



(11)

EP 4 206 395 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
05.07.2023 Bulletin 2023/27

(21) Application number: **21861600.1**

(22) Date of filing: **25.08.2021**

(51) International Patent Classification (IPC):
D06F 67/04 ^(2006.01) **D06C 3/00** ^(2006.01)
D06H 3/10 ^(2006.01)

(52) Cooperative Patent Classification (CPC):
D06F 67/04; D06C 3/00; D06H 3/10; D06F 95/00

(86) International application number:
PCT/JP2021/031112

(87) International publication number:
WO 2022/045176 (03.03.2022 Gazette 2022/09)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **28.08.2020 JP 2020144663**

(71) Applicant: **PUREX Co., Ltd.**
Takamatsu-shi, Kagawa 761-8032 (JP)

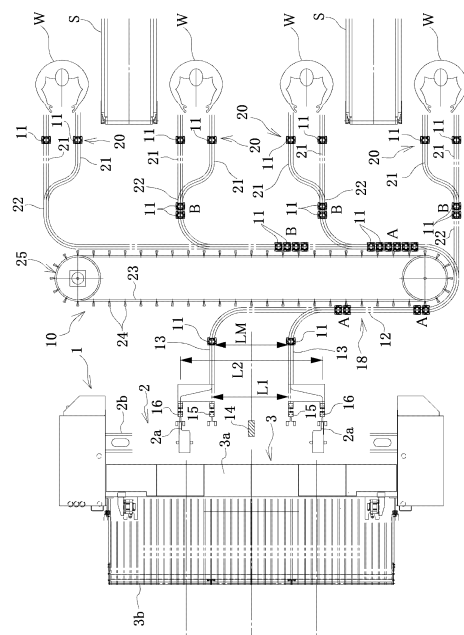
(72) Inventors:
• **KONDO, Masanori**
Takamatsu-shi, Kagawa 761-8032 (JP)
• **HAYASHIDA, Yoo**
Takamatsu-shi, Kagawa 761-8032 (JP)
• **KATO, Shinji**
Takamatsu-shi, Kagawa 761-8032 (JP)

(74) Representative: **Grünecker Patent- und Rechtsanwälte**
PartG mbB
Leopoldstraße 4
80802 München (DE)

(54) **CLOTH SUPPLY SYSTEM**

(57) In this cloth supply device, a moving distance of spreading clamps in spreading a cloth is reduced regardless of the difference in type of cloth to thereby shorten the spreading time and increase the processing efficiency. The device includes: double measurement paths through which a pair of conveying clamps that are respectively fed with adjacent corners of the upper edge part of a cloth and grasp these corners respectively pass side by side; a sag sensor that measures a degree of sagging of the upper edge part of the cloth between the corners having been respectively grasped by the pair of conveying clamps passing through the double measurement paths side by side; multiple sag-specific supply paths that are specified according to the degree of sagging of the upper edge part and each branch off from the double measurement paths; and cloth classification and supply control means that passes the pair of conveying clamps grasping the corners of the cloth respectively through double sag-specific supply paths corresponding to the degree of sagging of the upper edge part of that cloth among the multiple sag-specific supply paths, and transfers the corners of the cloth from the pair of conveying clamps to the pair of spreading clamps that are positioned so as to correspond to these double sag-specific supply paths.

FIG. 3



Description

Technical Field

[0001] The present invention relates to a cloth supply device used for a cloth spreading apparatus that, for the purpose of spreading washed cloths one by one and sending them to the next process at a cloth washing factory or the like, spreads in a right-left direction an upper edge part of the cloth between adjacent corners by respectively grasping these corners of the cloth by a pair of spreading clamps and ejects rearward the cloth of which the upper edge part has been spread. This cloth supply device conveys fed cloths one by one and transfers the adjacent corners of the cloth to the pair of spreading clamps.

Background Art

[0002] As a conventional cloth spreading apparatus, for example, the one described in Patent Literature 1 that the applicant of this application has disclosed earlier is known. This cloth spreading apparatus includes cloth feeding units, a spreading unit that spreads fed cloths in a right-left direction, and an ejection unit that ejects the spread cloths. The feeding units are provided in a front part of the cloth spreading apparatus, at a plurality of locations spaced apart in the right-left direction, and each have a pair of feeding clamps that grasp adjacent corners of a cloth at a feeding position, and a raising-lowering device that raises and lowers the pair of feeding clamps between the feeding position and a delivery position above the feeding position.

[0003] The spreading unit has a pair of spreading clamps that receive the adjacent corners of the cloth from the pair of feeding clamps at the delivery position of each feeding unit and grasp these corners, and a lateral moving device that laterally moves the pair of spreading clamps together and makes the pair of spreading clamps grasp the adjacent corners of the cloth at the delivery position of each feeding unit, and then laterally moves the pair of spreading clamps in directions away from each other so as to spread the cloth in the right-left direction. The ejection unit has a belt conveyor that receives the upper edge part of the cloth having been spread in the right-left direction from the spreading clamps through an intermediate moving body, and pulls in the upper edge part rearward while sequentially pulling up the rest of the cloth on a lower side from the upper edge part to eject the whole cloth rearward.

Citation List

Patent Literature

[0004]

Patent Literature 1: Japanese Patent Laid-Open No.

2018-123466

Patent Literature 2: Japanese Patent Laid-Open No. 2014-188377

Patent Literature 3: Japanese Patent Laid-Open No. 2010-075444

Summary of Invention

Technical Problem

[0005] In the conventional cloth spreading apparatus described in Patent Literature 1, the lateral moving device moves a pair of spreading clamps together to the delivery position of each of the feeding units provided at a plurality of locations, makes the spreading clamps grasp the adjacent corners of the cloth, and then laterally moves the pair of spreading clamps in directions away from each other so as to spread the cloth in the left-right direction. Therefore, it remains difficult to sufficiently increase the processing efficiency by shortening the operating time from feeding to spreading.

[0006] When spreading multiple types of cloths, especially cloths that are different from one another in the width of the upper edge part, if a mixture of such cloths is present, spreading takes time as spreading a cloth having a large width at the upper edge part requires the pair of spreading clamps to move a long distance from the delivery positions at a predetermined interval from the pair of feeding clamps. Also in this respect, it remains difficult to sufficiently increase the processing efficiency.

[0007] To solve these problems with the conventional cloth spreading apparatus, it is conceivable to supply cloths from a cloth supply device to a cloth spreading apparatus, and as a conventional cloth supply device, for example, the one described in Patent Literature 2 is known. This cloth supply device detects the level of a lower end of a drooping upper edge part of a cloth and the level of a lowermost end of the cloth by a sensor while conveying, at a predetermined interval, a pair of clamps having grasped adjacent corners of the upper edge part of the cloth. Based on the width and the length of each cloth obtained from these levels, this device sorts the cloths by type and retains the cloths, before feeding them into a processing device on a type-by-type basis.

[0008] As another conventional cloth supply device, for example, the one described in Patent Literature 3 is known. In this cloth supply device, a plurality of pairs of feeding clamps having grasped adjacent corners of cloths at the respective feeding positions of feeding units provided at a plurality of locations is temporarily retained in a plurality of conveying paths, then merged into a common conveying path and conveyed therethrough, separated pair by pair near a cloth spreading apparatus, and sent to a common delivery position. Merging into the common conveying path and standing by are performed according to the type of cloth to avoid processing multiple types of cloths in a mixed manner.

[0009] However, even when cloths are sorted by type

and the corners of each cloth are delivered to the pair of spreading clamps of the cloth spreading apparatus by these conventional cloth supply devices, a cloth having a large width at the upper edge part still requires the spreading clamps to move a long distance from the common delivery position when spreading the cloth. Thus, it was presumed to be difficult to sufficiently increase the processing efficiency.

Solution to Problem

[0010] The present invention aims to provide a cloth supply device that advantageously solves the problems with the conventional cloth spreading apparatuses as described above.

[0011] The cloth supply device of the present invention is used for a cloth spreading apparatus that spreads in a left-right direction an upper edge part of a cloth between adjacent corners by respectively grasping these corners of the cloth with a pair of spreading clamps and ejects rearward the cloth of which the upper edge part has been spread. This cloth supply device is configured to convey fed cloths one by one and transfer the adjacent corners of the cloth to the pair of spreading clamps, and includes:

double measurement paths extending parallel to each other at a predetermined interval through which a pair of conveying clamps that are respectively fed with the adjacent corners of the upper edge part of the cloth and grasp these corners respectively pass side by side;

a sag sensor that measures a degree of sagging of the upper edge part of the cloth between the corners having been respectively grasped by the pair of conveying clamps passing through the double measurement paths side by side;

multiple sag-specific supply paths that are specified according to the degree of sagging of the upper edge part and each branch off from the double measurement paths; and

cloth classification and supply control means that passes the pair of conveying clamps grasping the corners of the cloth respectively through double sag-specific supply paths corresponding to the degree of sagging of the upper edge part of that cloth among the multiple sag-specific supply paths, and transfers the corners of the cloth from the pair of conveying clamps to the pair of spreading clamps that are positioned so as to correspond to the double sag-specific supply paths through which the pair of conveying clamps have been passed among the multiple sag-specific supply paths.

Advantageous Effects of Invention

[0012] In the cloth supply device of the present invention, the pair of conveying clamps respectively fed with the adjacent corners of the upper edge part of a cloth

and grasping these corners pass side by side through the double measurement paths that extend parallel to each other at a predetermined interval. The sag sensor measures the degree of sagging of the upper edge part of the cloth between the corners respectively grasped by the pair of conveying clamps passing through the double measurement paths side by side. The cloth classification and supply control means respectively passes the pair of conveying clamps grasping the corners of the cloth through the double sag-specific supply paths corresponding to the degree of sagging of the upper edge part of that cloth among the multiple sag-specific supply paths that are specified according to the degree of sagging of the upper edge part and each branch off from the double measurement paths, and transfers the corners of the cloth from the pair of conveying clamps to the pair of spreading clamps that are positioned so as to correspond to the double sag-specific supply paths through which the pair of conveying clamps have been passed among the multiple sag-specific supply paths.

[0013] Thus, according to the cloth supply device of the present invention, the degree of sagging of the upper edge part of the cloth between the corners respectively grasped by the pair of conveying clamps that pass side by side through the double measurement paths extending parallel to each other at a predetermined interval is measured by the sag sensor. For a type of cloth of which the width at the upper edge part is inferred from the degree of sagging based on the measurement result, the conveying clamps are respectively passed through the double sag-specific supply paths corresponding to the degree of sagging of the upper edge part of that cloth among the multiple sag-specific supply paths specified according to the degree of sagging, and the corners are transferred to the spreading clamps disposed at corresponding positions. Thus, the moving distance of the spreading clamps in spreading a cloth can be reduced regardless of whether the width of the upper edge part of the cloth is large or small, and further of the difference in type of cloth, to thereby shorten the spreading time and sufficiently increase the processing efficiency.

[0014] In the cloth supply device of the present invention, the double measurement paths may both branch downward into the multiple sag-specific supply paths.

[0015] Thus, branching the measurement paths into the multiple sag-specific supply paths requires little of the factory floor area, so that the efficiency of the cloth supply space can be increased to reduce the facility cost.

[0016] Here, the sag-specific supply paths into which each of the double measurement paths branches may be two paths of an outer supply path and an inner supply path.

Brief Description of Drawings

[0017]

[Figure 1] Figure 1 is a side view showing one em-

bodiment of a cloth supply device of the preset invention along with a cross-section of a cloth spreading apparatus that uses this cloth supply device.

[Figure 2] Figure 2 is a sectional view of the cloth supply device of the embodiment as seen from part A in Figure 1.

[Figure 3] Figure 3 is a plan view showing one example of the configuration of only a supply rail line among rail lines in the cloth supply device of the embodiment.

[Figure 4] Figure 4 is a plan view showing one example of the configuration of only a retrieval rail line among the rail lines in the cloth supply device of the embodiment.

Description of Embodiment

[0018] An embodiment of the present invention will be described in detail below based on the drawings. Here, Figure 1 is a side view showing one embodiment of a cloth supply device of the preset invention along with a cross-section of a cloth spreading apparatus that uses this cloth supply device. Figure 2 is a sectional view of the cloth supply device of the embodiment as seen from part A in Figure 1. Figure 3 is a plan view showing one example of the configuration of only a supply rail line among rail lines in the cloth supply device of the embodiment. Figure 4 is a plan view showing one example of the configuration of only a retrieval rail line among the rail lines in the cloth supply device of the embodiment.

[0019] A cloth spreading apparatus 1 that uses the cloth supply device of this embodiment spreads washed cloths one by one to feed them into, for example, an iron roller in the next process at a cloth washing factory or the like. As illustrated in the sectional view of Figure 1, the front view of Figure 2, and the plan views of Figures 3 and 4, the cloth spreading apparatus 1 includes a cloth supply device 10 of the embodiment that is disposed on a front side of the cloth spreading apparatus 1 in place of a conventional cloth feeding unit, a spreading unit 2 that spreads fed cloths in a right-left direction, and an ejection unit 3 that ejects spread cloths. The spreading unit 2 and the ejection unit 3 are configured similarly to those of the conventional cloth spreading apparatuses described earlier.

[0020] Specifically, the spreading unit 2 has a pair of spreading clamps 2a that receive adjacent corners of a cloth C from a pair of conveying clamps at a predetermined delivery position and grasp these corners, and a lateral moving device 2b that laterally moves the pair of spreading clamps 2a together, makes the pair of spreading clamps 2a grasp the adjacent corners of the cloth C at the delivery position, and then laterally moves the pair of spreading clamps 2a in directions away from each other so as to spread the cloth C in the left-right direction. The ejection unit 3 has a catch base 3a as an intermediate moving body that receives, at its forward position, an upper edge part of the cloth C having been spread in the

left-right direction from the spreading clamps 2a, and sucks and holds this upper edge part in the spread state onto an upper surface thereof by negative pressure, and a belt conveyor 3b that, as the catch base 3a moves backward and the negative pressure is removed, receives the upper edge part of the cloth C having been spread in the left-right direction, and pulls in this upper edge part rearward while sucking and holding it by negative pressure, and sequentially pulls up the rest of the cloth C on a lower side from the upper edge part to eject the whole cloth C rearward.

[0021] On the other hand, the cloth supply device 10 of the embodiment includes: a common conveying path 12 by which a pair of conveying clamps 11, each having a lever-shaped claw that is urged to close by a spring and a travel roller, are conveyed while respectively grasping the adjacent corners of the fed cloth C; double measurement paths 13 that branch off leftward and rightward from the common conveying path 12 on the front side of the cloth spreading apparatus 1 and extend parallel to each other at a predetermined interval LM; a sag sensor 14 that optically measures whether a degree of sagging of the upper edge part of the cloth C between the corners, respectively grasped by the pair of conveying clamps 11 that depart sequentially from the common conveying path 12 and pass through the double measurement paths 13 laterally side by side, is high or low based on, for example, whether the amount of light received is large or small, and outputs the result as an on-off signal; double inner supply paths 15 and double outer supply paths 16 as sag-specific supply paths that each branch off from the double measurement paths 13; and a controller 17 as cloth classification and supply control means that has an ordinary computer. The common conveying path 12, the measurement paths 13, the inner supply paths 15, and the outer supply paths 16 constitute a supply rail line 18 while being each formed by, for example, a rail with a substantially square U-shaped cross-section of which the central part on a downward-facing side is cut away along a longitudinal direction. Ordinary switching mechanisms 19 are provided at points where the measurement paths 13 branch into the inner supply paths 15 and the outer supply paths 16.

[0022] Here, the double inner supply paths 15 extend parallel to each other at a predetermined interval L1, and the double outer supply paths 16 extend parallel to each other at a predetermined interval L2 that is larger than L1. Each of the inner supply paths 15 and the outer supply paths 16 has a substantially U-shape formed by connecting a descending path leading to the measurement path 13 and an ascending path facing the spreading unit 2 of the cloth spreading apparatus 1 to each other at lower end portions thereof with an arc-shaped coupling part. In the descending path, the conveying clamp 11 travels by the force of gravity due to its own weight and the weight of the cloth C that it grasps. In a part from the coupling part to an upper end portion of the ascending path, for example, as in the conventional feeding unit, an endless

timing belt disposed along a side part of the path is driven by a servomotor, a step motor, or the like, and one of many pins that are provided on this timing belt in a row in its extension direction so as to protrude is engaged with the conveying clamp 11. Thus, a driving mechanism (not shown) that drives the conveying clamps 11 is provided to control the motion of the conveying clamps 11.

[0023] Upon receiving an on-signal (the amount of light received being large) from the sag sensor 14, the controller 17 determines that the cloth C has a high degree of sagging of the upper edge part, and passes the pair of conveying clamps 11 grasping the corners of that cloth C from the double measurement paths 13 respectively to the left and right double outer supply paths 16 by the switching mechanisms 19. On the other hand, upon receiving an off-signal (the amount of light received being small) from the sag sensor 14, the controller 17 determines that the cloth C has a low degree of sagging of the upper edge part, and passes the pair of conveying clamps 11 grasping the corners of that cloth C from the double measurement paths 13 respectively to the left and right double inner supply paths 15 by the switching mechanisms 19. Further, the controller 17 determines the number of conveying clamps 11 remaining in the inner supply paths 15 and the outer supply paths 16 from the number of conveying clamps 11 that have passed through the switching mechanisms 19 and the number of times that the spreading clamps 2a of the cloth spreading apparatus 1 have performed a spreading action. Then, the controller 17 disposes the pair of spreading clamps 2a in the cloth spreading apparatus 1 so as to face the ascending paths of the left and right double supply paths in which the conveying clamps 11 are remaining among the left and right double outer supply paths 16 and the left and right double inner supply paths 15 through which the pair of conveying clamps 11 have been passed. The controller 17 releases a leading pair of conveying clamps 11 that are engaged by an ordinary engaging mechanism (not shown) in the descending paths of the supply paths in which the conveying clamps 11 are remaining, sends the leading pair of conveying clamps 11 to the ascending paths, and transfers the adjacent corners of the upper edge part of the cloth C from the pair of conveying clamps 11 that are driven by the driving mechanism to rise through the ascending paths to the pair of spreading clamps 2a.

[0024] Thus, according to the cloth supply device of the embodiment, since the pair of spreading clamps 2a receive the corners of a cloth C to be spread next at positions corresponding to the width of the upper edge part of the cloth C, the moving distance of the spreading clamps 2a in spreading the cloth C can be reduced regardless of whether the width of the upper edge part of the cloth C is large or small. As a result, the spreading time can be shortened and the processing efficiency can be increased.

[0025] At one or more locations, four locations in the example shown in the drawings, the cloth supply device

10 of the embodiment includes a feeding unit 20 as corner independent feeding means that has double feeding paths 21 extending side by side at a predetermined interval. Like the inner supply paths 15 and the outer supply paths 16, each of the double feeding paths 21 in each feeding unit 20 has a substantially U-shape formed by connecting a descending path located on a side far from the cloth spreading apparatus 1 and an ascending path located on a side close to the cloth spreading apparatus 1 to each other at lower end portions thereof with an arc-shaped coupling part. In the descending path, the conveying clamp 11 travels by the force of gravity due to its own weight. In a part from the coupling part to an upper end portion of the ascending path, for example, as in the conventional feeding unit, an endless timing belt disposed along a side part of the path is driven by a servomotor, a step motor, or the like, and one of many pins that are provided on the timing belt in a row in its extension direction so as to protrude is engaged with the conveying clamp 11. Thus, a driving mechanism (not shown) that drives the conveying clamps 11 is provided to control the motion of the conveying clamps 11. The driving mechanisms of the respective double feeding paths 21 operate independently of each other. The controller 17 sequentially activates these driving mechanisms upon switch operation performed by a worker W according to the type of the width of the upper edge part of a cloth having been supplied to the feeding unit 20 by, for example, a supply conveyor S, so as to raise the pair of conveying clamps 11 at an interval according to the size of the width of the upper edge part of the cloth to be fed.

[0026] Therefore, according to the cloth supply device of the embodiment, one corner of a cloth to be fed is grasped by one of the pair of conveying clamps 11 at the lower end portion of the feeding path 21 according to the size of the width of the upper edge part of the cloth, and then the other corner of the cloth C, which has become easy to find as the conveying clamp 11 rises and pulls up the one corner, can be grasped by the other conveying clamp 11 at the lower end portion of the feeding path 21. Thus, the efficiency of feeding the cloths C can be increased.

[0027] The double feeding paths 21 in each feeding unit 20 merge with each other at the upper end portions of their ascending paths and lead to a single retention path 22 that slopes downward toward the front side, and this single retention path 22 merges into the common conveying path 12 having a substantially U-shape as seen in a plan view. In each retention path 22, the conveying clamp 11 travels by the force of gravity due to its own weight and the weight of the cloth C that it grasps. In the common conveying path 12, an endless timing belt 23 disposed along a lower part of the path is driven by a servomotor, a step motor, or the like, and one of many pins 24 that are provided on the timing belt 23 in a row in its extension direction so as to protrude is engaged with the conveying clamp 11. Thus, a driving mechanism 25 that drives the conveying clamps 11 is provided to

control the motion of the conveying clamps 11. The double feeding paths 21 and the single retention path 22 in each feeding unit 20 and the common conveying path 12 also constitute parts of the supply rail line 18.

[0028] Here, at a point where the single retention path 22 of each feeding unit 20 merges into the common conveying path 12, an ordinary engaging mechanism (not shown) is provided that retains one or more pairs of conveying clamps 11 in the retention path 22 and passes a leading pair of conveying clamps 11 among these conveying clamps 11 in a tandem state through the common conveying path 12. The controller 17 receives input of the following pieces of data: the number of times that the worker W has performed switch operation for each type of cloth C; the number of conveying clamps 11 that have passed through each merge point in the common conveying path 12 as detected by a passage detector (not shown) of contact type, such as a microswitch, or of contactless type, such as an optical sensor, that is provided near that merge point on a downstream side thereof; and the number of conveying clamps 11 that have passed through the engaging mechanism as detected by a similar passage detector.

[0029] From these pieces of data, the controller 17 determines the types of the cloths C retained in the retention path 22 and the order of the pairs of conveying clamps 11 grasping these cloths C. When the same type of cloth as the type (e.g., A) of a cloth C that has passed through the common conveying path 12 from an upstream side thereof and passed through the merge point is present at the leading part of the retention path 22, the controller 17 releases the leading pair of conveying clamps 11 engaged by the engaging mechanism at that merge point and passes the leading pair of conveying clamps 11 from the retention path 22 to the common conveying path 12. When a type of cloth C (e.g., a second type B) different from the type of cloth C (e.g., the first type A) that has passed through the common conveying path 12 from the upstream side thereof and passed through the merge point is present at the first place in the retention path 22, the controller 17 releases the leading pair of conveying clamps 11 in the retention path 22 with a pause by waiting for a certain time after the preceding type (e.g., the first type A) passes that merge point, or releases the leading pair of conveying clamps 11 after waiting until the same type of cloth C as the type (e.g., the second type B) of cloth C at the first place in the retention path 22 passes through the common conveying path 12 from the upstream side thereof and passes through the merge point, and passes the leading pair of conveying clamps 11 from the retention path 22 to the common conveying path 12.

[0030] Thus, according to the cloth supply device of the embodiment, of the first type A and the second type B, for example, cloths C of the first or second type having the same width of the upper edge part can be continuously spread from the same transfer position with the spreading clamps 2a of the cloth spreading apparatus 1. Therefore, the moving distance of the spreading clamps

2a in spreading the cloth C can be further reduced to thereby shorten the spreading time and increase the processing efficiency. In addition, the cloths C can be collected by type and ejected from the cloth spreading apparatus 1.

[0031] Further, in the cloth supply device of this embodiment, the double measurement paths 13 each branch downward into the double inner supply paths 15 and the double outer supply paths 16 as multiple sag-specific supply paths.

[0032] Thus, according to the cloth supply device of the embodiment, branching the measurement paths 13 into the inner supply paths 15 and the outer supply paths 16 requires little of the factory floor area, so that the efficiency of the space for supplying cloths C can be increased to reduce the facility cost.

[0033] The cloth supply device of this embodiment further includes: quadruple return paths 26 that lead to the upper end portions of the respective ascending paths of the double inner supply paths 15 and double outer supply paths 16 and slope downward toward the front side; a common return path 27 which has a substantially U-shape as seen in a plan view and into which the quadruple return paths 26 sequentially merge; and conveying clamp supply paths 28 sloping downward toward the front side that branch off from the common return path 27 toward the respective feeding units 20, and that each further branch in each feeding unit 20 into two paths leading to the upper end portions of the descending paths of the double feeding paths 21. In each return path 26 and each conveying clamp supply path 28, the conveying clamp 11 travels by the force of gravity due to its own weight. In the common return path 27, an endless timing belt 29 disposed along an upper part of the path is driven by a servomotor, a step motor, or the like and one of many pins 30 that are provided on the timing belt 29 in a row in its extension direction so as to protrude is engaged with the conveying clamp 11. Thus, a driving mechanism 31 for driving the conveying clamps 11 is provided to control the motion of the conveying clamps 11.

[0034] The quadruple return paths 26, the common return path 27, and the conveying clamp supply paths 28 constitute a retrieval rail line 32 while being each formed by, for example, a rail with a substantially square U-shaped cross-section of which the central part on an upward-facing side is cut away along a longitudinal direction. At each point where the conveying clamp supply path 28 branches off from the common return path 27, a passage detector (not shown) is provided that is similar to the one described above and provided close to the branch point in the common return path 27 on the upstream side thereof, and also an ordinal switching mechanism (not shown) that is similar to the switching mechanism 19 is provided. Using the switching mechanism, the controller 17 separates, one by one, the conveying clamps 11 that have been detected by the passage detector while passing through the branch point, and sequentially passes these conveying clamps 11 to

the conveying clamp supply paths 28 of the four feeding units 20.

[0035] Thus, according to the cloth supply device of the embodiment, empty conveying clamps 11 that have transferred the corners of the cloth C to the spreading clamps 2a in the respective ascending paths of the double inner supply paths 15 and double outer supply paths 16 pass through the return path 26 by falling under their own weight and gather in the common return path 27. Then, these conveying clamps 11 are supplied pair by pair to the conveying clamp supply path 28 of each feeding unit 20, returned from the conveying clamp supply path 28 to the upper end portions of the descending paths of the feeding paths 21, and put on standby for being sent to the feeding paths 21 upon activation of the driving mechanism by switch operation performed by the worker W according to the type of the width of the upper edge part of the cloth to be fed. In this way, the task of feeding the cloths C can be efficiently performed.

[0036] While the present invention has been described above based on the example shown in the drawings, the present invention is not limited to the above-described example and changes can be made as necessary within the scope of the description of the claims. For example, in the cloth supply device of the embodiment, the controller 17 is provided separately from a control device that is provided in the cloth spreading apparatus 1, but the control device provided in the cloth spreading apparatus 1 may also be used as the controller 17 and the separate controller 17 may be omitted.

[0037] In the cloth supply device of the embodiment, the double measurement paths branch into the double inner supply paths 15 and the double outer supply paths 16 as the sag-specific supply paths according to the sag of the upper edge part. Alternatively, each of the double measurement paths may branch into a larger number of sag-specific supply paths.

[0038] In the cloth supply device of the embodiment, distinction is made between the first type and the second type of cloths C based on the difference in the width of the upper edge part thereof. Instead, distinction may be made, for example, based on the difference in the type of cloth, such as a sheet or a cover, that is distinguished from the difference in the width of the upper edge part thereof, or based on the difference in terms of customer or the like. Also in this case, a plurality of cloths of the same type can be continuously supplied to the cloth spreading apparatus to sufficiently increase its processing efficiency.

Industrial Applicability

[0039] Thus, according to the cloth supply device of the present invention, the degree of sagging of the upper edge part of a cloth between the corners respectively grasped by the pair of conveying clamps that pass side by side through the double measurement paths extending parallel to each other at a predetermined interval is

measured by the sag sensor. For a type of cloth of which the width at the upper edge part is inferred from the degree of sagging based on the measurement result, the conveying clamps are respectively passed through the double sag-specific supply paths corresponding to the degree of sagging of the upper edge part of that cloth among the multiple sag-specific supply paths specified according to the degree of sagging, and the corners are transferred to the spreading clamps disposed at corresponding positions. Thus, the moving distance of the spreading clamps in spreading a cloth can be reduced regardless of whether the width of the upper edge part of the cloth is large or small, and further of the difference in type of cloth, to thereby shorten the spreading time and sufficiently increase the processing efficiency.

Reference Signs List

[0040]

1	Cloth spreading apparatus
2	Spreading unit
2a	Spreading clamp
2b	Lateral moving device
3	Ejection unit
3a	Catch base
3b	Belt conveyor
10	Cloth supply device
11	Conveying clamp
12	Common conveying path
13	Measurement path
14	Sag sensor
15	Inner supply path
16	Outer supply path
17	Controller
18	Supply rail line
19	Switching mechanism
20	Feeding unit
21	Feeding path
22	Retention path
23	Timing belt
24	Pin
25	Driving mechanism
26	Return path
27	Common return path
28	Conveying clamp supply path
29	Timing belt
30	Pin
31	Driving mechanism
32	Retrieval rail line
C	Cloth
LM, L1, L2	Predetermined interval
S	Supply conveyor
W	Worker

Claims

1. A cloth supply device used for a cloth spreading apparatus that spreads in a left-right direction an upper edge part of a cloth between adjacent corners by respectively grasping these corners of the cloth with a pair of spreading clamps and ejects rearward the cloth of which the upper edge part has been spread, the cloth supply device being configured to convey fed cloths one by one and transfer the adjacent corners of the cloth to the pair of spreading clamps, **characterized in that** the cloth supply device comprises:

double measurement paths extending parallel to each other at a predetermined interval through which a pair of conveying clamps that are respectively fed with the adjacent corners of the upper edge part of the cloth and grasp these corners respectively pass side by side;

a sag sensor that measures a degree of sagging of the upper edge part of the cloth between the corners having been respectively grasped by the pair of conveying clamps passing through the double measurement paths side by side;

multiple sag-specific supply paths that are specified according to the degree of sagging of the upper edge part and each branch off from the double measurement paths; and

cloth classification and supply control means that passes the pair of conveying clamps grasping the corners of the cloth respectively through double sag-specific supply paths corresponding to the degree of sagging of the upper edge part of that cloth among the multiple sag-specific supply paths, and transfers the corners of the cloth from the pair of conveying clamps to the pair of spreading clamps that are positioned so as to correspond to the double sag-specific supply paths through which the pair of conveying clamps have been passed among the multiple sag-specific supply paths.

2. The cloth supply device according to claim 1, wherein the double measurement paths both branch downward into the multiple sag-specific supply paths.

3. The cloth supply device according to claim 1 or 2, wherein the sag-specific supply paths into which each of the double measurement paths branches are two paths of an outer supply path and an inner supply path.

55

FIG. 1

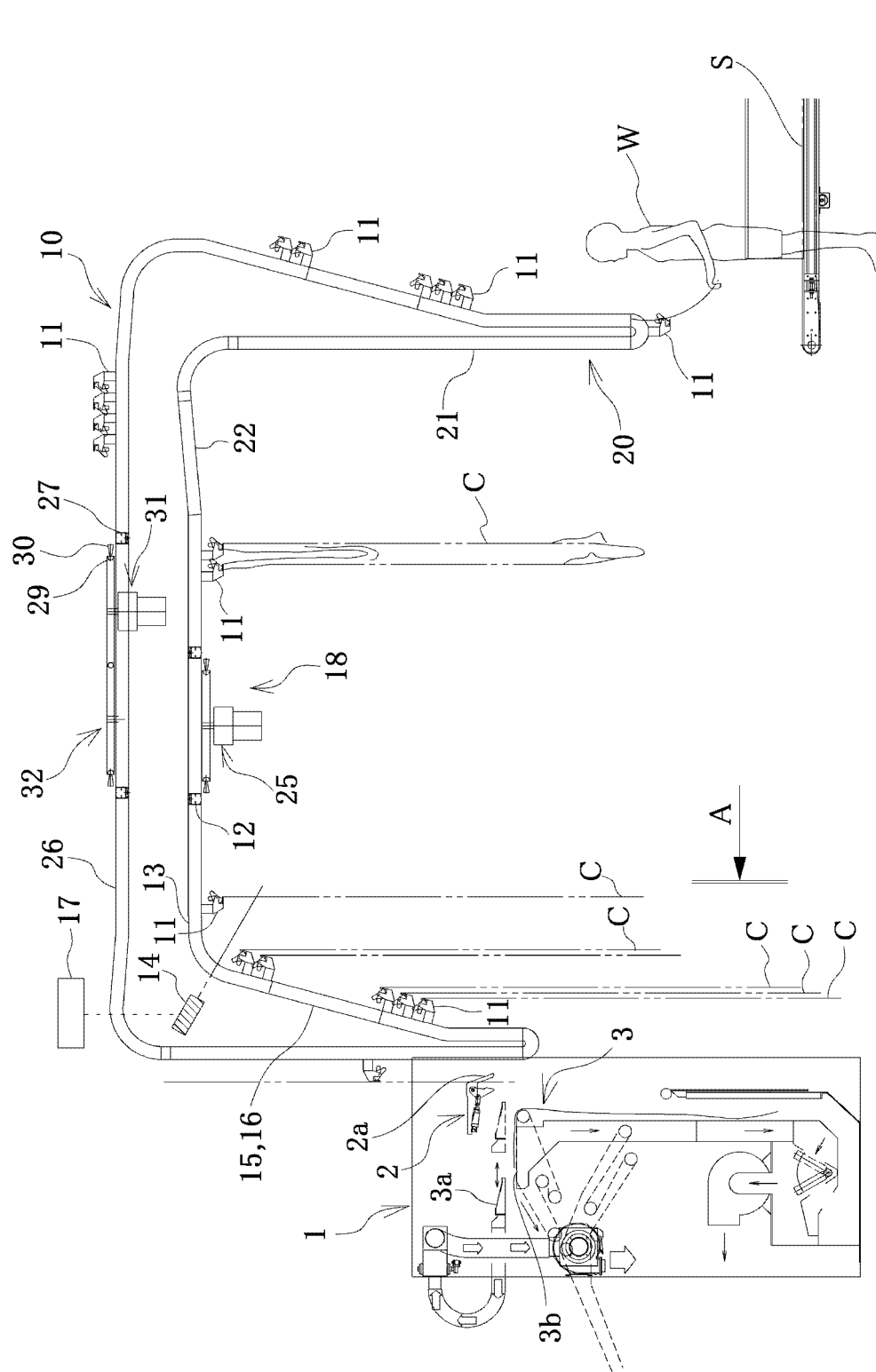


FIG. 2

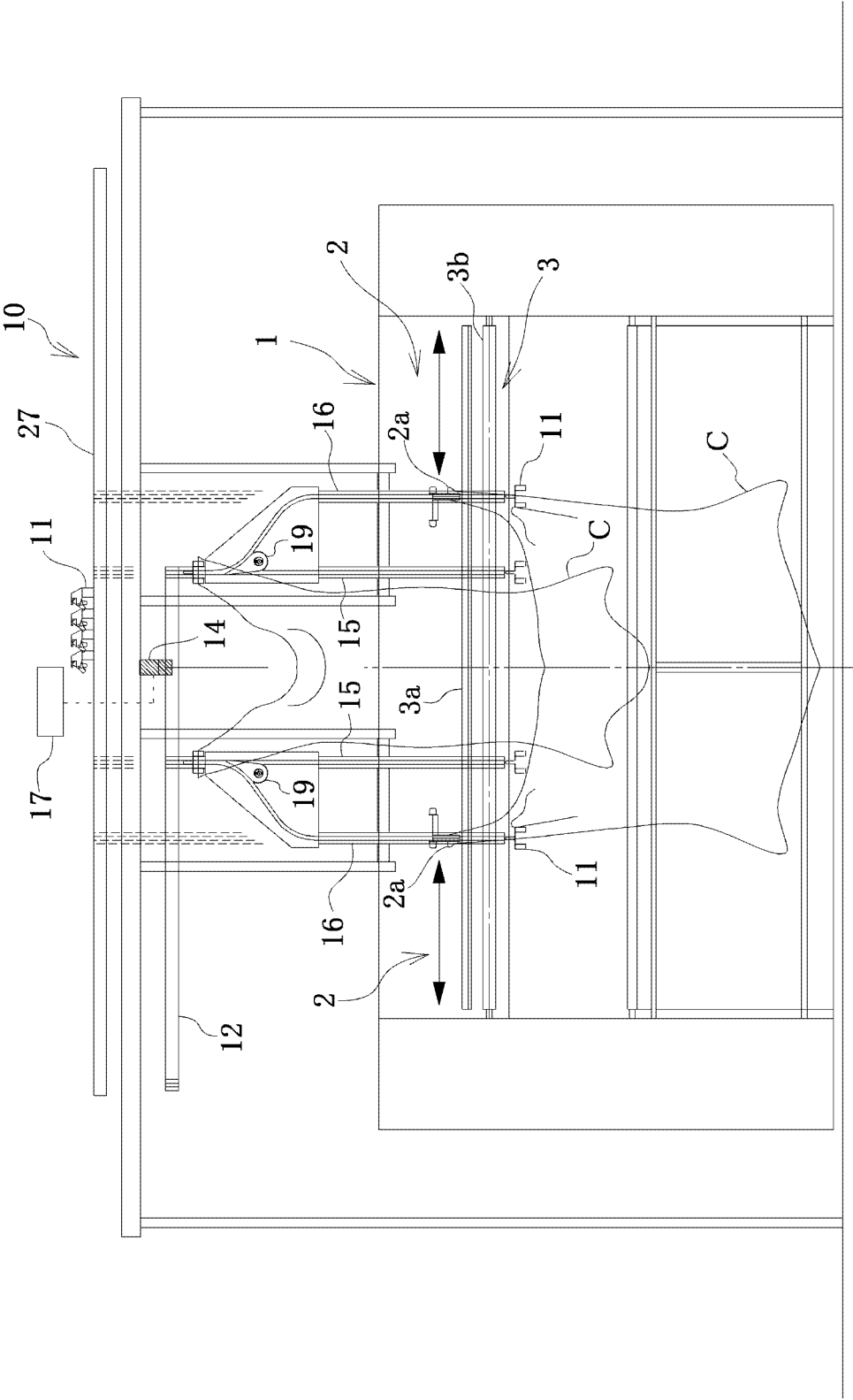


FIG. 3

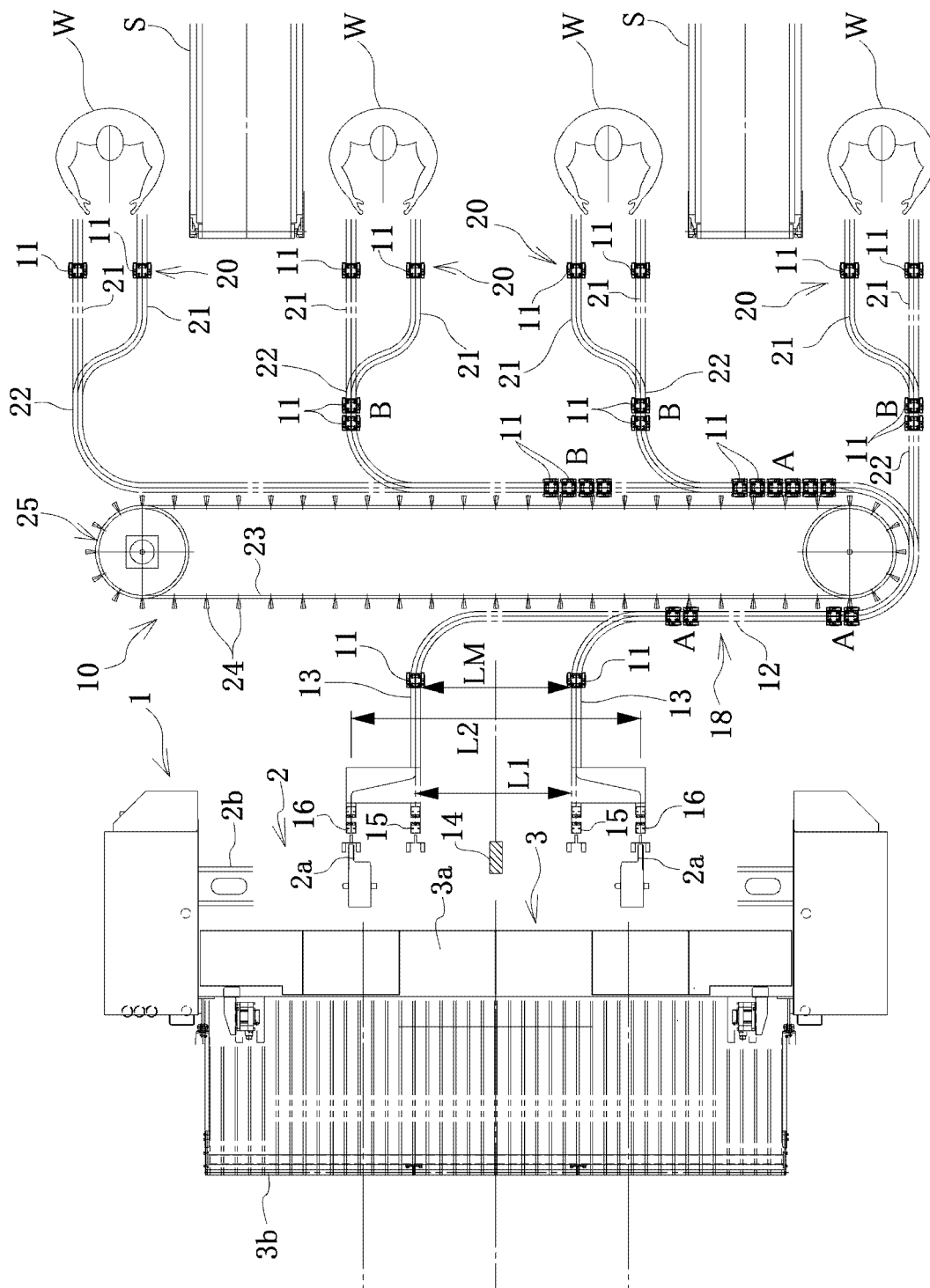
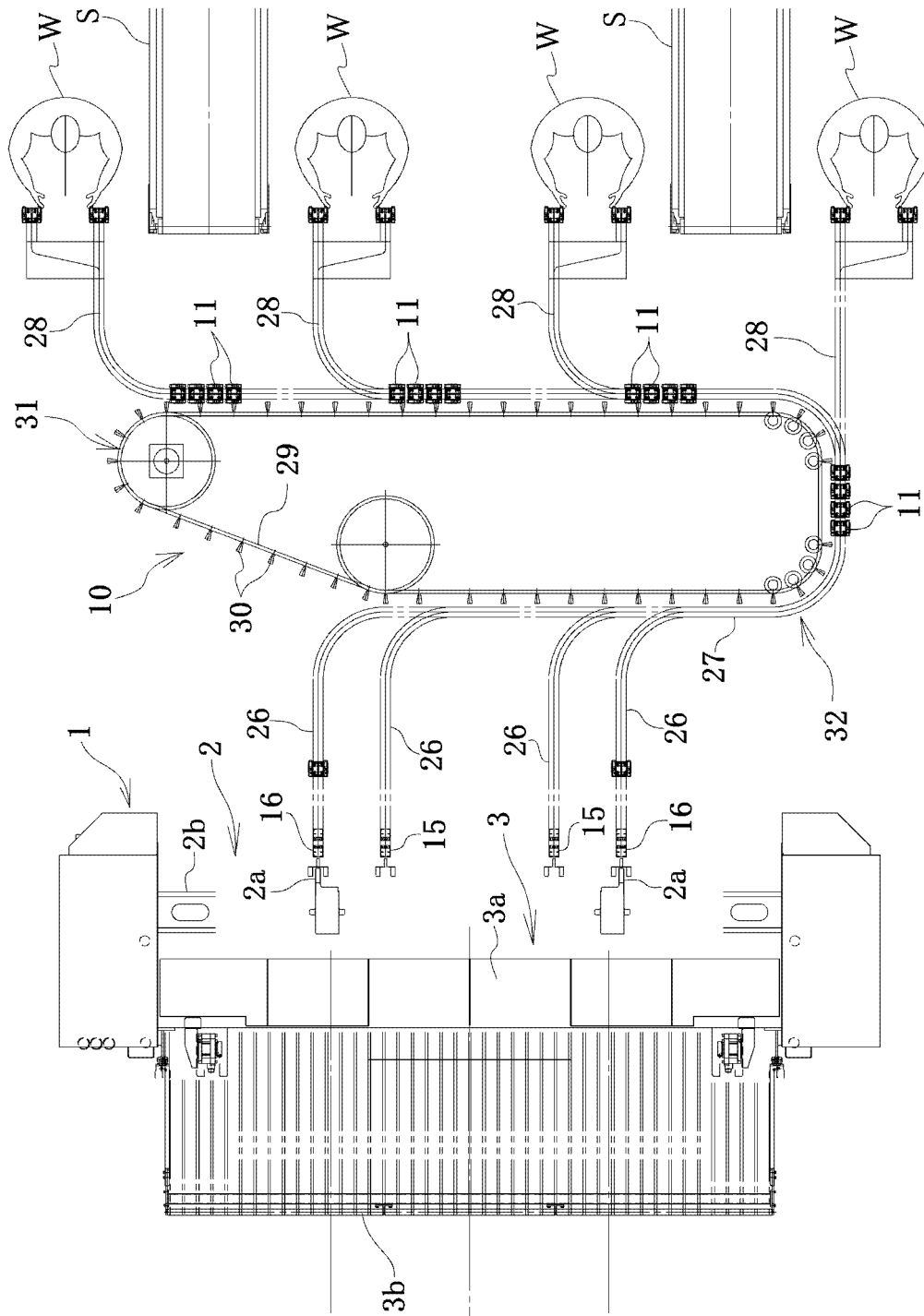


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/031112

A. CLASSIFICATION OF SUBJECT MATTER

D06F 67/04(2006.01)i; **D06C 3/00**(2006.01)i; **D06H 3/10**(2006.01)i
 FI: D06F67/04; D06C3/00; D06H3/10

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)

D06F67/04; D06C3/00; D06H3/10

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

Published examined utility model applications of Japan 1922-1996
 Published unexamined utility model applications of Japan 1971-2021
 Registered utility model specifications of Japan 1996-2021
 Published registered utility model applications of Japan 1994-2021

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.
A	WO 2020/008915 A1 (PUREX CO., LTD.) 09 January 2020 (2020-01-09) abstract, fig. 1	1-3
A	JP 2018-114029 A (KURASHIKI BOSEKI KABUSHIKI KAISHA) 26 July 2018 (2018-07-26) abstract, fig. 1	1-3
A	US 2017/0073881 A1 (HEBERT KANNEGIESSER GMBH) 16 March 2017 (2017-03-16) abstract, fig. 2	1-3
A	JP 2014-45801 A (KURASHIKI BOSEKI KABUSHIKI KAISHA) 17 March 2014 (2014-03-17) abstract, fig. 1	1-3
A	JP 2007-511302 A (JENSEN DENMARK AS) 10 May 2007 (2007-05-10) abstract, fig. 1	1-3
A	US 2016/0145055 A1 (HERBERT KANNEGIESSER GMBH) 26 May 2016 (2016-05-26) abstract, fig. 1	1-3

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

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

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

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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

“&” document member of the same patent family

Date of the actual completion of the international search

04 November 2021

Date of mailing of the international search report

16 November 2021

Name and mailing address of the ISA/JP

Japan Patent Office (ISA/JP)
 3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915
 Japan

Authorized officer

Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

International application No.
PCT/JP2021/031112

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 4143069 A1 (HERBERT KANNEGISSE GMBH) 01 July 1993 (1993-07-01) abstract, fig. 5	1-3

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2021/031112

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2020/008915 A1	09 January 2020	US 2021/0155437 A1 abstract, fig. 1 EP 3819236 A1 TW 202006213 A JP 2020-7083 A	
JP 2018-114029 A	26 July 2018	(Family: none)	
US 2017/0073881 A1	16 March 2017	EP 3147405 A1 DE 102015011602 A1	
JP 2014-45801 A	17 March 2014	(Family: none)	
JP 2007-511302 A	10 May 2007	US 2007/0068433 A1 abstract, fig. 1 WO 2005/049911 A1 EP 1685289 A1	
US 2016/0145055 A1	26 May 2016	EP 3029195 A1 DE 102014017477 A1 CN 105839365 A	
DE 4143069 A1	01 July 1993	(Family: none)	

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2018123466 A [0004]
- JP 2014188377 A [0004]
- JP 2010075444 A [0004]