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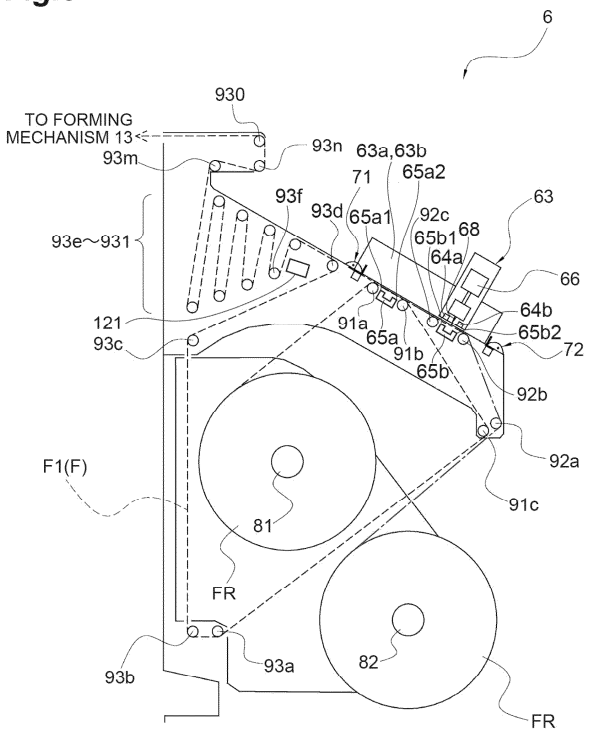
(54) FILM SUPPLY DEVICE AND BAG-MAKING-PACKAGING MACHINE

(57) A film supply device configured to supply (6) a film to a bag-making-packaging section of a bag-making-packaging machine, including: holding portions (81, 82) configured to respectively hold film rolls (FR) rotatably around which a film (F) is wound; drive portions (61, 62) configured to respectively rotate the film rolls (FR) held by the holding portions; a splicing portion (63) configured to splice a first film that is the film being used for bag-making and a second film that is the film to be used subsequent to the first film; and a control unit (110) configured to control operations of the drive portions and the splicing portion. The control unit (110) is configured to control the drive portion (61, 62) of one of the holding portions (81, 82) that holds the film roll (FR) around which the second film is wound to rotate in a first direction opposite to a second direction in which the second film is fed out, for a predetermined period after causing the splicing portion (63) to perform an operation of splicing the first film and the second film.

Fig.5



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Description

TECHNICAL FIELD

[0001] The present invention relates to a film supply device and a bag-making-packaging machine.

BACKGROUND

[0002] A film supply device is known that includes two holding portions configured to rotatably hold a film roll around which a film is wound, and a splicing portion configured to splice a first film being used and a second film to be used subsequent to the first film (see, for example, Japanese Unexamined Patent Publication No. 2024-2169).

[0003] A starting end of such a film may have an adhesive applied thereto for splicing to the film being used (see, for example, Japanese translation of a PCT international application No. 2024-514241).

SUMMARY

[0004] In the film supply device as described above, when splicing the film being used and the film to be used subsequent to the film, a splicing location between the films may adhere to components and the like of the film supply device around the splicing portion. In this case, there is a possibility that the adhesion of the film cannot be released only by existing configurations that pull the film toward a downstream of the film supply device, such as a pull-down belt mechanism provided in the bag-making-packaging section of the bag-making-packaging machine. If the adhered film is forcibly pulled, an overload may occur, and components of the film supply device or the bag-making-packaging machine may be damaged.

[0005] An object of the present invention is to provide a film supply device and a bag-making-packaging machine capable of reliably supplying the film spliced by the splicing portion.

[0006] (1) A film supply device according to one aspect of the present invention is a film supply device configured to supply a film to a bag-making-packaging section of a bag-making-packaging machine, including: holding portions configured to respectively hold film rolls rotatably around which a film is wound; drive portions configured to respectively rotate the film rolls held by the holding portions; a splicing portion configured to splice a first film being used for bag-making and a second film to be used subsequent to the first film; and a control unit configured to control operations of the drive portions and the splicing portion, wherein the control unit is configured to control the drive portion of one of the holding portions that holds the film roll around which the second film is wound to rotate in a first direction opposite to a second direction in which the second film is fed out, for a predetermined period after causing the splicing portion to perform an operation of splicing the first film and the second film.

[0007] In the film supply device according to one aspect of the present invention, for a predetermined period after causing the splicing portion to splice the first film and the second film, the drive portion of one of the holding portions that holds the film roll around which the second film is wound is controlled by the control unit to rotate in the first direction opposite to the second direction (feeding direction) in which the second film is fed out. As a result, even if the splicing location between the films adheres to components of the film supply device around the splicing portion when the first film and the second film are spliced by the splicing portion, the second film is pulled by the rotation in the first direction opposite to the feeding direction, and the adhesion can be released. Therefore, compared to a case where such operation of the drive portion is not performed, the supply of the film spliced by the splicing portion can be ensured. For example, damage to components of the film supply device or the bag-making-packaging machine due to an overload caused by forcibly pulling the adhered film can be prevented.

[0008] (2) In the above (1), the film supply device may further include: a dancer roller configured to adjust tension of the film being used for bag-making; and a detection portion configured to detect displacement of the dancer roller. The control unit may be configured to cause the drive portion to stop a rotation in the first direction when the detection portion detects the displacement in a direction opposite to a direction of a force applied by the dancer roller to the film. In this case, a release of the adhesion of the film can be indirectly detected by utilizing the displacement of the dancer roller in the direction opposite to the direction of the force applied by the dancer roller to the film.

[0009] (3) In the above (1) or (2), the splicing portion may include a heating element configured to heat-seal the first film and the second film to each other. In this case, adhesion that may occur when the first film and the second film are heat-sealed to each other can be prevented.

[0010] (4) In the above (3), the film provided with a sealant layer on one surface may be wound around the film rolls, and the splicing portion may be configured to heat-seal the first film and the second film to each other in a state where the sealant layers of the films pulled out from the respective film rolls held by the holding portions do not face each other. In this case, since a sealant layer is present on at least one of the non-facing back surfaces of the first film and the second film, the adhesion is likely to occur. Therefore, the operational effect of ensuring supply of the film becomes more remarkable.

[0011] (5) A bag-making-packaging machine according to another aspect of the present invention may include: the film supply device according to any one of the above (1) to (4); and the bag-making-packaging section. In this case, the supply of the film spliced by the splicing portion to the bag-making-packaging section of the bag-making-packaging machine can be ensured.

[0012] According to some aspects of the present invention, the supply of the film spliced by the splicing portion can be ensured.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is an external perspective view illustrating a weighing and bag-making-packaging system including a bag-making-packaging machine.
FIG. 2 is a diagram illustrating a part of a control block of the weighing and bag-making-packaging system.
FIG. 3 is a schematic perspective view illustrating a main configuration of a bag-making-packaging section.
FIG. 4 is a schematic perspective view of a film supply device as viewed from a rear.
FIG. 5 is a schematic side view of the film supply device.
FIG. 6 is a diagram illustrating an example of a splicing portion when performing an operation of splicing a first film and a second film.
FIG. 7 is a diagram for describing an example of releasing adhesion after splicing the first film and the second film.
FIG. 8 is a diagram for describing an operation after releasing the adhesion in FIG. 7.
FIG. 9 is a diagram illustrating another example of the splicing portion when performing an operation of splicing the first film and the second film.
FIG. 10 is a diagram for describing another example of releasing adhesion after splicing the first film and the second film.
FIG. 11 is a diagram for describing an operation after releasing the adhesion in FIG. 10.

DETAILED DESCRIPTION

[0014] Hereinafter, examples of the present invention will be described in detail with reference to the accompanying drawings. In the description of the drawings, the same or corresponding elements are denoted by the same reference signs, and an overlapping description is omitted. In the following description, the terms "front", "rear", "upper", "lower", "left", "right", and the like may be used to represent directions. In the present example, "front", "rear", "upper", "lower", "left", and "right" are defined by the directions of arrows in the drawings. In the present specification, "A or B" may include either A or B, and does not exclude including both A and B.

[0015] FIG. 1 is an external perspective view illustrating a weighing and bag-making-packaging system including a bag-making-packaging machine. FIG. 2 is a view illustrating a part of a control block of the weighing and bag-making-packaging system. As shown in FIG. 1 and FIG. 2, a weighing and bag-making-packaging system 100 accommodates weighed articles C in a formed body of a film F and manufactures individually packaged bags by making bags from the formed body. The weighing and bag-making-packaging system 100 includes a weighing device 101 and a bag-making-packaging machine 102. The bag-making-packaging machine 102 is disposed at a lower stage of the weighing device 101. In one example, a touch panel 111 and operation switches 112 that can integrally operate the bag-making-packaging machine 102 and the weighing device 101 are installed on the bag-making-packaging machine 102. As shown in FIG. 2, in the weighing and bag-making-packaging system 100, an operation of the weighing device 101 and an operation of the bag-making-packaging machine 102 are controlled by a control unit 110 included in the bag-making-packaging machine 102, but the present invention is not limited to this example.

[0016] The weighing device 101 is, for example, a known combination weighing machine, and includes a plurality of pool hoppers 24, a plurality of weighing hoppers 25 located at a lower stage of the plurality of pool hoppers 24, and a collecting chute 26 located at a lower stage of the plurality of weighing hoppers 25. The articles C are objects (objects to be packaged) to be weighed and packaged by the weighing and bag-making-packaging system 100. The articles C are, for example, foods such as snack confectioneries as shown in FIG. 3. In weighing and packaging the articles C, first, the articles C are supplied to an upper center of the weighing device 101. Next, the articles C are dispersed into a plurality of radial paths, and then supplied to corresponding weighing hoppers 25 via a plurality of pool hoppers 24 disposed at terminal ends of the respective paths. Some of the weighing hoppers 25 are selected so that the weight of the articles C weighed by each weighing hopper 25 falls within a predetermined range. The articles C accommodated in the selected weighing hoppers 25 are discharged to the collecting chute 26 based on a discharge request signal from the control unit 110. The articles C discharged from the collecting chute 26 are supplied to the bag-making-packaging machine 102.

[0017] As described above, the bag-making-packaging machine 102 includes a packaging unit 5 (bag-making-packaging section) that manufactures products by bagging the articles C, a film supply device 6 that supplies the film F to the packaging unit 5, and a control unit 110 that controls operations of the packaging unit 5 and the film supply device 6. The articles C discharged from the weighing device 101 pass through a funnel member 11 attached to the packaging unit 5 and fall into an internal space of a tube 12 included in the packaging unit 5. Then, the articles C fall through the internal space of the tube 12. The bag-making-packaging machine 102 accommodates the articles C via the tube 12 in a tubular film TF. Thereafter, the bag-making-packaging machine 102 simultaneously horizontally seals a lower end portion of the tubular film TF and an upper end portion of a preceding bag B (individually packaged bag). As a result, bag-making of the bag B accommodating the articles C is

performed. The film supply device 6 is a unit that supplies a sheet-like film F to a forming mechanism 13 of the packaging unit 5. The film supply device 6 is located behind the packaging unit 5. The film supply device 6 is located upstream of the packaging unit 5 in a conveyance direction MD (film conveyance direction) of the film F.

[0018] As shown in FIG. 1, FIG. 2, and FIG. 3, the packaging unit 5 is a unit that forms the film F to form a tubular film TF that is a bag-shaped formed body accommodating the articles C, and then cuts the film F to make a bag B accommodating the articles C. The packaging unit 5 includes a forming mechanism 13, a pull-down belt mechanism 14, a vertical sealing mechanism 15, and a horizontal sealing mechanism 17. The forming mechanism 13 forms the sheet-like film F into the tubular film TF. The pull-down belt mechanism 14 conveys the film formed into a tubular shape (tubular film TF) downward. The vertical sealing mechanism 15 vertically seals an overlapping portion TF-1 at both ends of the tubular film TF.

[0019] The forming mechanism 13 includes a tube 12 that guides the articles C into the tubular film TF, and a former 13a disposed so as to surround a lower portion of the tube 12. The film F supplied from the film supply device 6 is formed into a tubular shape along an outer peripheral surface of the tube 12 when passing through a gap between the former 13a and the tube 12. At this time, an upper surface of the film F becomes an inner peripheral surface of the tubular film TF, and a lower surface of the film F becomes an outer peripheral surface of the tubular film TF.

[0020] The pull-down belt mechanism 14 includes a pair of belts 14c disposed on left and right sides of the tube 12. The pull-down belt mechanism 14 is a mechanism that adsorbs the tubular film TF wound around the tube 12 and conveys the tubular film TF downward. The pull-down belt mechanism 14 functions as a conveyance section that conveys the film F together with the film supply device 6.

[0021] The vertical sealing mechanism 15 is a member that heat-seals the overlapping portion TF-1 at both ends of the tubular film TF while pressing the overlapping portion TF-1 against the tube 12 with a constant pressure. The vertical sealing mechanism 15 includes, for example, a heater block (not illustrated) and a metal belt (not illustrated) capable of running around the heater block in synchronization with the tubular film TF.

[0022] The horizontal sealing mechanism 17 horizontally seals the bag B formed by the tubular film TF, and simultaneously heat-seals an upper end portion of the bag B and a lower end portion of a subsequent bag (tubular film TF). The horizontal sealing mechanism 17 horizontally seals the tubular film TF, for example, in a state where the articles C have fallen into the tubular film TF through the tube 12. As a result, the bag B accommodating the articles C is formed. The horizontal sealing mechanism 17 includes a cutter (not illustrated) that separates the bag B and the subsequent tubular film TF from each other.

[0023] As shown in FIG. 1 to FIG. 5, the film supply device 6 includes a first holding portion 81 and a second holding portion 82. The first holding portion 81 and the second holding portion 82 are two holding portions configured to, respectively, rotatably hold film rolls FR around which a film F is wound. The first holding portion 81 and the second holding portion 82 are configured by, for example, air chucks that hold the film rolls FR. The film F provided with a sealant layer on one surface may be wound around the film rolls FR. The sealant layer is, for example, a silver-colored surface of the film F, and is provided on an inner side of the film F wound around the film roll FR.

[0024] The film supply device 6 includes roll drive motors 61 and 62. The roll drive motors 61 and 62 are drive portions configured to respectively rotate the film rolls FR held by the first holding portion 81 and the second holding portion 82. The roll drive motors 61 and 62 convey the film F together with the pull-down belt mechanism 14.

[0025] The film supply device 6 includes a plurality of rollers 91a, 91b, 91c, 92a, 92b, 92c, and 93a to 93o that guide the film F. The plurality of rollers 91a, 91b, 91c, 92a, 92b, 92c, and 93a to 93o are rollers that guide the film F. When the film F of the film roll FR held by the first holding portion 81 is being used for bag-making, the film F fed out from the first holding portion 81 is guided by the rollers 91a, 91b, and 91c, and further guided by the rollers 93a and subsequent rollers. When the film F of the film roll FR held by the second holding portion 82 is being used for bag-making, the film F fed out from the second holding portion 82 is guided by the rollers 92a, 92b, and 92c, and further guided by the rollers 93a and subsequent rollers. The roller 93f is a dancer roller configured to adjust tension of the film F being used for bag-making. When the film F is guided by the rollers 93a to 93o, the roller 93f applies a predetermined tension to the film F by, for example, its own weight.

[0026] The film supply device 6 includes a film switching portion 63. The film switching portion 63 is a splicing portion configured to splice a first film F1 that is the film F being used for bag-making and a second film F2 that is the film F to be used subsequent to the first film F1. When the film F of the film roll FR held by the first holding portion 81 is being used for bag-making, the film F fed out from the first holding portion 81 corresponds to the first film F1, and the film F of the film roll FR held by the second holding portion 82 corresponds to the second film F2. When the film F of the film roll FR held by the second holding portion 82 is being used for bag-making, the film F fed out from the second holding portion 82 corresponds to the first film F1, and the film F of the film roll FR held by the first holding portion 81 corresponds to the second film F2. By splicing the first film F1 and the second film F2 by the film switching portion 63, the film roll FR used for bag-making is switched between the film roll FR held by the first holding

portion 81 and the film roll FR held by the second holding portion 82. When the film F is switched by the film switching portion 63, the bag-making-packaging operation of the packaging unit 5 may be temporarily stopped or may be continued.

[0027] The film switching portion 63 includes impulse sealers 64a and 64b, seal bases 65a and 65b, a cutter 68, and an air cylinder 66. The impulse sealers 64a and 64b are heating elements configured to heat-seal the first film F1 and the second film F2 to each other.

[0028] The impulse sealers 64a and 64b extend in a direction intersecting the conveyance direction MD and are spaced apart from each other in the conveyance direction MD. The cutter 68 is located between the impulse sealers 64a and 64b in the conveyance direction MD. The impulse sealers 64a and 64b and the cutter 68 are integrally moved by the air cylinder 66. The film switching portion 63 is supported by a pair of support bases 63a and 63b. The film switching portion 63 moves along the conveyance direction MD by an air cylinder 69 different from the air cylinder 66. In FIG. 4, the film switching portion 63 is disposed at the rearmost side (rear end position) in the conveyance direction MD. As in the example of FIG. 7, by the operation of the air cylinder 69, the film switching portion 63 can move to the frontmost side (front end position) in the conveyance direction MD.

[0029] The seal base 65a is a member that faces the impulse sealers 64a and 64b of the film switching portion 63 located at the front end position with the film F interposed therebetween. The seal base 65b is a member that faces the impulse sealers 64a and 64b of the film switching portion 63 located at the rear end position with the film F interposed therebetween. The seal base 65a is located between the rollers 91a and 91b. The seal base 65b is located between the rollers 92b and 92c. The seal bases 65a and 65b have, for example, the same configuration as each other. Hereinafter, the seal base 65a will be described as an example representing the seal bases 65a and 65b. The seal base 65a is divided into a first portion 65a1 that can face the impulse sealer 64a and a second portion 65a2 that can face the impulse sealer 64b. A space into which the cutter 68 can enter and exit is defined between the first portion 65a1 and the second portion 65a2.

[0030] In such a film switching portion 63, the second film F2 pulled out from the film roll FR of the first holding portion 81 or the second holding portion 82 that is not used for bag-making is stretched to the impulse sealers 64a and 64b side relative to the first film F1 and is gripped by a first gripping portion 71 or a second gripping portion 72 described later, whereby the second film F2 is disposed. The disposition of the second film F2 may be performed, for example, manually or automatically using a disposition device.

[0031] In a state where the second film F2 is disposed in this manner, the air cylinder 66 moves the cutter 68 and the impulse sealers 64a and 64b toward the seal base 65a in response to a signal of an instruction for splicing and cutting from the control unit 110. For example, the first film F1 and the second film F2 overlapping each other are clamped by the impulse sealers 64a and 64b and the seal base 65a or the seal base 65b. Then, the first film F1 and the second film F2 are heat-sealed, and the first film F1 and the second film F2 are cut by the cutter 68. As a result, in the film switching portion 63, splicing locations for splicing the first film F1 and the second film F2 overlapping each other are respectively formed on both sides across a cutting location by the cutter 68.

[0032] In the film switching portion 63, a part of the first film F1 and a part of the second film F2 are spliced by the impulse sealer 64a and the first portion 65a1 or the first portion 65b1, and another part of the first film F1 and another part of the second film F2 are spliced by the impulse sealer 64b and the second portion 65a2 or the second portion 65b2. As a result, a starting end and a peripheral portion thereof of the film F to be newly used are spliced to the film F to be replaced. The "film F to be newly used" here is the second film F2 to be used subsequent to the first film F1. The "film F to be replaced" here is the first film F1 being used for bag-making.

[0033] The splicing and cutting of the first film F1 and the second film F2 by the film switching portion 63 are performed, for example, when switching from bag-making-packaging using the first film F1 to bag-making-packaging using the second film F2, and when switching from bag-making-packaging using the second film F2 to bag-making-packaging using the first film F1.

[0034] The film switching portion 63 further includes a first gripping portion 71 and a second gripping portion 72. The first gripping portion 71 is a jig that holds down a starting end of the film F pulled out, for example, manually from the second holding portion 82 as the second film F2. The second gripping portion 72 is a jig that holds down a starting end of the film F pulled out, for example, manually from the first holding portion 81 as the second film F2. Since the first gripping portion 71 and the second gripping portion 72 have the same structure, the first gripping portion 71 will be described here. The first gripping portion 71 includes a pressing member 71a including an L-shaped member extending in a left-right direction, and a pedestal 71b extending in the left-right direction. The pressing member 71a is switched manually or automatically between a state of being separated from the pedestal 71b and a state of being pressed against the pedestal 71b by gravity.

[0035] An operation of splicing the first film F1 and the second film F2 by the film switching portion 63 and switching the film roll FR will be described.

[0036] When the film F of the film roll FR held by the first holding portion 81 is being used for bag-making, as shown in FIG. 6, a portion F1b on the first holding portion 81 side of the first film F1 fed out from the first holding portion 81 and a portion F2a on a leading end side of the second film F2 pulled out, for example, manually from the second holding portion 82 are heat-sealed and spliced

between the impulse sealer 64a and the first portion 65a1. The spliced portion F1b and portion F2a are integrated as a used film F3 as shown in FIG. 7 and FIG. 8, and become a used film portion F3b on the first holding portion 81 side and a used film portion F3a on the leading end side with a seal portion SP therebetween.

[0037] When the film F of the film roll FR held by the first holding portion 81 is being used for bag-making, as shown in FIG. 6, a portion F2b and a portion F1a are heat-sealed and spliced between the impulse sealer 64b and the second portion 65a2. The portion F2b is a portion on the second holding portion 82 side of the second film F2 pulled out, for example, manually from the second holding portion 82. The portion F1a is a portion on a leading end side (packaging unit 5 side) of the first film F1 fed out from the first holding portion 81. The spliced portion F1a and portion F2b are integrated as the first film F1 used for bag-making as shown in FIG. 7 and FIG. 8. As a result, the film roll FR used for bag-making is switched from the film roll FR held by the first holding portion 81 to the film roll FR held by the second holding portion 82.

[0038] On the other hand, when the film F of the film roll FR held by the second holding portion 82 is being used for bag-making, as shown in FIG. 9, a portion F1b and a portion F2a are heat-sealed and spliced between the impulse sealer 64b and the second portion 65a2. The portion F1b is a portion on the second holding portion 82 side of the first film F1 fed out from the second holding portion 82. The portion F2a is a portion on a leading end side of the second film F2 pulled out, for example, manually from the first holding portion 81. The spliced portion F1b and portion F2a are integrated as a used film F3 as shown in FIG. 10 and FIG. 11. The integrated used film F3 becomes a used film portion F3b on the second holding portion 82 side and a used film portion F3a on the leading end side across a seal portion SP.

[0039] When the film F of the film roll FR held by the second holding portion 82 is being used for bag-making, as shown in FIG. 9, a portion F2b and a portion F1a are heat-sealed and spliced between the impulse sealer 64a and the first portion 65a1. The portion F2b is a portion on the first holding portion 81 side of the second film F2 pulled out, for example, manually from the first holding portion 81. The portion F1a is a portion on a leading end side (packaging unit 5 side) of the first film F1 fed out from the second holding portion 82. The spliced portion F1a and portion F2b are integrated as the first film F1 used for bag-making as shown in FIG. 10 and FIG. 11. As a result, the film roll FR used for bag-making is switched from the film roll FR held by the second holding portion 82 to the film roll FR held by the first holding portion 81.

[0040] The film supply device 6 includes a control unit 110 configured to control operations of the roll drive motors 61 and 62 and the film switching portion 63. The control unit 110 controls the weighing device 101 and the bag-making-packaging machine 102 individually or integrally. The control unit 110 is configured by, for example, a computer. The control unit 110 includes a control arithmetic device and a storage device. The control arithmetic device includes a processor such as a CPU or a GPU. The control arithmetic device reads a program stored in the storage device and performs predetermined image processing, arithmetic processing, and the like according to the program. Further, the control arithmetic device can write an arithmetic result to the storage device or read information stored in the storage device according to the program.

[0041] The control unit 110 controls each drive portion of the packaging unit 5 and the film supply device 6 according to parameters, operating conditions, and the like set by the touch panel 111 or the like. The control unit 110 controls a feeder, the pool hoppers 24, the weighing hoppers 25, and the like of the weighing device 101. Specifically, the control unit 110 acquires necessary information from various sensors equipped in the weighing device 101 and the bag-making-packaging machine 102, and performs various controls based on the information.

[0042] The film supply device 6 may not include a mechanism for changing the front and back sides of the film. The mechanism for changing front and back surfaces of the film means a mechanism for changing orientations of front and back surfaces of the first film F1 and the second film F2 so that sealant layers (silver-colored surfaces) of the film F adhere to each other when switching from the film roll FR of the first holding portion 81 to the film roll FR of the second holding portion 82 and when switching from the film roll FR of the second holding portion 82 to the film roll FR of the first holding portion 81. That is, the film switching portion 63 may heat-seal the first film F1 and the second film F2 to each other in a state where the sealant layers of the films F pulled out from the respective film rolls FR held by the first holding portion 81 and the second holding portion 82 do not face each other. The case where "the sealant layers of the films F do not face each other" includes a case where surfaces (back surfaces) that are not the sealant layers of both films F face each other, and a case where the sealant layer of one film F and a surface (back surface) that is not the sealant layer of the other film F face each other.

[0043] In such a film supply device 6, when the sealant layers of the films F do not face each other, compared to a case where the sealant layers of the films F face each other, there is a higher possibility that a splicing location between the films F adheres to components and the like of the film supply device 6 around the film switching portion 63. For example, there is a possibility that the adhesion of the film F cannot be released only by a conveyance force of a conveyance section that pulls the film F toward a downstream side of the film supply device 6, such as the pull-down belt mechanism 14 provided in the packaging unit 5 of the bag-making-packaging machine 102.

[0044] Therefore, the control unit 110 is configured to control either the roll drive motor 61 of the first holding portion 81 or the roll drive motor 62 of the second holding portion 82 (the drive portion of one of the holding por-

tions), whichever holds the film roll FR around which the second film F2 is wound, to rotate in a first direction opposite to the conveyance direction MD (second direction) that is a direction in which the second film F2 is fed out, for a predetermined period after causing the film switching portion 63 to perform an operation of splicing the first film F1 and the second film F2.

[0045] The predetermined period is a time for applying a peeling force to the film F in order to release the adhesion of the film F. The predetermined period may be a predetermined parameter stored in advance in the storage device of the control unit 110, or may be a predetermined parameter input via the touch panel 111 or the operation switches 112, or the like.

[0046] The predetermined period may be a period until the adhesion of the film F is released according to the displacement of the roller 93f that is a dancer roller. In this case, the film supply device 6 includes a detection portion 121 configured to detect displacement of the roller 93f. The detection portion 121 is a sensor that detects displacement in a direction opposite to a direction of a force applied by the roller 93f to the film F. The detection portion 121 is provided, for example, at a position where vertical movement of the roller 93f on a downstream side (packaging unit 5 side) of the film switching portion 63 in the conveyance direction MD can be detected. The detection portion 121 transmits a detection result of the displacement of the roller 93f to the control unit 110.

[0047] The control unit 110 may control the operations of the roll drive motors 61 and 62 based on the displacement of the roller 93f detected by the detection portion 121. For example, the control unit 110 is configured to stop rotation of the roll drive motors 61 and 62 in the first direction when the detection portion 121 detects the displacement in a direction opposite to a direction of a force applied by the roller 93f to the film F. The storage device of the control unit 110 may store in advance a displacement threshold for detecting the displacement of the roller 93f in a direction opposite to a direction of a force applied by the roller 93f to the film F. The control unit 110 continues the rotation of the roll drive motors 61 and 62 in the first direction when the displacement of the roller 93f detected by the detection portion 121 is less than a predetermined displacement threshold. The control unit 110 stops the rotation of the roll drive motors 61 and 62 in the first direction when the displacement of the roller 93f detected by the detection portion 121 is equal to or greater than the predetermined displacement threshold.

[0048] The operation of causing the film switching portion 63 to splice the first film F1 and the second film F2 may be the operation of switching from the film roll FR held by the first holding portion 81 to the film roll FR held by the second holding portion 82, as described above with reference to FIG. 6 to FIG. 8. The operation of causing the film switching portion 63 to splice the first film F1 and the second film F2 may be the operation of switching from the film roll FR held by the second holding portion 82 to the film roll FR held by the first holding portion 81, as described with reference to FIG. 9 to FIG. 11. The operation of causing the film switching portion 63 to splice the first film F1 and the second film F2 may be any of these operations.

[0049] For example, in the case of the operation of switching from the film roll FR held by the first holding portion 81 to the film roll FR held by the second holding portion 82 as in the example of FIG. 6 to FIG. 8 described above, the portion F1a and the portion F2b spliced to each other by the operation shown in FIG. 6 can become an adhered film Fad. The adhered film Fad is a portion of the film that adheres to components of the film supply device 6 around the film switching portion 63 (for example, the seal base 65a or the roller 91b or the like) even when the air cylinder 66 extends and the cutter 68 and the impulse sealers 64a and 64b are separated from the seal base 65a, as indicated by a two-dot chain line in FIG. 7. Therefore, as shown in FIG. 7, for a predetermined period, the roll drive motor 62 of the second holding portion 82 that holds the film roll FR around which the second film F2 is wound is rotated in a direction opposite to the conveyance direction MD that is a direction in which the second film F2 is fed out (the direction of the arrow in FIG. 7). As a result, a peeling force acts on the adhered film Fad, and the adhered film Fad is peeled off from the components of the film supply device 6 around the film switching portion 63 and reaches a position along the roller 92c. Note that if the roll drive motor 62 of the second holding portion 82 continues to be rotated in the direction of the arrow in FIG. 7, tension is generated in the first film F1, and the roller 93f is lifted upward (in a direction opposite to a direction of a force applied by the roller 93f to the film F). As a result, displacement occurs in the roller 93f, and when the displacement of the roller 93f becomes equal to or greater than the predetermined displacement threshold, the rotation of the roll drive motor 62 in the first direction is stopped.

[0050] On the other hand, in the case of the operation of switching from the film roll FR held by the second holding portion 82 to the film roll FR held by the first holding portion 81 as in the example of FIG. 9 to FIG. 11 described above, the portion F1a and the portion F2b spliced to each other by the operation shown in FIG. 9 can become an adhered film Fad. The adhered film Fad is a portion of the film that adheres to components of the film supply device 6 around the film switching portion 63 (for example, the seal base 65b or the roller 92c or the like) even when the air cylinder 66 extends and the cutter 68 and the impulse sealers 64a and 64b are separated from the seal base 65b, as indicated by a two-dot chain line in FIG. 10. Therefore, as shown in FIG. 10, for a predetermined period, the roll drive motor 61 of the first holding portion 81 that holds the film roll FR around which the second film F2 is wound is rotated in a direction opposite to the conveyance direction MD that is a direction in which the second film F2 is fed out (the direction of the arrow in FIG. 10). As a result, a peeling force acts on the adhered film Fad, and the adhered film Fad is peeled

off from the components of the film supply device 6 around the film switching portion 63 and reaches a position along the roller 91b. Note that if the roll drive motor 61 of the first holding portion 81 continues to be rotated in the direction of the arrow in FIG. 10, tension is generated in the first film F1, and the roller 93f is lifted upward (in a direction opposite to a direction of a force applied by the roller 93f to the film F). As a result, displacement occurs in the roller 93f, and when the displacement of the roller 93f becomes equal to or greater than the predetermined displacement threshold, the rotation of the roll drive motor 61 in the first direction is stopped.

[0051] As described above, in the film supply device 6, for a predetermined period after causing the film switching portion 63 to splice the first film F1 and the second film F2, either the roll drive motor 61 of the first holding portion 81 or the roll drive motor 62 of the second holding portion 82 (the drive portion of one of the holding portions) that holds the film roll FR around which the second film F2 is wound is controlled to rotate in a direction opposite to the conveyance direction MD that is a direction in which the second film F2 is fed out. As a result, even if the splicing location between the films adheres to components of the film supply device 6 around the film switching portion 63 when the first film F1 and the second film F2 are spliced by the film switching portion 63, the adhered film Fad (second film F2) is pulled by the rotation in the direction opposite to the conveyance direction MD that is the feeding direction, and the adhesion can be released. Therefore, compared to a case where such operation of the roll drive motor 61 or the roll drive motor 62 is not performed, the supply of the film F spliced by the film switching portion 63 can be ensured. For example, damage to components of the film supply device 6 or the bag-making-packaging machine 102 due to an overload caused by forcibly pulling the adhered film F can be prevented.

[0052] The film supply device 6 further includes the roller 93f configured to adjust tension of the first film F1 being used for bag-making, and the detection portion configured to detect displacement of the roller 93f. The control unit 110 is configured to cause the roll drive motor 61 or the roll drive motor 62 to stop the rotation in the first direction when the detection portion 121 detects the displacement in a direction opposite to a direction of a force applied by the roller 93f to the film F. As a result, a release of the adhesion of the film F can be indirectly detected by utilizing the displacement of the roller 93f in a direction opposite to the direction of the force applied by the roller 93f to the film F.

[0053] In the film supply device 6, the film switching portion 63 includes a heating element configured to heat-seal the first film F1 and the second film F2 to each other. As a result, adhesion that may occur when the first film F1 and the second film F2 are heat-sealed to each other can be prevented.

[0054] In the film supply device 6, the film F provided with a sealant layer on one surface is wound around the film rolls FR. The film switching portion 63 is configured to heat-seal the first film F1 and the second film F2 to each other in a state where the sealant layers of the films F pulled out from the respective film rolls FR held by the first holding portion 81 and the second holding portion 82 do not face each other. As a result, since a sealant layer is present on at least one of the non-facing back surfaces of the first film F1 and the second film F2, although the above-mentioned adhesion is likely to occur, the operational effect of ensuring supply of the film F becomes more remarkable.

[0055] The bag-making-packaging machine 102 includes the film supply device 6 and the packaging unit 5. As a result, the supply of the film F spliced by the film switching portion 63 to the packaging unit 5 of the bag-making-packaging machine 102 can be ensured.

[0056] Conventionally, in order to avoid the adhesion of the adhered film Fad, it was necessary to carefully change the settings of the time for applying heat to the film F by the impulse sealers 64a and 64b and the time for cooling, and the adjustment was difficult. In this regard, according to the film supply device 6 and the bag-making-packaging machine 102, the adjustment of difficult setting values is omitted, and the adhered film Fad can be peeled off without human intervention, and the bag-making operation can be continued.

[0057] Although the examples of the present invention have been described above, the present invention is not necessarily limited to the above-described examples, and various modifications can be made without departing from the gist thereof.

[0058] In the above example, the film switching portion 63 was configured to include the impulse sealers 64a and 64b of a sealing method capable of heat-sealing the film F by melting the film F at a high temperature regardless of the presence or absence of the sealant layer of the film F, but the present invention is not limited to this example. The splicing portion may be a splicing portion of a sealing method that splices the first film F1 and the second film F2 by utilizing the sealant layer of the film F. The splicing portion may be a splicing portion of a sealing method that joins the first film F1 and the second film F2 with an adhesive or a tape. In this case, the splicing portion may not include a heating element configured to heat-seal the first film F1 and the second film F2 to each other.

[0059] In the above example, the roller 93f was exemplified as the dancer roller whose displacement is to be detected, but other rollers that adjust the tension of the film F (the roller 93h, the roller 93j, or the roller 931 in the example of FIG. 5) may be the dancer roller whose displacement is to be detected. The detection portion 121 only needs to be provided for at least one of the dancer rollers whose displacement is to be detected.

Claims

1. A film supply device configured to supply a film to a

bag-making-packaging section of a bag-making-packaging machine, comprising:

holding portions configured to respectively hold film rolls rotatably around which a film is wound;
drive portions configured to respectively rotate the film rolls held by the holding portions;
a splicing portion configured to splice a first film that is the film being used for bag-making and a second film that is the film to be used subsequent to the first film; and
a control unit configured to control operations of the drive portions and the splicing portion,
wherein the control unit is configured to control the drive portion of one of the holding portions that holds the film roll around which the second film is wound to rotate in a first direction opposite to a second direction in which the second film is fed out, for a predetermined period after causing the splicing portion to perform an operation of splicing the first film and the second film.

2. The film supply device according to claim 1, further comprising:

a dancer roller configured to adjust tension of the film being used for bag-making; and
a detection portion configured to detect displacement of the dancer roller,
wherein the control unit is configured to cause the drive portion to stop a rotation in the first direction when the detection portion detects the displacement in a direction opposite to a direction of a force applied by the dancer roller to the film.

3. The film supply device according to claim 1 or 2, wherein the splicing portion includes a heating element configured to heat-seal the first film and the second film to each other.

4. The film supply device according to claim 3,

wherein the film provided with a sealant layer on one surface is wound around the film rolls, and
wherein the splicing portion is configured to heat-seal the first film and the second film to each other in a state where the sealant layers of the films pulled out from the respective film rolls held by the holding portions do not face each other.

5. A bag-making-packaging machine comprising:

the film supply device according to any one of claims 1 to 4; and
the bag-making-packaging section.

Fig.1

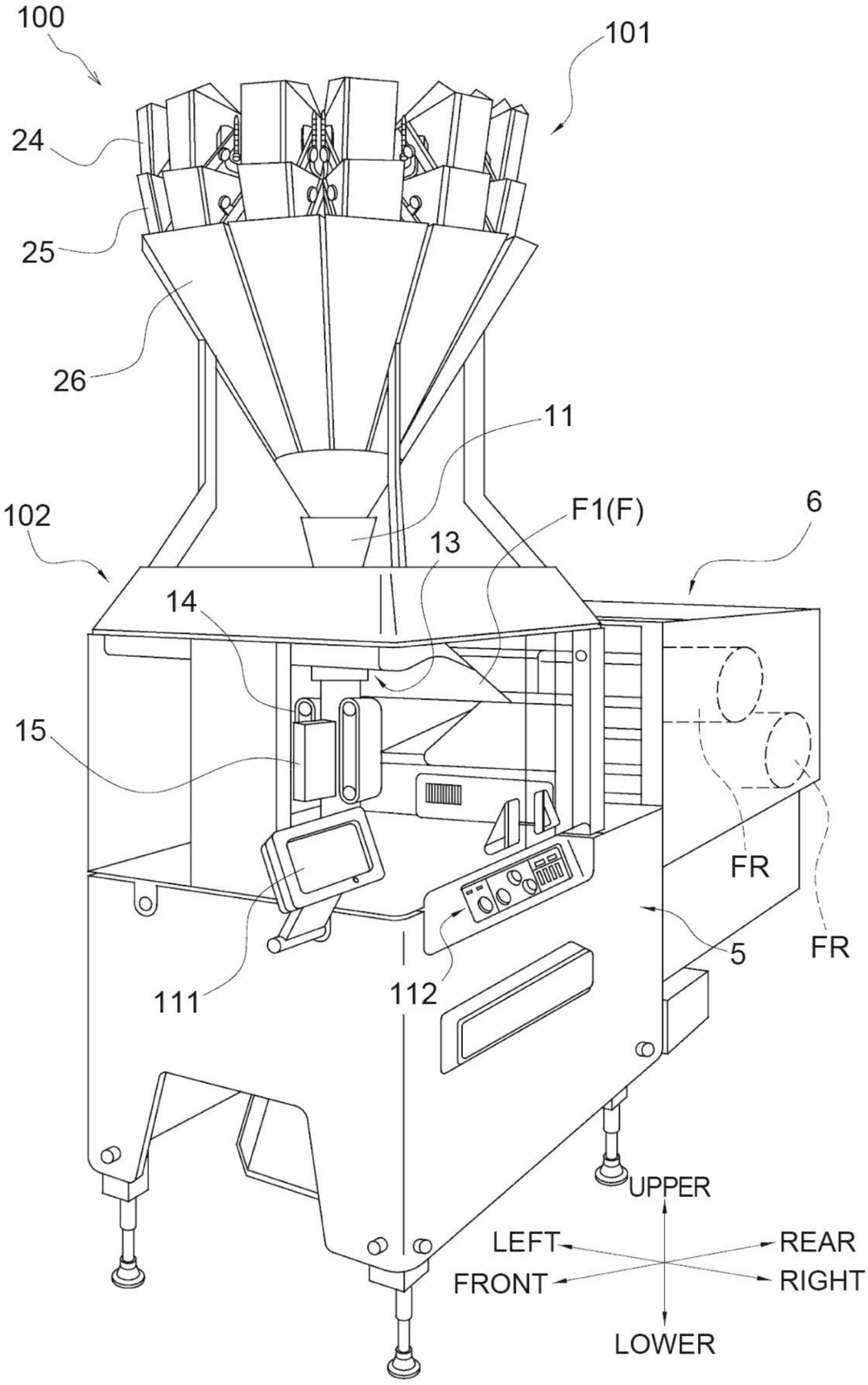

100
101
24
25
26
11
102
F1(F)
6
13
14
15
FR
FR
5
111
112
UPPER
LEFT
REAR
FRONT
RIGHT
LOWER

Fig.2

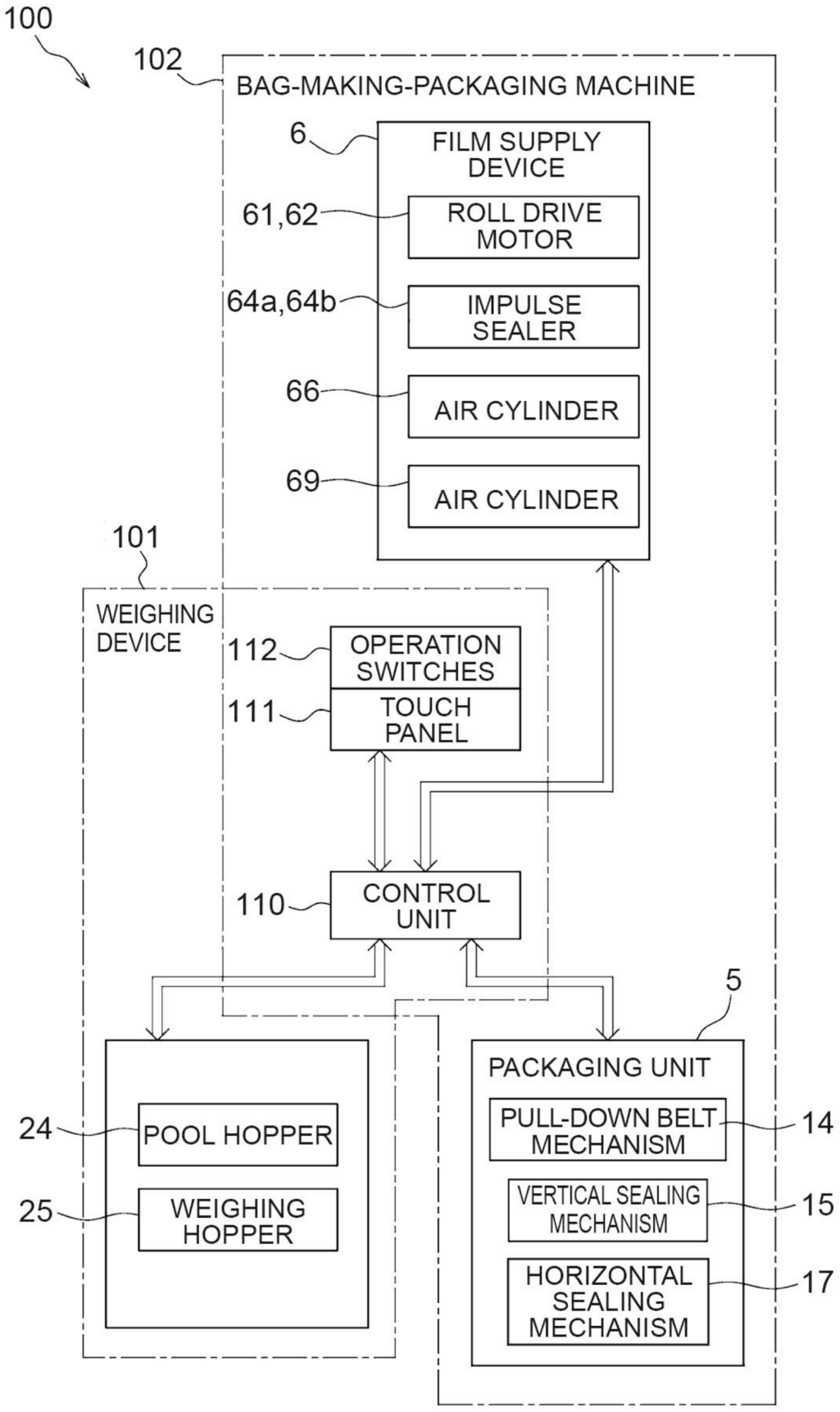

100
102
BAG-MAKING-PACKAGING MACHINE
6
FILM SUPPLY DEVICE
61,62
ROLL DRIVE MOTOR
64a,64b
IMPULSE SEALER
66
AIR CYLINDER
69
AIR CYLINDER
101
WEIGHING DEVICE
112
OPERATION SWITCHES
111
TOUCH PANEL
110
CONTROL UNIT
5
PACKAGING UNIT
24
POOL HOPPER
25
WEIGHING HOPPER
PULL-DOWN BELT MECHANISM
14
VERTICAL SEALING MECHANISM
15
HORIZONTAL SEALING MECHANISM
17

Fig.3

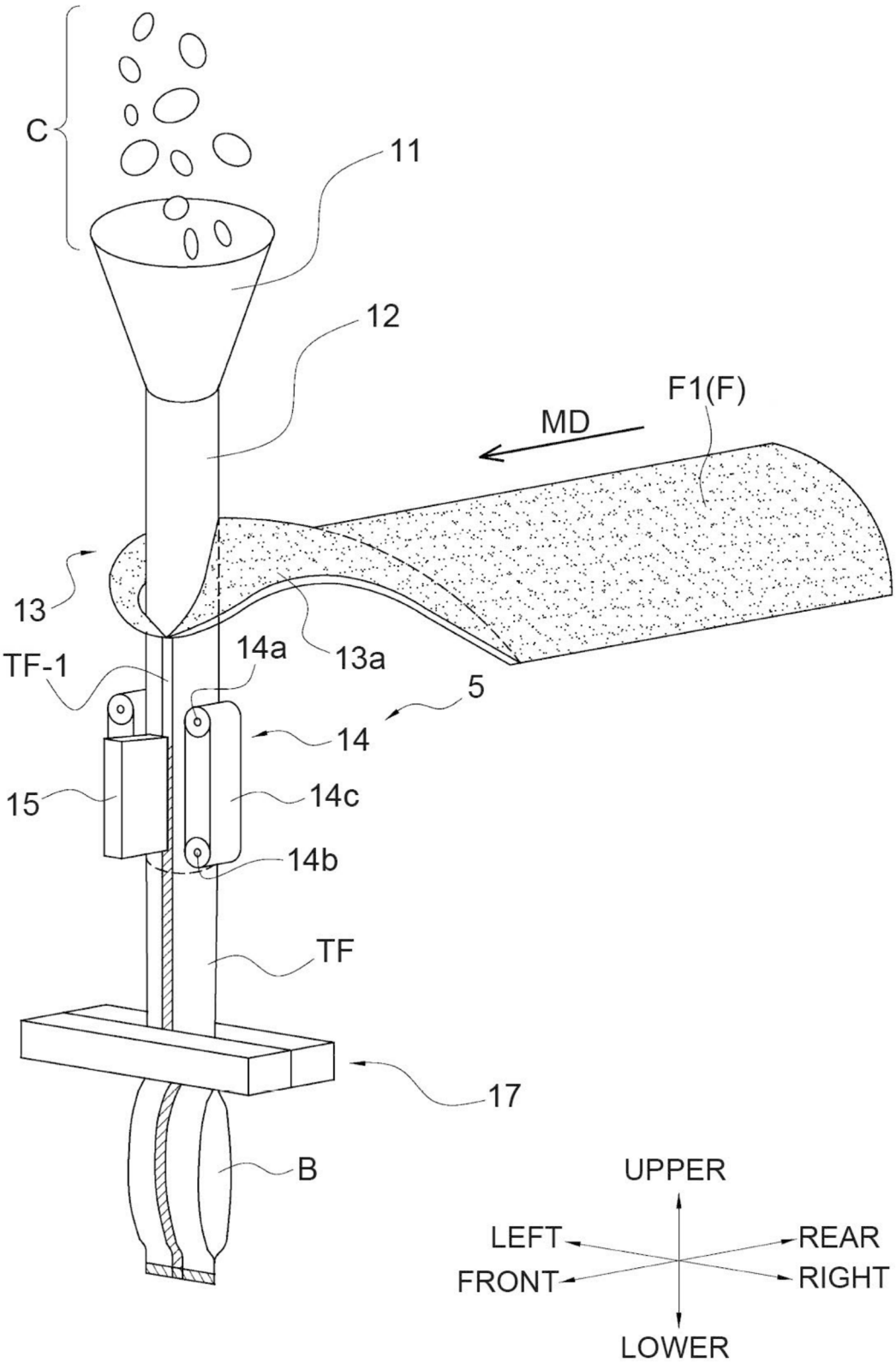
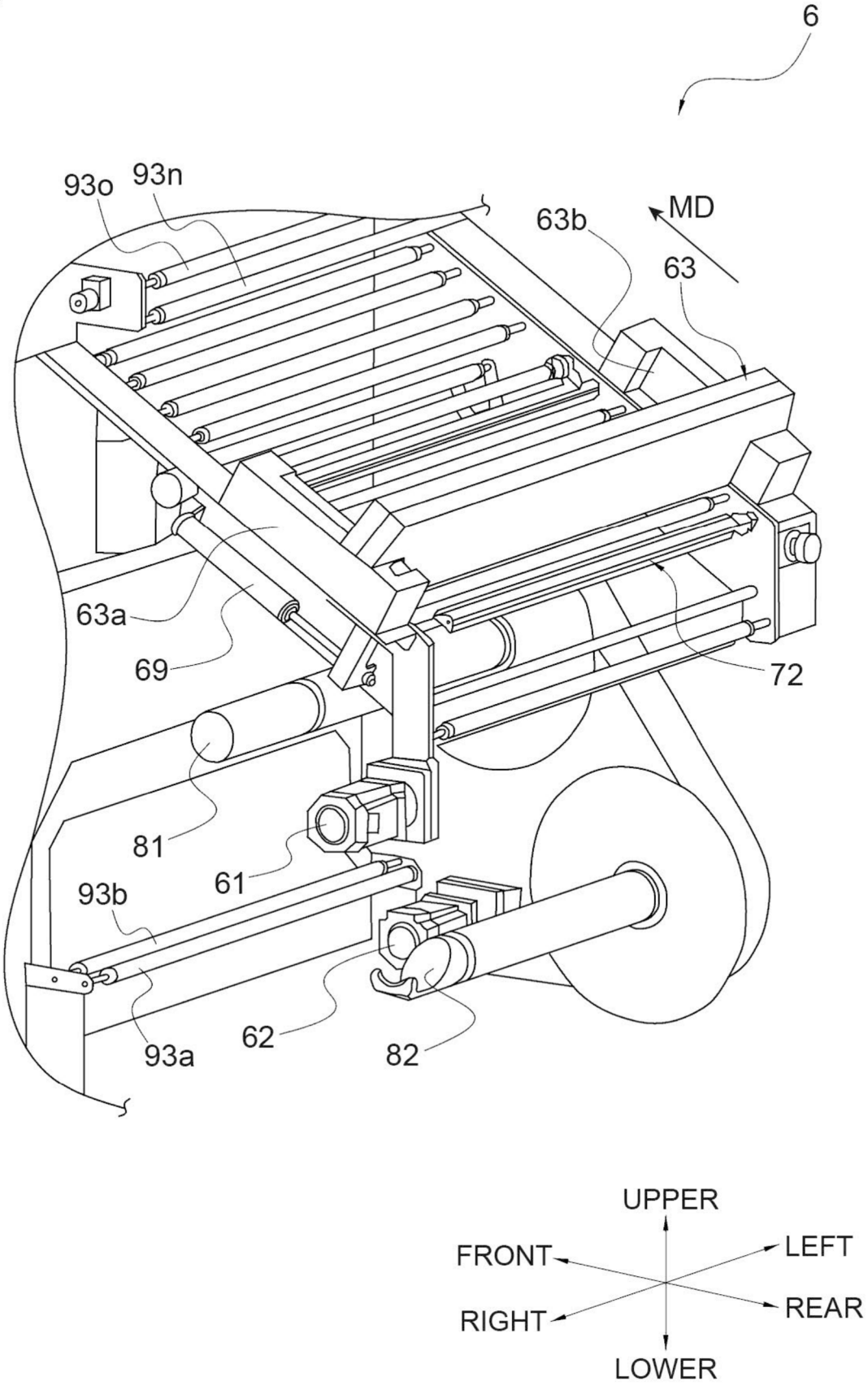

C
11
12
F1(F)
MD
13
13a
14a
TF-1
5
14
15
14c
14b
TF
17
B
UPPER
LEFT
REAR
FRONT
RIGHT
LOWER

Fig.4


6
93o
93n
63b
MD
63
63a
69
72
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61
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62
82
93a
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FRONT
LEFT
RIGHT
REAR
LOWER

Fig.5

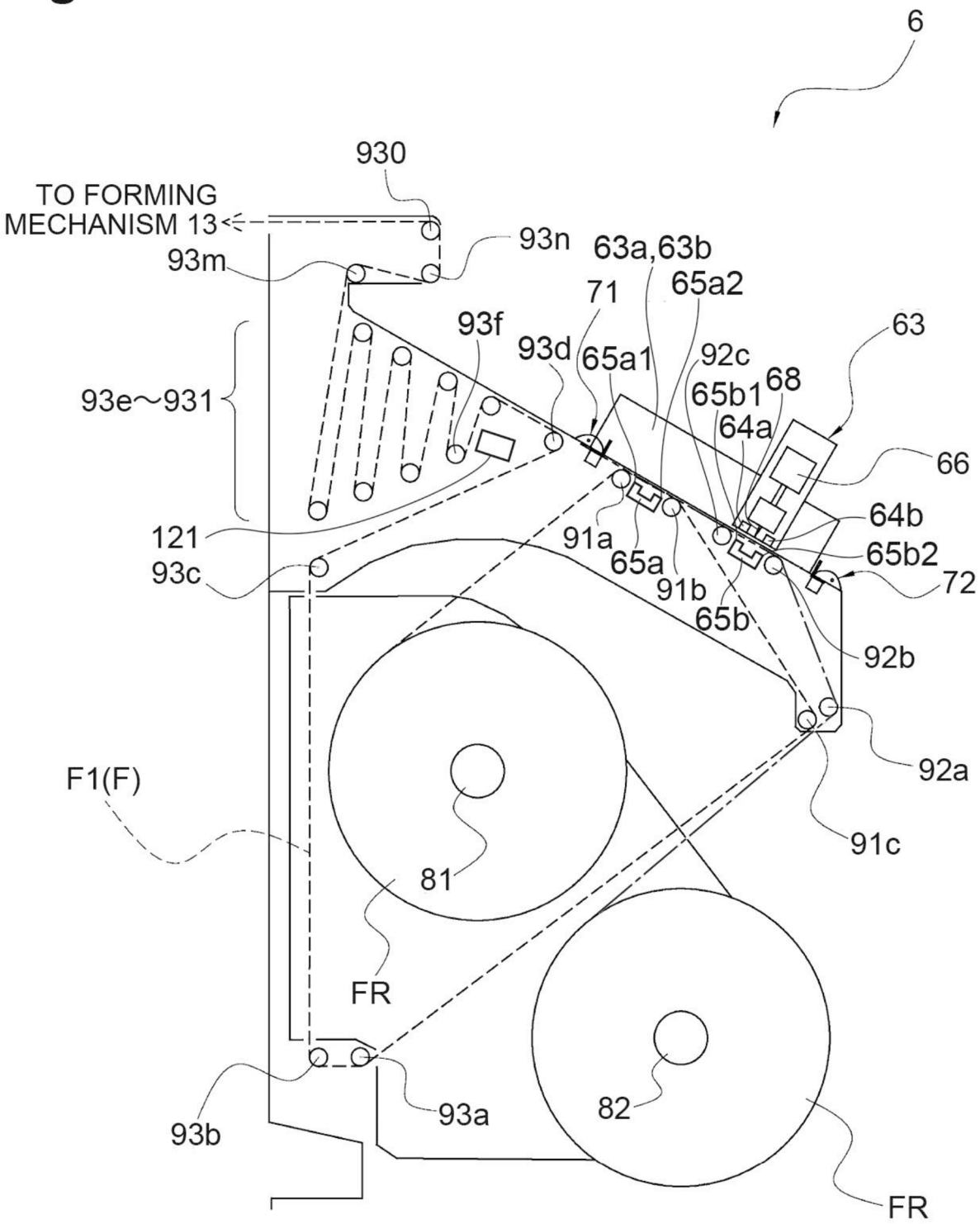

6
930
TO FORMING MECHANISM 13
93n
93m
63a,63b
65a2
71
93f
93d
65a1
92c
63
93e~931
65b1
68
64a
66
64b
121
91a
65a
65b2
93c
91b
72
65b
92b
92a
F1(F)
91c
81
FR
82
93a
93b
FR

Fig.6

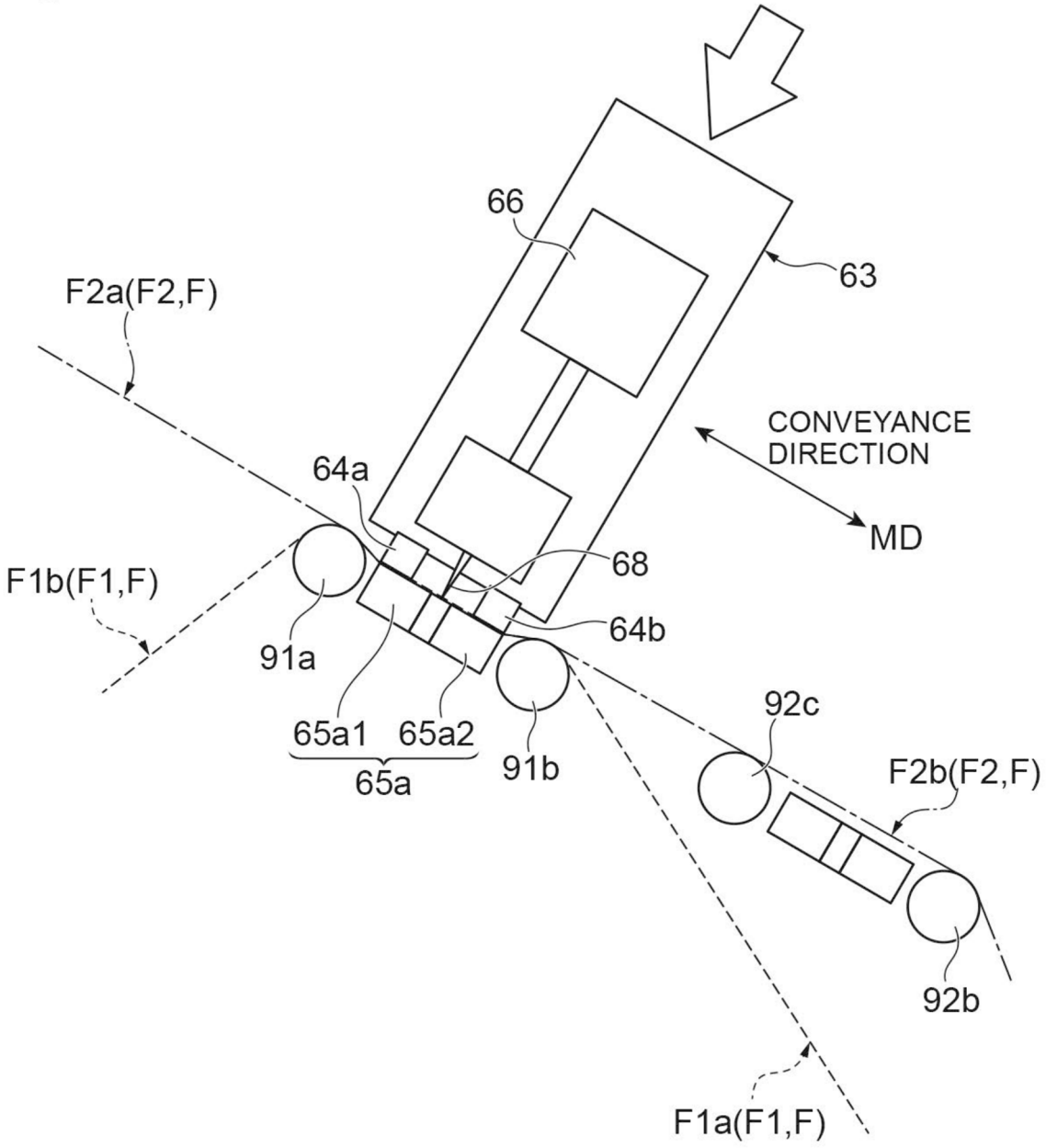

66
63
F2a(F2,F)
CONVEYANCE DIRECTION
MD
64a
68
F1b(F1,F)
64b
91a
92c
65a1
65a2
65a
91b
F2b(F2,F)
92b
F1a(F1,F)

Fig.7

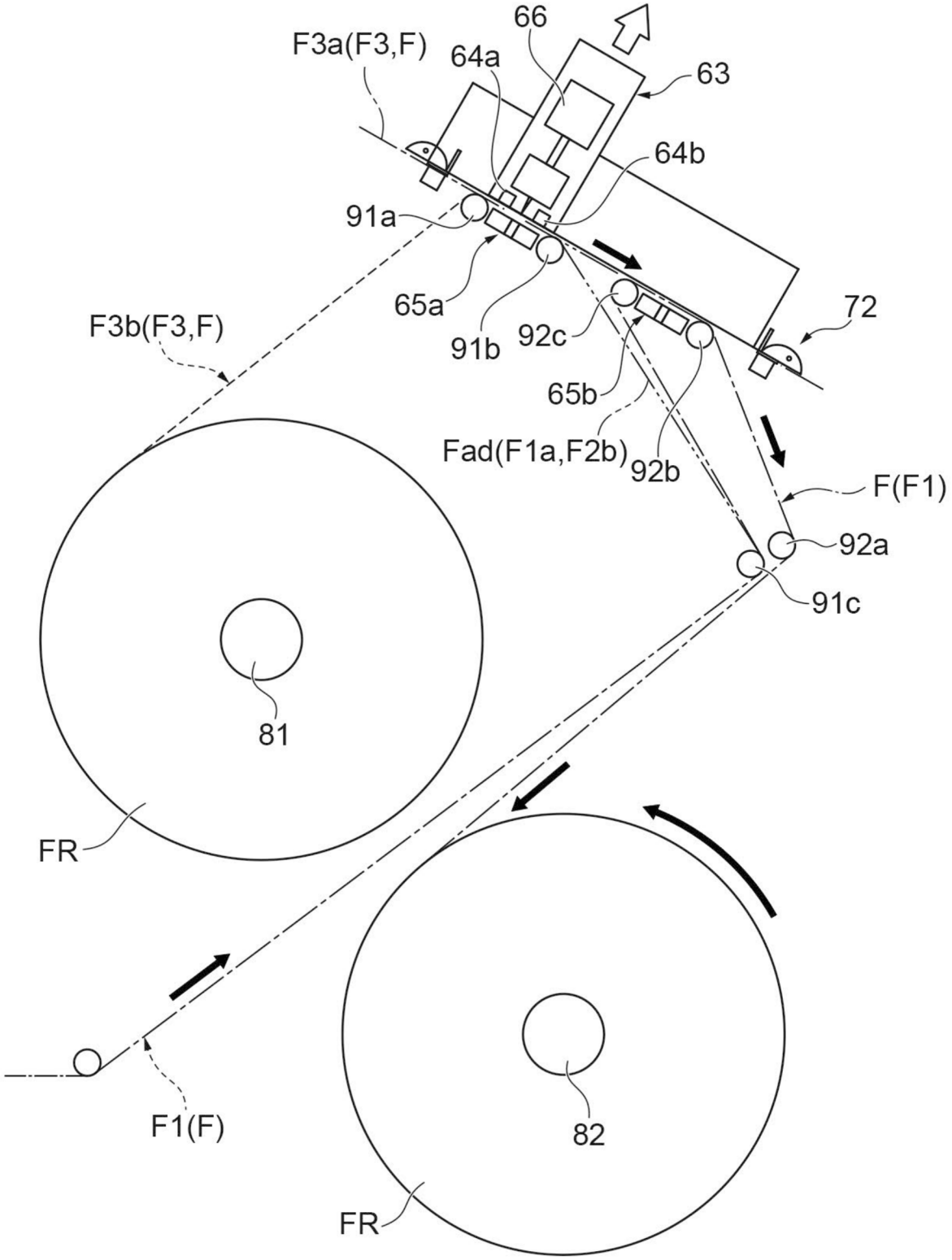
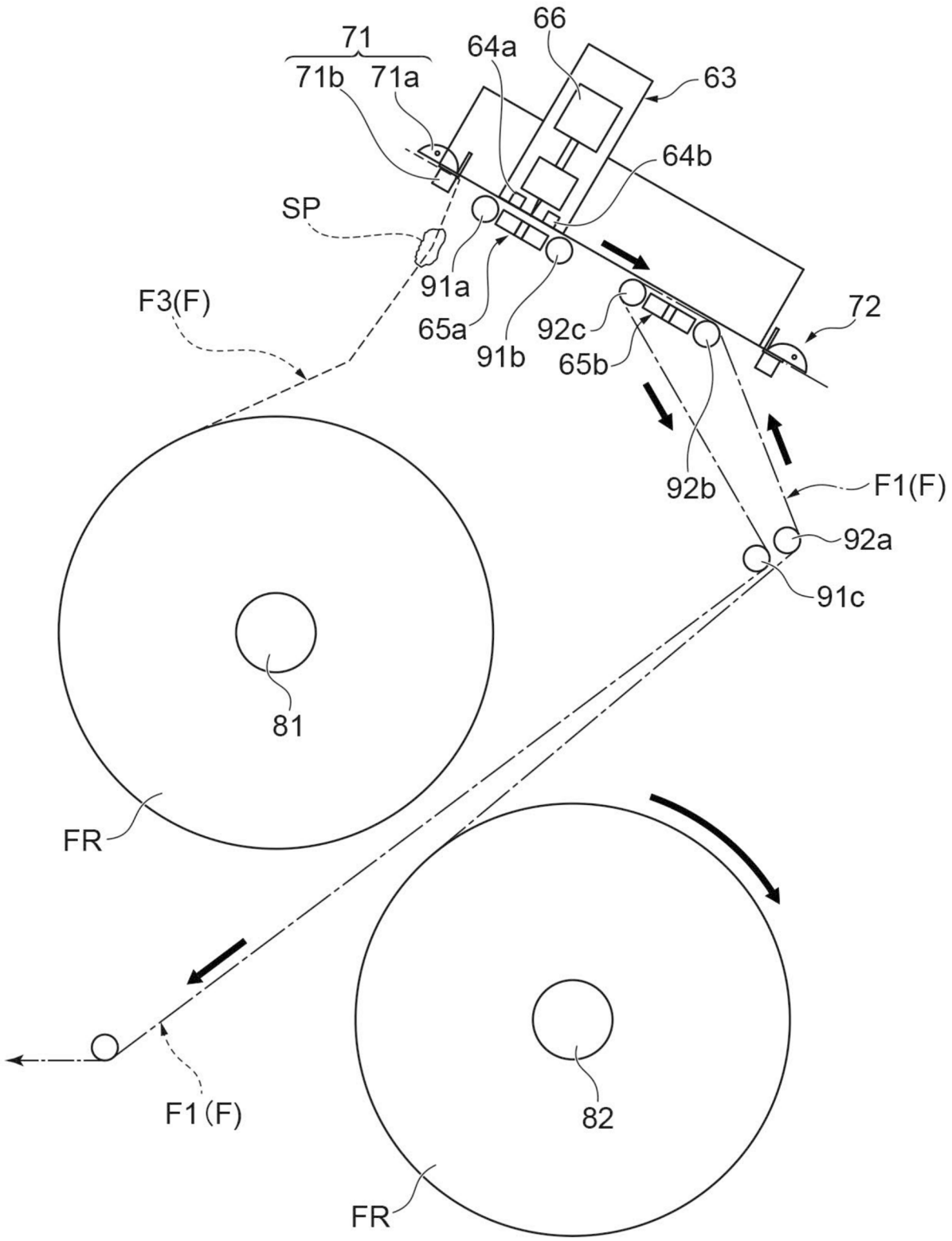

66
F3a(F3,F)
64a
63
64b
91a
65a
91b
92c
72
F3b(F3,F)
65b
Fad(F1a,F2b)
92b
F(F1)
92a
91c
81
FR
F1(F)
82
FR

Fig.8


71
71b
71a
64a
66
63
64b
SP
91a
65a
91b
92c
65b
72
F3(F)
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F1(F)
92a
91c
81
FR
F1(F)
82
FR

Fig.9

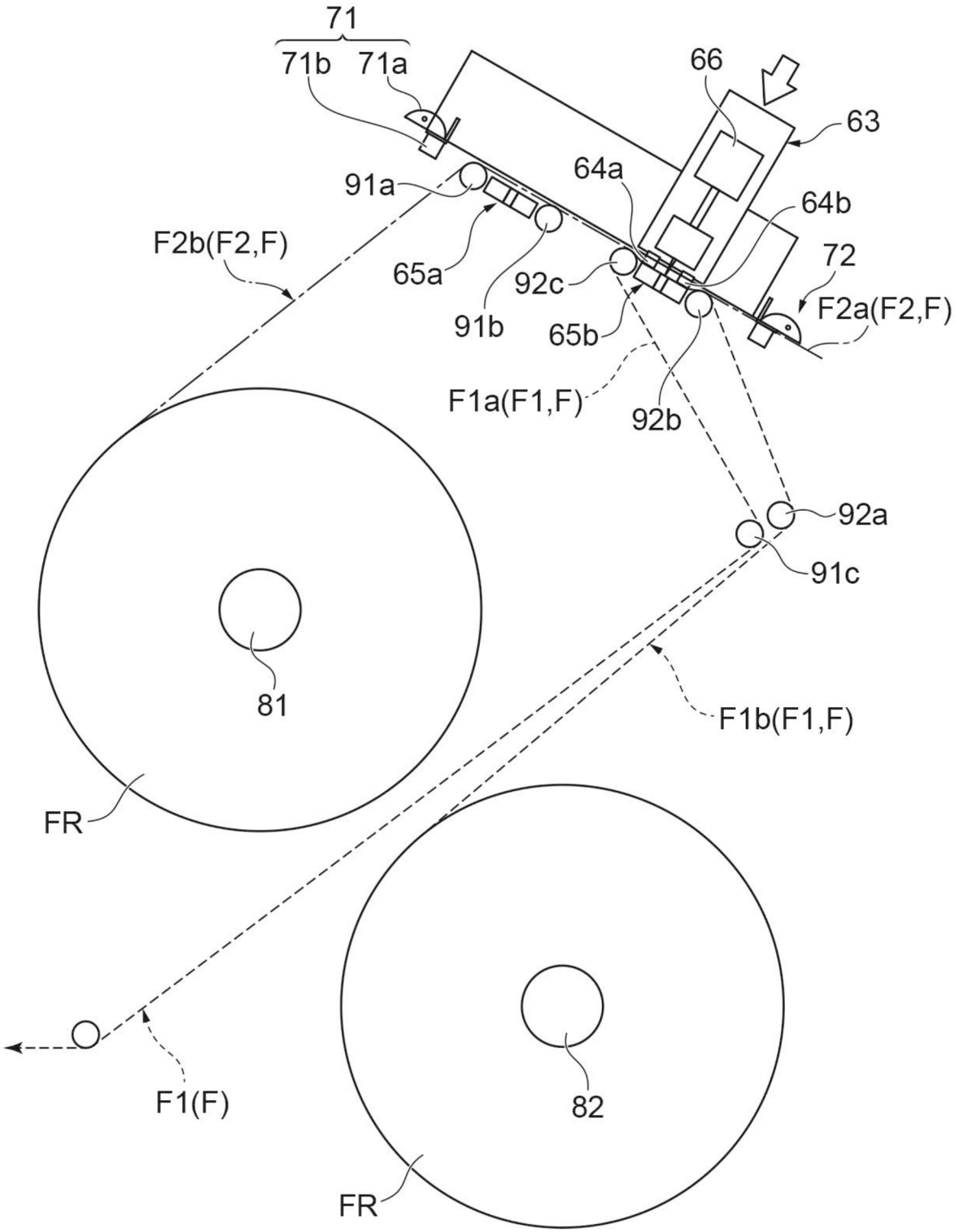

71
71b
71a
66
63
64a
64b
91a
72
F2b(F2,F)
65a
92c
F2a(F2,F)
91b
65b
F1a(F1,F)
92b
92a
91c
81
F1b(F1,F)
FR
F1(F)
82
FR

Fig.10

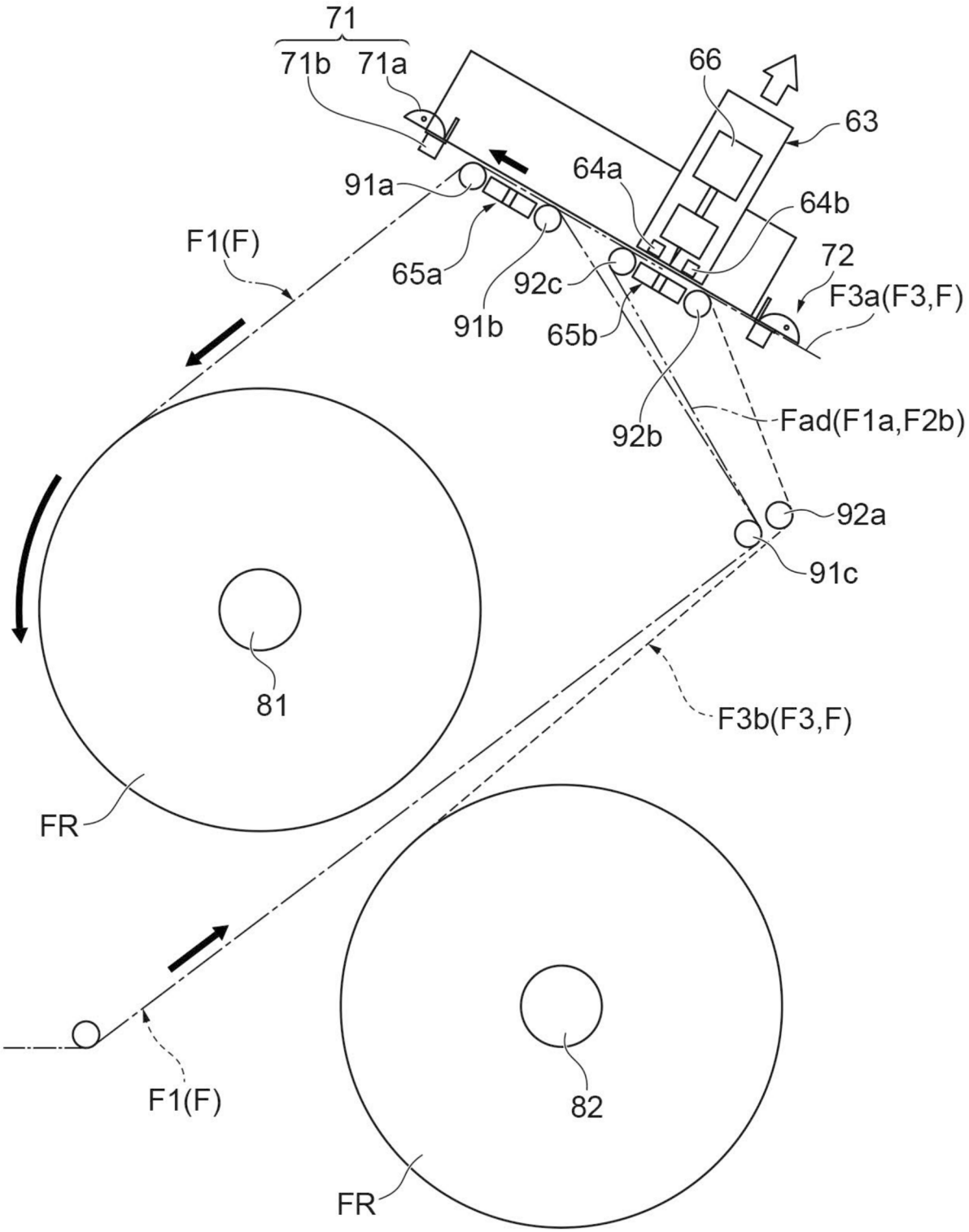
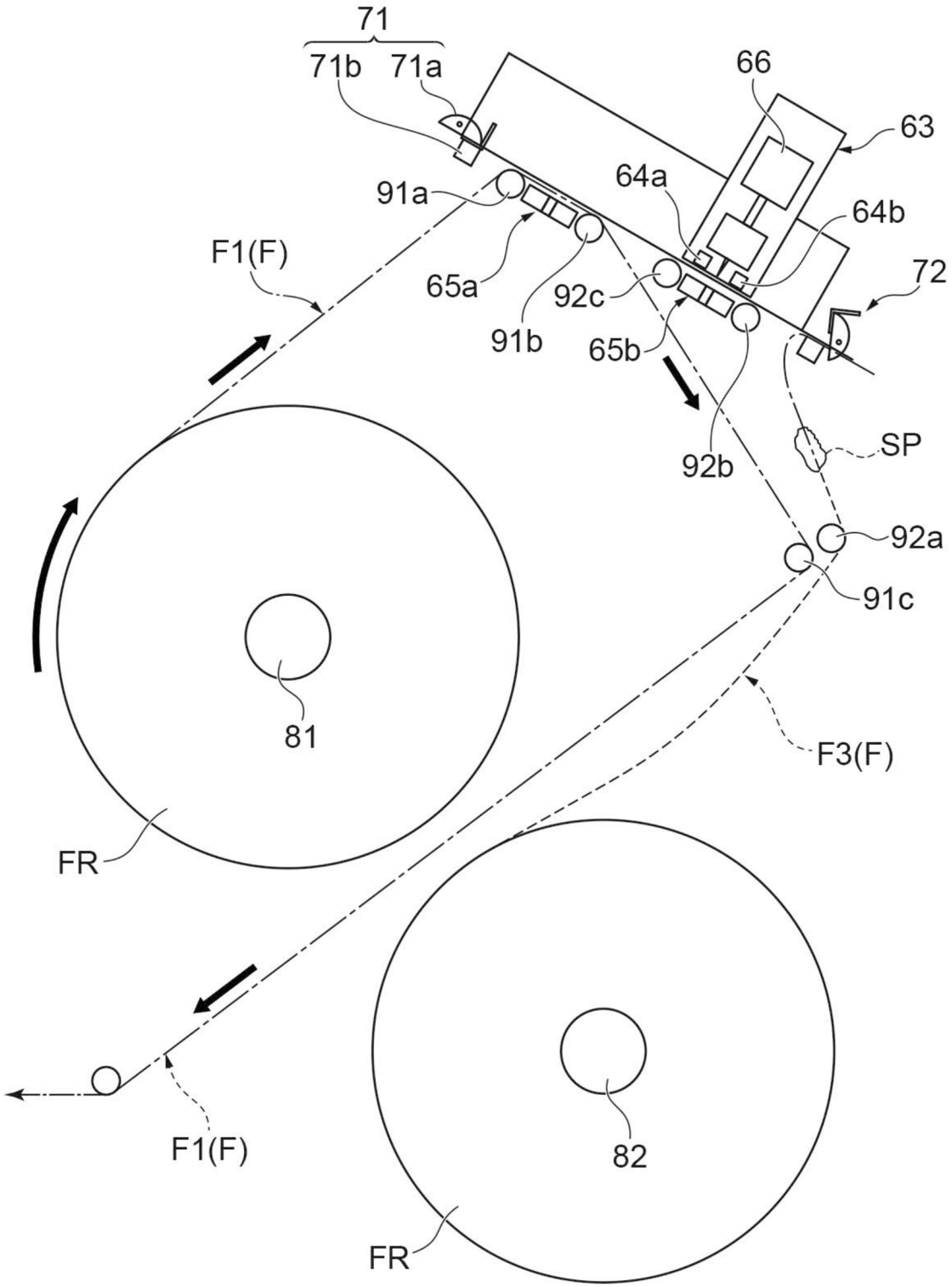

71
71b
71a
66
63
64a
91a
64b
F1(F)
65a
92c
72
F3a(F3,F)
91b
65b
92b
Fad(F1a,F2b)
92a
91c
81
F3b(F3,F)
FR
F1(F)
82
FR

Fig.11


71
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91c
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EUROPEAN SEARCH REPORT

Application Number
EP 25 22 7856

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 668 328 A (KYYTSOENEN MARKKU [FI]) 26 May 1987 (1987-05-26)	1-3	INV. B65H19/18
Y	* abstract *	5	B65H23/08
A	* figure 5h *	4	B65H23/185
	* line 59, paragraph 4 - line 4, paragraph 5 *		
	* the whole document *		

Y	JP 2021 113079 A (KAWASHIMA PACKAGING MACHINERY LTD) 5 August 2021 (2021-08-05)	5	
	* abstract *		
	* figures 6a, 6b *		
	* paragraph [0010] *		
	* paragraphs [0031] - [0035] *		
	* the whole document *		

TECHNICAL FIELDS SEARCHED (IPC)

B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 April 2026	Piekarski, Adam

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29-04-2026

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- JP 2024514241 W **[0003]**