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# (54) BAG MANUFACTURING AND PACKAGING MACHINE

(57) A bag making and packaging machine (100) is provided with a feed mechanism (10), a roll holding portion (20), a printing mechanism (30), a former (60), a longitudinal seal mechanism (70), a transverse seal mechanism (75), a cutting mechanism (80), a first sensor (91), and a second sensor (92). The printing mechanism (30) prints information on a film (F). The former (60) causes the two longitudinal sides of the film F to become overlapped. The longitudinal seal mechanism (70) bonds the two longitudinal sides and makes a film tube (FT). The transverse seal mechanism (75) sandwiches and bonds the film tube (FT) and makes a transverse seal portion. The cutting mechanism (80) cuts the film tube (FT) at the transverse seal portion. The first sensor (91) detects a mark on the film F for identifying a cutting position for cutting the film tube FT. The second sensor (92) detects a mark for specifying a printing position of the film (F) where predetermined information is to be printed.

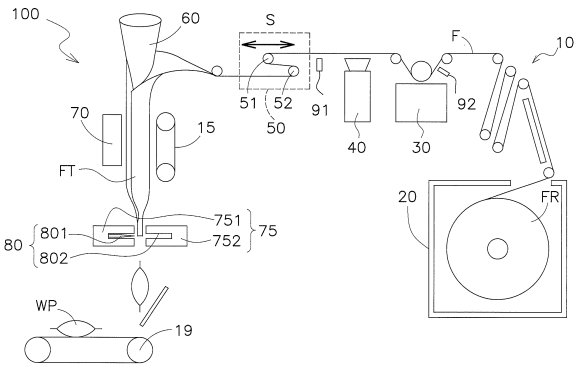


FIG. 1

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a bag making and packaging machine.

### BACKGROUND ART

**[0002]** A bag making and packaging machine pulls a film for wrapping from a film roll, makes a bag with the film, and wraps articles with the bag. Marks are regularly printed at a constant interval on the film beforehand. The bag making and packaging machine uses a sensor to detect the marks in order to print predetermined information such as the manufacturing date at an appropriate position on the film, and cut the bag-shaped film at an appropriate position for discharging individual wrapped articles.

**[0003]** The bag making and packaging machine disclosed in Patent Document No. 1 (Japanese Patent No. 3971833) is provided with one sensor for detecting the marks.

### SUMMARY OF THE INVENTION

#### <Technical Problem>

**[0004]** At a factory for manufacturing wrapped articles, the operation of the bag making and packaging machine is temporarily stopped just before finishing up one film roll. Next, a new film roll is set on the bag making and packaging machine by a worker, and the terminating edge of the previous film and the starting edge of the film on the new roll are joined with an adhesive tape or the like. The operation of the bag making and packaging machine is then restarted.

**[0005]** Usually, the positional relationship of the two films is not matched at the joining portion of the films, whereby the interval between adjacent marks on either side of the joining portion is improper. As a result, displacement of the positions for printing and cutting may occur near the joining portion of the films. The range where such displacement in the films could extend by the feed path between the farthest two among the cutting mechanism, the printing mechanism, and the sensor for detecting the marks. The film portion having such a displacement must be discarded.

**[0006]** An object of the present invention is to reduce the amount of film that must be discarded with regard to a bag making and packaging machine.

#### <Solution to problem >

**[0007]** A bag making and packaging machine according to a first aspect of the present invention wraps an article with a bag made from a film on which a mark is printed at a constant interval in a longitudinal direction. The interval is a dimension from a first side to a second side of the bag. The second side is opposite to the first side. The bag making and packaging machine includes a feed mechanism, a roll holding portion, a printing mechanism, a former, a longitudinal seal mechanism, a transverse seal mechanism, a cutting mechanism, a first sensor, and a second sensor. The feed mechanism feeds the film from the upstream side toward the downstream side. The roll holding portion holds a film roll onto which the film is wound. The printing mechanism is disposed downstream of the roll holding portion and prints predetermined information on the film. The former is disposed downstream of the printing mechanism and causes the two longitudinal edges of the film to become overlapped. The longitudinal seal mechanism is disposed downstream of the former and makes a film tube by bonding the two longitudinal edges that are overlapping. The transverse seal mechanism is disposed downstream of the longitudinal seal mechanism and makes a transverse seal portion that extends in the transverse direction in the film tube by bonding two opposing portions of the film tube. The transverse direction is perpendicular to the longitudinal direction. The cutting mechanism is disposed downstream of the longitudinal seal mechanism and cuts the film tube at the transverse seal portion. The first sensor detects a mark for specifying a cutting position of the film tube to be cut. The second sensor detects a mark for specifying a printing position of the film where the predetermined information is to be printed.

**[0008]** According to this configuration, the bag making and packaging machine has the first sensor corresponding to the cutting mechanism and the second sensor corresponding to the printing mechanism. Therefore, the printing mechanism and the cutting mechanism are both able to operate at an optimal timing and, consequently, the amount of film that must be discarded can be reduced.

**[0009]** A bag making and packaging machine according to a second aspect of the present invention is related to the bag making and packaging machine according to the first aspect, wherein the second sensor is disposed upstream of the printing mechanism.

**[0010]** According to this configuration, the printing mechanism is able operate at an appropriate timing because the printing mechanism is able to use a detection signal of the second sensor disposed further upstream than the printing mechanism itself.

**[0011]** A bag making and packaging machine according to a third aspect of the present invention is related to the bag making and packaging machine according to the first aspect or the second aspect, wherein the first sensor is disposed downstream of the longitudinal seal mechanism and upstream of the cutting mechanism.

**[0012]** According to this configuration, the length of the feed path from the first sensor to the cutting mechanism is small and, therefore, there is less concern that a measurement error will affect the position on the film learned by a control circuit. Therefore, the cutting mechanism is able to operate at a more accurate timing.

**[0013]** A bag making and packaging machine according to a fourth aspect of the present invention is related to the bag making and packaging machine according to the first aspect or the second aspect, wherein the first sensor is disposed downstream of the printing mechanism and upstream of the former.

**[0014]** According to this configuration, the first sensor used to allow the cutting mechanism to operate at an appropriate timing can be disposed at a location that facilitates installation.

**[0015]** A bag making and packaging machine according to a fifth aspect of the present invention is related to the bag making and packaging machine according to any one of the first to fourth aspects, wherein the length of the feed path from the roll holding portion to the printing mechanism is equal to or more than three times as long as the dimension of the bag.

**[0016]** According to this configuration, the amount of film that must be discarded can be reduced regardless of whether the distance of the feed path from the roll holding portion to the printing mechanism is long.

**[0017]** A bag making and packaging machine according to a sixth aspect of the present invention is related to the bag making and packaging machine according to any one of the first to fifth aspects, wherein the length of the feed path from the printing mechanism to the cutting mechanism is equal to or more than three times as long as the dimension of the bag.

**[0018]** According to this configuration, the amount of film that must be discarded can be reduced regardless of whether the distance of the feed path from the printing mechanism to the cutting mechanism is long.

**[0019]** A bag making and packaging machine according to a seventh aspect of the present invention is related to the bag making and packaging machine according to any one of the first to sixth aspects, and is further provided with a printing inspection mechanism and a third sensor. The printing inspection mechanism inspects whether or not the predetermined information is printed appropriately. The third sensor detects the mark for specifying the timing to enable the printing inspection mechanism to operate. The third sensor is disposed upstream of the printing inspection mechanism.

**[0020]** According to this configuration, the bag making and packaging machine has the printing inspection mechanism and the third sensor that corresponds to the printing inspection mechanism. Therefore, the information printed on the film by the printing mechanism can be verified more accurately.

**[0021]** A bag making and packaging machine according to an eighth aspect of the present invention is related to the bag making and packaging machine according to any one of the first to seventh aspects, and is further provided with a feed length changing mechanism. The feed length changing mechanism changes the length from the printing mechanism to the cutting mechanism of the film fed by the feed mechanism. The feed mechanism is able to stop once for each time the film is fed by the bag dimension. The printing mechanism and the cutting mechanism both operate in the stoppage.

**[0022]** According to this configuration, the processing speed of the bag making and packaging machine can be improved because the feeding of the film is stopped only when the printing mechanism and the cutting mechanism operate at the same time. Furthermore, the verification accuracy of the feeding state is improved because the position of the film is double-checked by two sensors.

**[0023]** A bag making and packaging machine according to a ninth aspect of the present invention is related to the bag making and packaging machine according to any one of the first to eighth aspects, wherein the feed mechanism is able to stop twice for each time the film is fed by the dimension of the bag. One of the printing mechanism and the cutting mechanism operates in the first stoppage. The other of the printing mechanism and the cutting mechanism operates in the second stoppage.

**[0024]** According to this configuration, the processing speed of the bag making and packaging machine is improved.

**<Advantageous Effects of Invention>**

**[0025]** The amount of film that must be discarded can be reduced according to the bag making and packaging machine according to the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0026]**

FIG. 1 is a schematic view of a configuration of a bag making and packaging machine 100 according to a first embodiment of the present invention.

FIG. 2 is a plan view of a film F.

FIG. 3 is a perspective view of a film tube FT subjected to a longitudinal seal.

FIG. 4 is a perspective view of the film tube FT subjected to a transverse seal.

FIG. 5 is a block diagram of a control circuit 200 mounted in the bag making and packaging machine 100.

FIG. 6 is a schematic view of a configuration of a bag making and packaging machine 100A according to a second embodiment of the present invention.

FIG. 7 is a schematic view of a configuration of a bag making and packaging machine 100B according to a third embodiment of the present invention.

## DESCRIPTION OF EMBODIMENTS

<First Embodiment>

(1) Overall configuration

**[0027]** FIG. 1 shows a configuration of a bag making and packaging machine 100 according to a first embod-

iment of the present invention. The bag making and packaging machine 100 is provided with a feed mechanism 10, a roll holding portion 20, a printing mechanism 30, a printing inspection mechanism 40, a feed length changing mechanism 50, a former 60, a longitudinal seal mechanism 70, a transverse seal mechanism 75, a cutting mechanism 80, a first sensor 91, and a second sensor 92.

(2) Detailed configurations

(2-1) Feed mechanism 10

**[0028]** The feed mechanism 10 feeds a film F for wrapping fed out from the roll holding portion 20.

**[0029]** FIG. 2 illustrates the film F. The film F extends lengthwise in a longitudinal direction L and has a constant width that extends in a transverse direction W which is perpendicular to the longitudinal direction L. A pattern for use as a bag for product wrapping is repeatedly printed on the film F at each dimension D. A mark M is also printed on the film F at an interval of the dimension D in the longitudinal direction L. When the film F is finally fabricated into a bag, the dimension D becomes the distance between the top side and the bottom side of the bag, or the distance between the left side and the right side of the bag according to the design of the bag.

**[0030]** Returning to FIG. 1, the film F is fabricated into the shape of a bag in the course of the feed mechanism 10 feeding the film F. The feed mechanism 10 finally discharges a wrapped product WP that is filled and sealed.

**[0031]** The feed mechanism 10 has a plurality of rollers, which are not provided with a reference numeral, a pull-down belt 15, a discharge conveyor 19, and a feed length changing mechanism 50 to be mentioned below.

(2-2) Roll holding portion 20

**[0032]** The roll holding portion 20 is provided upstream in the feed path formed by the feed mechanism 10. The roll holding portion 20 holds a film roll FR. The film roll FR has a core and the film F which is wound onto the core and extends in the longitudinal direction.

**[0033]** The feed mechanism 10 holds one end of the film F and draws out the film F from the roll holding portion 20.

(2-3) Printing mechanism 30

**[0034]** The printing mechanism 30 prints predetermined information such as the manufacturing date or the like at an appropriate position on the film F during feeding. As a result, the predetermined information is printed on each of the wrapped products WP finally discharged from the bag making and packaging machine 100.

**[0035]** The length of the feed path from the roll holding portion 20 to the printing mechanism 30 is equal to or more than three times as long as the dimension D of the bag. Consequently, a space for disposing the mechanisms from the roll holding portion 20 to the printing mechanism 30 can be easily obtained.

(2-4) Printing inspection mechanism 40

**[0036]** The printing inspection mechanism 40 includes a camera.

**[0037]** The printing inspection mechanism 40 inspects whether the predetermined information printed by the printing mechanism 30 is printed on the film F in a correct manner, or not. Specifically, the printing inspection mechanism 40 determines whether the sharpness of the printing, the contents of the information, the position of the printing, or the like is appropriate or inappropriate.

(2-5) Feed length changing mechanism 50

**[0038]** The feed length changing mechanism 50 is one of the components of the feed mechanism 10 and changes the position of some parts in order to adjust the length of the feed path of the film F between the printing mechanism 30 and the cutting mechanism 80.

**[0039]** The feed length changing mechanism 50 has a moveable roller 51 and a fixed roller 52. The film F is fed from the upstream side to the moveable roller 51, and then fed to the fixed roller 52, and then is fed toward the subsequent former 60.

**[0040]** The rotating axis of the moveable roller 51 is moved in a movement direction S by a movement mechanism that is not illustrated. The fixed roller 52 is able to rotate at a fixed position. The length of the feed path of the film F is changed by the movement of the moveable roller 51.

(2-6) Former 60

**[0041]** The former 60 is used for rounding the film F fed in a flat state and causing the two longitudinal sides of the film F to become overlapped. The former 60 has a cylindrical member. The internal space of the cylindrical member is used as a filling path for filling articles be wrapped in the bag formed with the film F.

(2-7) Longitudinal seal mechanism 70

**[0042]** The longitudinal seal mechanism 70 bonds the two longitudinal sides of the film F overlapped by the former 60. The longitudinal seal mechanism 70 has a heater. The heat produced by the heater temporarily softens the overlapping portions of the film F, whereby bonding is performed.

**[0043]** FIG. 3 illustrates the film tube FT made by bonding and having a tubular shape. A longitudinal seal portion SL is formed on the film tube FT due to the bonding.

(2-8) Transverse seal mechanism 75

**[0044]** Returning to FIG. 1, the transverse seal mech-

anism 75 bonds two opposing portions on the film tube FT.

**[0045]** The transverse seal mechanism 75 has a first member 751 and a second member 752 that face each other on either side of the feed path. The first member 751 and the second member 752 are able to approach each other and move away from each other by means of a motor that is not illustrated. The first member 751 and the second member 752 both have heaters.

**[0046]** The bonding of the film tube FT is carried out in the following manner. First, the first member 751 and the second member 752 approach each other and press the film tube FT. Two opposing locations that sandwich the internal space of the film tube FT are the portions to be pressed. The pressing is performed across the entire dimension in the width direction of the film tube FT. Next, heat is applied by the heaters of the first member 751 and the second member 752 to the pressed portion of the film tube FT. As a result, the pressed portion is softened and bonded. Finally, the first member 751 and the second member 752 stop pressing and move away from each other.

**[0047]** FIG. 4 illustrates the film tube FT subjected to a bonding process by the transverse seal mechanism 75. The film tube FT has a transverse seal portion SW formed by the bonding process of the transverse seal mechanism 75.

**[0048]** Returning to FIG. 1, the film tube FT is filled with articles of the amount for one bag through the internal space of the former 60 each time an operation of the transverse seal mechanism 75 is finished.

(2-9) Cutting mechanism 80

**[0049]** The cutting mechanism 80 is provided in the transverse seal mechanism 75. The cutting mechanism 80 has a blade 801 and a receiving portion 802. The blade 801 is provided in the first member 751 and is able to exsert and retract. The receiving portion 802 is provided in the second member 752 and is able to receive the exserted blade 801.

**[0050]** A cutting position CP that is cut by the cutting mechanism 80 is indicated in FIG. 4. The cutting position CP is in the transverse seal portion SW.

**[0051]** Returning to FIG. 1, the blade 801 exserts toward the receiving portion 802 in the cutting operation of the cutting mechanism 80. As a result, individual wrapped products WP are cut off.

**[0052]** The length of the feed path from the printing mechanism 30 to the cutting mechanism 80 is equal to or more than three times as long as the dimension D of the bag. Consequently, a space for disposing the mechanisms from the printing mechanism 30 to the cutting mechanism 80 can be easily obtained.

(2-10) First sensor 91

**[0053]** The first sensor 91 is a sensor for detecting the mark M (FIG. 2) printed on the film F for identifying the cutting position CP (FIG. 4) to be cut on the film tube FT.

**[0054]** The first sensor 91 is disposed upstream of the cutting mechanism 80 in the feed path, and is specifically disposed between the printing inspection mechanism 40 and the feed length changing mechanism 50.

(2-11) Second sensor 92

**[0055]** The second sensor 92 is a sensor for detecting the mark M (FIG. 2) printed on the film F for identifying the printing position to print the predetermined information on the film F.

**[0056]** The second sensor 92 is disposed upstream of the printing mechanism 30 in the feed path.

(3) Control circuit

(3-1) Overall configuration

**[0057]** FIG. 5 illustrates a control circuit 200 for controlling the bag making and packaging machine 100. The control circuit 200 has a CPU 210 and a memory 220. The CPU 210 has a group of input ports and a group of output ports.

(3-2) Inputs

**[0058]** A first detection unit 231, a second detection unit 232, an image processing unit 233, and an operation panel control unit 271 are connected to the input ports of the CPU 210.

**[0059]** The first detection unit 231 converts signals from the first sensor 91 to mark detection signals.

**[0060]** The second detection unit 232 converts signals from the second sensor 92 to mark detection signals.

**[0061]** The image processing unit 233 fabricates or processes the data output by the printing inspection mechanism 40.

**[0062]** The operation panel control unit 271 processes information input by a user through an operation panel 270 mounted on the bag making and packaging machine 100 for enabling various types of settings, and enables the CPU 210 to read the information.

(3-3) Outputs

**[0063]** A roller motor drive circuit 251, a motor drive circuit for roller rotating shaft motion 252, a printing mechanism drive circuit 253, a heater drive circuit 254, a motor and heater drive circuit 255, and a solenoid drive circuit 256 are connected to the output ports of the CPU 210.

**[0064]** The roller motor drive circuit 251 generates an electric current for driving the motors for rotating various rollers included in the feed mechanism 10.

**[0065]** The motor drive circuit for roller rotating shaft motion 252 generates an electric current for driving a motor included in the movement mechanism for moving

the rotating shaft of the moveable roller 51.

**[0066]** The printing mechanism drive circuit 253 generates signals or an electric current for controlling the printing mechanism 30.

**[0067]** The heater drive circuit 254 generates an electric current for controlling the heater of the longitudinal seal mechanism 70.

**[0068]** The motor and heater drive circuit 255 generates signals or an electric current for controlling the motor and heaters of the transverse seal mechanism 75.

**[0069]** The solenoid drive circuit 256 generates an electric current for controlling the solenoid that governs the extension and retraction of the blade 801 of the cutting mechanism 80.

(3-4) Centralized processing

**[0070]** The CPU 210 detects the marks on the film F via the first sensor 91 and the second sensor 92. Additionally, the CPU 210 controls the motors for rotating the various rollers included in the feed mechanism 10.

**[0071]** Therefore, the CPU 210 is able to learn the positions indicating where each mark is present on the film F at any timing.

(4) Operations

**[0072]** Returning to FIG. 1, the "continuous operation" executed by the bag making and packaging machine 100 will be discussed next.

**[0073]** The feed mechanism 10 feeds the film F at a feeding speed that is normally constant.

**[0074]** Because the control circuit 200 (FIG. 5) knows the time when the mark M is detected by the second sensor 92 as well as the distance that the film F has been fed by since that time, it calculates the timing for operating the printing mechanism 30 from time and distance values. Thereafter, the control circuit 200 controls the printing mechanism 30 according to the calculated timing to cause the printing of the predetermined information at the appropriate position on the film F.

**[0075]** The feeding of the film F continues. Because the control circuit 200 knows the time when the mark M is detected by the second sensor 92 as well as the distance that the film F has been fed by since that time, it calculates the timing for operating the printing inspection mechanism 40 from the time and distance values. Thereafter, the control circuit 200 controls the printing inspection mechanism 40 according to the calculated timing to acquire images of the film F to be inspected and the inspection is performed.

**[0076]** Next, after the film F passes through the feed length changing mechanism 50, the film F is rounded by the former 60 and the two longitudinal sides of the film F are made to overlap each other. The longitudinal seal mechanism 70 heats the overlapping portion. Consequently, the overlapping portion is bonded and the film tube FT having the longitudinal seal portion SL (FIG. 3) is made.

**[0077]** The film tube FT is filled with articles of the amount for one bag in the previous cycle. The transverse seal mechanism 75 makes a transverse seal portion SW (FIG. 4) at a location of the film tube FT that is higher than the location where the articles are pooled. The cutting mechanism 80 makes a cut at the cutting position CP (FIG. 4) in the transverse seal portion SW. The timing of the operations of the transverse seal mechanism 75 and the cutting mechanism 80 is determined by the control circuit 200 (FIG. 5) from the time when the mark M is detected by the first sensor 91 and the distance that the film F has been fed by since that time.

**[0078]** The individual wrapped products WP cut in this way are discharged from the bag making and packaging machine 100 by the discharge conveyor 19.

(5) Characteristics

**[0079]**

(5-1) The bag making and packaging machine 100 is provided with two sensors for detecting the mark M. That is, there is the first sensor 91 corresponding to the cutting mechanism 80 and the second sensor 92 corresponding to the printing mechanism 30. Therefore, the printing mechanism 30 and the cutting mechanism 80 are able to operate at optimal timings, respectively, even when a joining portion that may accompany the replacement of the film roll FR reaches the feed mechanism 10 and the interval between adjacent marks M becomes an incorrect value other than the dimension D. As a result, the amount of film F that must be discarded can be reduced.

(5-2) The second sensor 92 is disposed upstream of the printing mechanism 30. The printing mechanism 30 is able to operate at an appropriate timing because the printing mechanism 30 is able to use a detection signal of the second sensor 92 disposed further upstream than the printing mechanism 30 itself.

(5-3) The first sensor 91 to be used for enabling the cutting mechanism 80 to be operated at an appropriate timing is disposed downstream of the printing mechanism 30 and upstream of the former 60. The feed path extends in a straight line in this region. Additionally, the fed film F is in a sheet-shape and has not been rounded yet in this region. Therefore, the first sensor 91 can be installed easily in this region.

(5-4) The length of the feed path from the roll holding portion 20 to the printing mechanism 30 is equal to or more than three times as long as the dimension D of the bag. According to this configuration, the amount of film that must be discarded can be reduced despite the long distance of the feed path from the roll holding portion 20 to the printing mechanism 30.

(5-5) The length of the feed path from the printing mechanism 30 to the cutting mechanism 80 is equal to or more than three times as long as the dimension D of the bag. According to this configuration, the amount of film F that must be discarded can be reduced regardless of whether the distance of the feed path from the printing mechanism 30 to the cutting mechanism 80 is long.

(6) Modified examples

**[0080]** The following describes a modified example of the first embodiment.

(6-1) First modified example 1A

(6-1-1) Operation

**[0081]** The bag making and packaging machine 100 according to a first modified example 1A of the first embodiment has the same mechanical configuration as the bag making and packaging machine 100 according to the first embodiment described in FIG. 1. However, the bag making and packaging machine 100 according to the first modified example 1A executes an "intermittent operation" instead of the abovementioned "continuous operation" in the operation method. That is, stopping and feeding of the film F is repeated.

**[0082]** The feed mechanism 10 stops once temporarily for each time the film F is fed by the dimension D (FIG. 2) of the bag. The printing mechanism 30 and the cutting mechanism 80 both operate in the stoppage period.

**[0083]** In order to make it possible for both the printing mechanism 30 and the cutting mechanism 80 to operate at the same time, the feed length changing mechanism 50 changes the length of the feed path from the printing mechanism 30 to the cutting mechanism 80 before the wrapping operation so as to achieve an optimal value. As a result, the occurrence of mismatching of the printing and cutting positions can be suppressed.

**[0084]** The timing of the feed stoppage is decided by the control circuit 200 from the time when the mark M is detected by the second sensor 92 and the distance the film F is fed by after that time. Additionally, the control circuit 200 uses the time at which the first sensor 91 detects the mark M, thereby verifying whether or not the film F has been fed appropriately according to the assumed timing.

**[0085]** When a joining portion of the film enters the feed path, the second sensor 92 calculates the difference between the distance of the adjacent marks M on either side of the joining portion and the dimension D of the bag. The control circuit 200 adjusts the length of the feed distance from the printing mechanism 30 to the cutting mechanism 80 by controlling the feed length changing mechanism 50 in response to the value of the above difference. As a result, the printing and the cutting can be performed appropriately even when a portion that has a mismatch in the distance between the marks M on the film F has arrived.

(6-1-2) Characteristics

**[0086]** According to this configuration, the processing speed of the bag making and packaging machine 100 can be improved because the feeding of the film F is stopped only when the printing mechanism 30 and the cutting mechanism 80 operate at the same time. Furthermore, the verification accuracy of the feeding state is improved because the position of the film F is double-checked by two sensors.

(6-2) First modified example 1B

(6-2-1) Operation

**[0087]** The bag making and packaging machine 100 according to a first modified example 1B executes a different intermittent operation from the above-mentioned first modified example 1A.

**[0088]** The feed mechanism 10 is able to carry out the intermittent operation accompanying two temporary feed stoppages in addition to the intermittent operation accompanying one temporary feed stoppage as explained in the first modified example 1A. That is, the feed mechanism 10 is able to stop twice for each time the film F is fed by the bag dimension D (FIG. 2). The printing mechanism 30 prints the predetermined information on the film F in the first feed stoppage period. The cutting mechanism 80 cuts the transverse seal portion SW of the film tube FT in the second feed stoppage period.

**[0089]** The timing of the first feed stoppage is decided by the control circuit 200 from the time when the mark M is detected by the second sensor 92 and the distance the film F is fed by after that time. The timing of the second feed stoppage is decided by the control circuit 200 from the time when the mark M is detected by the first sensor 91 and the distance the film F is fed by after that time.

**[0090]** Before starting the wrapping operation of the bag making and packaging machine 100, the length of the feed path of the film F between the printing mechanism 30 and the cutting mechanism 80 is appropriately adjusted by the feed length changing mechanism 50. As a result, the bag making and packaging machine 100 is able to perform intermittent operation with one temporary feed stoppage in the usual case, and perform intermittent operation with two temporary feed stoppages near the joining portion of the film F.

(6-2-2) Characteristics

**[0091]** According to this configuration, the need for the operation of the feed length changing mechanism 50 is made unnecessary so long as the bag making and packaging machine 100 produces the same type of wrapped products by using the same type of the film F. As a result,

the processing speed of the bag making and packaging machine 100 can be further improved.

<Second Embodiment>

(1) Configuration

**[0092]** FIG. 6 illustrates a configuration of a bag making and packaging machine 100A according to a second embodiment of the present invention. The arrangement position of the first sensor 91 in the bag making and packaging machine 100A differs from that of the bag making and packaging machine 100 according to the first embodiment. The first sensor 91 is disposed downstream of the longitudinal seal mechanism 70 and upstream of the cutting mechanism 80.

(2) Characteristics

**[0093]** The cutting mechanism 80 is able to use the detection signal of the first sensor 91 disposed upstream of the cutting mechanism 80 itself and near the cutting mechanism 80 in order to decide the timing for the cutting operation. Therefore, there is less concern that a measurement error will affect the position on the film F learned by the control circuit 200 because the length of the feed path from the first sensor 91 to the cutting mechanism 80 is small. As a result, the cutting mechanism 80 is able to operate at a more accurate timing.

(3) Modified example

**[0094]** The intermittent operation according to the first modified example 1A or the second modified example 1B of the first embodiment may be applied to the bag making and packaging machine 100A according to the second embodiment.

<Third Embodiment>

(1) Configuration

**[0095]** FIG. 7 illustrates a configuration of a bag making and packaging machine 100B according to a third embodiment of the present invention. The arrangement positions of the first sensor 91 and the second sensor 92 in the bag making and packaging machine 100B are the same as those of the bag making and packaging machine 100 according to the first embodiment. However, the bag making and packaging machine 100B is further provided with a third sensor 93 and thus differs from the bag making and packaging machine 100 according to the first embodiment.

**[0096]** The third sensor 93 detects a mark for specifying the timing to enable the printing inspection mechanism 40 to operate. The third sensor 93 is disposed upstream of the printing inspection mechanism 40 in the feed path, and is specifically disposed between the printing inspection mechanism 40 and the printing mechanism 30.

(2) Characteristics

**[0097]** The bag making and packaging machine 100B has the printing inspection mechanism 40 and the third sensor 93 that corresponds to the printing inspection mechanism 40. Therefore, the information printed on the film F by the printing mechanism 30 can be verified more accurately.

(3) Modified example

**[0098]** The intermittent operation according to the first modified example 1A or the second modified example 1B of the first embodiment may be applied to the bag making and packaging machine 100B according to the third embodiment.

## REFERENCE SIGNS LIST

**[0099]**

| | |
|---|---|
| F | Film |
| FR | Film roll |
| WP | Wrapped product |
| 10 | Feed mechanism |
| 20 | Roll holding portion |
| 30 | Printing mechanism |
| 40 | Printing inspection mechanism |
| 50 | Feed length changing mechanism |
| 51 | Moveable roller |
| 52 | Fixed roller |
| 60 | Former |
| 70 | Longitudinal seal mechanism |
| 75 | Transverse seal mechanism |
| 80 | Cutting mechanism |
| 91 | First sensor (sensor for cutting) |
| 92 | Second sensor (sensor for printing) |
| 93 | Third sensor (sensor for printing inspection) |
| 100, 100A, 100B | Bag making and packaging machine |

## CITATION LIST

## PATENT LITERATURE

**[0100]** Patent Document No. 1: Japanese Patent No. 3971833

## Claims

1. A bag making and packaging machine for wrapping an article with bag made from a film on which a mark is printed at a constant interval in a longitudinal di-

rection, the interval being a dimension from a first side of the bag to a second side opposite to the first side, comprising:

a feed mechanism that feeds the film from an upstream side toward a downstream side;
a roll holding portion that holds a film roll onto which the film is wound;
a printing mechanism disposed downstream from the roll holding portion and that prints predetermined information on the film;
a former disposed downstream of the printing mechanism and that causes two longitudinal edges of the film to become overlapped;
a longitudinal seal mechanism disposed downstream of the former and that makes a film tube by bonding the two longitudinal edges that are overlapping;
a transverse seal mechanism disposed downstream of the longitudinal seal mechanism and that makes a transverse seal portion that extends in a transverse direction perpendicular to the longitudinal direction in the film tube by bonding two opposing portions of the film tube;
a cutting mechanism disposed downstream of the longitudinal seal mechanism and that cuts the film tube at the transverse seal portion;
a first sensor that detects the mark for specifying a cutting position of the film tube to be cut; and
a second sensor that detects the mark for specifying a printing position of the film where the predetermined information is to be printed.

**2.** The bag making and packaging machine according to claim 1, wherein:

the second sensor is disposed upstream of the printing mechanism.

**3.** The bag making and packaging machine according to claim 1 or 2, wherein:

the first sensor is disposed downstream of the longitudinal seal mechanism and upstream of the cutting mechanism.

**4.** The bag making and packaging machine according to claim 1 or claim 2, wherein:

the first sensor is disposed downstream of the printing mechanism and upstream of the former.

**5.** The bag making and packaging machine according to any one of claims 1 to 4, wherein:

the length of a feed path from the roll holding portion to the printing mechanism is equal to or more than three times as long as the dimension of the bag.

**6.** The bag making and packaging machine according to any one of claims 1 to 5, wherein
the length of a feed path from the printing mechanism to the cutting mechanism is equal to or more than three times as long as the dimension of the bag.

**7.** The bag making and packaging machine according to any one of claims 1 to 6, further comprising:

a printing inspection mechanism that inspects whether or not the predetermined information is printed appropriately; and
a third sensor that detects the mark for specifying a timing to enable the printing inspection mechanism to operate, wherein,
the third sensor is disposed upstream of the printing inspection mechanism.

**8.** The bag making and packaging machine according to any one of claims 1 to 7, further comprising:

a feed length changing mechanism that changes a length of the film from the printing mechanism to the cutting mechanism, the film being fed by the feed mechanism, ,
wherein the feed mechanism is able to stop once for each time the film is fed by the dimension of the bag, and
wherein the printing mechanism and the cutting mechanism both operate in the stoppage.

**9.** The bag making and packaging machine according to any one of claims 1 to 8, wherein
the feed mechanism is able to stop twice for each time the film is fed by the dimension of the bag, and one of the printing mechanism and the cutting mechanism operates in a first stoppage, and
the other of the printing mechanism and the cutting mechanism operates in a second stoppage.

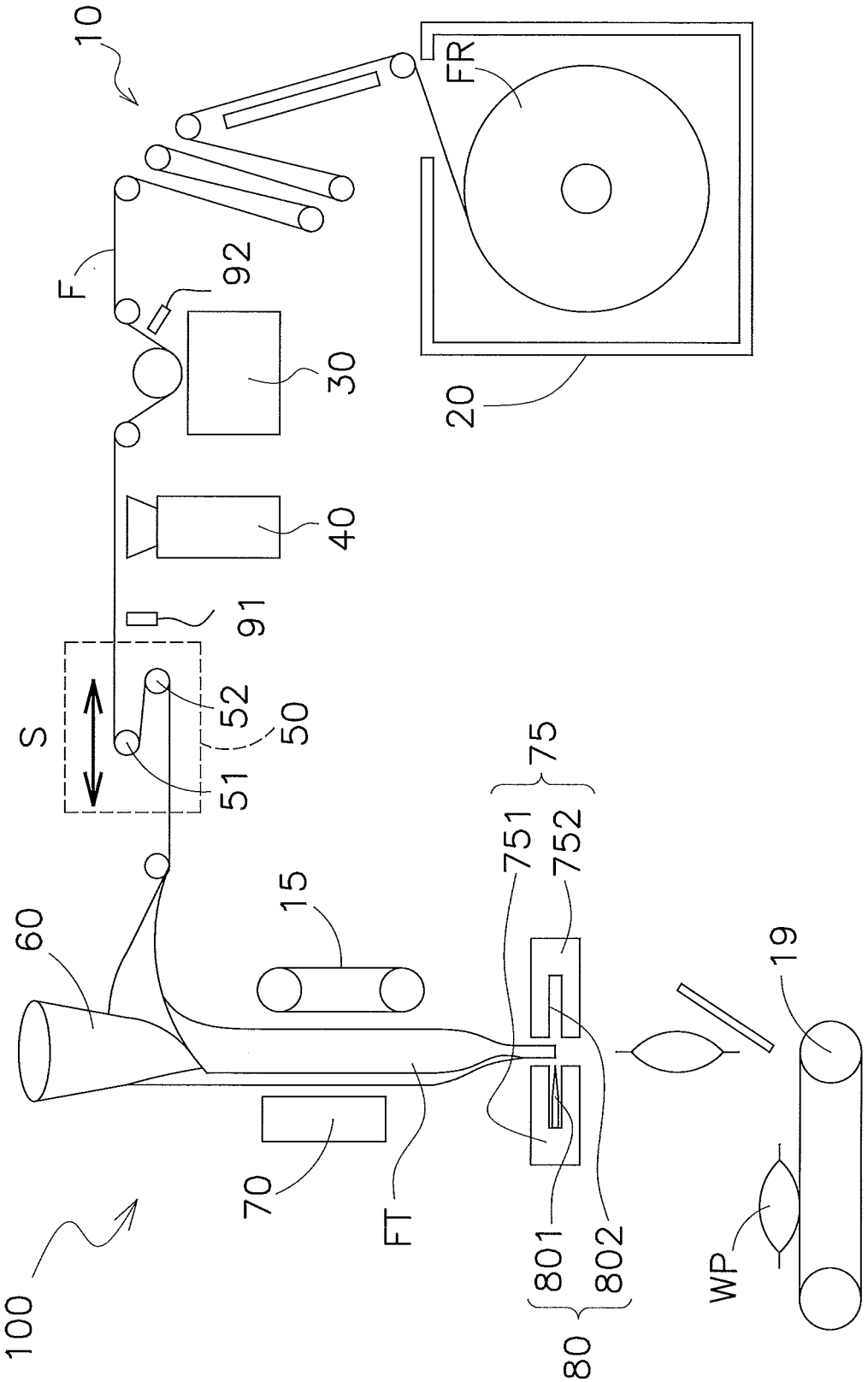
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FIG. 1

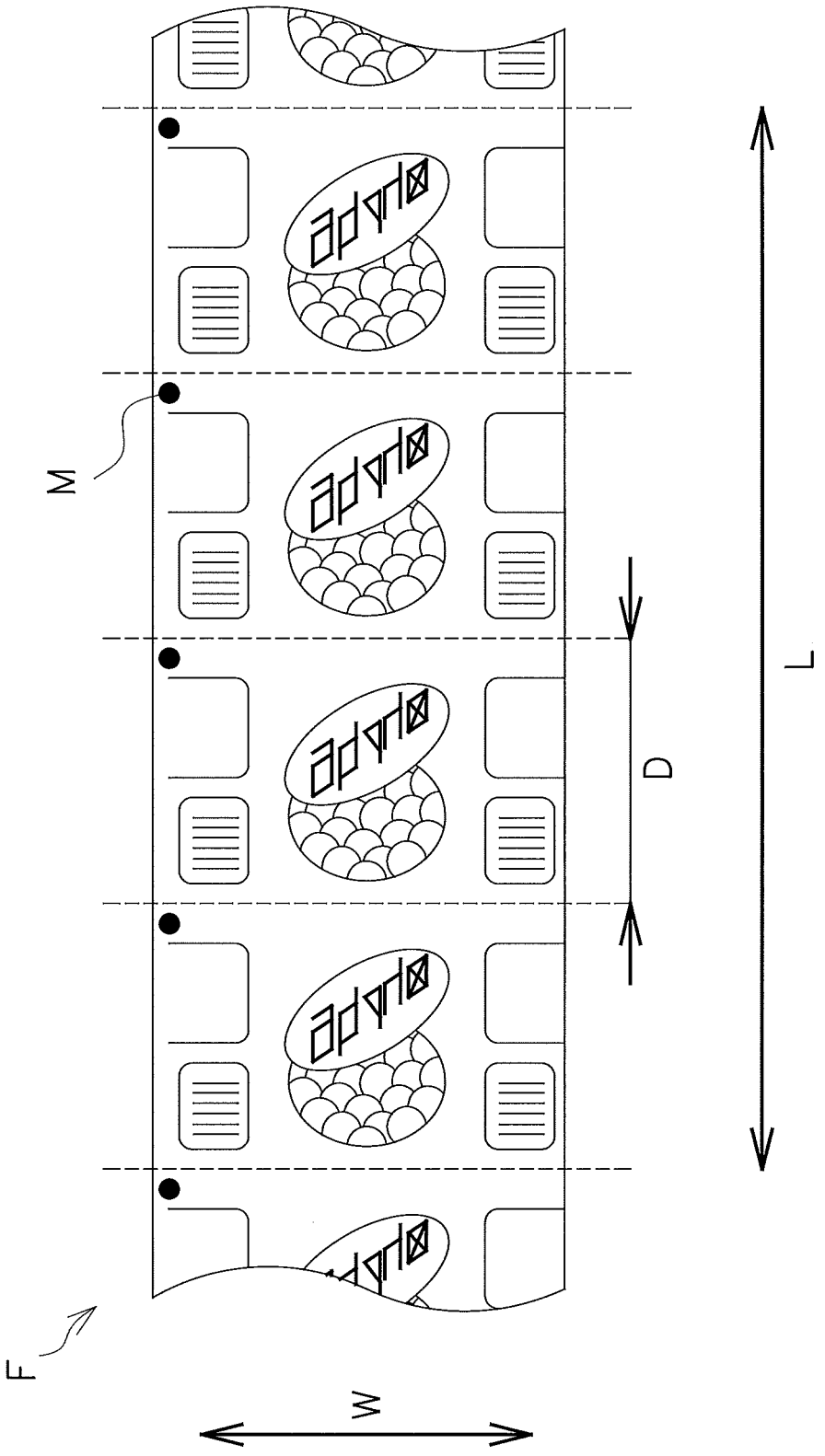


FIG. 2

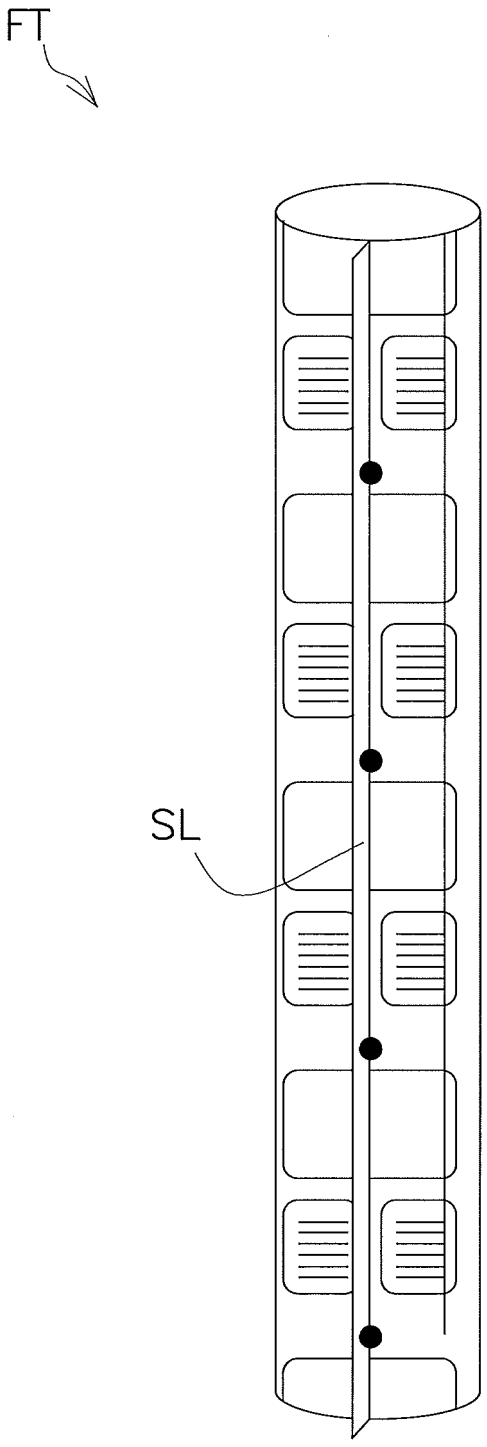


FIG. 3

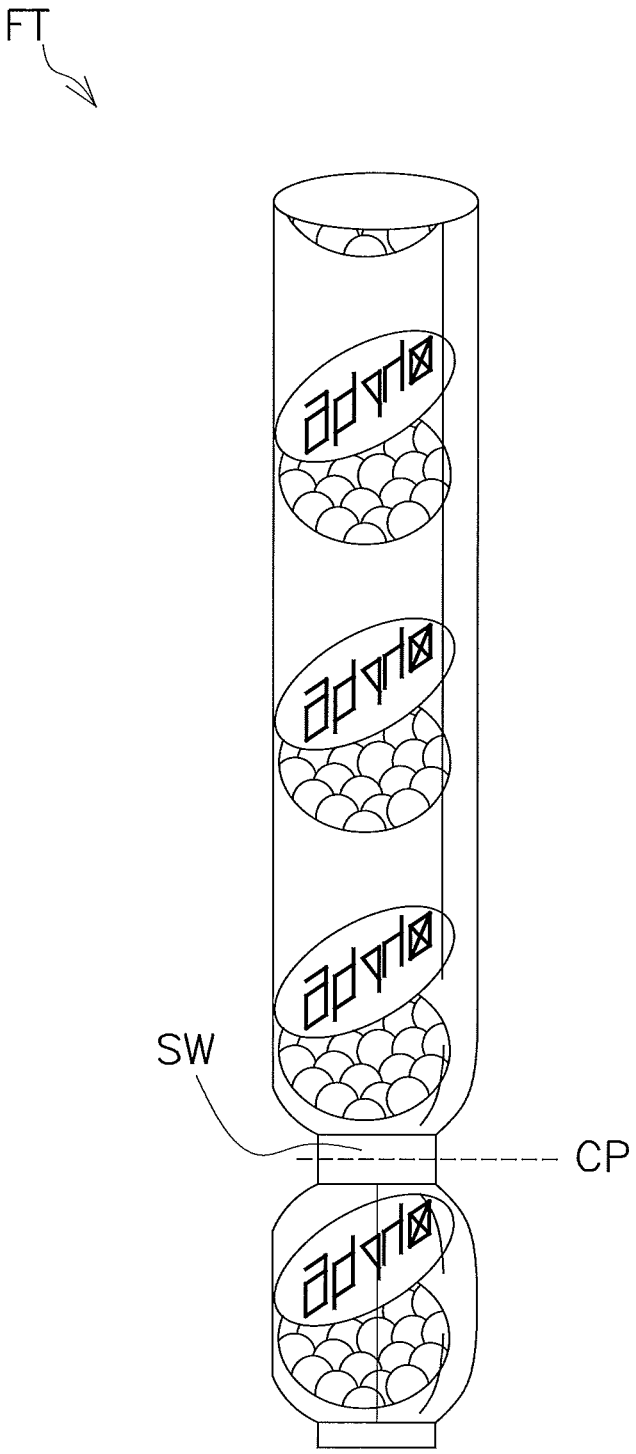


FIG. 4

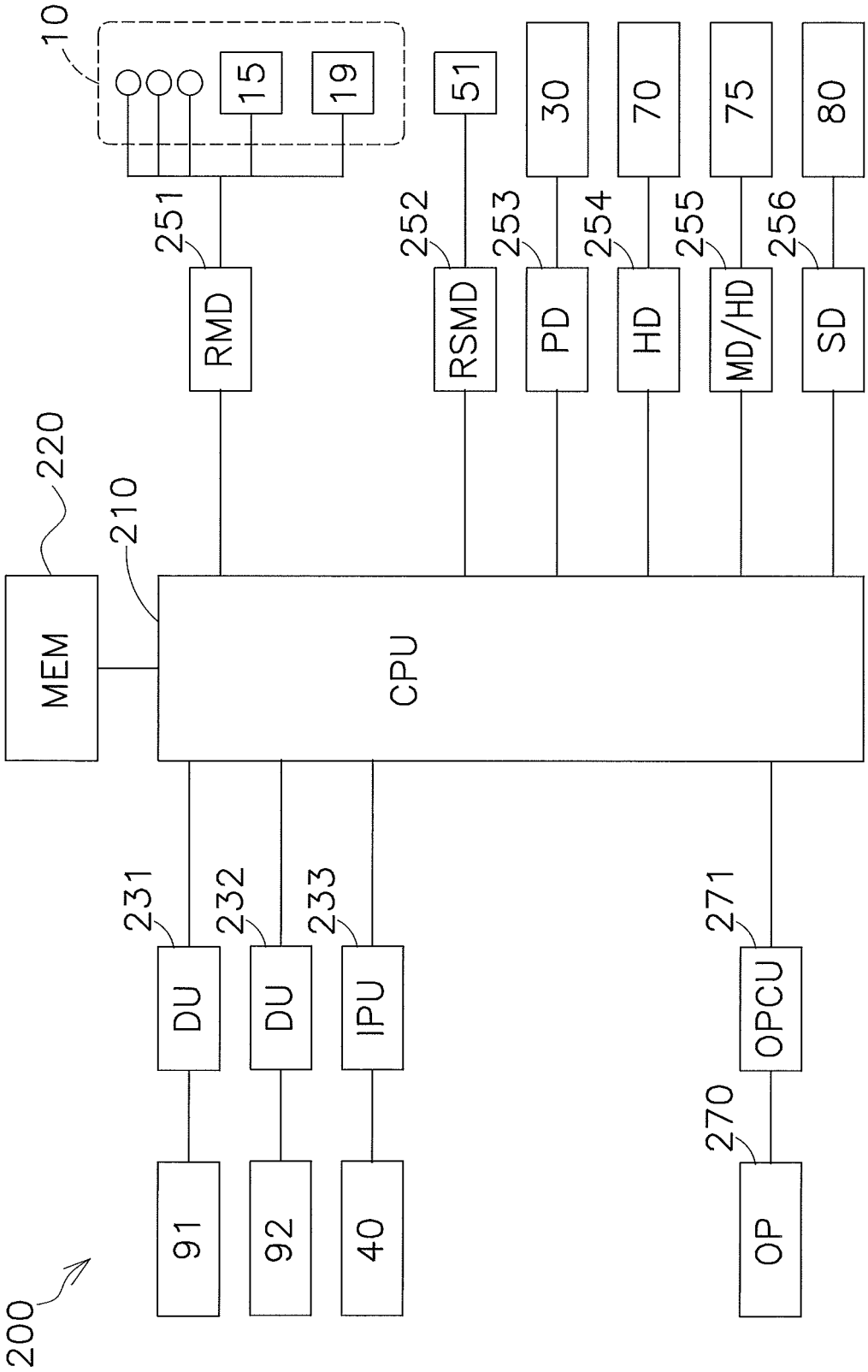
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FIG. 5

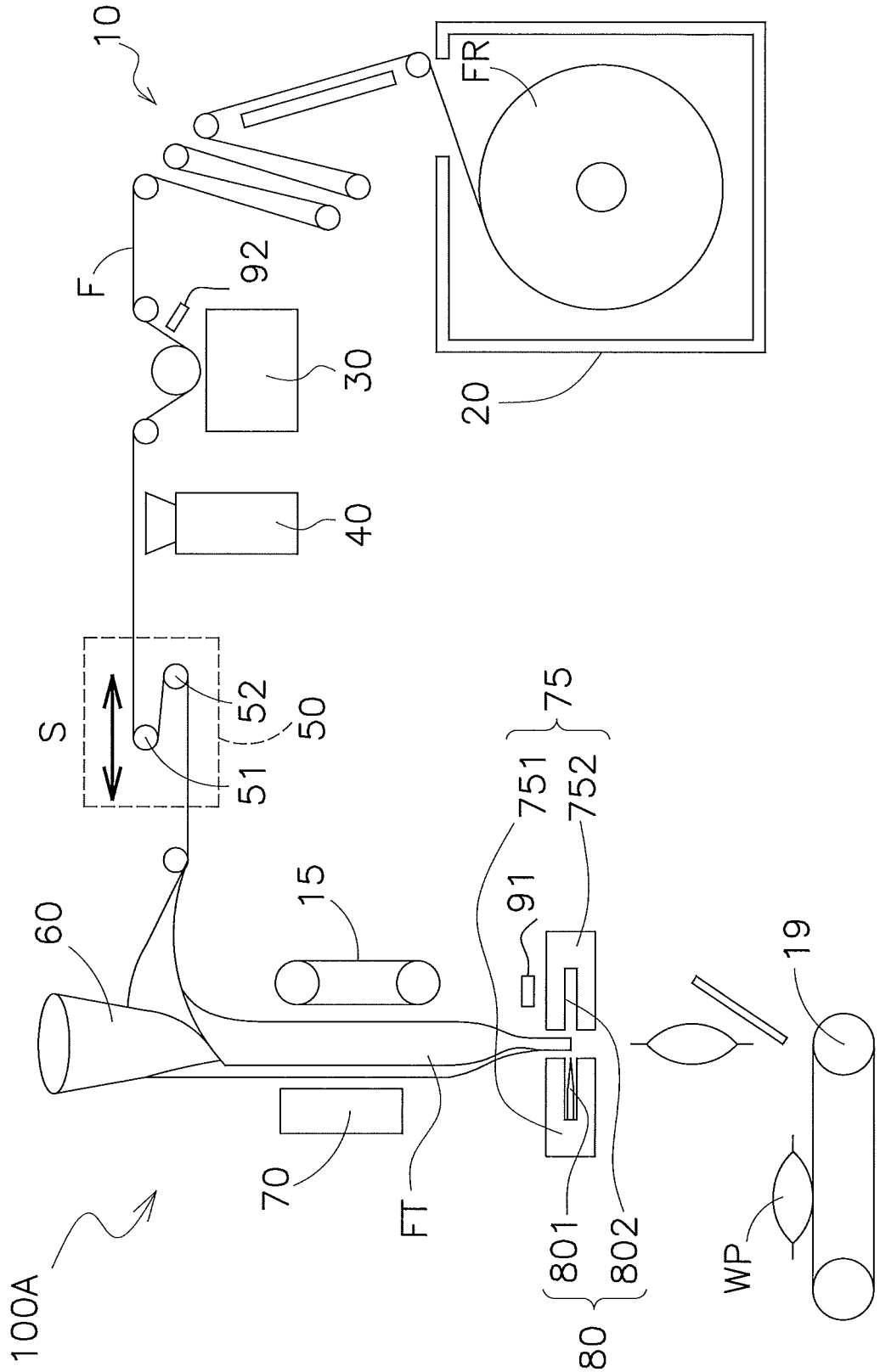
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FIG. 6

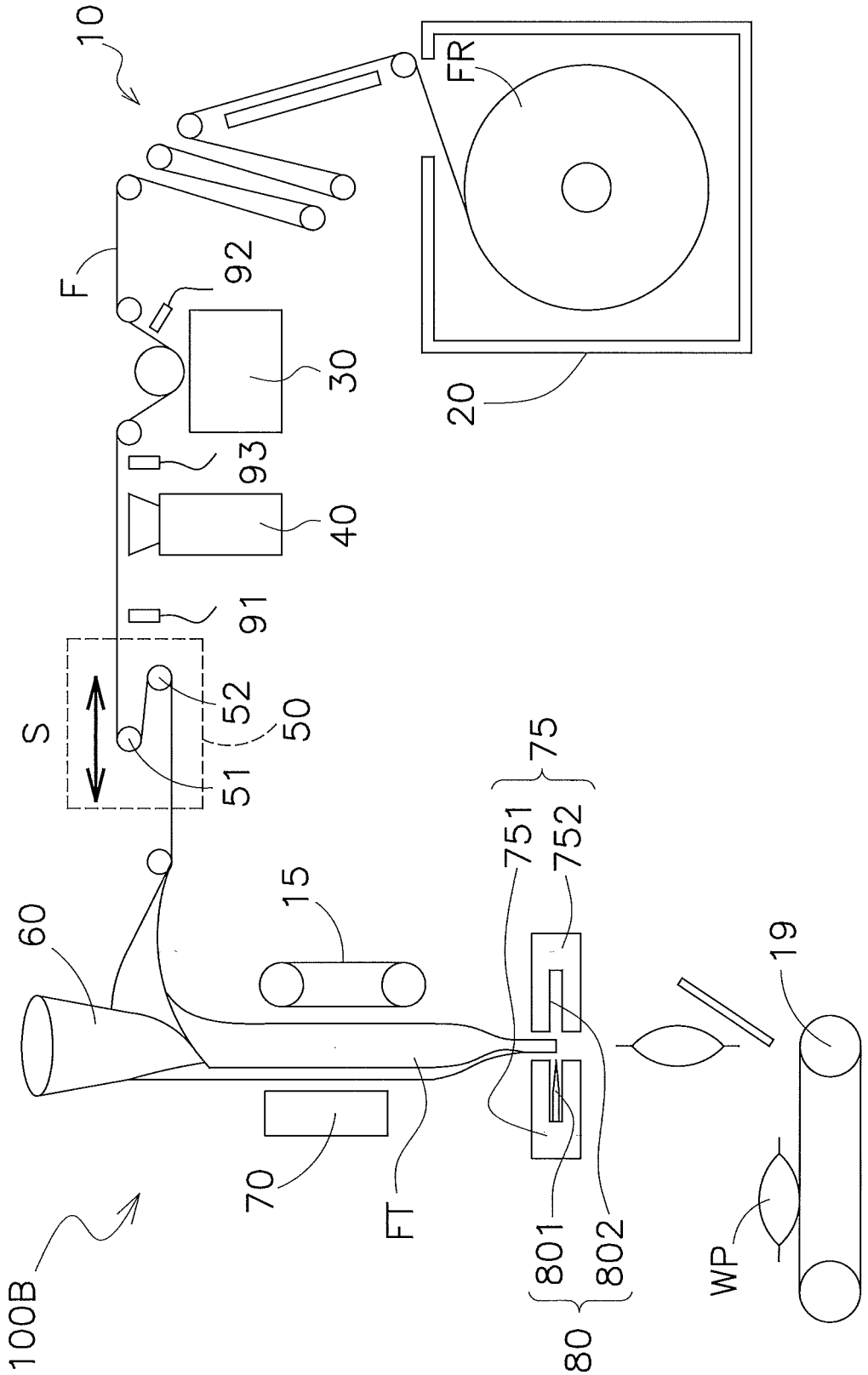
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FIG. 7

**INTERNATIONAL SEARCH REPORT**

International application No.
PCT/JP2015/078702

A. CLASSIFICATION OF SUBJECT MATTER
*B65B61/02*(2006.01)i, *B65B57/00*(2006.01)n

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)
B65B61/02, B65B57/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015
Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | JP 63-272609 A (Noriko BABA), 10 November 1988 (10.11.1988), page 2, lower right column, line 6 to page 6, lower left column, line 4; fig. 1 to 2 (Family: none) | 1-9 |
| Y | JP 2007-69950 A (CKD Corp.), 22 March 2007 (22.03.2007), paragraphs [0039] to [0062]; fig. 3 (Family: none) | 1-9 |
| Y | JP 2010-235159 A (Fuji Machinery Co., Ltd.), 21 October 2010 (21.10.2010), paragraphs [0025] to [0052]; fig. 1, 5 (Family: none) | 7-9 |

☒ 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
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"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 24 December 2015 (24.12.15) | 12 January 2016 (12.01.16) |
| Name and mailing address of the ISA/<br>Japan Patent Office<br>3-4-3,Kasumigaseki,Chiyoda-ku,<br>Tokyo 100-8915,Japan | Authorized officer<br><br>Telephone No. |

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**INTERNATIONAL SEARCH REPORT**

International application No.
PCT/JP2015/078702

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | JP 10-203505 A (Omori Machinery Co., Ltd.), 04 August 1998 (04.08.1998), paragraph [0029]; fig. 1 (Family: none) | 8-9 |
| Y | JP 62-220408 A (Taiyo Shokai Co., Ltd.), 28 September 1987 (28.09.1987), page 4, upper left column, lines 5 to 13 (Family: none) | 8-9 |
| A | JP 2000-118512 A (Fuji Machinery Co., Ltd.), 25 April 2000 (25.04.2000), entire text; all drawings (Family: none) | 8-9 |
| A | JP 2008-127093 A (Ishida Co., Ltd.), 05 June 2008 (05.06.2008), entire text; all drawings (Family: none) | 1-9 |

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## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- JP 3971833 B **[0003] [0100]**