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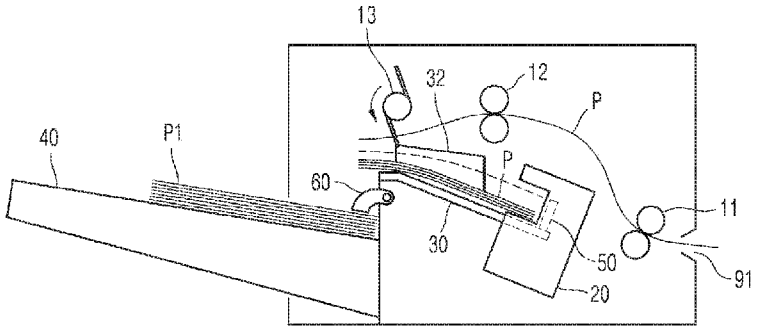
(54) Title: PAPER PRESSING STRUCTURE OPERATED IN CONJUNCTION WITH PAPER DISCHARGING OPERATION OF EJECTOR

FIG. 1



(57) Abstract: A post-processing apparatus can include a paper alignment tray on which a plurality of sheets of paper to be post-processed is aligned, a tray on which the plurality of sheets of paper discharged from the paper alignment tray is loaded, and an ejector to push the plurality of sheets of paper on the paper alignment tray to be discharged to the tray. The post-processing apparatus can include a pressing member movable, in conjunction with a discharging operation of the ejector, to a pressing position to press down the sheets of paper loaded on the tray and to an escape position for the pressing member to escape from the pressing position such that the plurality of sheets of paper discharged are loaded on the tray.

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PAPER PRESSING STRUCTURE OPERATED IN CONJUNCTION WITH PAPER DISCHARGING OPERATION OF EJECTOR

BACKGROUND

[0001] Post-processing apparatuses perform a post processing operation on a sheet-type medium, for example, a sheet of paper. Post-processing apparatuses may be stand-alone apparatuses. A post-processing apparatus may be connected to a printing apparatus to configure an image forming apparatus, and may perform, on sheets of paper on which printing has been completed, a post processing process as a subsequent process of the printing performed by the printing apparatus.

[0002] The post processing process may include at least one of a binding process in which a plurality of aligned sheets of paper is bound, a folding process in which a sheet of paper is folded at least once, and a punching process in which a sheet of paper is punched.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] FIG. 1 is a schematic diagram of an example of a post-processing apparatus.

[0004] FIG. 2 is a perspective view showing an example of a paper pressing structure operating in conjunction with a paper discharging operation of an ejector in the example of the post-processing apparatus shown in FIG. 1.

[0005] FIG. 3 is a perspective view showing an example state in which the ejector is located at an alignment position.

[0006] FIG. 4 is a perspective view showing an example state in which the ejector is located at a discharge position.

[0007] FIG. 5 is a view showing an example moving path along which the ejector moves as a belt is driven.

[0008] FIGS. 6 to 10 are views schematically showing an example state in which a pressing member is rotated to an escape position and a pressing position in conjunction with the discharging operation of the ejector in the example of the post-processing apparatus shown in FIGS. 2 to 5.

[0009] FIGS. 11 and 12 are perspective views showing an example of the paper

pressing structure operating in conjunction with the paper discharging operation of the ejector, wherein FIG. 11 shows an example state in which the ejector is located at the alignment position and the pressing member is located at the pressing position, and FIG. 12 shows an example state in which the ejector enters a connection section and the pressing member is located at the escape position.

[0010] FIG. 13 is a perspective view showing an example of the paper pressing structure operating in conjunction with the paper discharging operation of the ejector.

[0011] FIG. 14 is a schematic side view of the example of the paper pressing structure in FIG. 13.

[0012] FIG. 15 is a schematic diagram of an example of an image forming apparatus.

DETAILED DESCRIPTION OF EXAMPLES

[0013] Sheets of paper on which a post processing operation has been completed by a post-processing apparatus can be discharged to and loaded on a tray. To prevent the sheets of paper on the tray from fluttering away, the post-processing apparatus can include a pressing member. The pressing member may be located at a pressing position to press down the sheets of paper loaded on the tray. To allow stable loading onto the tray of the sheets of paper discharged after the post processing operation has been completed, the pressing member may be switched to an escape position where the pressing member does not interfere with the sheets of paper discharged. In such examples, a driving source may be used to allow the pressing member to be switched between the pressing position and the escape position.

[0014] In some examples, the pressing member can be switched from the pressing position to the escape position in conjunction with a discharging operation of an ejector to discharge the sheets of paper on which the post processing operation has been completed. When the discharging operation of the ejector is completed, in some examples, the pressing member can be returned to the pressing position to press down the sheets of paper loaded on the tray. In such examples, a separate driving source such as a motor to drive the pressing member may not be used, and thus the structure of a post-processing apparatus can be simplified and the costs for manufacturing the post-processing apparatus can be reduced. In some examples, since a motor to drive the pressing member may not be controlled, and the pressing

member may be driven in conjunction with the discharging operation of the ejector, mismatches between operations of the pressing member and the ejector due to a control error may be reduced. Hereinafter, examples of a post-processing apparatus will be described.

[0015] FIG. 1 is a schematic side view of an example of a post-processing apparatus. FIG. 2 is a perspective view showing an example of a paper pressing structure operating in conjunction with a paper discharging operation of an ejector 50 in the example of the post-processing apparatus shown in FIG. 1. FIG. 3 is a perspective view showing an example state in which the ejector 50 is located at an alignment position. FIG. 4 is a perspective view showing an example state in which the ejector 50 is located at a discharge position. In some examples, the post-processing apparatus of the present example drives staples into sheets of paper P.

[0016] Referring to FIGS. 1 to 4, the post-processing apparatus can include: a paper alignment tray 30 on which a plurality of sheets of paper P to be post-processed is aligned; a tray 40 on which the plurality of sheets of paper P discharged from the paper alignment tray 30 is loaded; an ejector 50 to push the plurality of sheets of paper P on the paper alignment tray 30 to be discharged to the tray 40; and a pressing member 60 movable, in conjunction with a discharging operation of the ejector 50, to a pressing position to press down the sheets of paper P loaded on the tray 40 and also in conjunction with an escape position for the pressing member to escape from the pressing position such that the plurality of sheets of paper P discharged is loaded on the tray 40.

[0017] In some examples, a plurality of sheets of paper P is loaded on the paper alignment tray 30. Both ends in the width direction W of the plurality of sheets of paper P can be aligned by a pair of side guides 32. Ends in the longitudinal direction L of the plurality of sheets of paper P can be aligned by an end guide 33.

[0018] In some examples, the post-processing apparatus is provided with a transport structure to transport sheets of paper P. In some examples, the transport structure may include transporting rollers 11 and 12 and an alignment member 13. Each of the transporting rollers 11 and 12 can include a pair of rollers engaged with each other to be rotated, and can transport a sheet of paper P introduced through an inlet 91. The alignment member 13 may be located above the paper alignment tray 30. The alignment member 13 may include, for example, a paddle having an elastic arm. In

some examples, the sheet of paper P transported by the transporting rollers 11 and 12 can be dropped onto the paper alignment tray 30. The alignment member 13 can push the sheet of paper P on the paper alignment tray 30 toward the end guide 33 while being rotated. Both ends in the width direction W of the sheet of paper P can be aligned by the pair of side guides 32, and one end in the length direction L of the sheet of paper P can be aligned by the end guide 33. In such examples, a plurality of sheets of paper P may be aligned on the paper alignment tray 30.

[0019] In some examples, the post-processing apparatus includes a binder 20 to drive staples into corners of the plurality of sheets of paper P. The binder 20 can be aligned at one edge of the end of the paper alignment tray 30, and can drive the staples into the corners of the plurality of sheets of paper P.

[0020] The plurality of sheets of paper P on which a binding operation (e.g., a post-processing operation) has been completed can be discharged to the tray 40 by the ejector 50 in some examples. The ejector 50 may be moved to an alignment position (e.g., see FIG. 3) to align the sheets of paper P and a discharge position (e.g., see FIG. 4) to discharge the sheets of paper P. In some examples, the ejector 50 located at the alignment position can be spaced apart from the end guide 33. Accordingly, in some instances, the ends of the plurality of sheets of paper P may not be in contact with the ejector 50 located at the alignment position.

[0021] In some examples, the ejector 50 can be connected to a belt 100 and can be circulated between the alignment position and the discharge position as the belt 100 is circulated. The belt 100 can be supported by a belt frame 110. The belt 100 may be supported by a plurality of pulleys (not shown) to be circulated in some examples.

[0022] FIG. 5 is a view showing an example moving path along which the ejector 50 moves as the belt 100 is driven. Referring to FIG. 5, the belt 100 may include a discharge section 100-1 extending from the alignment position in the discharge direction, a return section 100-3 at the opposite side of the discharge section 100-1, and a connection section 100-2 to connect the discharge section 100-1 with the return section 100-3. The discharge section 100-1 may be a straight section. The discharge section 100-1 may be a section extending linearly toward the tray 40. The discharge position of the ejector 50 may be an end of the discharge section 100-1 or a position of the connection section 100-2. In some examples, the return section 100-3 may not be a straight section. The discharging operation of the ejector 50 refers to an

operation in which the ejector 50 is moved from the alignment position to the discharge section 100-1, the connection section 100-2, and the return section 100-3, and then is returned to the alignment position. In some examples, the ejector 50 pushes the ends of the plurality of sheets of paper P on the paper alignment tray 30 toward the tray 40 while being moved from the alignment position to the discharge position along the discharge section 100-1. The plurality of sheets of paper P can get out of the paper alignment tray 30 and can be loaded on the tray 40. As the belt 100 is circulated, the ejector 50 can be returned to the alignment position via the connection section 100-2 and the return section 100-3.

[0023] In some examples, if a sheet of paper P1 loaded on the tray 40 is fluttering away, the plurality of sheets of paper P discharged to the tray 40 by the ejector 50 and the sheet of paper P1 loaded on the tray 40 may interfere with each other. In such examples, the sheet of paper P1 loaded on the tray 40 may be pushed by the plurality of sheets of paper P discharged and deviate from the tray 40, or the plurality of sheets of paper P discharged may be discharged underneath the sheet of paper P1 loaded on the tray 40 rather than being sequentially stacked on the sheet of paper P1 loaded on the tray 40. In consideration of this, the post-processing apparatus, in some examples, can include the pressing member 60. The pressing member 60 can press down the sheet of paper P1 loaded on the tray 40, such that it does not flutter away.

[0024] In some examples, if the plurality of sheets of paper P is discharged in a state in which the pressing member 60 is located at the pressing position as shown in FIG. 3, the plurality of sheets of paper P may be stacked over the pressing member 60. The pressing member 60 may be switched to the escape position where the pressing member 60 does not interfere with the plurality of sheets of paper P discharged as shown in FIG. 4 such that the plurality of sheets of paper P can be loaded on the tray 40. When the plurality of sheets of paper P are completely discharged, the pressing member 60 can be returned to the pressing position and can press down the sheets of paper P loaded on the tray 40.

[0025] In some examples, the pressing member 60 may be switched between the pressing position and the escape position by an actuator such as a motor or a solenoid. In such examples, since an actuator and a control circuit to control the actuator are used, costs for manufacturing the post-processing apparatus may be

increased. The actuator may be controlled to allow the pressing member 60 to be switched to the escape position at the time of discharging the plurality of sheets of paper P, however, if a control error occurs, the plurality of sheets of paper P discharged may not be properly loaded on the tray 40.

[0026] In consideration of this, in some examples, the pressing member 60 can be switched from the pressing position to the escape position in conjunction with the discharging operation of the ejector 50. For example, a dedicated actuator to operate the pressing member 60 and a control circuit to control the actuator may not be used. This can reduce the costs for manufacturing the post-processing apparatus, and since the pressing member 60 can be operated in conjunction with the discharging operation of the ejector 50, a mismatches between operations of the pressing member 60 and the ejector 50 due to a control error may be reduced and/or avoided altogether.

[0027] In some examples, the post-processing apparatus may include a switch member 70 to allow the pressing member 60 to be switched from the pressing position to the escape position by interfering with the ejector 50 during the discharging operation of the ejector 50. For example, the switch member 70 may interfere with the ejector 50 while the ejector 50 is moved along the connection section 100-2. The pressing member 60 may be switched from the pressing position to the escape position while the ejector 50 is moved along the connection section 100-2. In some examples, if the ejector 50 gets out of the connection section 100-2, the interference with the switch member 70 may be terminated, and the pressing member 60 may be returned to the pressing position.

[0028] In some examples, the pressing member 60 may be rotated to the pressing position and the escape position. The pressing member 60 may include a rotating shaft 61, a pressing lever 62 extending from the rotating shaft 61 to press down the sheet of paper P1 on the tray 40, and an extending lever 63 extending from the rotating shaft 61. The rotating shaft 61, in some examples, may be rotatably supported by a support frame 200 on which the belt frame 110 and the tray 40 are installed. The pressing lever 62 may extend from the rotating shaft 61 toward the upper side of the tray 40. The extending lever 63 may extend from the rotating shaft 61 toward the opposite side of the pressing lever 62. For example, the extending lever 63 may have a cam shape to allow the pressing member 60 to be switched from

the pressing position to the escape position by interfering with the ejector 50 to perform the discharging operation as described below.

[0029] In some examples, the pressing member 60 may remain in the pressing position by its own weight. The post-processing apparatus may include a first elastic member 81 to apply an elastic force to the pressing member 60 in a direction in which the pressing member 60 is located at the pressing position. For example, the first elastic member 81 may be implemented by a torsion coil spring.

[0030] In some examples, the switch member 70 can be moved to a first position to rotate the pressing member 60 from the pressing position to the escape position by interfering with the ejector 50 during the discharging operation of the ejector 50. The switch member 70 can be moved to the first position to rotate the pressing member 60 from the pressing position to the escape position by interfering with the ejector 50 while the ejector 50 is moved along the connection section 100-2. In some examples, the switch member 70 may rotate the pressing member 60 from the pressing position to the escape position by interfering with the extending lever 63 of the pressing member 60 while being moved to the first position. In some instances, a second elastic member 82 can apply an elastic force to the switch member 70 such that the switch member 70 is moved to a second position to allow the pressing member 60 to be returned from the escape position to the pressing position by its own weight or by the elastic force of the first elastic member 81 when the interference between the ejector 50 and the switch member 70 is terminated. In such examples, the switch member 70 can be lifted to the first position and the second position. The switch member 70 may be supported by the belt frame 110 to be lifted. The switch member 70 can descend from the second position to the first position by interfering with the ejector 50 during the discharging operation of the ejector 50. The switch member 70 may be provided with an interference portion 71 to interfere with the extending lever 63. The interference portion 71 can push the extending lever 63 downward when the switch member 70 descends to the first position. As the pressing member 60 is rotated, the pressing lever 62 can move upward to the escape position. When the interference with the ejector 50 is terminated, the switch member 70 can ascend by the elastic force of the second elastic member 82 and is returned to the second position. The second elastic member 82 may be implemented by, for example, a compression coil spring having one end and the other end supported by the switch

member 70 and the belt frame 110, respectively.

[0031] FIGS. 6 to 10 are views schematically showing an example state in which the pressing member 60 is rotated to the escape position and the pressing position in conjunction with the discharging operation of the ejector 50 in the example of the post-processing apparatus shown in FIGS. 2 to 5.

[0032] As the belt 100 is driven after the post processing operation has been completed, the ejector 50 can be moved from the alignment position shown in FIG. 3 to the discharge position shown in FIG. 4 along the discharge section 100-1. The ejector 50 can push the ends of the plurality of sheets of paper P on the paper alignment tray 30. The plurality of sheets of paper P can be discharged to the tray 40. As shown in FIG. 6, when the ejector 50 reaches the discharge position, the forward ends of the plurality of sheets of paper P can be supported by the tray 40 and the backward ends of the plurality of sheets of paper P can be supported by a supporter 51 of the ejector 50. For example, the backward ends of the plurality of sheets of paper P may not yet be dropped onto the tray 40. The supporter 51 of the ejector 50 can be in contact with the upper portion of the switch member 70 located at the second position. The extending lever 63 of the pressing member 60 can be in contact with the interference unit 71 of the switch member 70. The switch member 70 can remain in the second position, and the pressing member 60 can be located at the pressing position and can press down the sheet of paper P1 on the tray 40.

[0033] In some examples, as the belt 100 is driven, the ejector 50 can enter the connection section 100-2 to be returned to the alignment position. As shown in FIG. 7, the ejector 50 can descend. The switch member 70 can be pressed down by the supporter 51 of the ejector 50 and descends. The interference unit 71 of the switch member 70 can press the extending lever 63 of the pressing member 60 downward. In response, the pressing member 60 can be rotated in a direction in which the pressing lever 62 is spaced apart from the sheet of paper P1 on the tray 40.

[0034] In some examples, as the belt 100 is driven, the ejector 50 can further descend as shown in FIG. 8, and the switch member 70 can reach the first position. The pressing lever 62 can reach the escape position. In the escape position, the pressing lever 62 can be located above the plurality of sheets of paper P. The backward ends of the plurality of sheets of paper P can be supported by the supporter 51 of the ejector 50. In some examples, as the belt 100 is rotated, the ejector 50 can

get out of the connection section 100-2 and can be moved toward the alignment position. As shown in FIG. 9, the backward ends of the plurality of sheets of paper P can deviate from the supporter 51 of the ejector 50, and the plurality of sheets of paper P can be loaded onto the sheet of paper P1 on the tray 40. Since the switch member 70 is in contact with the ejector 50, the switch member 70 can remain at the first position, and the pressing member 60 can remain at the escape position.

[0035] In some examples, if the ejector 50 enters the return section 100-3, the interference between the ejector 50 and the switch member 70 can be terminated. The switch member 70 can ascend by the elastic force of the second elastic member 82 and can be returned to the second position as shown in FIG. 10. The pressing member 60 can be returned from the escape position to the pressing position by its own weight or by the elastic force of the first elastic member 81. The pressing lever 62 can press down the plurality of sheets of paper P loaded onto the sheet of paper P1. In some instances, the belt 100 can be driven until the ejector 50 reaches the alignment position as shown in FIG. 3. In such examples, if the ejector 50 reaches the alignment position, the discharging operation of the ejector 50 may be completed.

[0036] As described above, the pressing member 60 may be rotated from the pressing position to the escape position in conjunction with the discharging operation of the ejector 50 and subsequently returned to the pressing position. In such examples, the plurality of sheets of paper P discharged may be loaded onto the sheet of paper P1 loaded on the tray 40. In examples in which the ejector 50 tilts while passing through the connection section 100-2, a failure may occur in the discharging operation of the ejector 50. In such examples, the switch member 70 may be lifted below the ejector 50. While the ejector 50 is moved along the connection section 100-2, the ejector 50 can be horizontally supported by the switch member 70. Therefore, the ejector 50 may pass through the connection section 100-2. In some examples, the switch member 70 can be elastically biased by the second elastic member 82 in the upward direction (e.g., toward the ejector 50). In such examples, the ejector 50 may be more stably and horizontally supported while passing through the connection section 100-2.

[0037] In some examples, the post-processing apparatus may include a pair of pressing members 60 spaced apart from each other in the width direction W of the sheets of paper P and a pair of ejectors 50. The pair of pressing members 60 can be

rotatably supported by the belt frame 110 and the support frame 200, respectively. The pair of ejectors 50 can be located at both sides in the width direction W of the belt 100 and can be connected to each other by a connector 52. The connector 52 can be connected to the belt 100. As the belt 100 is driven, the pair of ejectors 50 can be moved together.

[0038] In some examples, the switch member 70 can be located between the pair of pressing members 60 and supported by the belt frame 110 to be lifted to the first and second positions. Each of the pair of ejectors 50 can allow the switch member 70 to descend from the second position to the first position by interfering with the switch member 70 in the connection section 100-2. In some examples, the pair of pressing members 60 can be rotated from the pressing position to the escape position as the switch member 70 is moved to the first position. In instances where the pair of ejectors 50 gets out of the connection section 100-2 and enters the return section 100-3, the interference with the switch member 70 can be terminated, and the pair of pressing members 60 can be returned from the escape position to the pressing position.

[0039] FIGS. 11 and 12 are perspective views showing an example of the paper pressing structure operating in conjunction with the discharging operation of the ejector 50. FIG. 11 shows an example state in which the ejector 50 is located at the alignment position and a pressing member 60a is located at the pressing position. FIG. 12 shows an example state in which the ejector 50 enters the connection section 100-2 and the pressing member 60a is located at the escape position.

[0040] Referring to FIGS. 11 and 12, the pair of ejectors 50 can be supported by the belt 100 and circulated between the alignment position and the discharge position. As described with reference to FIG. 5, the ejector 50 can push the backward ends of the plurality of sheets of paper P on the paper alignment tray 30 toward the tray 40 to discharge the plurality of sheets of paper P to the tray 40 while being moved from the alignment position to the discharge position along the discharge section 100-1, and can be returned to the alignment position via the connection section 100-2 and the return section 100-3.

[0041] In some examples, the pressing member 60a includes a rotating shaft 61a and a pressing lever 62a extending from the rotating shaft 61a to press down the sheet of paper P1 on the tray. The rotating shaft 61a may be rotatably supported by the belt

frame 110. The rotating shaft 61a may penetrate the belt frame 110 to be rotatably supported by the support frame 200 (see FIG. 2). In some examples, the pressing member 60a may include an extending lever 63a connected to the rotating shaft 61a. The extending lever 63a can extend from the rotating shaft 61a toward the opposite side of the pressing lever 62a. The extending lever 63a may be formed integrally with the rotating shaft 61a or may be coupled to the rotating shaft 61a. The extending lever 63a can function as the switch member 70 in the examples shown in FIGS. 2 to 5. For example, the extending lever 63a may have a cam shape to allow the pressing member 60a to switch from the pressing position to the escape position by interfering with the ejector 50 performing the discharging operation as described below. The pressing member 60a may be rotated to the pressing position (see FIG. 11) and the escape position (see FIG. 12). In some examples, the pressing member 60a can include a pair of pressing levers 62a spaced apart from each other in the width direction W, and the extending lever 63a can be located between the pair of pressing levers 62a. The pressing member 60a may remain in the pressing position by its own weight. The post-processing apparatus may include a first elastic member 81 to apply an elastic force to the pressing member 60a in a direction in which the pressing member 60a is located at the pressing position. The first elastic member 81 may be implemented by, for example, a torsion coil spring.

[0042] As shown in FIG. 11, the ejector 50 can be located at the alignment position. In such an example, the plurality of sheets of paper P can be aligned on the paper alignment tray 30 (see FIG. 1). The binder 20 (see FIG. 1) can perform a post processing operation, for example, a stapling operation of driving staples, on corners of the plurality of sheets of paper P. When the post processing operation is completed, a discharging operation of discharging the plurality of sheets of paper P can be performed. The ejector 50 can rotate the pressing member 60a from the pressing position to the escape position by interfering with the extending lever 63a during the discharging operation. In some examples, the belt 100 is driven and the ejector 50 is moved. The ejector 50 can discharge the plurality of sheets of paper P to the tray 40 while being moved along the discharge section 100-1. If the ejector 50 enters the connection section 100-2, the supporter 51 of the ejector 50 may be in contact with the extending lever 63a and can press the extending lever 63a downward. The pressing member 60a can be rotated to the escape position as shown in FIG. 12. The

plurality of sheets of paper P can be loaded on the tray 40. In an example where the ejector 50 gets out of the connection section 100-2 and enters the return section 100-3, the interference between the ejector 50 and the extending lever 63a can be terminated, and the pressing member 60a can be returned from the escape position to the pressing position shown in FIG. 11 by its own weight or by the elastic force of the first elastic member 81.

[0043] FIGS. 13 and 14 are a perspective view and a side view showing an example of a paper pressing structure operating in conjunction with the paper discharging operation of the ejector 50. Referring to FIGS. 13 and 14, the paper pressing structure of the present example may be different from the paper pressing structure shown in FIGS. 11 and 12 in that a pinion 63b is employed instead of the extending lever 63a.

[0044] In some examples, the ejector 50 can be provided with a rack gear 53. The rack gear 53 may be provided on the bottom surface of the supporter 51. The pressing member 60b can include a rotating shaft 61b and a pressing lever 62b extending from the rotating shaft 61b to press down the sheet of paper P1 on the tray. The rotating shaft 61b may be rotatably supported by the belt frame 110. The rotating shaft 61b may penetrate the belt frame 110 and may be rotatably supported by the support frame 200 (see FIG. 2). The switch member may include a pinion 63b connected to the pressing member 60b and engaged with the rack gear 53 during the discharging operation of the ejector 50 to rotate the pressing member 60b to the escape position. In some examples, the pinion 63b may be formed integrally with the rotating shaft 61b of the pressing member 60b and may be coupled to the rotating shaft 61b. The pressing member 60b may be rotated to the pressing position (e.g., see FIG. 13) and the escape position (e.g., see FIG. 14). In some examples, the pressing member 60b can include a pair of pressing levers 62b spaced apart from each other in the width direction W, and the pinion 63b can be located between the pair of pressing levers 62b. The pressing member 60b may remain in the escape position by its own weight. In some instances, the post-processing apparatus may include a first elastic member 81 to apply an elastic force to the pressing member 60b in a direction in which the pressing member 60b is located at the pressing position. The first elastic member 81 may be implemented by, for example, a torsion coil spring.

[0045] In such examples, as shown in FIG. 13, the plurality of sheets of paper P can be aligned on the paper alignment tray 30 (see FIG. 1) in a state in which the ejector 50 is located at the alignment position. The binder 20 (see FIG. 1) can perform a post processing operation, for example, a stapling operation of driving staples, on corners of the plurality of sheets of paper P. When the post processing operation is completed, a discharging operation of discharging the plurality of sheets of paper P can be performed. The ejector 50 can discharge the plurality of sheets of paper P to the tray 40 while being moved along the discharge section 100-1. In some examples, if the ejector 50 enters the connection section 100-2, the rack gear 53 of the ejector 50 can be engaged with the pinion 63b during the discharging operation. As the ejector 50 is moved, the pinion 63b can be rotated, and as shown in FIG. 14, the pressing member 60b can be rotated from the pressing position to the escape position. The plurality of sheets of paper P can be loaded on the tray 40. In some examples, when the engagement between the pinion 63b and the rack gear 53 is terminated, the pressing member 60b can be returned from the escape position to the pressing position shown in FIG. 13 by its own weight or by the elastic force of the first elastic member 81.

[0046] FIG. 15 is a schematic diagram of an example of an image forming apparatus. Referring to FIG. 15, the image forming apparatus includes a printer 1 to print an image on a sheet of paper P, for example, a print medium, and a post-processing apparatus 2 to perform a post processing operation on the sheet of paper P discharged from the printer 1.

[0047] In some examples, the printer 1 may print an image on a sheet of paper P by using printing methods such as an electrophotographic method, an inkjet method, a thermal transfer method, and a thermal sublimation method, among others. The sheet of paper P may be fed from a paper feeding apparatus 4 to the printer 1. The paper feeding apparatus 4 may include a feeding cassette, for example, a main cassette feeder, a secondary cassette feeder, and/or a high capacity feeder. The paper feeding apparatus 4 may include a multi-purpose tray (MPT) installed in a side portion of the printer 1.

[0048] In some examples, a sheet of paper P on which printing has been completed may be discharged to the tray 40 via the post-processing apparatus 2. The post-processing apparatus 2 may perform a post processing operation such as binding, punching, and/or folding on the sheet of paper P. The post-processing

apparatus 2 of the present example may have the structure described with reference to FIGS. 1 to 14, and may drive staples into a plurality of sheets of paper P. In some instances, the post-processing apparatus 2 may discharge the sheets of paper P to the tray 40 without performing a post processing operation.

[0049] The image forming apparatus, in some examples, may include a scanner 3 to read an image recorded on a document. The scanner 3 may have configurations including, for instance, a flatbed configuration in which a document is placed at a fixed position and a reading member reads an image while being moved, a document feed configuration in which the reading member is placed at a fixed position and the document is fed, and/or a combination thereof.

[0050] Examples described herein may be considered in a descriptive sense and not for purposes of limitation. Descriptions of features or aspects within each example may be considered as available for other similar features or aspects in other examples. While examples have been described with reference to the figures, various changes in form and details may be made therein without departing from the spirit and scope as defined by the following claims.

WHAT IS CLAIMED IS:

1. A post-processing apparatus comprising:

a paper alignment tray on which a plurality of sheets of paper to be post-processed are aligned;

a tray on which the plurality of sheets of paper discharged from the paper alignment tray is loaded;

an ejector to push the plurality of sheets of paper on the paper alignment tray to be discharged to the tray; and

a pressing member movable, in conjunction with a discharging operation of the ejector, to:

a pressing position to press down the sheets of paper loaded on the tray; and

an escape position to escape from the pressing position such that the plurality of sheets of paper discharged is loaded on the tray.

2. The post-processing apparatus of claim 1, comprising a first elastic member to apply an elastic force to the pressing member in a direction in which the pressing member is arranged at the pressing position.

3. The post-processing apparatus of claim 1, comprising a switch member moved to a first position to move the pressing member from the pressing position to the escape position by interfering with the ejector during the discharging operation of the ejector.

4. The post-processing apparatus of claim 3, comprising a second elastic member to apply an elastic force to the switch member to move the switch member to a second position to allow the pressing member to be returned from the escape position to the pressing position when the interference between the switch member and the ejector is terminated.

5. The post-processing apparatus of claim 4, wherein the switch member is lifted to the first position or the second position.

6. The post-processing apparatus of claim 4, comprising:

the pressing member comprising a rotating shaft, a pressing lever extending from the rotating shaft to press down the sheets of paper on the tray, and an extending lever extending from the rotating shaft; and

the switch member to rotate the pressing member from the pressing position to the escape position by interfering with the extending lever while being moved to the first position.

7. The post-processing apparatus of claim 1, comprising:

the pressing member comprising a rotating shaft, a pressing lever extending from the rotating shaft to press down the sheets of paper on the tray, and an extending lever extending from the rotating shaft; and

the ejector to rotate the pressing member to the escape position by interfering with the extending lever during the discharging operation.

8. The post-processing apparatus of claim 1, wherein:

the pressing member comprises a rotating shaft and a pressing lever extending from the rotating shaft to press down the sheets of paper on the tray;

a pinion is connected to the rotating shaft; and

the ejector comprises a rack gear engaged with the pinion during the discharging operation to rotate the pressing member to the escape position.

9. The post-processing apparatus of claim 1, comprising a binder to drive staples into the plurality of sheets of paper on the paper alignment tray.

10. A post-processing apparatus comprising:

a paper alignment tray on which a plurality of sheets of paper to be post-processed is aligned;

a tray on which the plurality of sheets of paper discharged from the paper alignment tray is loaded;

an ejector to move along a discharge section from an alignment position to push the plurality of sheets of paper on the paper alignment tray to be discharged to

the tray;

a return section to allow the ejector to be returned to the alignment position;

a connection section to connect the discharge section with the return section;

a pressing member switchable between the pressing position to press down the sheets of paper loaded on the tray and an escape position to escape from the pressing position such that the plurality of sheets of paper discharged is loaded on the tray; and

a switch member to interfere with the ejector moved along the connection section to allow the pressing member to be switched from the pressing position to the escape position.

11. The post-processing apparatus of claim 10, wherein the switch member is lifted to a first position to allow the pressing member to be switched to the escape position by interfering with the ejector moved along the connection section, or to a second position to allow the pressing member to be returned from the escape position to the pressing position when the interference with the ejector is terminated.

12. The post-processing apparatus of claim 11, comprising:

a first elastic member to apply an elastic force to the pressing member in a direction in which the pressing member is located at the pressing position; and

a second elastic member to apply an elastic force to the switch member in a direction in which the switch member is moved to a second position.

13. The post-processing apparatus of claim 10, comprising:

the pressing member comprising a rotating shaft and a pressing lever extending from the rotating shaft to press down the sheets of paper on the tray;

the switch member comprising an extending lever connected to the rotating shaft, and

the ejector to rotate the pressing member from the pressing position to the escape position by interfering with the extending lever while being moved along the connection section.

14. The post-processing apparatus of claim 10, wherein:

the ejector comprises a rack gear; and

the switch member comprises a pinion connected to the pressing member and is engaged with the rack gear while the ejector is moved along the connection section to rotate the pressing member to the escape position.

15. An image forming apparatus comprising:

a printer to print an image on a sheet of paper; and

a post-processing apparatus to perform a post processing operation on the sheet of paper discharged from the printer, comprising:

a paper alignment tray on which a plurality of sheets of paper to be post-processed are aligned;

a tray on which the plurality of sheets of paper discharged from a paper alignment tray is loaded;

an ejector to push the plurality of sheets of paper on the paper alignment tray to be discharged to the tray; and

a pressing member movable, in conjunction with a discharging operation of the ejector, to:

a pressing position to press down the sheets of paper loaded on the tray; and

an escape position to escape from the pressing position such that the plurality of sheets of paper discharged is loaded on the tray.

FIG. 1

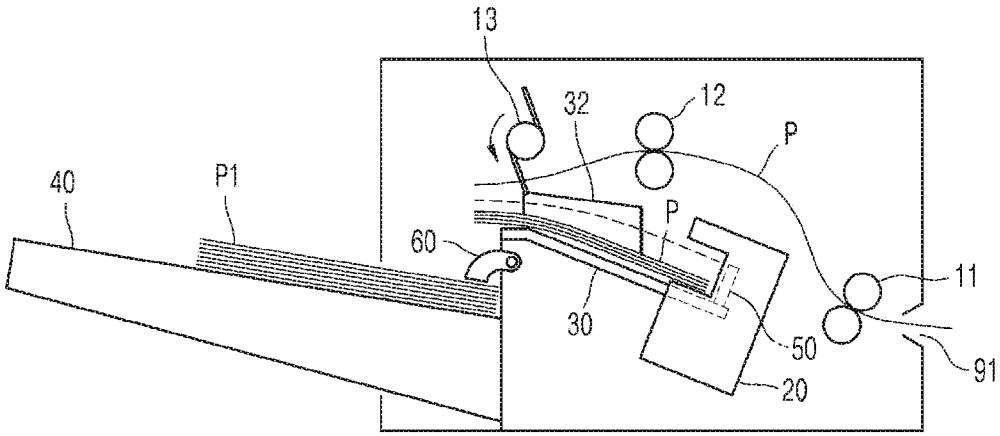

FIG. 2

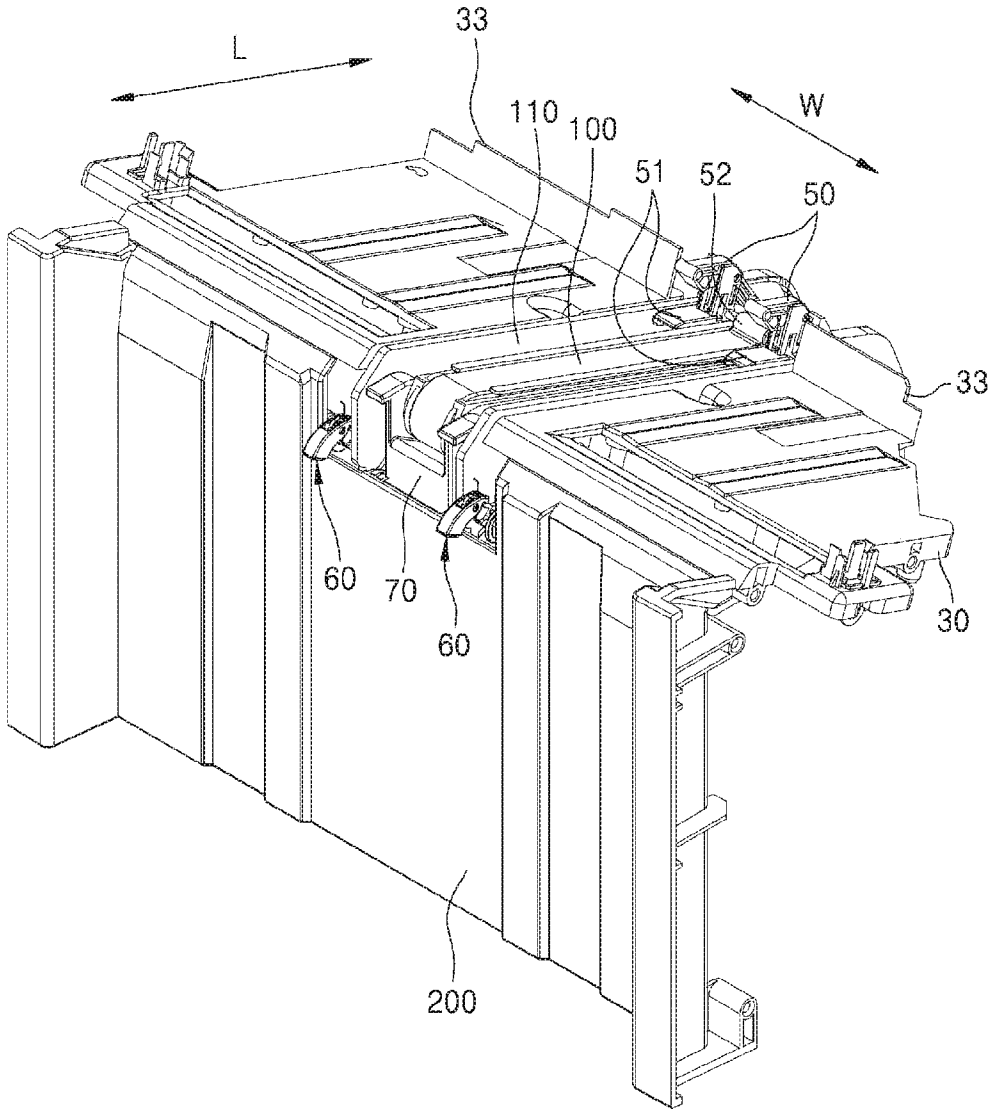

FIG. 3

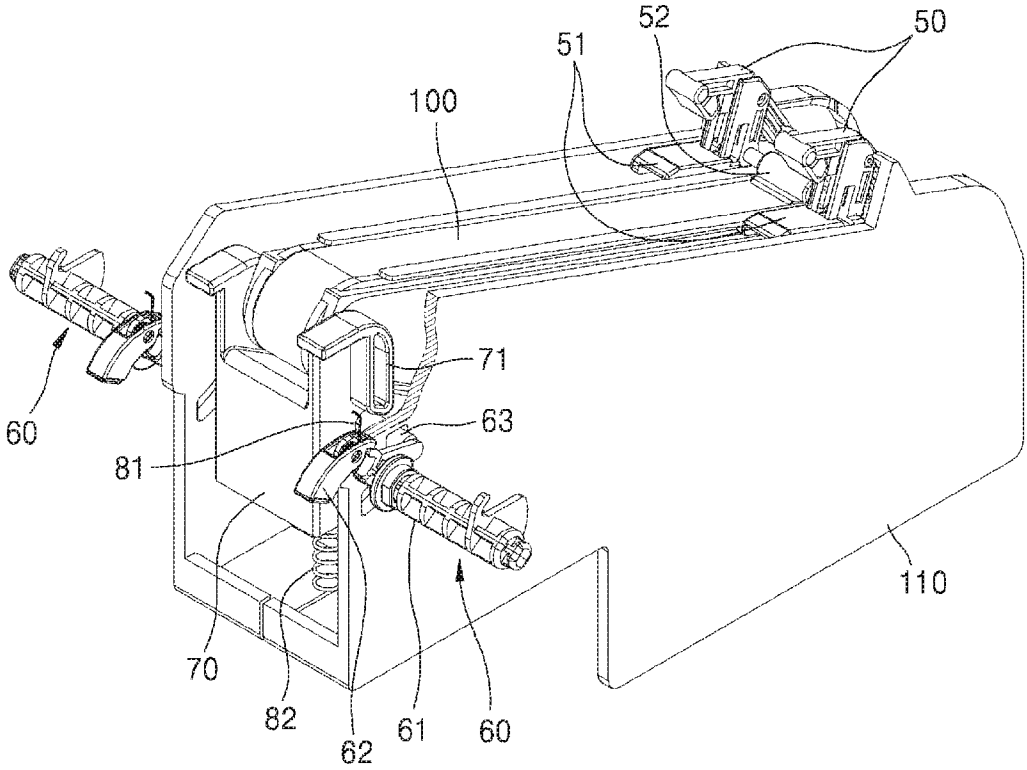
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FIG. 4

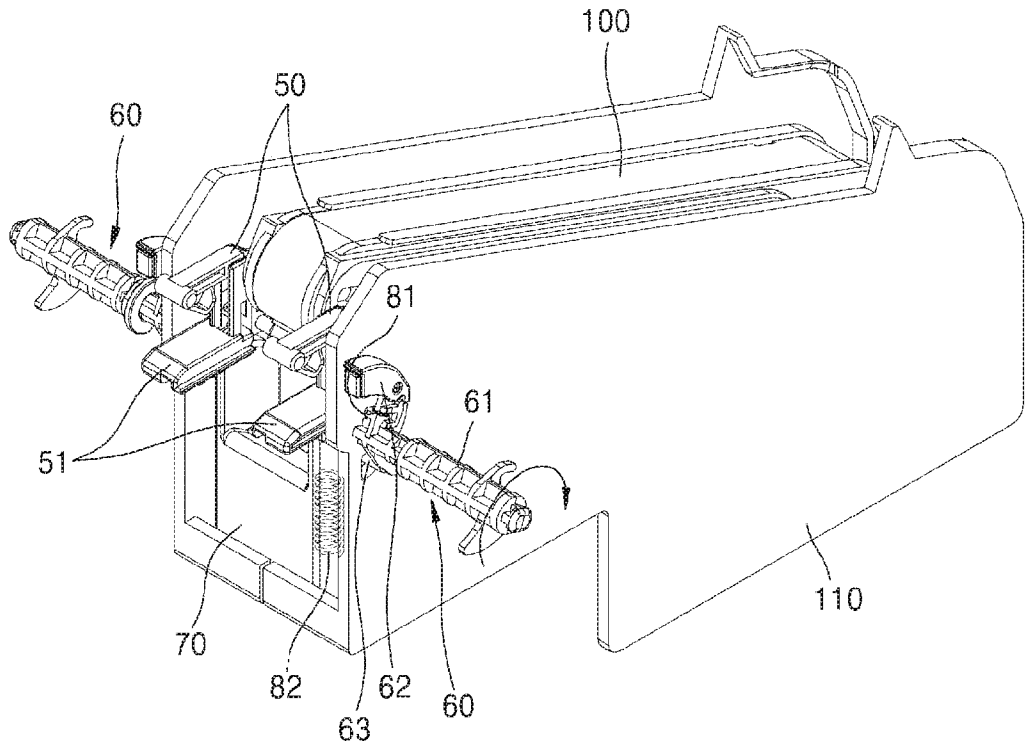
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FIG. 5

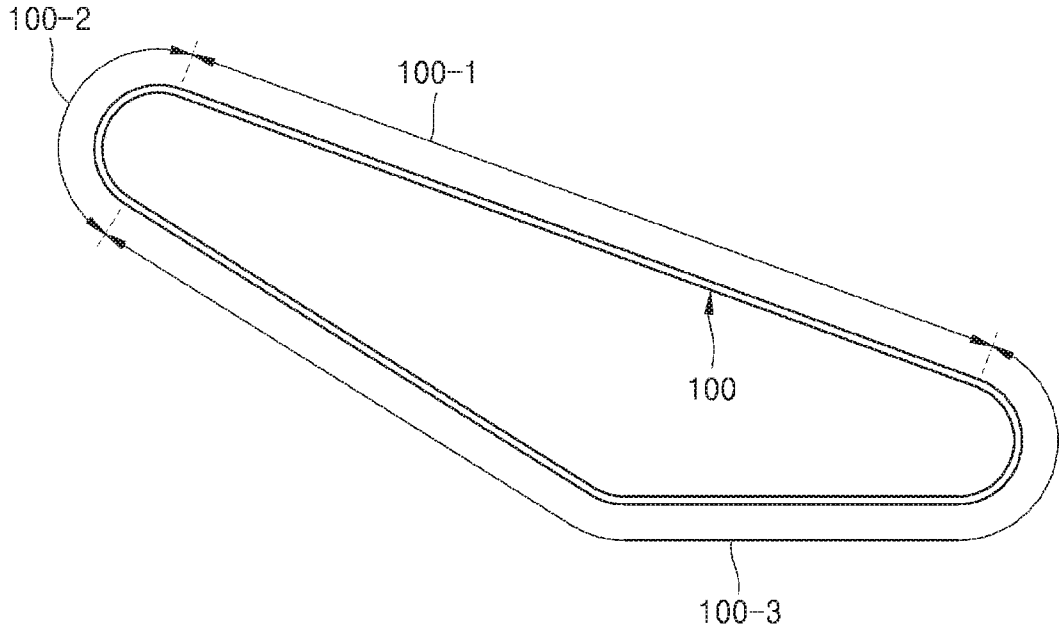

FIG. 6

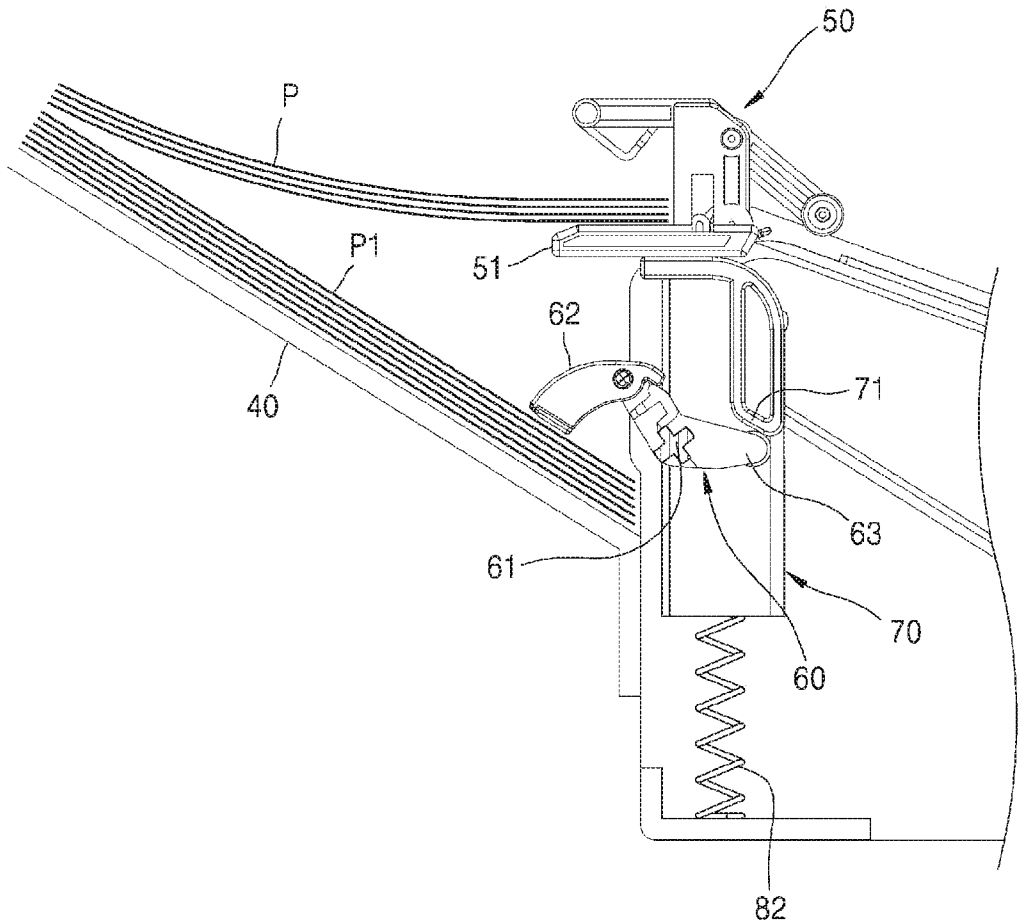

FIG. 7

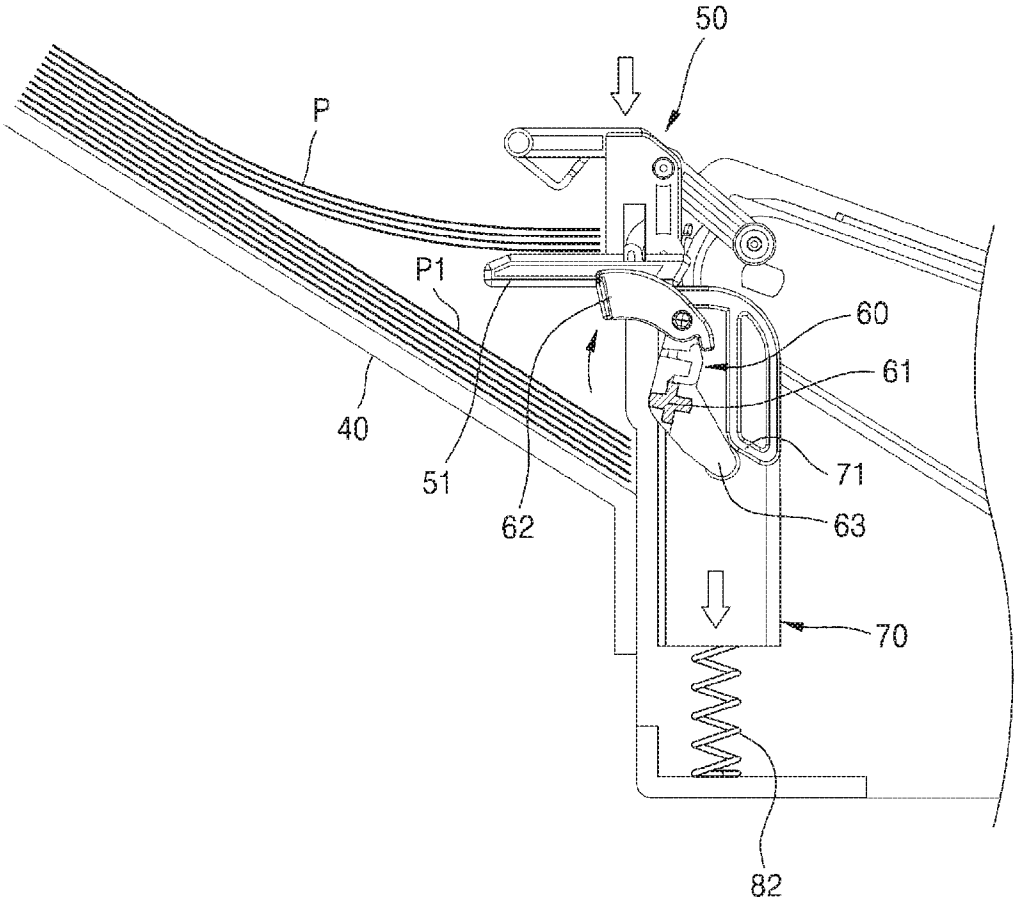

FIG. 8

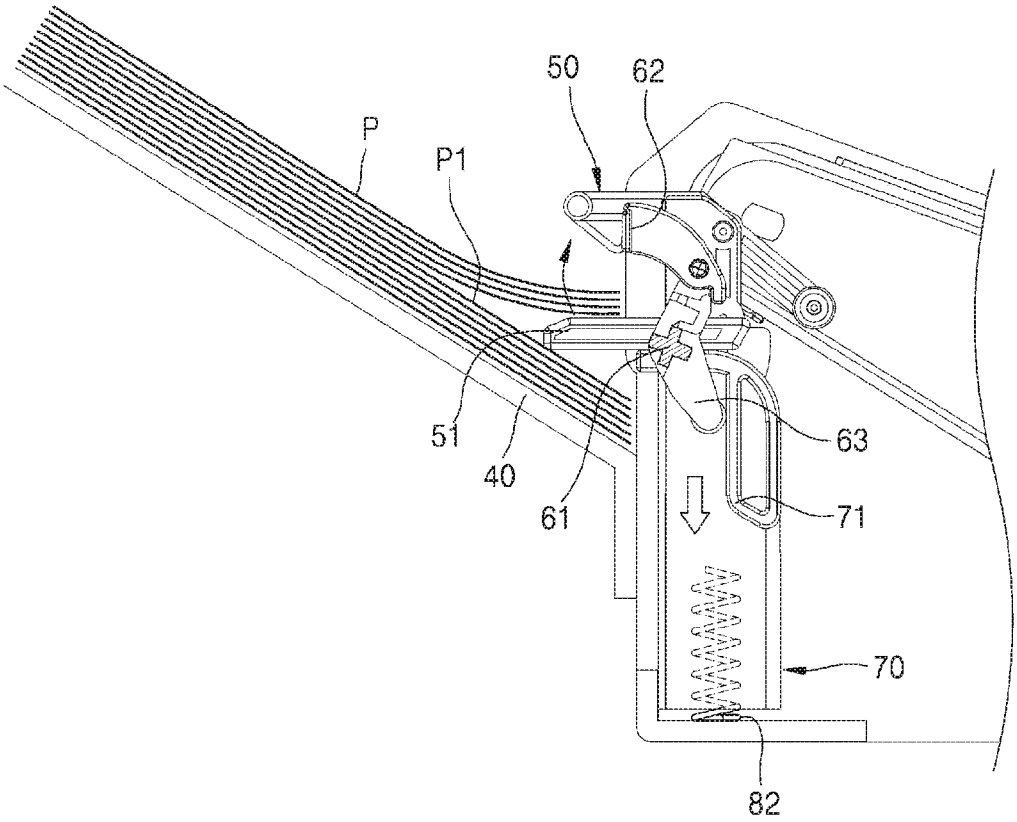

FIG. 9

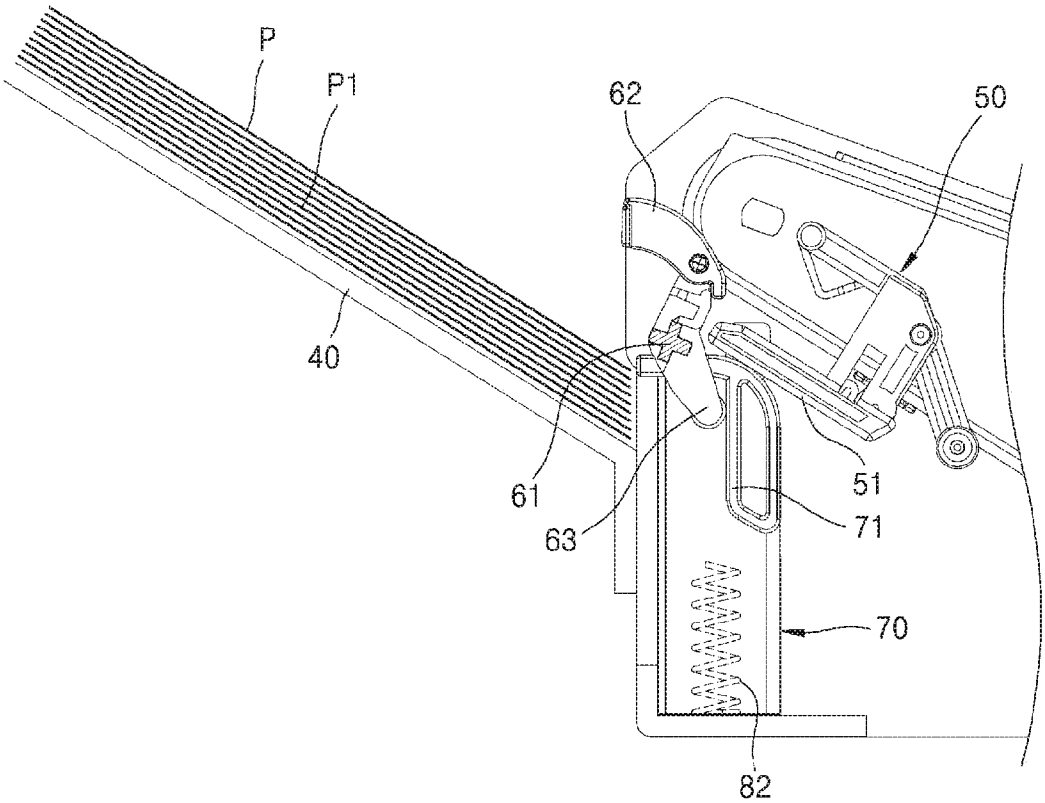

FIG. 10

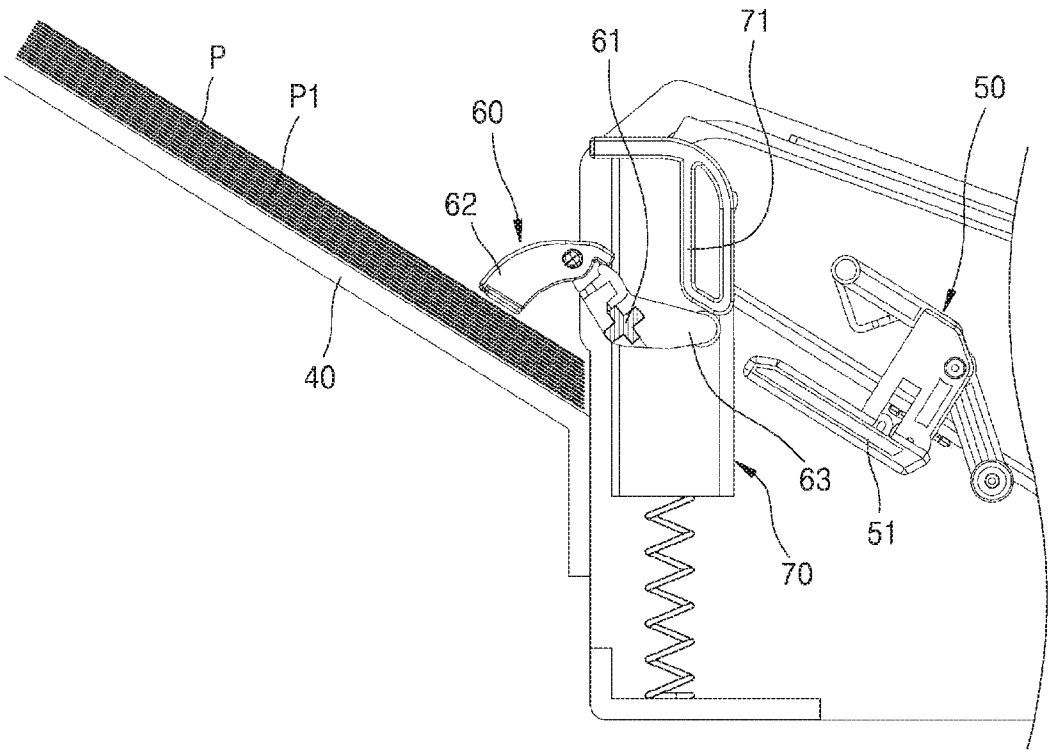

FIG. 11

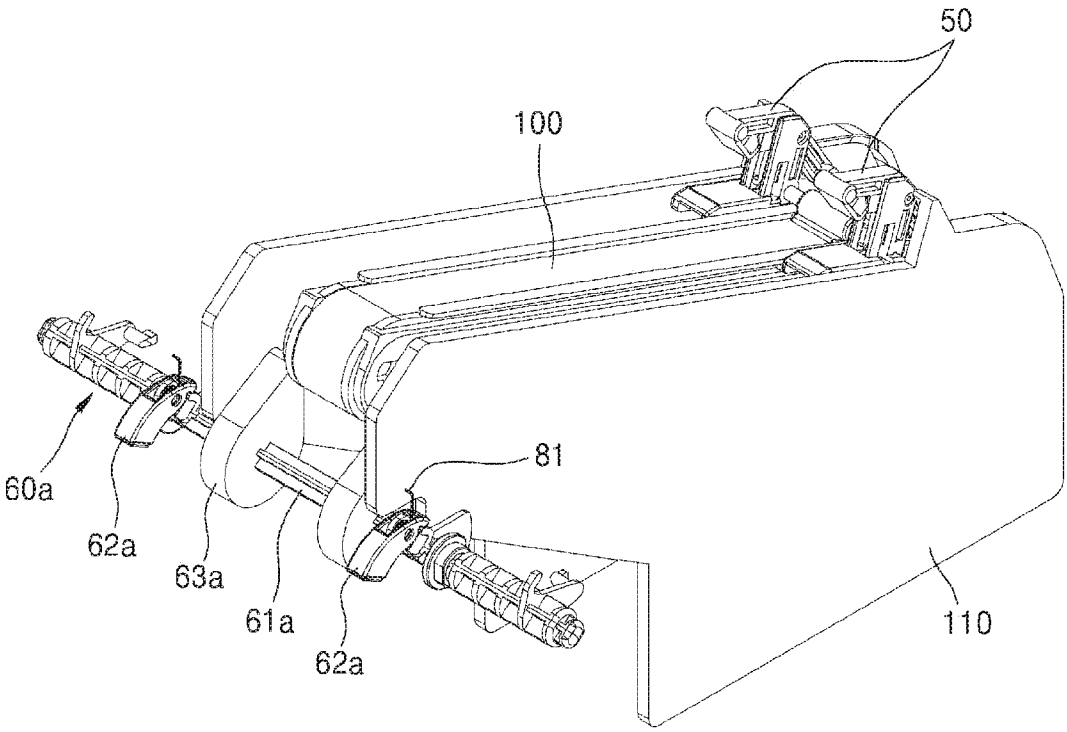
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FIG. 12

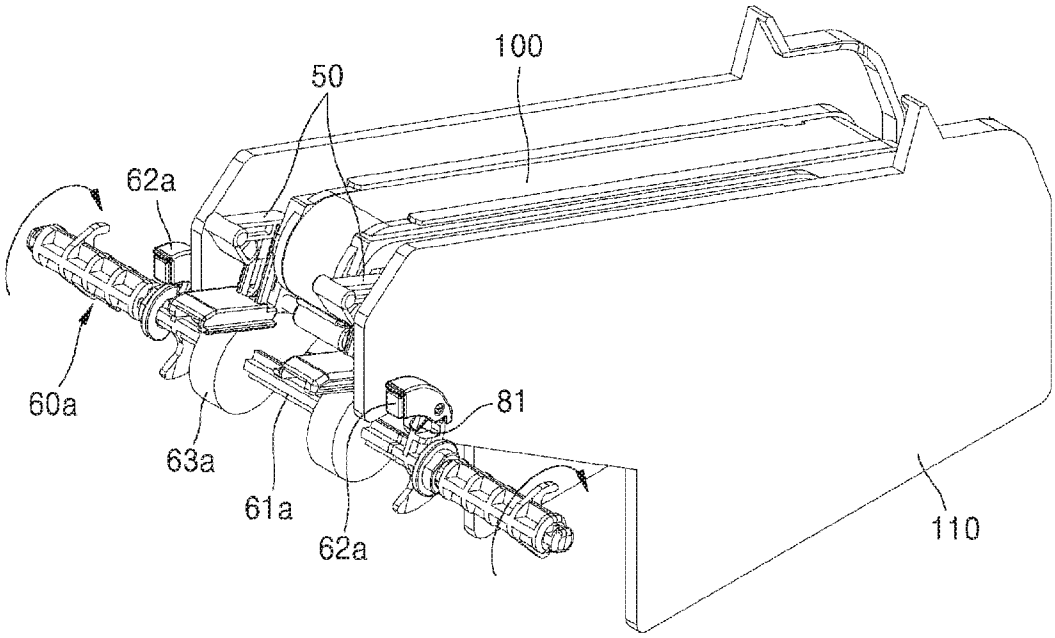
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FIG. 13

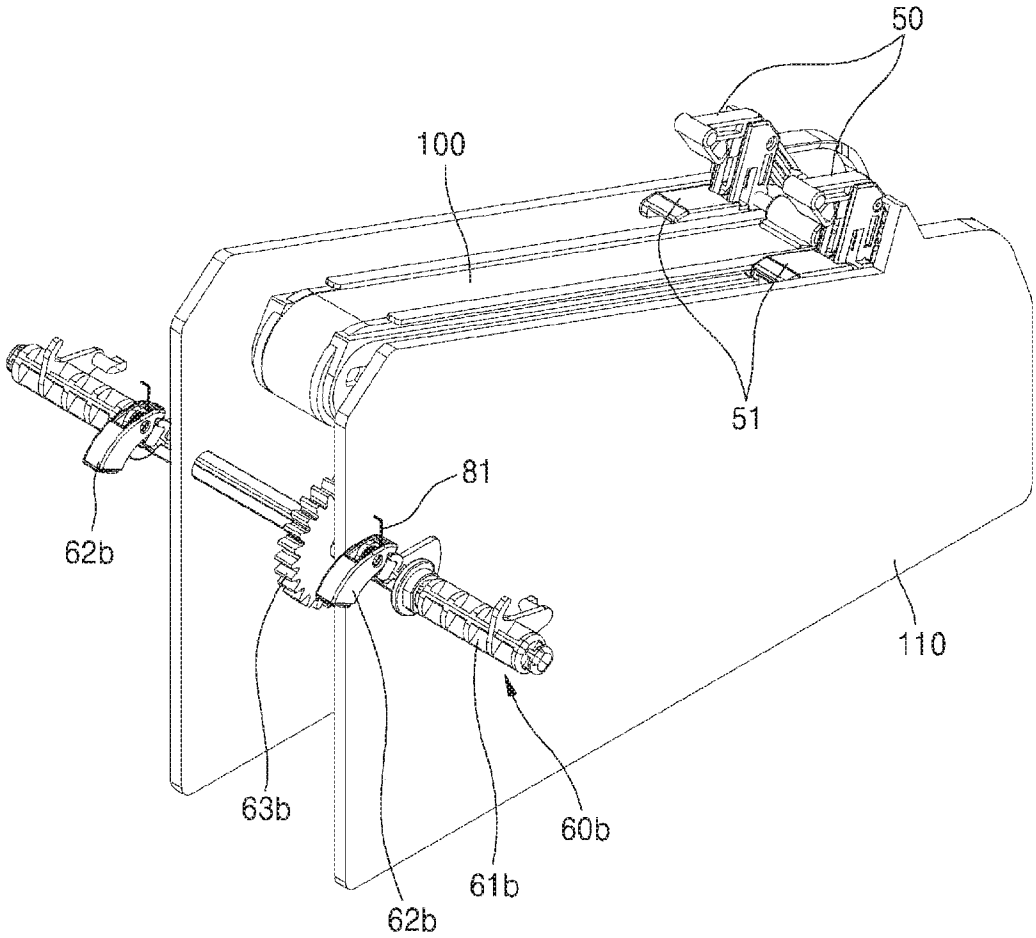


FIG. 14

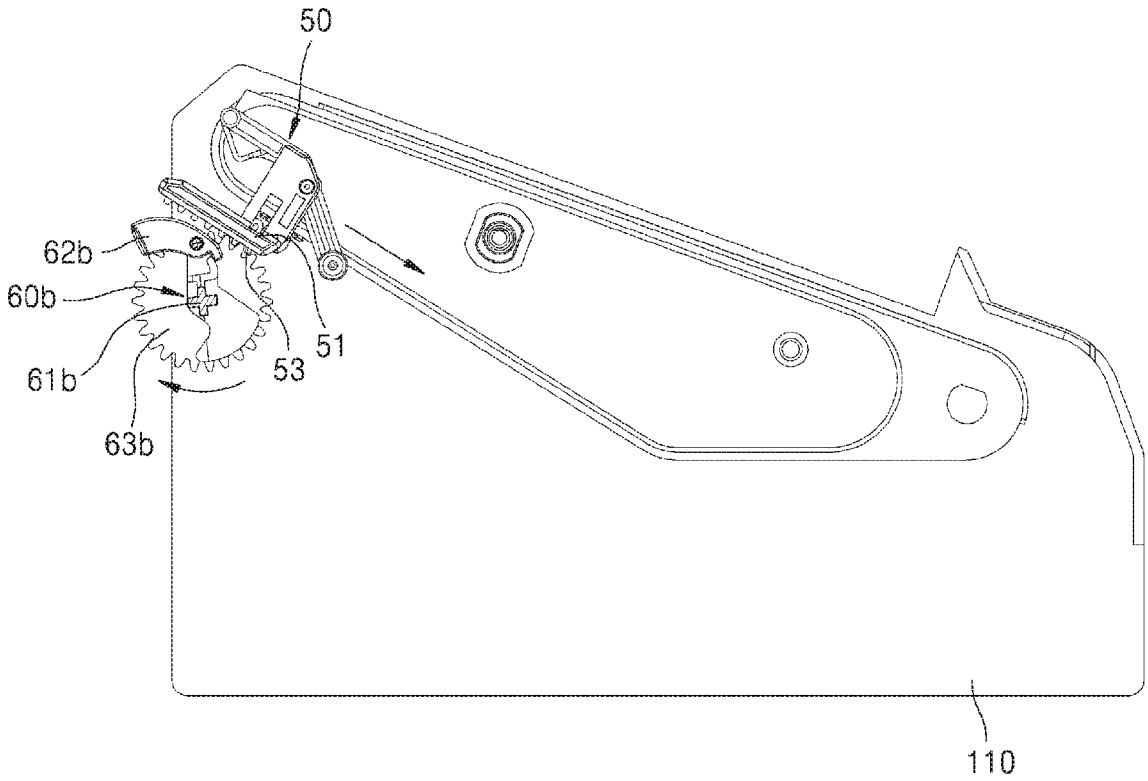
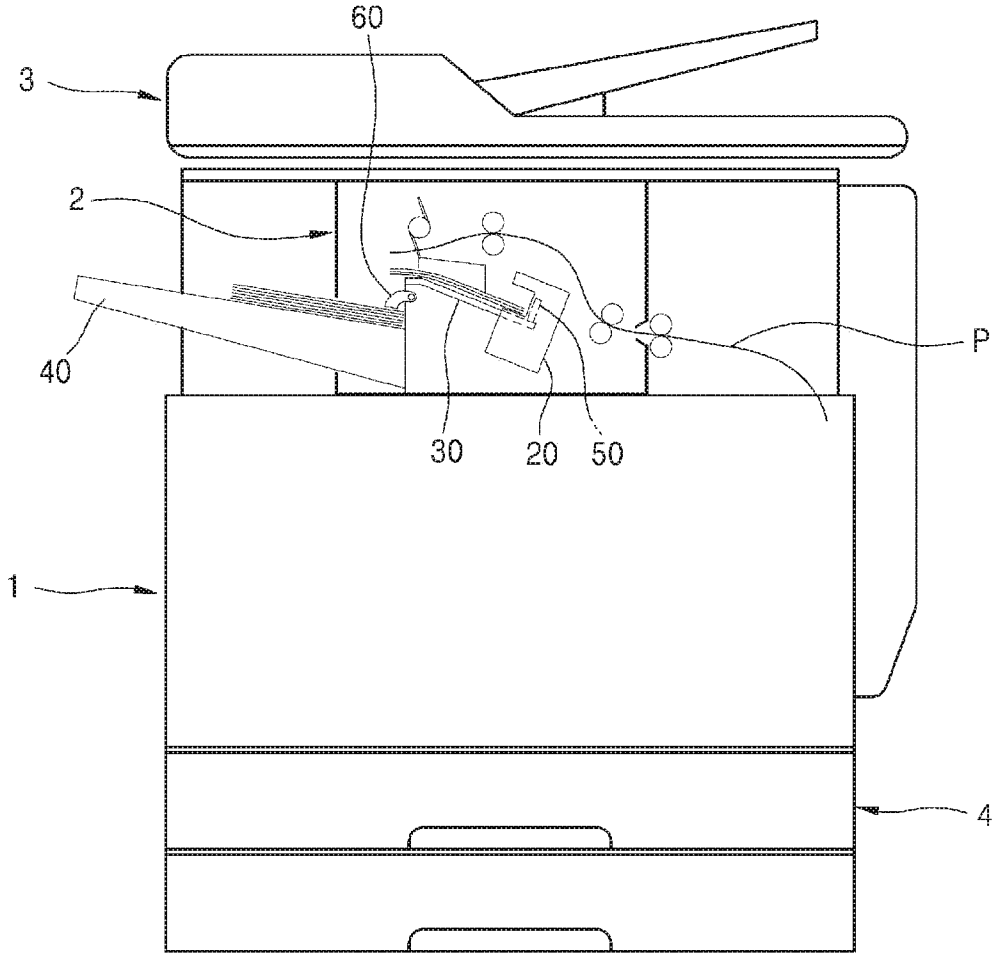


FIG. 15



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 2020/053431

A. CLASSIFICATION OF SUBJECT MATTER

B65H 31/00 *(2006.01)*
B65H 31/34 *(2006.01)*
B65H 31//40 *(2006.01)*
B65H 31/30 *(2006.01)*
B41L 43/10 *(2006.01)*

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65H 29/00, 31/00, 31/30, 31/34, 31/40, 35/00, 37/00, 39/00, B41L 43/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatSearch (RUPTO Internal), USPTO, PAJ, Espacenet, Information Retrieval System of FIPS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 2003128332 A (SHARP CORP) 08.05.2003, abstract, figure 2, paragraphs [0036]-[0038]	1, 15 2, 7-9 3-6, 10-14
Y	JP 4932675 B2 (RICOH CO LTD) 16.05.2012, figure 10, paragraphs [0001], [0050], claim 3	2, 7-9
A	JP 2009067557 A (RICOH CO LTD) 02.04.2009, figures 17, 18, paragraphs [0055]-[0061]	1-15
A	JP 2013124178 A (RICOH CO LTD) 24.06.2013, paragraphs [0001], [0027]	1-15
A	JP 2013245070 A (RICOH CO LTD) 09.12.2013, figures 3, 5, abstract	1-15

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 December 2020 (11.12.2020)	04 February 2021 (04.02.2021)

Name and mailing address of the ISA/RU:	Authorized officer
Federal Institute of Industrial Property, Berezhkovskaya nab., 30-1, Moscow, G-59, GSP-3, Russia, 125993 Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37	E. Kubasova Telephone No. 8(495)531-65-15