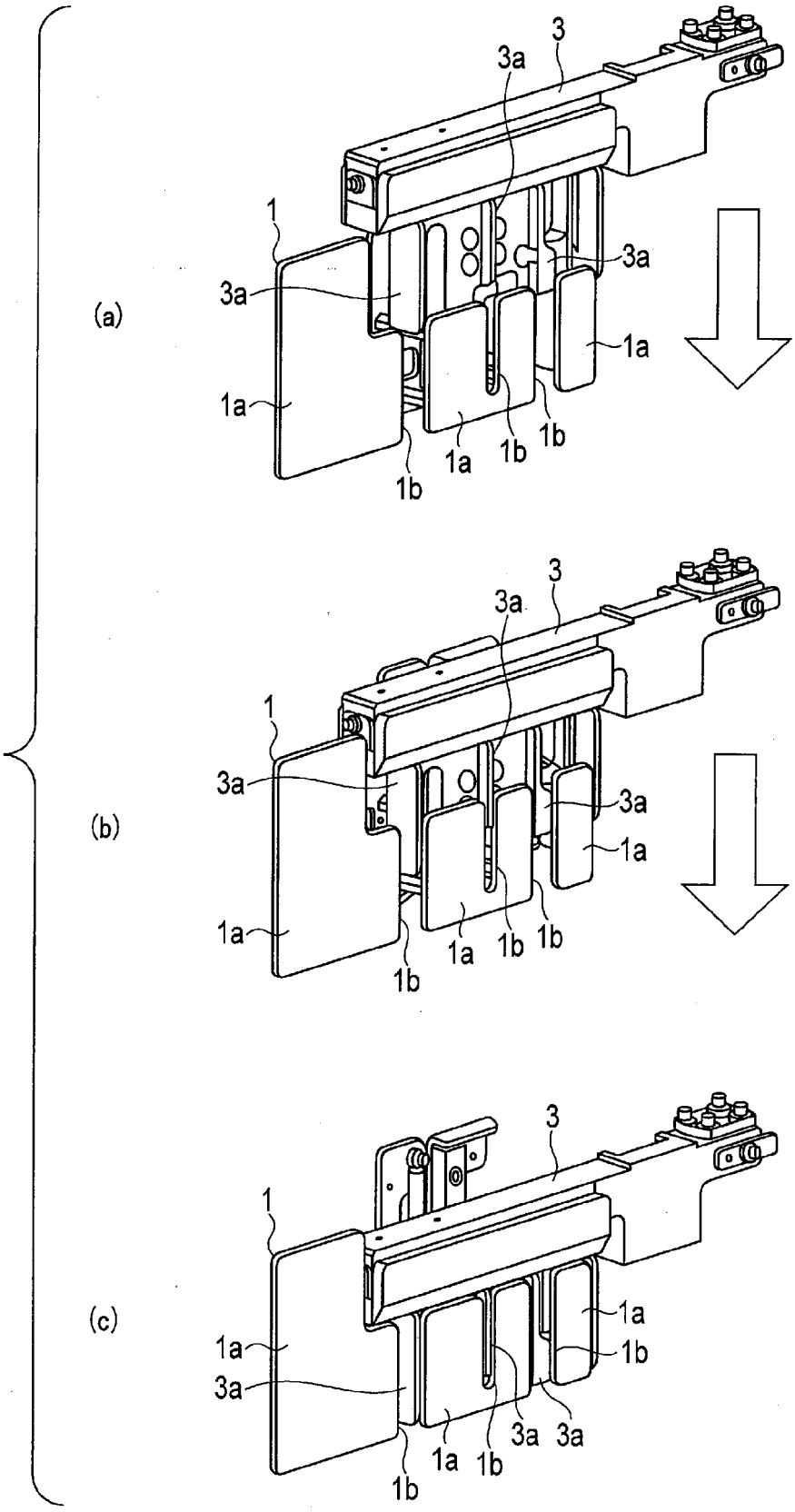
(a)
3
3a
1
3a
3a
1a
1a
1b
1a
1b
1b
(b)
3
3a
1
3a
3a
1a
1a
1b
1a
1b
1b
(c)
3
1
1a
1a
1b
3a
3a
3a
1a
1b
1b

FIG. 12

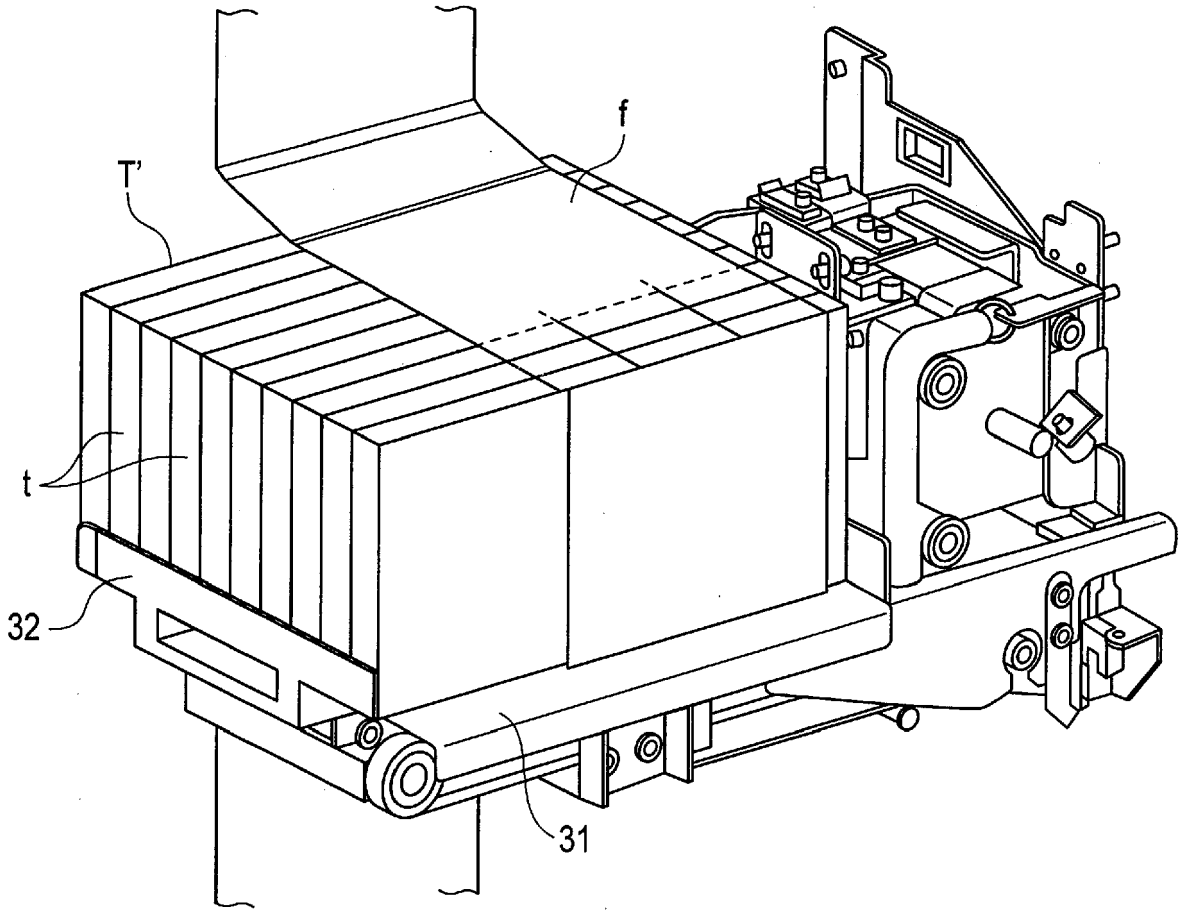

FIG. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 8540

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 720 040 A (ROCKER H) 13 March 1973 (1973-03-13) * figure 1 * * column 1, lines 6-7 * * column 8, lines 33-48 *	1-3,5 4	INV. B65B27/08 B65B25/14 B65B13/22 B65B13/32 B65B11/10
X	CN 104 309 843 B (HEBEI HUIJIN ELECTROMECHANICAL) 30 March 2016 (2016-03-30) * figure 1 *	1-3,5 4	B65B27/12 G07D11/00 B65B51/14 B29C65/00 B65B61/10
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B65B
G07D
B29C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 January 2018	Schmitt, Michel

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