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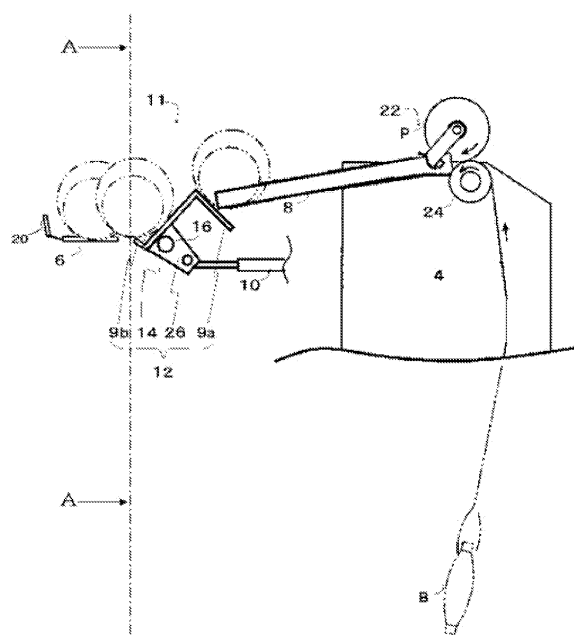
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(54) **Winding Machine**

(57) A winding machine 2 of the present invention includes a plurality of winding units 4, a conveyer 6 that carries a package P released from the winding units 4 in a direction in which the winding units 4 are arranged next to one another, a slope 8 which is arranged such that the package P rolls down from the winding units 4 to the conveyer 6, and a package receiving member 20 which is arranged along a conveying direction of the conveyer 6 and receives the package P rolling down the slope 8. Further, the winding machine 2 of the present invention includes a plurality of blocking portions 9a and 9b which are arranged along the slope 8 and block rolling motion of the package P during the rolling motion of the package P from the each of the winding units 4 to the conveyer 6, a switching mechanism 10 which switches the plurality of blocking portions 9a and 9b to a state in which rolling motion of the package P is blocked or a state in which rolling motion of the package P is allowed, and a control section which controls the operation of the switching mechanism 10 such that the plurality of blocking portions 9a and 9b block the rolling motion of the package P a plurality of times (Fig. 2).

FIG. 2



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a winding machine including a carrier device that carries a package released from a winding unit.

2. Description of the Related Art

[0002] A package is released from a cradle portion of a winding unit in the process of being conveyed from a winding machine. The winding machine, which receives a package with a package receiving member and is provided with a carrier device for stopping a package on a conveyer to carry the package for following processes, is known. For example, Japanese Unexamined Patent Application Publication No. 2006-1683 describes a winding machine provided with a package carrier device placing a shutter device for temporarily stopping a fully wound package in the middle of a guide passage (a slanted basal plate). The shutter device described in Japanese Unexamined Patent Application Publication No. 2006-1683 includes a blocking portion that blocks motion of a fully wound package rolling down the guide passage.

[0003] Adjusting a package in an appropriate position to be stopped on the conveyer is required for easily performing the following process of carrying the package. However, in the package carrier device described in Japanese Unexamined Patent Application Publication No. 2006-1683, only a blocking portion is placed on the guide passage which connects a cradle portion of a winding unit to a conveyer. Accordingly, in the package carrier device described in Japanese Unexamined Patent Application Publication No. 2006-1683, a package is forced to be stopped in the middle of the guide passage under a state in which the shutter device is closed. Then, the shutter device is switched from a closed state to an open state; consequently, the stopped package rolls down again to a package receiving member. That is, in the package carrier device described in Japanese Unexamined Patent Application Publication No. 2006-1683, force acting on a package is recovered while the package is rolling down again an inclined plane. Accordingly, a package is subjected to impact when the package receiving member receives the package. Then, the impact causes the position of the stopped package on the conveyer to be displaced. As a result, in the winding machine described in Japanese Unexamined Patent Application Publication No. 2006-1683, the following process of carrying a package becomes troublesome.

SUMMARY OF THE INVENTION

[0004] The present invention has been made to solve the above-described problems. It is a main object of the

present invention to provide a winding machine capable of making a package stop on a conveyer in a manner that the package is kept in the right position.

[0005] According to the present invention, a winding machine as described below is provided. That is, the winding machine comprises a plurality of winding units, a conveyer which is arranged along a direction in which the winding units are arranged next to one another and carries packages released from each of the winding units, a slope which is arranged in a way that the packages roll down from each of the winding units to the conveyer, and a package receiving member which is arranged along a conveying direction of the conveyer and receives the packages rolling down from the slope. The winding machine is characterized by: an at least one plurality of blocking portions associated with at least one winding unit and arranged along the slope, which block the rolling motion of the packages during the rolling motion of the packages from the at least one winding units to the conveyer, an at least one switching mechanism which switches the at least one plurality of blocking portions between a state in which the rolling motion of the package is blocked and a state in which the rolling motion of the package is allowed, and a control section which controls the operation of the switching mechanism such that the plurality of blocking portions block the rolling motion of the package a plurality of times.

[0006] In such a structure, the winding machine of the present invention can control a package released from each of the winding units to gradually roll down from the each of the winding units to the conveyer. Accordingly, the winding machine of the present invention can absorb force generated by motion of a package rolling down to the conveyer. Further, the winding machine of the present invention can adjust a package in an appropriate position per each short interval of the slope; therefore, the winding machine of the present invention can make a package stop on the conveyer without excessively displacing the position of the package in the middle of carrying the package. Furthermore, the winding machine of the present invention also controls the force generated by a package rolling down the slope per each short interval of the slope; therefore, the winding machine of the present invention can absorb impact generated when a package is received by the package receiving member or impact generated by having a package rubbed against a separator that forces the position of a meandering package to be set right. As a result, without changing a package into an irregular winding shape, the winding machine of the present invention can stop the package on the conveyer in a way that the package is kept in an appropriate position. That is, the winding machine of the present invention can easily carries a package for the following processes. Further, the winding machine of the present invention can absorb force that has been generated by rolling motion of a package and acts on the package; therefore, a package can be received by a package

receiving member that is smaller than a conventionally-known package receiving member.

[0007] The winding machine of the present invention may also be configured as follows. That is, at least one of the plurality of blocking portions of the winding machine is arranged in the vicinity of the conveyer.

[0008] In such a structure, the winding machine of the present invention blocks rolling motion of a package immediately before the package is received by the package receiving member. Accordingly, the winding machine of the present invention can minimize force kept in the package of when the package reaches the conveyer; therefore, the winding machine of the present invention can further absorb the impact generated when a package is received by the package receiving member. Consequently, the winding machine of the present invention can prevent the package from being formed in an irregular winding shape and can prevent yarn quality of the package from being deteriorated.

[0009] Further, the winding machine of the present invention may also be configured as follows. That is, the switching mechanism of the winding machine switches the blocking portions between a state in which rolling motion of a package is blocked by placing the blocking portions in a position higher than the slope and a state in which rolling motion of a package is allowed by placing the blocking portions approximately at the same level as the slope or by placing the blocking portions in a position lower than the slope.

[0010] In such a structure, by an easy operation to move the blocking portions with respect to the slope in a vertical direction, the winding machine of the present invention can switch the blocking portions between the state in which rolling motion of a package is blocked and the state in which rolling motion of a package is allowed.

[0011] Further, the winding machine of the present invention may also be configured as follows. That is, the winding machine includes a shaft arranged parallel to a conveying direction of the conveyer and a swing member arranged capable of swinging in a way that the shaft as a fulcrum point supports the swing member. The swing member includes the plurality of blocking portions. Then, the switching mechanism swings the swing member, which causes the blocking portions to be switched between the state in which rolling motion of a packaged is blocked and the state in which rolling motion of a package is allowed.

[0012] In such a structure, by a single step operation to swing the swing member, the winding machine of the present invention can switch the plurality of blocking portions between the state in which rolling motion of a package is blocked and the state in which rolling motion of a package is allowed. Accordingly, the winding machine of the present invention can be configured without providing a switching mechanism for switching between the state in which rolling motion of a package is blocked and the state in which rolling motion of a package is allowed per each blocking portion.

[0013] Further, the winding machine of the present invention may also be configured as follows. That is, in the winding machine, an inclined plane portion, which is arranged such that the package rolls down, is formed on the upper surface of the swing member. Further, a first blocking portion is formed upstream of a rolling direction of a package on the swing member in a manner that the first blocking portion hangs down from the inclined plane portion. Meanwhile, a second blocking portion is formed downstream of the rolling direction of a package on the swing member in a manner that the second blocking portion is raised from the inclined plane portion.

[0014] Further, the winding machine of the present invention may also be configured as follows. That is, in the winding machine, the plurality of blocking portions and the inclined plane portion are formed by bending a piece of sheet metal.

[0015] In such a structure, the swing member can easily be formed in the winding machine of the present invention. Further, in such a structure, the number of components of the winding machine of the present invention can be reduced. Furthermore, in the winding machine of the present invention, a light and strong swing member can be produced by a bending process of sheet metal.

[0016] The above described embodiment describes a feature that the plurality of blocking portions are arranged in each winding unit and the swing member is arranged so as to cover the plurality of winding units; however, the number of slopes and the number of swing members of the winding machine are not limited to the number indicated in such a feature. For example, each of all the winding units of the winding machine may be provided with a dedicated slope and a dedicated swing member. Further, a slope and a swing member may be shared by all the winding units of the winding machine. Furthermore, a slope and a swing member may be shared by not all the winding units of the winding machine but the plurality of winding units. That is, a slope and a swing member may be arranged in per the plurality of winding units i.e. the winding machine may include a plurality of slopes and a plurality of swing members.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 is a perspective view illustrating a winding machine according to an embodiment of the present invention.

Fig. 2 is a side view illustrating the winding machine in the embodiment.

Fig. 3 is a view seen from a direction along the A-A line of Fig 2.

Fig. 4 is a side view illustrating a state in which a package gradually rolls down a slope of the winding machine in the embodiment.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0018] Next, by referring to the drawings, an embodiment of the present invention will be described. As illustrated in Fig. 1, a winding machine 2 according to the embodiment of the present invention includes a plurality of winding units 4 and a package carrier device 11. The plurality of winding units 4 are arranged next to one another. As illustrated in Fig. 2, the winding unit 4 traverses a yarn supplied from a yarn supplying bobbin B set in a lower side of the winding unit 4. The lower side of the winding unit 4 will hereinafter be referred to as an upstream side of a yarn travelling direction. Then, the winding unit 4 winds the yarn supplied from the yarn supplying bobbin B around a winding bobbin supported by a cradle portion 22 arranged in an upper side of the winding unit 4. The upper side of the winding unit 4 will hereinafter be referred to as a downstream side of a yarn travelling direction. By performing such operations, the winding unit 4 forms a package P. The winding bobbin supported by the cradle portion 22 makes contact with a traverse drum 24 and rotates, which allows winding around the winding bobbin. Accordingly, the winding unit 4 forms a package from the yarn supplying bobbin B.

[0019] Further, the package carrier device 11 is provided in a back portion of the winding unit 4 (i.e., a back portion of the winding unit 4 of when the yarn travelling direction is referred to as a front portion of the winding unit 4). The package carrier device 11 carries the package P, which has been released from the cradle portion 22 of the winding unit 4, from the winding machine 2. The package carrier device 11 includes a slope 8 and a conveyer 6. The package P is conveyed from the winding machine 2 by the package carrier device 11. Then, a lifter (not illustrated in the drawings) receives the package P. Further, the lifter carries the package P for the following processes.

[0020] The slope 8 is provided at a back part of the cradle portion 22 of each of the winding units 4. As illustrated in Fig. 3, the winding machine has a basal plate 17 shared by all the winding units 4. The slope 8 is formed by the basal plate 17 separated per each winding unit 4 by a separator 19. Further, the slope 8 connects the cradle portion 22 to the conveyer 6, and is configured such that a cradle portion 22 side of the slope 8 is located higher than a conveyer 6 side thereof. That is, when the package P is released from the cradle portion 22, the package P rolls down the slope 8 to the conveyer 6 under its own weight. Furthermore, at an end portion of the conveyer 6 side of the slope 8, a swing member 12 with blocking portions 9a and 9b to temporarily block rolling motion of a package is provided. Details of the swing member 12 will be described later.

[0021] As illustrated in Fig. 1, the conveyer 6 is placed along a direction in which the winding units 4 are arranged next to one another. The package P rolling down from the slope 8 is stopped on the conveyer 6. Then, the pack-

age P is conveyed to an end portion of the winding machine 2 by the conveyer 6.

[0022] As illustrated in Fig. 1 and Fig. 2, a package receiving member 20 is placed along a lateral side of the conveyer 6 opposite to a slope 8 side of the conveyer 6. The package receiving member 20 receives the package P rolling down from the slope 8 (i.e., the package receiving member 20 prevents the package P from passing through the conveyer 6 and falling from the winding machine 2). That is, the package P rolling down from the slope 8 is received by the package receiving member 20, and then is stopped on the conveyer 6.

[0023] The lifter is located at an end of a conveying direction of the conveyer 6. The lifter lifts and lowers the package P received from the conveyer 6. At an upper part of the lifter, an overhead conveyer (not illustrated in the drawings) with a plurality of hooks is located. The package P is handed over by the lifter from conveyer 6 to the overhead conveyer. As described above, the overhead conveyer carries the package P for the following processes.

[0024] In the above-described structure, the package P released from the cradle portion 22 of the winding unit 4 is conveyed from the winding machine 2. Next, the structure of the swing member 12 will be described.

[0025] As illustrated in Fig. 2, at an end portion of the conveyer 6 side of the slope 8, the swing member 12 is located. The swing member 12 can swing in a way that a shaft 16 as a fulcrum point supports the swing member 12. The shaft 16 is arranged parallel to a longitudinal direction of the conveyer 6. The swing member 12 includes a first blocking portion 9a, a second blocking portion 9b, and an inclined plane portion 14. First, the first blocking portion 9a blocks rolling motion of the package P released from the cradle portion 22. Next, the second blocking portion 9b blocks the rolling motion of the package P released from the cradle portion 22. The inclined plane portion 14 connects the first blocking portion 9a to the second blocking portion 9b, and functions as a passage where the package P rolls down.

[0026] The swing member 12 is formed by bending a piece of sheet metal. That is, the first blocking portion 9a, the second blocking portion 9b, and the inclined plane portion 14 are formed on the swing member 12 by performing a sheet-metal processing. The swing member 12 is bent to be formed in a shape in which the first blocking portion 9a hangs down from the inclined plane portion 14 formed on the upper surface of the swing member 12. Further, the swing member 12 is bent to be formed in a shape in which the second blocking portion 9b is raised from the inclined plane portion 14. The first blocking portion 9a is formed upstream of a rolling direction of the package P on the swing member 12. That is, the first blocking portion 9a is formed in a cradle portion 22 side of the swing member 12. Meanwhile, the second blocking portion 9b is formed downstream of the rolling direction of the package P on the swing member 12. That is, the first blocking portion 9a is formed in a conveyer 6 side of

the swing member 12 and in the vicinity of the conveyer 6.

[0027] As illustrated in Fig. 3, a swing member supporting plate 26 that supports the swing member 12 is attached to a lower portion of the swing member 12. A plurality of swing member supporting plates 26 are attached to the lower portion of the swing member 12. The swing member supporting plates 26 can swing in a way that the shaft 16 as a fulcrum point of swinging motion supports the swing member supporting plates 26. As illustrated in Fig. 2, a specific swing member supporting plate 26 of the plurality of swing member supporting plates 26 is connected to an air cylinder (a switching mechanism) 10. As described above, the swing member supporting plates 26 are supported by the shaft 16 that is a fulcrum point of swinging motion of the swing member 12, and is also connected to the air cylinder 10. In such a structure, the swing member supporting plates 26 function as converting members that converts straight line motion of the air cylinder 10 into swinging motion of the swing member 12. The operation of the air cylinder 10 is controlled by a control section (not illustrated in the drawings). The shaft 16 is supported by a plurality of shaft supporting members 13 attached to the back surface of the winding unit 4. Accordingly, the shaft 16 is supported by a frame of a winding machine main body.

[0028] As illustrated in Fig. 1, the swing member 12 is arranged so as to cover the plurality of winding units 4 in a longitudinal direction of the winding machine 2. That is, by swinging the swing member 12, each position of the first blocking portion 9a and the second blocking portion 9b is switched to an upper side of the slope 8 or a lower side of the slope 8. Accordingly, the slope 8 is switched between a state in which rolling motion of the package P is blocked and a state in which rolling motion of the package P is allowed. Further, the swing member 12 swings to place any one of the first blocking portion 9a and the second blocking portion 9b in a higher position than the slope 8. That is, the control section swings the swing member 12; consequently, motion of the package P rolling down from each of the winding units 4 to the conveyer 6 is blocked by the first blocking portion 9a and the second blocking portion 9b a plurality of times (i.e., the control section swings the swing member 12; consequently, the winding machine 2 controls the package P to gradually roll down from the winding unit 4 to the conveyer 6.)

[0029] In the above-described structure, when the state of the air cylinder 10 is turned into a degenerate state, the state of the first blocking portion 9a turns into a blocked state in which the first blocking portion 9a is located higher than a virtual extended surface 8a of the slope 8 as illustrated in Fig. 4. Further, when the degenerate state of the air cylinder 10 is switched to an extended state, the state of the first blocking portion 9a turns into an allowed state in which the first blocking portion 9a is located lower than the virtual extended surface 8a of the slope 8. Meanwhile, when the state of the air cylinder 10 is turned into the extended state, the state of

the second blocking portion 9b turns into a blocked state in which the second blocking portion 9b is located higher than the virtual extended surface 8a. Further, when the extended state of the air cylinder 10 is switched to the degenerate state, the state of the second blocking portion 9b turns into an allowed state in which the second blocking portion 9b is located lower than the virtual extended surface 8a. That is, since the swing member 12 includes the first blocking portion 9a, the second blocking portion 9b, and the inclined plane portion 14, by swinging the swing member 12, the winding machine 2 of the present embodiment can switch the blocking portions between a first blocking position indicating a state in which the first blocking portion 9a blocks rolling motion of the package P and a second blocking position indicating a state in which the second blocking portion 9b blocks motion of the package P rolling down the inclined plane portion 14.

[0030] The first blocking position indicates a state in which the first blocking portion 9a of the swing member 12 is blocked and rolling motion of the package P is blocked at an end portion of the conveyer 6 side of the slope 8. Further, the second blocking position indicates a state in which the first blocking portion 9a of the swing member 12 is allowed, the inclined plane portion 14 of the swing member 12 overlaps the virtual extended surface 8a of the slope 8, and the second blocking portion 9b blocks rolling motion of the package P at an end portion of a conveyer 6 side of the inclined plane portion 14. As described above, by switching the position of the swing member 12 to the first blocking position or the second blocking position, the package carrier device 11 of the present invention controls the package P released from the cradle portion 22 to gradually roll down the slope 8 in order to guide the package P onto the conveyer 6.

[0031] Next, by referring to Fig. 2 and Fig. 4, a description will be made on how the slope 8 controls the package P to gradually roll down. Fig. 4 is a side view illustrating a state in which the package P gradually rolls down the slope 8 of the package carrier device 11 of the present invention.

[0032] As illustrated in (a) of Fig. 4, the air cylinder 10 is normally in the degenerate state. That is, normally, the state of the first blocking portion 9a of the swing member 12 is turned into a blocked state in which the first blocking portion 9a is located higher than the slope 8, and the swing member 12 is in the first blocking position. As illustrated in Fig. 2, under a state in which the swing member 12 is kept in the first blocking position, when the package P is released from the cradle portion 22 of the winding unit 4, the package P rolls down the slope 8, is received by the first blocking portion 9a, and is stopped. Accordingly, as illustrated in (a) of Fig. 4, the package P is kept in a first position in which the package P is temporarily stopped in the middle of the slope 8.

[0033] Next, under a state in which the package P is kept in the first position (i.e., a state in which the position of the swing member 12 is kept in the first blocking position), when the air cylinder 10 in the degenerate state

is extended as illustrated in (b) of Fig. 4, the swing member 12 can swing in a way that the shaft 16 as a fulcrum point supports the swing member 12. Accordingly, the first blocking portion 9a of the swing member 12 moves to a position lower than the virtual extended surface 8a of the slope 8. That is, the state of the first blocking portion 9a is switched to the state in which rolling motion of the package P is allowed. Then, as the first blocking portion 9a moves to the position lower than the virtual extended surface 8a, the inclined plane portion 14 mostly overlaps the virtual extended surface 8a, and the second blocking portion 9b moves to a position higher than the virtual extended surface 8a of the slope 8. By swinging the swing member 12, the first blocking position in which the first blocking portion 9a blocks the rolling motion of the package P is switched to the second blocking position in which the second blocking portion 9b blocks the rolling motion of the package P. When the swing member 12 performs such an operation, the temporarily-stopped package P at the first position is released from a state in which the first blocking portion 9a blocks such a package P from rolling down, and the released package P rolls down the inclined plane portion 14. Then the second blocking portion 9b blocks the released package P from rolling down. That is, the swing member 12 swings to switch its position from the first blocking position to the second blocking position. Consequently, the package P rolls down from the first position located in the middle of the slope 8 to the second position located in an end portion of a conveyer 6 side of the swing member 12.

[0034] Next, the extended air cylinder 10 is turned back to be in the degenerate state as illustrated in (c) of Fig. 4 under a state in which the package P is kept in the second position in which the package P is temporarily stopped at an end portion of a conveyer 6 side of the slope 8 (i.e., under a state in which the position of the swing member 12 is kept in the second blocking position). Consequently, the position of the swing member 12 is switched back to the first blocking position from the second blocking position. By switching the position of the swing member 12 from the second blocking position to the first blocking position, the package P is pressed obliquely upward by the inclined plane portion 14. Then, the package P climbs over the second blocking portion 9b by shifting the center of gravity of the package P from a second blocking portion 9b side of the swing member 12 toward a conveyer 6 side thereof. Further, as indicated by the dashed lines in (c) of Fig. 4, the package P rolls down to a third position on the conveyer 6, hits the package receiving member 20, and is stopped on the conveyer 6. As described above, the winding machine 2 according to the present embodiment gradually stops the package P released from the cradle portion 22 until the package P is stopped on the conveyer 6. In such a structure, the winding machine 2 according to the present embodiment can prevent the position of the package P from being displaced while the package P is rolling down to the third position. Consequently, the winding machine 2

according to the present embodiment can stop the package P in a way that the position of the package P is kept appropriately on the conveyer 6.

[0035] As described above, the package carrier device 11 of the winding machine 2 in the embodiment of the present invention blocks force generated by motion of the package P rolling down from each of the winding units 4 to the conveyer 6 with the first blocking portion 9a and the second blocking portion 9b a plurality of times. That is, since the package P is configured so as to gradually roll down from the each of the winding units 4 to the conveyer 6, the winding machine 2 can sufficiently control force generated by motion of the package P rolling down the slope 8 and the inclined plane portion 14 to the conveyer 6. Accordingly, the winding machine 2 of the present invention can control the package P released from each of the winding units 4 to gradually roll down from the each of the winding units 4 to the conveyer 6; therefore, the winding machine 2 can absorb impact acting on the package receiving member 20 of when the package P rolls down to the conveyer 6. Further, the winding machine 2 of the present invention can adjust the package P in an appropriate position per each short interval until the package P reaches the conveyer 6; therefore, the winding machine of the present invention can stop the package P on the conveyer 6 without excessively displacing the position of the package P in the middle of carrying the package P. Furthermore, force generated by rolling motion of the package P is also controlled per each short interval until the package P reaches the conveyer 6; therefore, the winding machine of the present invention can absorb impact generated when the package P is received by the package receiving member 20 or impact generated by having the package P rubbed against the separator 19 that forces the position of the meandering package P to be set right. As a result, without forming the package P in an irregular winding shape, the winding machine 2 of the present invention can stop the package P on the conveyer 6 in a way that the package P is kept in an appropriate position; therefore, the winding machine 2 can easily carry the package P for the following processes. Further, since the force which has been generated by the rolling motion of the package P and acts on the package P is absorbed; therefore, the package can be received by the package receiving member 20 that is smaller than a conventionally-known package receiving member.

[0036] Further, the second blocking portion 9b in the embodiment of the present invention is arranged in the vicinity of the conveyer 6. In such a structure, since the winding machine 2 of the present invention blocks rolling motion of the package P immediately before the package P is received by the package receiving member 20, the winding machine 2 can minimize force kept in the package P of when the package reaches the conveyer 6. Accordingly, the winding machine 2 of the present invention can further absorb the impact generated when the package P is received by the package receiving member 20.

That is, the winding machine 2 of the present invention can prevent the package P from being formed in an irregular winding shape and can prevent yarn quality of the package P from being deteriorated.

[0037] Further, the air cylinder 10 of the winding machine 2 in the embodiment of the present invention switches the blocking portions 9 between a state in which rolling motion of the package P is blocked by placing the blocking portions 9 in a position higher than the slope 8 and a state in which rolling motion of the package P is allowed by placing the blocking portions 9 approximately at the same level as the slope 8 or by placing the blocking portions 9 in a position lower than the slope 8. In such a structure, by an easy operation to move the blocking portions 9 with respect to the slope 8 in a vertical direction, the winding machine 2 in the embodiment of the present invention can switch the blocking portions 9 between the state in which rolling motion of the packaged P is blocked and the state in which rolling motion of the package P is allowed.

[0038] Further, in the winding machine 2 in the embodiment of the present invention, the air cylinder 10 swings the swing member 12, which causes the blocking portions 9 to be switched between the state in which rolling motion of the packaged P is blocked and the state in which rolling motion of the package P is allowed. In such a structure, by a single step operation to swing the swing member 12, the winding machine 2 in the embodiment of the present invention can switch the plurality of blocking portions 9a and 9b between the state in which rolling motion of the package P is blocked and the state in which rolling motion of the package P is allowed. Accordingly, the winding machine 2 of the present invention can be configured without providing a switching mechanism for switching between the state in which rolling motion of the package P is blocked and the state in which rolling motion of the package P is allowed per each of the first blocking portion 9a and the second blocking portion 9b.

[0039] Further, in the winding machine 2 in the embodiment of the present invention, the plurality of blocking portions 9a and 9b and the inclined plane portion 14 are formed by bending a piece of sheet metal. In such a structure, the swing member 12 can easily be formed in the winding machine 2 of the present invention. Further, in such a structure, the number of components of the winding machine 2 of the present invention can be reduced. Furthermore, in the winding machine 2 of the present invention, a light and strong swing member 12 can be produced by a bending process of sheet metal.

[0040] In the above-described embodiment, two blocking portions (i.e., the first blocking portion 9a and the second blocking portion 9b) are arranged on the slope 8; however, the number of blocking portions arranged on the slope 8 may be increased appropriately according to the length of the slope 8.

[0041] Further, in the above-described embodiment, each of the blocking portions 9 is a component of the swing member 12; however, as long as the blocking por-

tions 9 are configured so as to gradually block the rolling motion of the package P, the blocking portions 9 may be separated from the swing member 12.

[0042] Further, in the above-described embodiment, the blocking portions 9 are sheet metal members; however, members with a shape capable of blocking rolling motion of the package P are also acceptable. For example, the blocking portions 9 may be replaced with rod shaped members that can be switched between a state in which each of the rod shaped members protrudes from the slope 8 and a state in which each of the rod shaped members does not protrude from the slope 8.

[0043] Further, in the above-described embodiment, an air cylinder is adopted as the switching mechanism 10 and straight line motion of the air cylinder is converted into swinging motion by a conventionally-known mechanism; however, a mechanism to swing the swing member 12 is not limited to the air cylinder. For example, a reversible electric-motor may be replaced with the air cylinder, or the swing member 12 may be swung by converting straight line motion of a hydraulic cylinder into rotational motion.

[0044] The above described embodiment describes a feature that the plurality of blocking portions 9 are arranged in each winding unit 4 and the swing member 12 is arranged so as to cover the plurality of winding units 4; however, the number of slopes 8 and the number of swing members 12 of the winding machine 2 are not limited to the number indicated in such a feature. For example, each of all the winding units 4 of the winding machine 2 may be provided with a dedicated slope 8 and a dedicated swing member 12. Further, a slope 8 and a swing member 12 may be shared by all the winding units 4 of the winding machine 2. Furthermore, a slope 8 and a swing member 12 may be shared by not all the winding units 4 of the winding machine 2 but the plurality of winding units 4. That is, a slope 8 and a swing member 12 may be arranged in per the plurality of winding units 4 i.e. the winding machine 2 may include a plurality of slopes 8 and a plurality of swing members 12.

Claims

1. A winding machine comprising a plurality of winding units (4), a conveyer (6) which is arranged along a direction in which the winding units (4) are arranged next to one another and carries packages (P) released from each of the winding units (4), a slope (8) which is arranged in a way that the packages (P) roll down from each of the winding units (4) to the conveyer (6), and a package receiving member (20) which is arranged along a conveying direction of the conveyer (6) and receives the packages (P) rolling down from the slope (8), the winding machine characterized by:

an at least one plurality of blocking portions (9)

- associated with at least one winding unit (4) and arranged along the slope (8), which block the rolling motion of the packages (P) during the rolling motion of the packages (P) from the at least one winding units (4) to the conveyer (6),
 an at least one switching mechanism (10) which switches the at least one plurality of blocking portions (9) between a state in which the rolling motion of the package (P) is blocked and a state in which the rolling motion of the package (P) is allowed, and
 a control section which controls the operation of the switching mechanism (10) such that the plurality of blocking portions (9) block the rolling motion of the package (P) a plurality of times.
2. The winding machine according to claim 1, **characterized in that** at least one of the plurality of blocking portions (9) is arranged in the vicinity of the conveyer (6).
3. The winding machine according to claim 1 or claim 2, **characterized in that** the switching mechanism (10) switches the blocking portions (9) between a state in which rolling motion of the package (P) is blocked by placing the blocking portions (9) in a position higher than the slope (8) and a state in which rolling motion of the package (P) is allowed by placing the blocking portions (9) approximately at the same level as the slope (8) or by placing the blocking portions (9) in a position lower than the slope (8) .
4. The winding machine according to any one of claim 1 through claim 3 **characterized by** further comprising a shaft (16) which is arranged parallel to a conveying direction of the conveyer (6) and a swing member (12) which can swing in a way that the shaft (16) as a fulcrum point supports the swing member (12),
characterized in that the swing member (12) includes the plurality of blocking portions (9), and the switching mechanism (10) swings the swing member (12), which causes the blocking portions (9) to be switched between the state in which rolling motion of the package (P) is blocked and the state in which rolling motion of the package (P) is allowed.
5. The winding machine according to claim 4, **characterized in that** an inclined plane portion (14), which is arranged such that the package (P) rolls down, is formed on the upper surface of the swing member (12), a first blocking portion (9a) is formed upstream of a rolling direction of the package (P) on the swing member (12) in a manner that the first blocking portion (9a) hangs down from the inclined plane portion (14), and a second blocking portion (9b) is formed downstream of the rolling direction of the package (P) on the swing member (12) in a manner that the
- second blocking portion (9b) is raised up from the inclined plane portion (14).
6. The winding machine according to claim 5, **characterized in that** the plurality of blocking portions (9) and the inclined plane portion (14) are formed by bending a piece of sheet metal.

FIG. 1

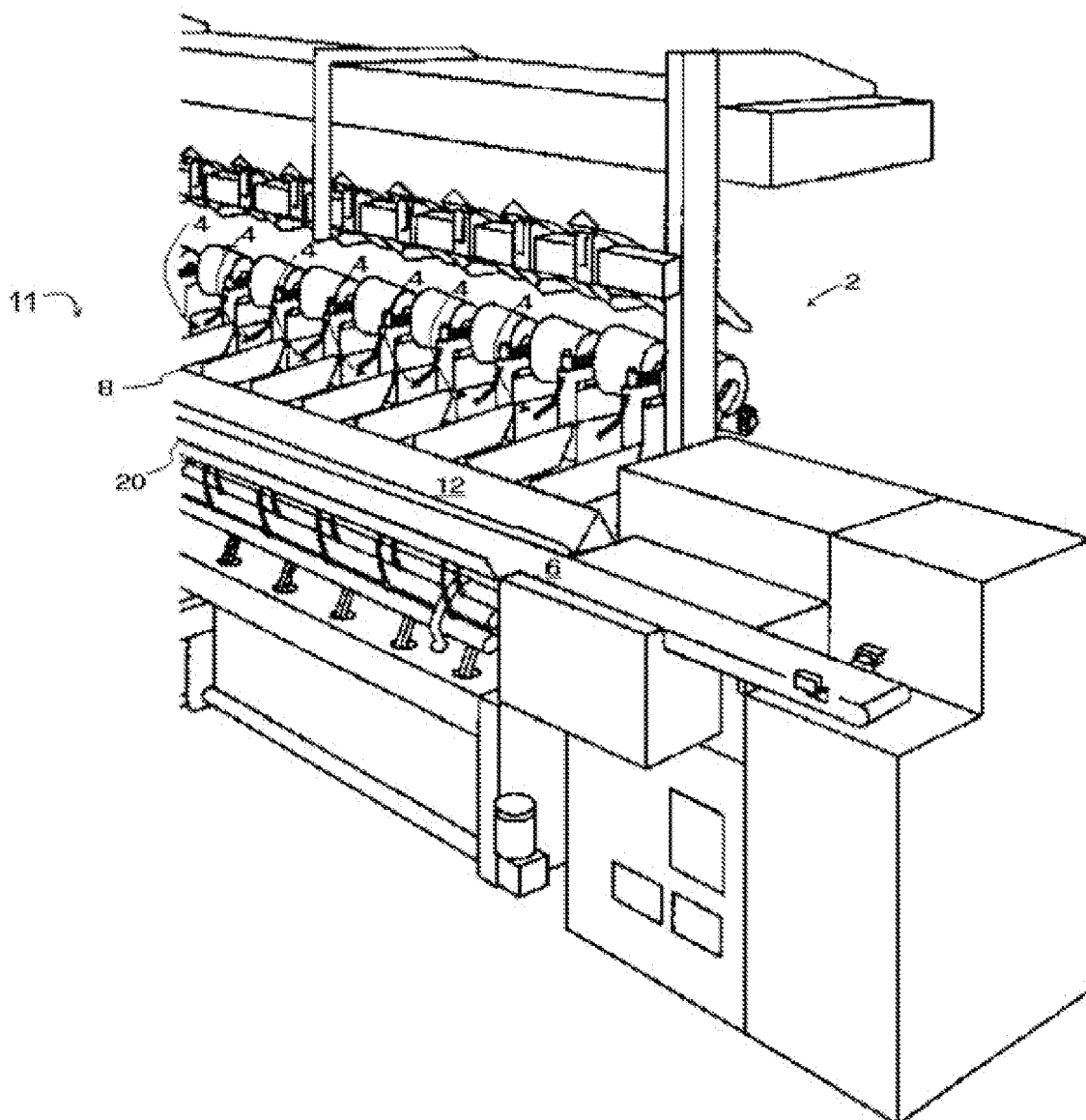


FIG. 2

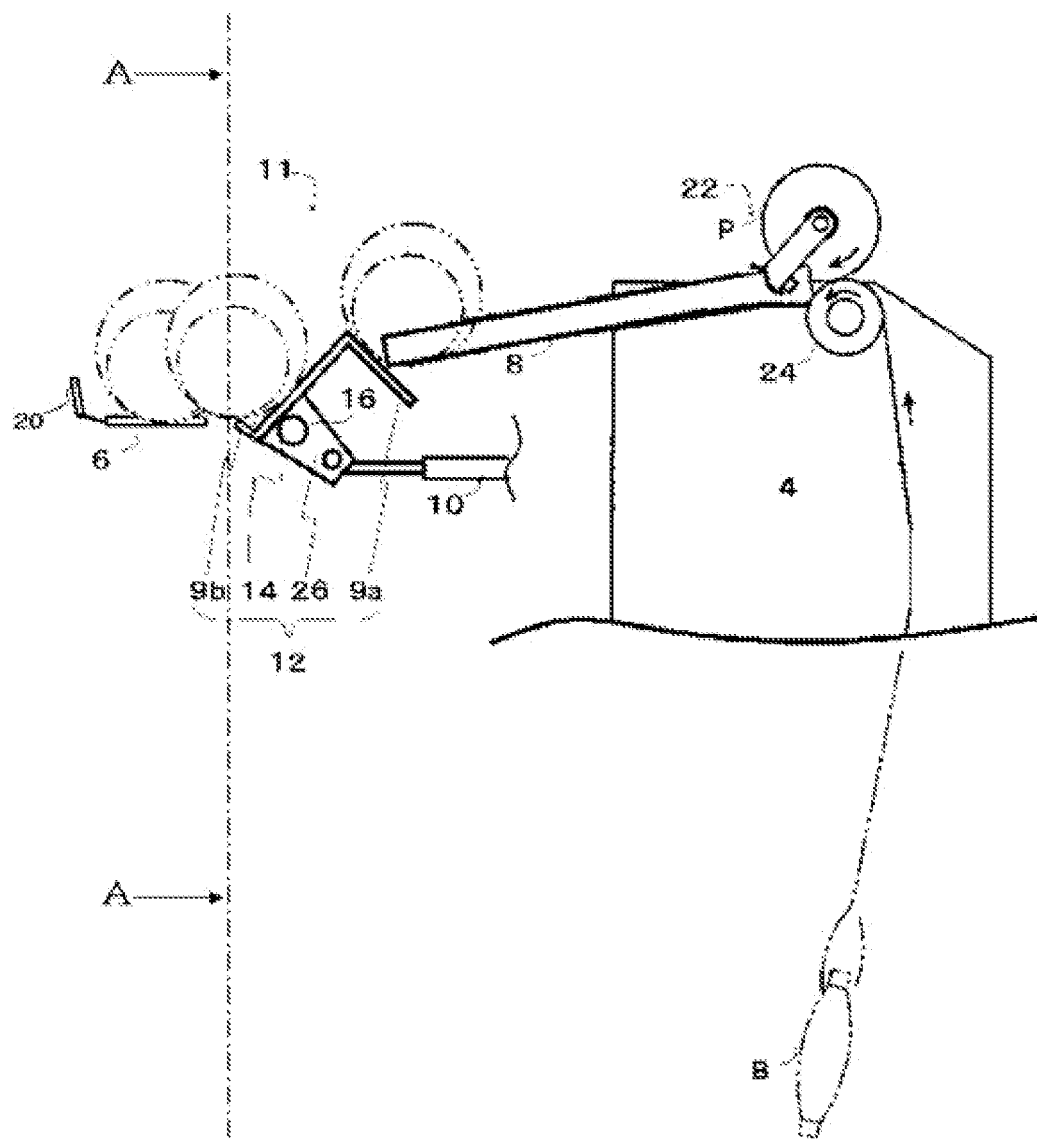


FIG. 3

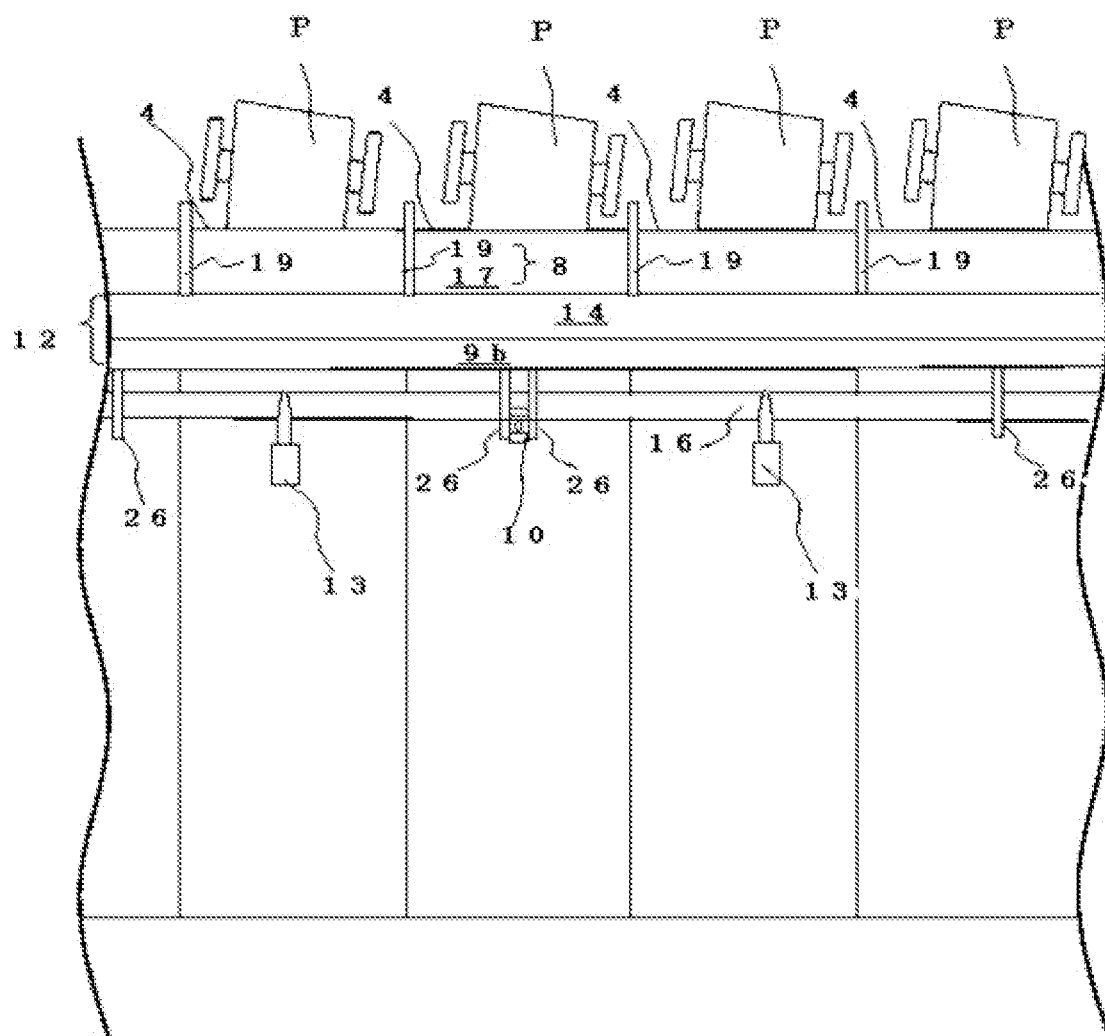
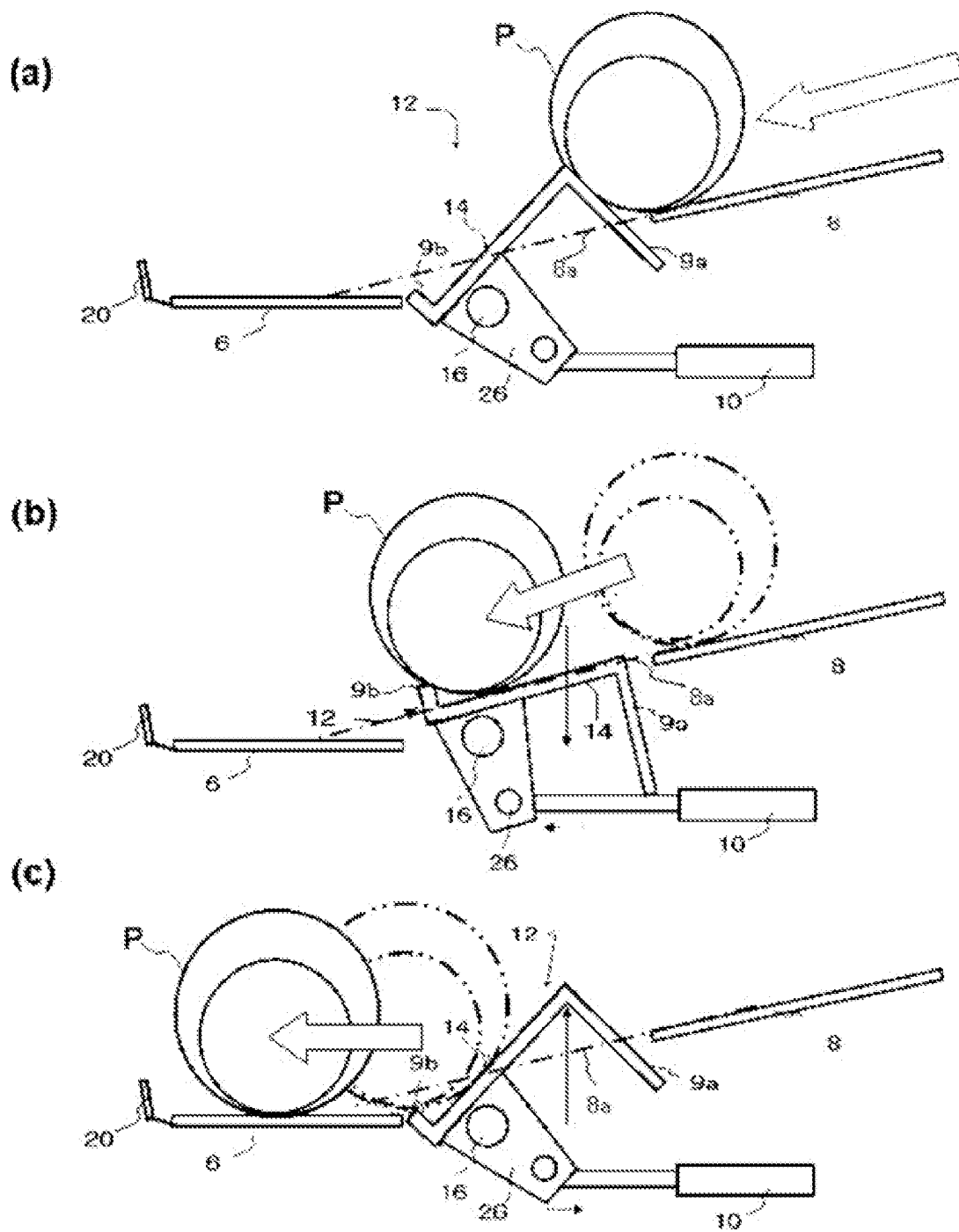


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2006001683 JP [0002]
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