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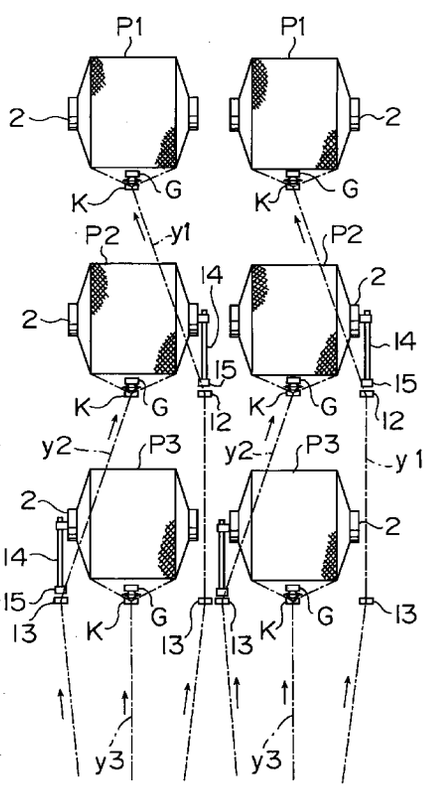
(54) Winder

(57) The yarn winding on another package interferes with and makes picking of the winding package from the front difficult.

On a false twister positioned with three levels of winding spindles in the vertical direction adjacent to each other and of which the yarn path for supplying yarn to each of these winding spindles passes in the vertical direction infront of the winding spindles, a traverse fulcrum of each winding spindle is positioned above the winding package of the lower level winding spindle in approximately the center of the width direction of the winding package, and in order to prevent interference with the picking path, is arranged with a yarn path alteration guide that flexes the yarn path upstream from the traverse fulcrum guide. The yarn path alteration guide freely moves between the winding position and the picking position and is maintained alternatively in either position by a spring.

FIG. 2



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Description

Field of the Invention

The present invention relates to a winder positioned with a plurality of winding spindles in the vertical direction adjacent to each other in a plurality of levels, and of which the yarn path for supplying yarn to each of these winding spindles passes in the vertical direction infront of the winding spindles.

Background of the Invention

A false twister as described below is known as one example of a winder. The false twister forms synthetic yarn packages by winding on paper tubes synthetic yarn which has bad predetermined false twist processing applied, is positioned on three levels In the vertical direction with cradles that support a paper tube with the axis in the left/right direction such that it rotates freely and winds while running yarn upwards such that it passes infront of the lower winding packages.

A schematic diagram showing the yarn path on this kind of false twister is shown in Figure 5. As shown In Figure 5, a traverse guide G that traverses to the left and right yarns y1-y3 running from the bottom upwards, is arranged directly below each package P1-P3 of the highest level, middle level and lowest level. Below the traverse guide G, a traverse fulcrum guide K being the traverse fulcrum of the yarns y1-y3 traversed by the traverse guide G is arranged such that it is positioned in the center of the left/right direction of each winding package P1-P3.

When a full package has been formed on the paper tube due to the winding of a predetermined amount of yarn, or when a partial package is generated due to a yarn breakage arising during winding, these winding packages are paid out onto the front side stocker by being separated from the cradle that supports both ends of the paper tube. The winding package on the stocker is picked from the front by hand.

However, on a conventional false twister as shown in Figure 5, as the traverse fulcrum of the uppermost level and middle level packages P1,P2 are positioned below the middle level ad lowest level packages P2,P3, the traverse path of the packages P1,P2 overlaps with packages P2,P3 when viewed from the front. In short, as the traverse path of the highest level and middle level package P1,P2 is inside the picking path of the middle level and lowest level packages P2,P3, when the packages P2,P3 paid out onto the stocker are to be picked from the front, the yarns y1,y2 to the packages P1,P2 interfere with this picking and make picking extremely difficult.

Furthermore, when the packages P2,P3 are picked while moving the interfering yarns y1,y2 to the side by hand, the traverse fulcrum of the packages P1,P2 moves to the side from the center thus the tension of the winding yarns y1,y2 can not be maintained and the shape of the packages P1,P2 becomes deformed.

Summary of the Invention

In view of the above problems, it is an object of the present invention to propose a winder positioned with a plurality of winding spindles in the vertical direction adjacent to each other and of which the yarn path for supplying yarn to each of these winding spindles passes in the vertical direction infront of the winding spindles, wherein the picking of the winding packages may be performed easily without interfering with the yarn passing in front and winding on other packages while maintaining a suitable value for the tension of the winding yarn.

In order to achieve the above object, a first aspect of the present invention is a winder positioned with a plurality of winding spindles in the vertical direction adjacent to each other and of which the yarn path for supplying yarn to each of these winding spindles passes in the vertical direction infront of the winding spindles, that positions above the winding package picking path of the lower level winding spindle and moreover in approximately the center of the width of the winding package, a traverse fulcrum guide for each winding spindle except the lowest level. As the traverse fulcrum guide for each winding spindle except the lowest level is set above the winding package picking path of the lower level winding spindles, the lower level winding packages may be picked even while the package is winding on the upper level winding spindles, due to the flexing of the yarn path upstream from the traverse fulcrum. Furthermore, in order to prevent large changes in the winding tension due to the traverse movement, it is necessary to maintain the distance between the paper tube and traverse fulcrum to some extent but the yarn path avoids the winding package picking path by flexing only upstream from the traverse fulcrum guide by extending the distance between the paper tube and traverse fulcrum not downwards as with conventional devices but upwards.

Further, the height relationship and distance between the winding package and traverse fulcrum guide on the lowest level winding spindle is the same as that of the winding spindles above that. On the present invention, as there are no winding spindles below that, even concerning the lowest level winding spindle for which the problem of interference with the winding package picking path of the lower level winding spindle need not be addressed, the height relationship and distance between the winding package and traverse fulcrum guide is the same as that of the upper level winding spindles thus the quality of the winding packages on the lowest or higher winding spindles is uniform.

Yet further, it is possible for each winding spindle to be individually doffed. As each winding spindle may be individually doffed, when a full package is generated or

when a yarn breakage is generated at some mid-point, doffing operations may be quickly performed independently at that winding spindle and the winding package may be picked from the winding spindle where doffing operations were performed while yarn is winding at another winding spindle.

Furthermore, the present invention is provided with a stocker that stocks the winding packages that each winding spindle paid out infront. During doffing operations, as the winding package may be paid out onto the front stocker from the cradle, winding of the next winding package may quickly start by attaching a empty paper tube in the cradle.

In order to prevent interference with the winding package picking path of the lower level winding spindle, a yarn path alteration guide that flexes the yarn path upstream from the traverse fulcrum guide is arranged. Thus interference with the winding package picking path of the lower winding spindle is prevented by flexing the yarn path only upstream from the traverse fulcrum guide using this yarn path alteration guide.

The yarn path alteration guide may switch between a winding position that forms a yarn path near the center of the width direction of the winding package and that interferes with the picking path, and a picking position that forms a yarn path retracted to the side of the winding package picking path. Thus when there is no picking of the winding package during winding, flexing of the yarn path more than during picking of the winding package is restricted as a yarn path upstream from the traverse fulcrum guide being a yarn path with little flexing.

Furthermore, the winding spindles are positioned at three vertical levels and for the two yarn paths that are supplied to the uppermost level and middle level winding packages and which pass over the lower level winding package picking path, the yarn path alteration guide is arranged such that one of the yarn paths is retracted to the left side of the picking path and the other yarn path is retracted to the right side. Thus the yarn paths for the winding spindles on two levels are divided to the left and right and the yarn paths of each do not interfere with each other.

When the yarn path is in the state where it is flexed by the yarn path alteration guide and is retracted to the side from the picking path of the lower level winding package, the position of the yarn path alteration guide is set more forward than `the traverse fulcrum guide. Accordingly, the flexing of the yarn path at the traverse fulcrum guide, is dispersed In the width direction (left/right direction) and front/back direction of the winding package and when the yarn path is in the state where it is retracted to the side from the picking path of the lower level winding package, extreme flexing of the yarn path at the traverse fulcrum guide is prevented.

Further, the yarn path alteration guide is comprised of a material with low contact resistance, and the guides upstream from the yarn path alteration guide are comprised of a material having high anti-abrasive properties. Due to the guides upstream from the yarn path alteration guide being comprised of a material having high anti-abrasive properties and the flexing of the yarn path at those guides being only a small angle and the yarn path alteration guide being comprised of a material with low contact resistance and the flexing of the yarn path at that guide being a large angle, the tension of the yarn during winding may be restricted and the vertical spacing of the winding spindles may be reduced.

Brief Description of the Drawing

Figure 1 is a side view showing the three vertical levels of winding spindles on one embodiment of the present invention.

Figure 2 is a schematic front view showing the yarn path during normal winding.

Figure 3 is a schematic front view showing the yarn path when the yarn path alteration guide is in the picking position.

Figure 4 is a schematic side view showing the yarn path when the yarn path alteration guide is in the picking position.

Figure 5 is a, schematic side view showing the yarn path on a conventional flase twister.

Detailed Description of the Preferred Embodiments

Hereafter, an embodiment of the present invention will be described using the drawings but it should be noted that the present invention is not limited to these embodiments provided the object is not surpassed. In the present specification, the front is the right side of Figure 1, the rear is the left side of the same drawing, right Is the reverse side of the paper of Figure 1 and left is the surface of the paper of Figure 1. Up is upwards of Figure 1 and down is downwards of the same.

Figure 1 shows the side of the main body of the false twister being one example of a winder. The side of the main body of the false twister is positioned with three winding spindles 1 adjacent to each other in the vertical direction at three levels and the yarn path for supplying yarn (synthetic yarn) to each of these winding spindles 1 passes in front of the winding spindles 1 in the vertical direction. A plurality of these three level winding spindles 1 are juxtaposed in the left/right direction. A main body side and supply yarn side comprising a creel stand or the like are positioned opposing each other either side of an operation pathway and the yarn continuously supplied from the supply yarn side is wound by the winding spindle 1.

Each winding spindle 1 has a cradle 3 which freely rotates vertically and which supports the left and right ends of the paper tube 2 so that it may freely rotate, a friction roller 4 for rotating by contact the paper tube 2, a traverse device 5 for traversing to the left and right the yarn wound on the paper tube 2, a pay-out stocker 6

which is able to pick the winding package P from the cradle 3 in the raised position, a cutter 7 of which the position may be freely altered between - operation side and standby side and which cuts the yarn y during winding when in the operation position, a suction mouth 8 that sucks and holds the yarn y cut by the cutter 7, a threading lever 9 that grips and threads the yarn y held by the' suction mouth 8 onto the paper tube 2, and a freely swinging empty paper tube stocker 10 that supplies paper tubes 2 to the cradle 3.

The traverse device 5 traverses the yarn y to the left and right while being slightly below and slightly infront of the paper tube 2 in contact with the friction roller 4, and has a traverse guide G which freely performs a reciprocal movement to the left and right by the rotation of a traverse cam arranged with a spiral grave in the surface.

The pay-out stocker 6 comprises a slanted guide positioned such that it contacts the front' of the cradle 3 in the raised position. When a predetermined amount of yarn y has been wound on the paper tube 2 and a full package P has been formed, the mid-winding running yarn y is cut by the cutter 7, the left and right of the cradle 3 are released by rotation to the raised position and that full package is paid out onto the pay-out stocker 6. If a full package is not achieved such as when a yarn breakage occurs during winding, similarly, the half-full package P is paid out onto the pay-out stocker 6.

The paid out winding package P rolls forward along the slope to the front most end of the pay-out stocker 6 and then is either immediately or later removed from the marine from the front side by hand or by a picking robot or the like. As winding packages P of each level are paid out onto the pay-out stocker 6 at different times due to the differences in winding start times and the occurrence of yarn breakages, when the middle package P2 in the middle pay-out stocker 6 is to be picked, the uppermost package P1 may be still winding. It should be noted that when there is no pay-out stocker 6, the winding package P supported in the cradle 3 is removed directly from the front of the machine.

When the winding package P is paid out from the cradle 3, the empty paper tube stocker 10 attaches a new paper tube 2 to the cradle 3 by swinging from the front side. Thereafter, the cradle 3 drops to a position where the winding is performed and winding restarts by the yarn 2 held by the suction mouth 8 being threaded onto the paper tube 2 by the actions of the yarn threading lever 9. The false twister of the present embodiment is of the single spindle doffing type for which doffing actions may be performed independently at each winding spindle 1.

A pair of left and right mounting frames 11 extending in the vertical direction are arranged on the front most part of the winding spindle 1. The left and right mounting frames 11 are slightly in front of the winding package P positioned at the front end of the pay-out stocker 6 and when viewed from the front side, are positioned to the left and right side of the winding packages P1-P3 of each level.

As shown clearly in Figures 2 and 3, a first guide 12 and left/right second guide 13 are arranged at a predetermined height on the mounting frame 11. The first guide 12 is positioned in front and moreover slightly across and down to the right of the middle package P2. The left/right second guide 13 is positioned slightly in front and below the left and right side of the lowest package P3.

It should be noted that when the winding packages P1-P3 at the front most of the pay-out stocker 6 of each level are viewed from the front, the winding packages P1-P3 of each level show in Figures 2 and 3 which are winding are approximately the same height.

A horizontal passing rod (omitted from drawing) at a height slightly below the contact surface of between the winding package P which are winding and friction roller 4 is passed between the left and right mounting frames 11.

A traverse fulcrum guide K is arranged around the middle of this passing rod such that it is positioned in the (left/right) center (the approximate center of the width direction of the winding package P) of the corresponding winding package P. The traverse fulcrum guide K is positioned lower than that winding package P on which yarn y passing through that guide K is winding and moreover is higher than the lower level winding package P as seen from the front. The traverse yarn y being traversed by the traverse guide G forms a triangular traverse path with the traverse fulcrum guide K positioned at the apex.

It should he noted that it is preferable for the distance from the traverse fulcrum guide K to the traverse guide G to be as long as possible with respect to not exerting an excessive tension on the winding yarn y.

A rotating lever 14 that freely rotates about a left-right horizontal axis is arranged to the right of the middle package P2 and to the left of the lowest package. These left and right rotating levers 14 are mounted on the left and right mounting frames 11 respectively.

A yarn path alteration guide 15 is arranged on the tip of the rotating lever 14 and this yarn path alteration guide 15 moves in an arc together with the rotation of the rotating lever 14 in `the vertical plane of the front-rear direction. When the rotating lever 14 is pointing downwards, the yarn path alteration guide 15 on the end of that is positioned is close proximity (above and slightly to the rear) to the first guide 12 and is able to immediately hold the yarn y in close proximity to the first guide 12. Furthermore, when the rotating lever 14 is pointing upwards, the yarn path alteration guide 15 is positioned higher than the winding packages P2 or P3 at the side and is in a position projecting, further forward than the first guide 12, second guide 13 and traverse fulcrum guide K. In this way, when the rotating lever 14 is pointing upwards, the yarn path alteration guide 15 is positioned more forward than the traverse fulcrum guide K and is able to reduce the flexing angle of the yarn y at

the traverse fulcrum guide K.

The rotating lever 14 may be selectively held in either the downwards pointing state or the upwards pointing state. In short, a spring 16 is arranged between the rotating level 14 and the mounting frame 11 and during normal winding, the rotating lever 14 is forced in a downwards pointing state and when rotated more than a certain amount, is forced into an upwards pointing state. It should be noted that the rotating lever 14 may be rotated by a driving means such as a motor or the like instead of this arrangement.

Concerning the material of each guide, the first guide 12 and left/right second guides 13 that are in continuous contact with the running yarn y during winding are made of alumina (ceramic) and the yarn path alteration guide 15 that is in contact with the running yarn y only when altering the yarn path is made of a metal compromising matt plated iron. Accordingly, by making the guides 12,13 of highly non-abrasive ceramic, the durability of the guide increases and by making the yarn path alteration guide 15 of low contact resistance metal, the exertion of excessive tension on the winding yarn y may be prevented even if the yarn path has a large flexing angle.

Next, an example of the yarn path alteration will be described with the alteration of the yarn path of the yarn y1 to the uppermost package P1 as an example.

Firstly, during normal winding, the yarn path alteration guide 15 is in the winding position and the yarn y1 to the uppermost package P1 is passing between the traverse fulcrum guide K and the first guide 12 such that it cuts across the front of the middle package P2. In short, the yarn y1 forms a yarn path towards the center of the width direction of the middle package P2 and that yarn path interferes with the picking path of the middle package P2. At this time, the flexing angle ofthe yarn path at the first guide 12 Is small and winding is stably performed without an excessive tension being applied to the yarn y1. It should be noted that the picking path of the winding package P means the path that the winding package P moves when it is to be picked.

When the yarn path alteration guide 15 is positioned in the picking position by the rotating lever 14 rotating upwards from the state in figure 2, the, yarn path is altered by the yarn y1 being captured by the yarn path alteration guide 15 at some point along that rotation. In short, the yarn y1 forms a yarn path that avoids the picking path of the middle package P2 to the right side and the prevents the overlapping of the yarn y1 and the middle package P2 when viewed from the front. At this time, the flexing angle of the yarn path at the yarn path alteration guide 15 is larger than the flexing angle at the `first guide, 12 of before alteration. In this state, the winding package P at the front-most of, the pay-out stocker 6 may be easily picked from the front by hand for example.

The yarn path alteration guide 15 that alters the path of the yarn y2 to the middle package P2 is positioned to the left side of the lowest package P3 and avoids the path of the yarn y1 to the uppermost level package P1 at the right, and avoids the path of the yarn y2 to the middle package P1 at the left.

As described above, as the path of the interfering yarn y upstream from the traverse fulcrum guide K need only be changed when necessary by the yarn path alteration guide 15, the picking of the winding package P may be easily performed while maintaining the correct winding tension.

The yarn path alteration guide 15 is fixed to the picking position and during normal winding, the yarn y may be made to always pass to the side of the picking path of the lowest winding package P. However, in that situation, in order to prevent the flexing angle of the yarn path increasing and an excessive tension being applied to the yarn y, it is necessary to provide countermeasures such, as increasing the vertical spacing between the winding packages of each level.

Due to the arrangement as described above, the present invention demonstrates the following advantages.

An arrangement according to a first aspect of the present invention, where as the winding package may be picked from the front of the winding spindles, the juxtaposed spindles may be positioned back-to-back with the secondary heater or the like thus making the entire machine layout more compact than compared to a format where the winding packages are picked from the rear of the winding spindles in order to prevent interference with the yarn paths.

Moreover, as the traverse fulcrum guide of each winding spindle is set above the winding package picking path, of the lower winding spindles, an arrangement is produced where the winding packages may be picked from the front without paying particular attention to the presence or absence of a yarn being supplied to another winding spindle and a winding package having a stable shape may be formed under stable tension without the traversing actions being influenced when that arrangement is utilized.

Furthermore, as the height relationship and distance between the winding package and traverse fulcrum guide of the lowest winding spindle below which no winding spindle exists are the same as the upper level winding spindles, the tension changes due to traversing during winding are the same and the yarn quality of the winding packages at all the winding spindles may be made uniform.

Yet further, as each winding spindle may be individually doffed, the doffing operations may be performed immediately at each winding spindle when a full package is generated or the like, a winding package may be picked while the yarn is being wound at another winding spindle and the efficiency of the winder may be increased..

Further, as the doffed winding packages are paid out and stocked in to a front stocker, the winding of the

next winding package may be started immediately and the efficiency of the winder may be improved.

Yet further, the winding package may be picked from the front without affecting the path of a yarn supplied to a winding package of a lower winding spindle due to the flexing of the yarn path only upstream from the traverse fulcrum guide using the yarn path alteration guide.

Further still, when there is no winding package to be picked, as the flexing of the yarn path upstream from the traverse fulcrum guide is reduced, the effects on the yarn properties due to the flexing of the yarn path may be kept to a minimum. In short, with an arrangement where the winding packages may be picked independently without considering the existence of yarn supplied to another winding spindle, the quality of the winding package may be made more stable.

Yet further, as the yarn path may be retracted to either the left or right, there is no interference between yarn paths and the arrangement is simple.

Furthermore, when the yarn path is in the state where it is retracted to the, side from the picking path of a lower winding package, as the extremes of the yarn path at the traverse fulcrum guide may be dispersed, the effect on the yarn properties by extreme flexing of the yarn path by the traverse fulcrum guide may be suppressed.

Further, as the guide of which the flexing at that position is small comprises a material which is highly non-abrasive and the yarn path alteration guide where the flexing at that position when the yarn path is retracted is large comprises a ,material with low resistance, whenever the yarn path is retracted when the winding package is to be picked, there is no application of excessive tension on the yarn despite large flexing of the yarn path and while maintaining the yarn tension during winding at the correct value.

Claims

1. A winder positioned with a plurality of winding spindles at a plurality of levels adjacent to each other in the vertical direction, where the path of the yarn for supplying a yarn to each of these winding spindles passes the front of the winding spindles and heading upwards, and which picks from the front a winding package on which yarn has wound , where
   a traverse fulcrum guide of each winding spindle except the lowest level is positioned above the winding package picking path of the lower winding splindleand moreover, in approximately the center of the width direction of the, winding package.

2. A winder as in claim 1, wherein the height relationship and distance between the winding package and the traverse fulcrum guide at the lowest winding spindle is the same as that of higher winding spindles.

3. A winder as in claims 1 or 2, wherein each winding spindle may be doffed independently.

4. A winder as in any one of the claims 1 to 3, wherein each winding spindle is provided with a stocker that stocks winding packages paid out to the front of each.

5. A winder as in any one of claims 1 to 4, arranged with a yarn path alteration guide that flexes the yarn path upstream from the traverse fulcrum guide in order to prevent interference with the winding package, picking path of lower winding spindles.

6. A winder as in claim 5, wherein the yarn path alteration guide may be switched between a winding position that forms a yarn path at the center of the width direction of the winding package that interferes with the picking path, and a picking position that forms a yarn path retracted to the side of the winding package picking path.

7. A winder as in claims 5 or 6, wherein the winding spindles are positioned at three vertical levels, the yarn path alteration guide is arranged such that, with respect to the two yarn paths that pass the lower winding package picking paths and that are supplied to the uppermost and middle winding packages, one yarn path is retracted to the left side of the picking path and the other yarn path is retracted to the right side.

8. A winder as in claims 5 to 7, wherein the position of the yarn path alteration guide is set more forward than the traverse fulcrum guide when retracted to the side from the lower winding package picking path by flexing the yarn path by the yarn path alteration guide.

9. A winder as in any one of claims 5 to 8, wherein the yarn path alteration guide comprises a material with a low contact resistance and the guides further upstream than the yarn path alteration guide comprise a material having good non-abrasive properties.

FIG. 1

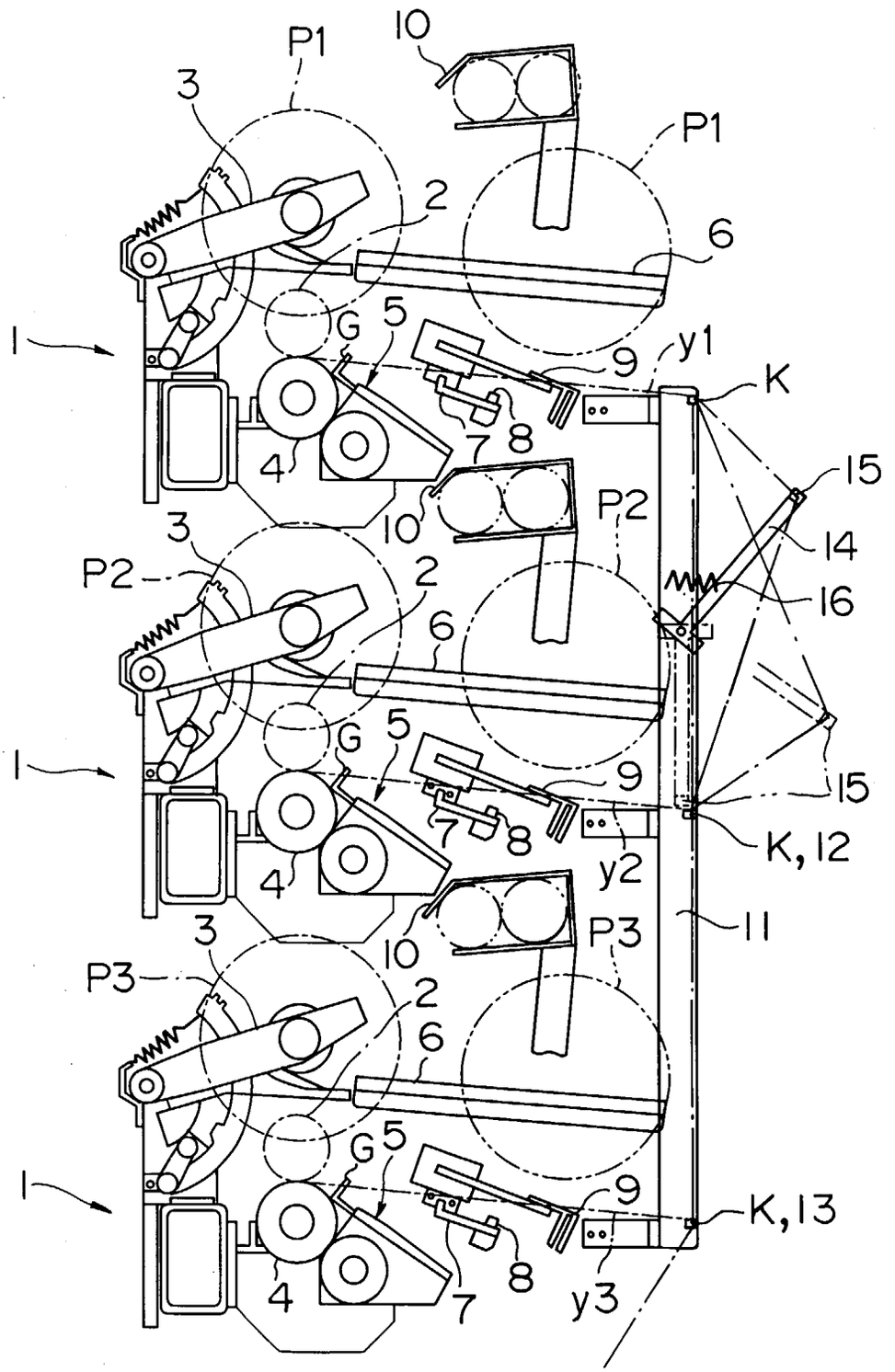
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FIG. 2

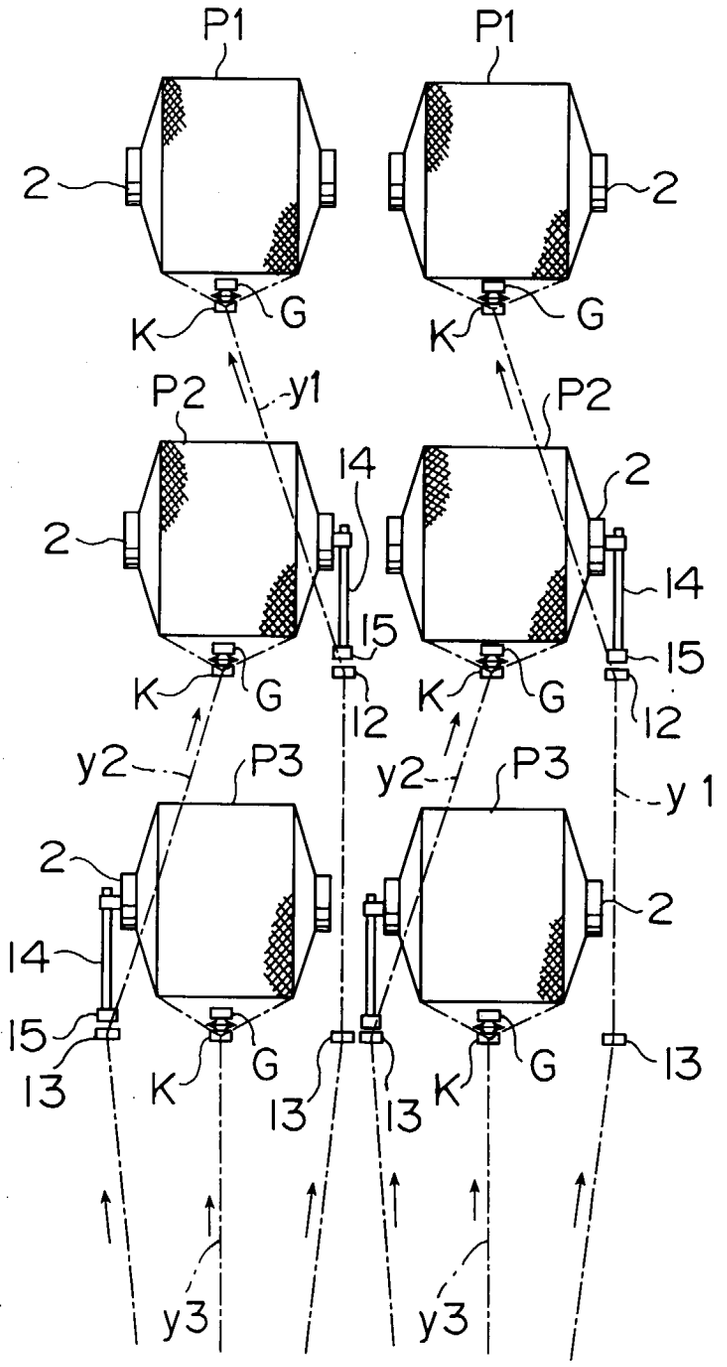
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FIG. 3

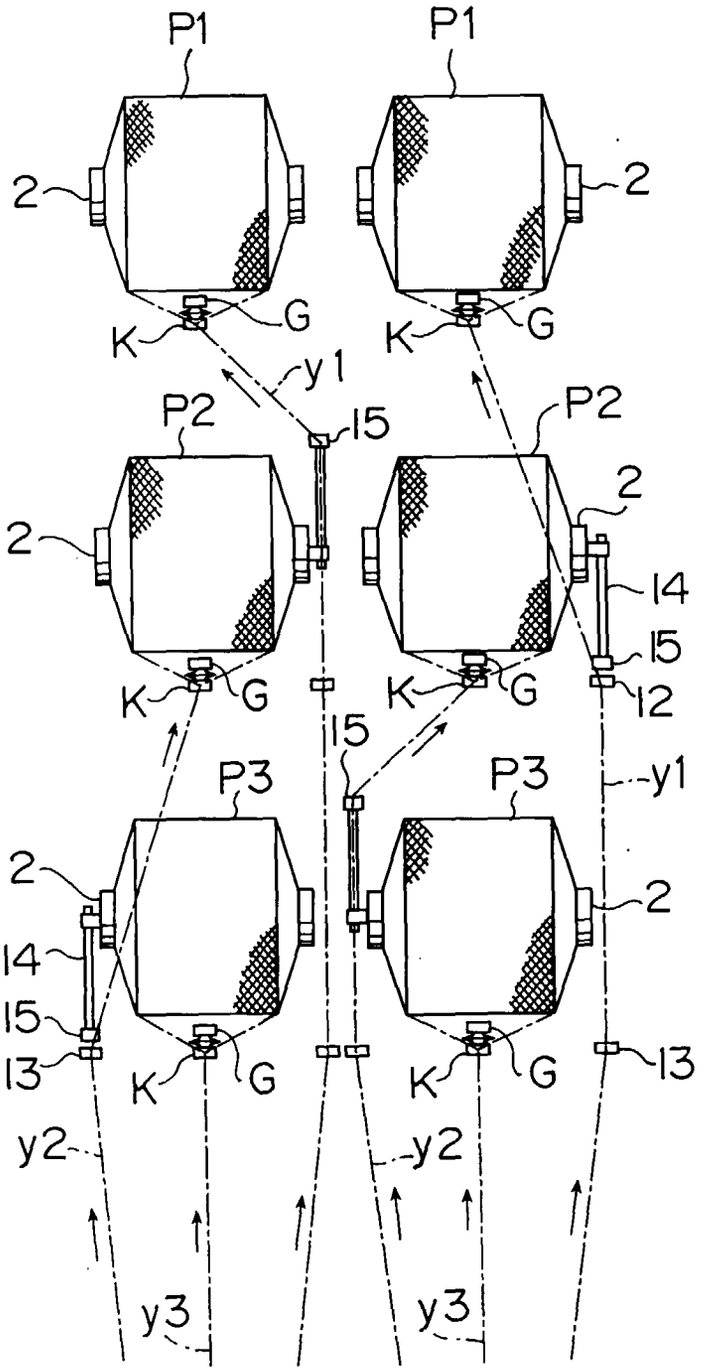
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FIG. 4

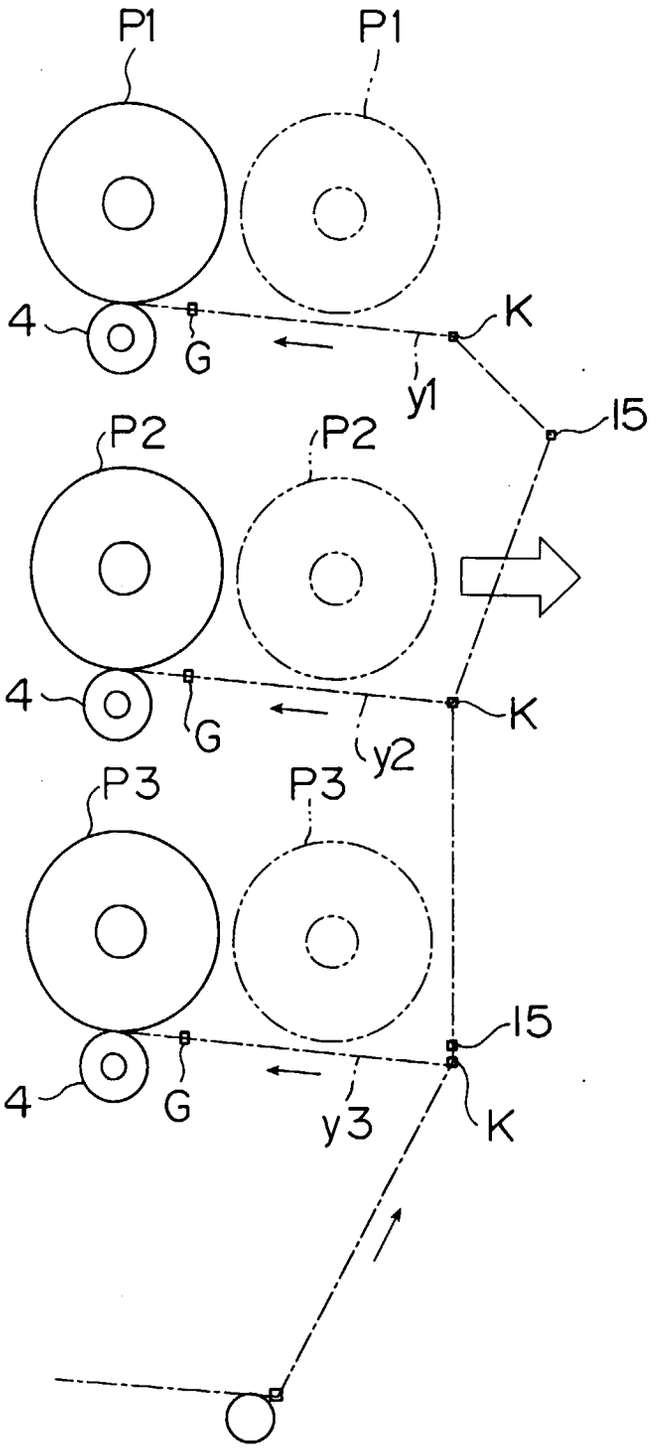

FIG. 5