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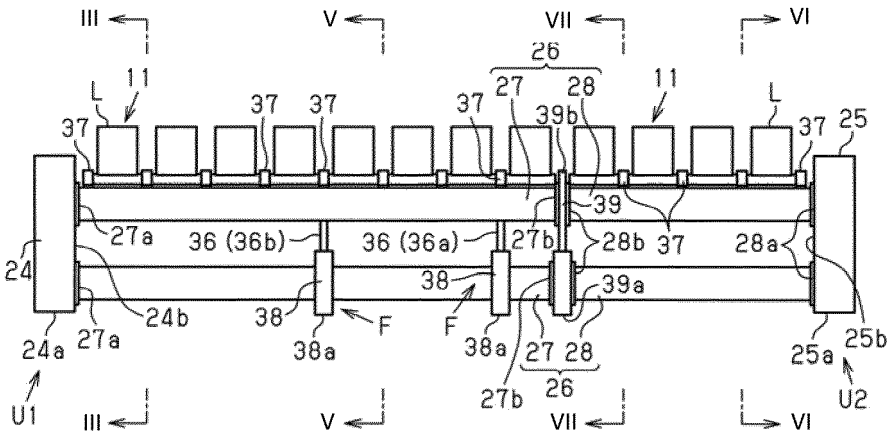
(54) **FRAME STRUCTURE FOR COMBER**

(57) A frame structure for a comber includes right and left frames (25, 24). A plurality of rails (26) are coupled to the right and the left frames (25, 24). The frame structure is dividable into right and left frame units (U2, U1) including the right and the left frames (25, 24), respectively. The right frame unit (U2) includes a plurality of rail members (28) forming parts of the respective rails (26) and each coupled to the right frame (25) at one end thereof. The left frame unit (U1) includes a plurality of rail members (27) forming parts of the respective rails (26) and each coupled to the left frame (24) at one end thereof. One of the frame units (U2, U1) includes a middle frame (39) to which the other ends of the rail members (28, 27) of the frame units (U2, U1) are coupled, and the other of the frame units (U2, U1) includes a rail supporting frame (F) that supports the rail members (28, 27) of the other.

FIG. 1A



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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a frame structure for a comber.

[0002] Generally, a comber has a work station including eight combing heads, and for example, Japanese Unexamined Patent Application Publication No. 2012-001844 discloses a frame structure for such a comber. The frame structure for a comber that is mentioned in the above-mentioned publication includes a right frame, a left frame, and upper and lower rails. The right frame and the left frame are arranged such that all the combing heads are interposed between the right frame and the left frame. The rails extend between and are coupled to the right and the left frames. A nipper shaft, a cylinder shaft, and detaching rollers are supported by the upper rails via brackets that are fixed to the upper rails.

[0003] Nowadays, combers are requested to have a work station including 12 or 16 combing heads. In a comber frame structure supporting 12 or 16 combing heads, the rails that are coupled to the right and the left frames are further extended, so that such a comber is unwieldy to be transported as compared to a comber having a work station that includes eight combing heads.

[0004] The present invention, which has been made in light of the above-described problem, is directed to providing a frame structure for a comber that facilitates transportation of a comber.

SUMMARY OF THE INVENTION

[0005] In accordance with one aspect of the present invention, there is provided a frame structure for a comber including right and left frames and a plurality of rails. The right frame and the left frame are arranged such that a plurality of combing heads is interposed between the right frame and the left frame. The plurality of rails extends in parallel between and is coupled to the right and the left frames. The frame structure for a comber is dividable into a right frame unit including the right frame and a left frame unit including the left frame. The right and the left frame units each include a plurality of rail members. The rail members of the right frame form parts of the respective rails and are each coupled to the right frame at one end thereof. The rail members of the left frame form parts of the respective rails and are each coupled to the left frame at one end thereof. One of the right frame unit and the left frame unit includes a middle frame to which the other ends of the rail members of the right and the left frame units are coupled. The other of the right frame unit and the left frame unit includes a rail supporting frame that supports the rail members of the other.

[0006] Other aspects and advantages of the invention will become apparent from the following description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The invention together with objects and advantages thereof, may best be understood by reference to the following description of the embodiment together with the accompanying drawings in which:

FIG. 1A is a schematic front view of a frame structure for a comber, according to an embodiment of the present invention;

FIG. 1B is a fragmentary front view of a connecting structure of a middle frame of FIG. 1A;

FIG. 2 is a schematic side view of a combing head;

FIG. 3 is a sectional view of the frame structure for a comber taken along the line III-III of FIG.1A;

FIG. 4 is a schematic front view of the frame structure for a comber divided into a right unit and a left unit;

FIG. 5 is a sectional view of the frame structure for a comber taken along the line V-V of FIG.1A;

FIG. 6 is a sectional view of the frame structure for a comber taken along the line VI-VI of FIG.1A;

FIG. 7 is a sectional view of the frame structure for a comber taken along the line VII-VII of FIG.1A; and

FIG. 8 is a schematic front view of a frame structure for a comber that is divided into a right unit and a left unit, according to a modified embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0008] An embodiment of a frame structure for a comber of the present invention will be described with reference to FIGS. 1 to 7.

[0009] Referring to FIG. 1A, a comber has a work station including 12 combing heads 11.

[0010] As shown in FIG. 2, the combing heads 11 each include a pair of lap rollers 12, a nipper device 14 including a feed roller 13, a combing cylinder 15 that rotates integrally with a cylinder shaft 15a, and detaching rollers 16, 17 (i.e., a pair of top and bottom detaching rollers 16a, 16b and a pair of top and bottom detaching rollers 17a, 17b that is disposed in front of the top and bottom detaching rollers 16a, 16b). The nipper device 14 further includes a nipper frame 18 that is disposed swingable back and forth above the combing cylinder 15. The nipper frame 18 includes a bottom nipper 19 at the bottom thereof. A nipper arm 20 is pivotably coupled to the nipper frame 18 with a support shaft 18a. A top nipper 20a is fixed to the distal end of the nipper arm 20. In synchro-

nization with the back and forth swinging motion of the nipper frame 18, the top nipper 20a opens and closes at predetermined timing to hold a lap L in cooperation with the bottom nipper 19. The nipper frame 18 has a top comb 21 that is disposed in front of the bottom nipper 19 so that the top comb 21 performs a predetermined action in synchronization with the motion of the nipper frame 18.

[0011] A nipper shaft 22 is disposed so as to be reciprocally pivotable behind the combing cylinder 15 and below the nipper frame 18. A first end of a nipper frame drive arm 23 is secured to the nipper shaft 22 so as to be pivotable with the nipper shaft 22, and the rear end of the nipper frame 18 is pivotably supported at a second end of the nipper frame drive arm 23 with a support shaft 23a of the nipper frame drive arm 23. The nipper frame 18 is configured to swing back and forth by reciprocal pivoting (i.e., swinging motion) of the nipper shaft 22 such that the distal end of the bottom nipper 19 moves toward and away from the detaching rollers 16, 17.

[0012] A frame structure for a comber will be described herein.

[0013] As shown in FIG. 1A, a frame structure for a comber includes a left frame 24, a right frame 25, and four rails 26 (i.e., two upper rails 26 and two lower rails 26) that extend in parallel to each other between and coupled to the left frame 24 and the right frame 25. The frame structure for a comber includes a left frame unit U1 including the left frame 24, and a right frame unit U2 including the right frame 25. The frame structure for a comber is configured such that the left frame unit U1 and the right frame unit U2 are coupled to each other. In other words, the frame structure for a comber is dividable into the left and the right frame units U1, U2. The left frame 24 and the right frame 25 are arranged such that all the combing heads 11 are interposed between the left frame 24 and the right frame 25. In the front view of the frame structure for a comber, the left frame unit U1 is located on the left side and the right frame unit U2 is located on the right side.

[0014] The left frame unit U1 and the right frame unit U2 of the frame structure for a comber will be described herein.

[0015] The left frame unit U1 includes the left frame 24, four left rail members 27 (i.e., two upper left rail members 27 and two lower left rail members 27) each forming a left part of the corresponding rail 26 and coupled to the left frame 24, and auxiliary frames 36 coupled to the left rail members 27. As shown in FIG. 3, the left frame 24 has a substantially rectangular plate shape. Each of the left rail members 27 has a left flange 27a at one end thereof and is coupled to the left frame 24 with a screw 40 through the left flange 27a.

[0016] As shown in FIGS. 1A and 1B, each of the left rail members 27 further has at the other end thereof a coupling flange 27b. The coupling flange 27b is connectable to a middle frame 39 that is included in the right frame unit U2. The four left rail members 27 are arranged parallel to each other. The longitudinal direction of each left rail member 27 is perpendicular to a side surface 24b of the left frame 24 to which the left flange 27a is coupled.

[0017] As shown in FIG. 3, the left frame unit U1 further includes shaft supporting frames 37. The shaft supporting frames 37 are supported by the two upper left rail members 27. The shaft supporting frames 37 are fastened to, in other words, coupled to, the upper left rail members 27 in a manner that is not illustrated. Specifically, eight shaft supporting frames 37 are arranged in the left frame unit U1 at equal intervals in the longitudinal direction of each left rail member 27. The combing heads 11 are each located between any two adjacent shaft supporting members 37, so that the left frame unit U1 has a work station including eight combing heads 11.

[0018] The bottom detaching rollers 16b, 17b (i.e., the detaching rollers 16, 17) that each function as a shaft are supported in front portions of the shaft supporting frames 37, and the cylinder shaft 15a is supported under the bottom detaching rollers 16b, 17b. The nipper shaft 22 is supported in rear portions of the shaft supporting frames 37, and lap roller shafts 12a of the lap rollers 12 are supported above the nipper shaft 22. The lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22 each have a length enough to support the whole of the eight combing heads 11.

[0019] The lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22 each have approximately the same length as the length of the left frame unit U1 in the longitudinal direction of the left frame unit U1, and are each dividable axially at its middle point. Each portion of the divided lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22 has a length enough to support the whole of four combing heads 11. The divided lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22 are each connectable again with a coupling that is not illustrated.

[0020] As shown in FIGS. 1A and 5, the left frame unit U1 includes the auxiliary frames 36 (i.e., first and second auxiliary frames 36a, 36b) that are located between the two upper left rail members 27 and the two lower left rail members 27. The first auxiliary frame 36a is coupled to the eighth shaft supporting frame 37 from the left frame 24. The eighth shaft supporting frame 37 is located at the furthest position from the left frame 24, that is, the first auxiliary frame 36a is coupled to the shaft supporting frame 37 that is located at a position closest to the other ends of the left rail members 27.

[0021] The second auxiliary frame 36b is coupled to the fifth shaft supporting frame 37 from the left frame 24. That is, the second auxiliary frame 36b is coupled to the fifth shaft supporting frame 37 that is located adjacent to the middle position between the first auxiliary frame 36a and the left frame 24 in the longitudinal direction of the left rail members 27.

[0022] The first and the second auxiliary frames 36a, 36b each have two leg portions. The top sides of the first and the second auxiliary frames 36a, 36b are attached to the bottom sides of the accompanying shaft supporting

frames 37, respectively. The bottom sides of the leg portions of the first and the second auxiliary frames 36a, 36b are attached to the upper sides of the two lower left rail members 27.

[0023] The left frame unit U1 further includes legs 38 disposed in the two lower left rail members 27 at positions where the first and the second auxiliary frames 36a, 36b are attached, respectively. A bottom surface 38a of each leg 38 is flush with a bottom surface 24a of the left frame 24. This configuration enables the left rail members 27 to extend horizontally when the left frame unit U1 is installed in a horizontal plane. The four left rail members 27 are supported by the shaft supporting frames 37, the first and the second auxiliary frames 36a, 36b, and the legs 38 such that the left rail members 27 are parallel to each other. Accordingly, the left rail members 27 are supported by a rail supporting frame F including the shaft supporting frames 37, the first and the second auxiliary frames 36a, 36b, and the legs 38 of the left frame unit U1, with the vertical displacement of the left rail members 27 eliminated or minimized.

[0024] The right frame unit U2 of the frame structure for a comber will be described herein.

[0025] As shown in FIGS. 1A and 6, the right frame unit U2 includes the right frame 25, four right rail members 28 (i.e., two upper right rail members 28 and two lower right rail members 28) coupled to the right frame 25, and the middle frame 39 coupled to the right rail members 28.

[0026] The right frame 25 has a substantially rectangular shape. Each of the right rail members 28 has a right flange 28a at one end thereof and is coupled to the right frame 25 with the screw 40 through the right flange 28a.

[0027] As shown in FIGS. 1B and 7, each of the right rail members 28 further has at the other end thereof a coupling flange 28b and is coupled to the middle frame 39 with the screw 40 through the coupling flange 28b. The middle frame 39 has a substantially rectangular shape. A bottom surface 39a of the middle frame 39 is flush with a bottom surface 25a of the right frame 25. Each of the right rail members 28 extends between and is coupled to the right frame 25 and the middle frame 39, and forms a right part of the corresponding rail 26. The four right rail members 28 are arranged parallel to each other. The longitudinal direction of each right rail member 28 is perpendicular to a side surface 25b of the right frame 25 to which the right flange 28a is coupled. This configuration enables the right rail members 28 to extend horizontally when the right frame unit U2 is installed in a horizontal plane.

[0028] The right frame unit U2 further includes the shaft supporting frames 37. The shaft supporting frames 37 are supported by the two upper right rail members 28. The shaft supporting frames 37 are fastened to, in other words, coupled to, the two upper right rail members 28 in a manner that is not illustrated. Specifically, the four shaft supporting frames 37 are arranged in the right frame unit U2 at equal intervals in the longitudinal direction of each right rail member 28. The combing heads 11 are each located between any two adjacent shaft supporting members 37, so that the right frame unit U2 has a work station including four combing heads 11, and the right frame unit U2 is shorter than the left frame unit U1 in a longitudinal direction of the comber.

[0029] The middle frame 39 includes a shaft supporting portion 39b in the upper portion thereof such that the right frame unit U2 further has the shaft supporting portion 39b next to the fourth shaft supporting frame 37 from the right frame 25. In the right frame unit U2, the fourth combing head 11 from the right frame 25 is interposed between the fourth shaft supporting frames 37 on the right side and the shaft supporting portion 39b of the middle frame 39 on the left side. The right frame unit U2 further includes the lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22. The lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22 each have a length enough to support the whole of the four combing heads 11.

[0030] The left rail members 27 of the left frame unit U1 is coupled to the middle frame 39 with screws 40 through the coupling flanges 27b, so that the left frame unit U1 and the right frame unit U2 are coupled to each other to form the frame structure for a comber.

[0031] As shown in FIG. 1A, the bottom surface 24a of the left frame 24, the bottom surfaces 38a of the legs 38, the bottom surface 39a of the middle frame 39, and the bottom surface 25a of the right frame 25 are flush with each other. The left rail members 27 are supported by the rail supporting frame F including the shaft supporting frames 37, the first and the second auxiliary frames 36a, 36b, and the legs 38 of the left frame unit U1 such that the left rail members 27 are parallel to each other. The right rail members 28 are coupled to the right frame 25 and the middle frame 39 such that the right rail members 28 are parallel to each other. Accordingly, each of the left rail members 27 faces the corresponding right rail member 28 in the longitudinal direction of the comber at the same height.

[0032] Each left rail member 27 and the corresponding right rail member 28 face each other in the longitudinal direction of the comber and are coupled to each other through the middle frame 39. The left rail member 27 and the corresponding right rail member 28 cooperate to form the rail 26. The rails 26 extend between and are coupled to the left frame 24 and the right frame 25 to form the rail structure. The rail structure that is formed by the rails 26 is supported by the middle frame 39 and the rail supporting frame F including the shaft supporting frames 37, the first and the second auxiliary frames 36a, 36b, and the legs 38. In the frame structure for a comber, the four rails 26 are arranged parallel to each other and extend horizontally when the comber is installed in a horizontal plane.

[0033] The two upper rails 26 are supported by the eight shaft supporting frames 37 of the left frame 24, the four shaft supporting frames 37 of the right frame 25, and the shaft supporting portion 39b of the right frame unit

U2 that are arranged side by side, so that the shafts of the combing heads 11 (i.e., the lap roller shafts 12a, the cylinder shaft 15a, the detaching rollers 16, 17, and the nipper shaft 22) are supported by the shaft supporting frames 37 and the shaft supporting portion 39b at 13 positions. Each combing head 11 is disposed between any two adjacent shaft supporting frames 37 or between the shaft supporting portion 39b and its adjacent shaft supporting frame 37. The lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22 of the left frame unit U1 are coupled to the lap roller shafts 12a, the cylinder shaft 15a, and the nipper shaft 22 of the right frame unit U2 by a coupling, which is not illustrated, to support the whole of the combing heads 11.

[0034] The operation of the frame structure for a comber according to the embodiment is described herein.

[0035] For example, the left frame unit U1 including the eight combing heads 11 and the right frame unit U2 including the four combing heads 11 are fabricated separately. Then, referring to FIG. 4, the left frame unit U1 and the right frame unit U2 are separately transported to a factory for installation. In the factory, the left frame unit U1 and the right frame unit U2 are coupled to each other such that the coupling flanges 27b of the left rail members 27 are coupled to the middle frame 39 of the right frame unit U2. Accordingly, the right and the left rail members 28, 27 are coupled to each other through the middle frame 39 to form the rails 26, and the comber that has a work station including the 12 combing heads 11 is assembled.

[0036] For example, when the comber is transported from the factory for repair, the screws 40 are unscrewed from the coupling flanges 27b of the left rail members 27 to remove the left members 27 from the middle frame 39 and to disassemble the comber into the right frame unit U2 and the left frame unit U1. The separate right frame unit U2 and the left frame unit U1 each remain equipped with the combing heads 11, and the right and the left frame units U2, U1 with the combing heads 11 are transported separately for repair.

[0037] The embodiment according to the present invention offers the following effects.

(1) A frame structure for a comber having a work station including 12 combing heads 11 is dividable into the right frame unit U2 and the left frame unit U1. This configuration enables the comber to be transported with the right frame unit U2 and the left frame unit U1 divided, thereby facilitating transportation of the comber as compared to transportation of an indivisible comber.

(2) In the right frame unit U2, the right rail members 28 extend in parallel between and are coupled to the right frame 25 and the middle frame 39. In the left frame unit U1, the left rail members 27 are coupled to the rail supporting frame F including the shaft supporting frames 37, the first and the second auxiliary frames 36a, 36b, and the legs 38 such that the left rail members 27 are parallel to each other. This configuration eliminates or minimizes the vertical displacement between the left rail members 27 and the right rail members 28 in the left frame unit U1 and the right frame unit U2 that are coupled to each other, thereby eliminating or minimizing the vertical displacement of the detaching rollers 16, 17, the cylinder shaft 15a, the nipper shaft 22, and the lap rollers 12 and therefore the vertical displacement of the 12 combing heads 11.

(3) In the right frame unit U2, the right rail members 28 extend in parallel between and are coupled to the right frame 25 and the middle frame 39. In the left frame unit U1, the left rail members 27 are coupled to the rail supporting frame F including the shaft supporting frames 37, the first and the second auxiliary frames 36a, 36b, and the legs 38 such that the left rail members 27 are parallel to each other. This configuration eliminates or minimizes the deflection or the vertical displacement of the left and the right rail members 27, 28 that may occur under the load of a large number of parts such as the detaching rollers 16, 17, the cylinder shaft 15a, the nipper shaft 22, and the lap rollers 12, thereby enabling separate transportation of the right frame unit U2 and the left frame unit U1 that are equipped with the large number of parts. Accordingly, this configuration facilitates the assembly of the comber at the factory as compared to the case that the parts are mounted to the right and the left frame units U2, U1 at the factory after the right and the left frame units U2, U1 are transported to the factory.

(4) The left frame unit U1 including the eight combing heads 11 has the same structure as a general comber, and the right frame unit U2 has a structure that is connectable to the left frame unit U1. This configuration allows the increase in the number of the combing heads 11 to be mounted to a comer, and facilitates an assembly of a comber including the increased number of combing heads 11.

(5) The right frame unit U2 has the rail structure such that the right rail members 28 are coupled to the right frame 25 and the middle frame 39. Therefore, the right frame unit U2 does not need the rail supporting frame F including the shaft supporting frame 37, the first and the second auxiliary frames 36a, 36b, and the legs 38.

(6) The middle frame 39 of the right frame unit U2 is formed integrally with the shaft supporting portion 39b. This configuration allows the shaft supporting portion 39b of the middle frame 39 to be used instead of one shaft supporting frames 37 to mount the combing heads 11 to the right frame unit U2. Accordingly, this frame structure is simpler than a structure in

which a shaft supporting frame 37 is used in addition to the middle frame 39.

[0038] The above-described embodiment may be modified as follows.

[0039] As shown in FIG. 8, the left frame unit U1 and the right frame unit U2 may each have a work station including six combing heads 11. In this case, the left frame unit U1 includes six shaft supporting frames 37 and two auxiliary frames 36. In the left rail members 27, one of the auxiliary frames 36 is coupled to one of the shaft supporting frames 37 that is the furthest shaft supporting frame 37 from the left frame 24 (i.e., the sixth shaft supporting frame 37 from the left frame 24), and the other of the auxiliary frames 36 is coupled to one of the shaft supporting frames 37 that is located adjacent to the middle position between the furthest shaft supporting frame 37 and the left frame 24 (i.e., the fourth shaft supporting frame 37 from the left frame 24).

[0040] The right frame unit U2 includes the shaft supporting potion 39b that is integrated with the middle frame 39, and six shaft supporting frames 37 that are coupled to the right rail members 28, so that the shafts of the combing heads 11 (i.e., the lap roller shafts 12a, the cylinder shaft 15a, the detaching rollers 16, 17, and the nipper shaft 22) are supported by the six shaft supporting frames 37 and the shaft supporting portion 39b at seven positions. The right frame unit U2 further includes one auxiliary frame 36 that is coupled to one of the shaft supporting frames 37 located at the approximate middle of the right frame unit U2 in the longitudinal direction of the right frame unit U2.

[0041] The left frame unit U1 in this configuration is longitudinally shorter than the left frame unit U1 in the above-described embodiment having the work station that includes the eight combing heads 11. This configuration enables the left frame unit U1 to be transported to a site to which the left frame unit U1 according to the embodiment cannot be transported.

[0042] The middle frame 39 may include an additional shaft supporting frame 37 as an alternative to the shaft supporting portion 39b.

[0043] The comber may have a work station including 16 combing heads 11. In this case, each of the left frame unit U1 and the right frame unit U2 may preferably include eight combing heads 11.

[0044] The right and the left frame units U2, U1 may be transported to a factory without being equipped with the combing heads 11, and then may be equipped with the combing heads 11 at the factory.

[0045] The right frame unit U2 may have the auxiliary frames 36 and the legs 38. That is, the right frame unit U2 may include the rail supporting frame F including the shaft supporting frames 37, the auxiliary frames 36, and the legs 38.

[0046] The left frame unit U1 may include four combing heads 11 and a middle frame 39. In this case, the right frame unit U2 includes eight combing heads 11, the auxiliary frames 36, and the legs 38, and the left frame unit U1 is shorter than the right frame unit U2 in the longitudinal direction of the comber.

[0047] The right and the left frame units U2, U1 may each have a work station including an odd number of the combing heads 11. For example, the right and the left frame units U2, U1 respectively may have nine and three combing heads 11, or respectively may have seven and five combing heads 11.

[0048] The comber may have an additional frame unit between the left frame unit U1 and the right frame unit U2 such that the left frame unit U1, the right frame unit U2, and the additional frame unit each have four combing heads 11. In this case, the additional frame unit includes rail members forming parts of the respective rails 26 and each coupled at one end thereof to a connecting frame. Each rail member of the additional frame unit has a coupling flange at the other end thereof. The additional frame unit may have the rail supporting frame F that supports the rail members, or may not have the rail supporting frame F.

[0049] In this case, the coupling flanges 27b of the left frame unit U1 are coupled to the additional frame unit, and the coupling flanges of the rail members of the additional frame unit are coupled to the middle frame 39 of the right frame unit U2. Accordingly, a frame structure for a comber that has a work station including 12 combing heads 11 is configured.

[0050] The number of members of the combing heads 11 that are supported by the shaft supporting frames 37 and the shaft supporting portion 39b may be changed as necessary. In this case, the number of the shafts supported by the shaft supporting frames 37 and the shaft supporting portions 39b is changed as well.

A frame structure for a comber includes right and left frames (25, 24). A plurality of rails (26) are coupled to the right and the left frames (25, 24). The frame structure is dividable into right and left frame units (U2, U1) including the right and the left frames (25, 24), respectively. The right frame unit (U2) includes a plurality of rail members (28) forming parts of the respective rails (26) and each coupled to the right frame (25) at one end thereof. The left frame unit (U1) includes a plurality of rail members (27) forming parts of the respective rails (26) and each coupled to the left frame (24) at one end thereof. One of the frame units (U2, U1) includes a middle frame (39) to which the other ends of the rail members (28, 27) of the frame units (U2, U1) are coupled, and the other of the frame units (U2, U1) includes a rail supporting frame (F) that supports the rail members (28, 27) of the other.

Claims

1. A frame structure for a comber comprising:

a right frame (25) and a left frame (24) arranged such that a plurality of combing heads (11) are

interposed between the right frame (25) and the left frame (24); and
a plurality of rails (26) extending in parallel between and coupled to the right and the left frames (25, 24), **characterized in that**
the frame structure for a comber is dividable into a right frame unit (U2) including the right frame (25) and a left frame unit (U1) including the left frame (24),
the right frame unit (U2) includes a plurality of rail members (28) forming parts of the respective rails (26) and each coupled to the right frame (25) at one end of the rail member (28) of the right frame unit (U2),
the left frame unit (U1) includes a plurality of rail members (27) forming parts of the respective rails (26) and each coupled to the left frame (24) at one end of the rail member (27) of the left frame unit (U1),
one of the right frame unit (U2) and the left frame unit (U1) includes a middle frame (39) to which the other ends of the rail members (28, 27) of the right and the left frame units (U2, U1) are coupled, and
the other of the right frame unit (U2) and the left frame unit (U1) includes a rail supporting frame (F) that supports the rail members (28, 27) of the other.

2. The frame structure for a comber according to claim 1, **characterized in that** the comber has a work station including 12 combing heads (11) wherein the right frame unit (U2) and the left frame unit (U1) include four combing heads (11) and eight combing heads (11), respectively.

3. The frame structure for a comber according to claim 1, **characterized in that** the comber has a work station including 12 combing heads (11) wherein the right and the left frame units (U2, U1) each include six combing heads (11).

4. The frame structure for a comber according to claim 1 or 2, **characterized in that**
the right and the left frame units (U2, U1) each include a plurality of shaft supporting frames (37) that supports shafts (12a, 15a, 16, 17, 22) of the combing heads (11),
the shaft supporting frames (37) of the right frame unit (U2) are coupled to at least two of the rail members (28) of the right frame unit (U2),
the shaft supporting frames (37) of the left frame unit (U1) are coupled to at least two of the rail members (27) of the left frame unit (U1), and
the middle frame (39) includes a shaft supporting portion (39b) that supports the shafts (12a, 15a, 16, 17, 22).

5. The frame structure for a comber according to claim 3, **characterized in that**
the right and the left frame units (U2, U1) each include a plurality of shaft supporting frames (37) that supports shafts (12a, 15a, 16, 17, 22) of the combing heads (11),
the shaft supporting frames (37) of the right frame unit (U2) are coupled to at least two of the rail members (28) of the right frame unit (U2),
the shaft supporting frames (37) of the left frame unit (U1) are coupled to at least two of the rail members (27) of the left frame unit (U1), and
the middle frame (39) includes a shaft supporting portion (39b) that supports the shafts (12a, 15a, 16, 17, 22).

6. The frame structure for a comber according to claim 4, **characterized in that**
the frame structure for a comber is divided into the right frame unit (U2) and the left frame unit (U1),
one of the right frame unit (U2) and the left frame unit (U1) is shorter than the other (U2, U1) in the longitudinal direction of the comber, and
the other ends of the rail members (28, 27) of the shorter frame unit (U2, U1) are coupled to the middle frame (39).

7. The frame structure for a comber according to claim 4 or 6, **characterized in that**
the frame structure for a comber is divided into the right frame unit (U2) and the left frame unit (U1),
one of the right frame unit (U2) and the left frame unit (U1) is longer than the other (U2, U1) in the longitudinal direction of the comber,
the rail supporting frame (F) includes an auxiliary frame (36, 36a, 36b), and
the auxiliary frame (36, 36a, 36b) is coupled to one of the shaft supporting frames (37) of the longer frame unit (U2, U1) that is located at a position closest to the other ends of the rail members (28, 27) of the longer frame unit (U2, U1).

FIG. 1A

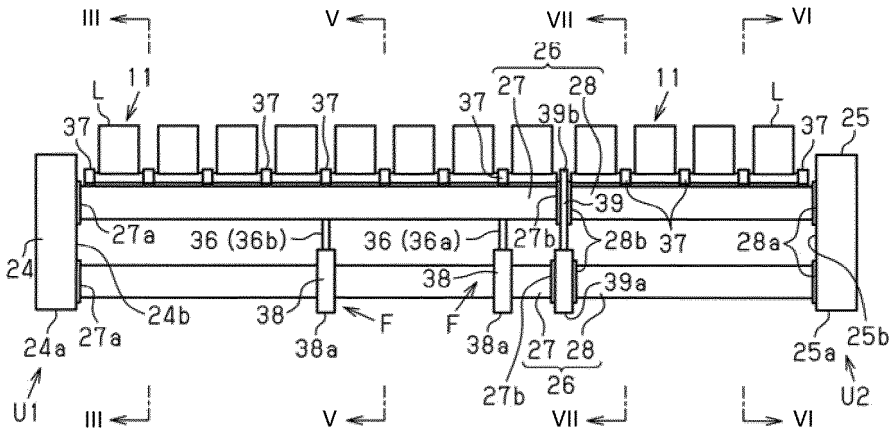

III
V
VII
VI
26
27
28
11
11
L
L
37
37
37
37
37
39b
25
39
27a
36 (36b)
36 (36a)
27b
28b
37
28a
24
38
39a
24b
38
F
F
38a
38a
27 28
25a
25b
24a
27a
27b
26
U1
U2
III
V
VII
VI

FIG. 1B

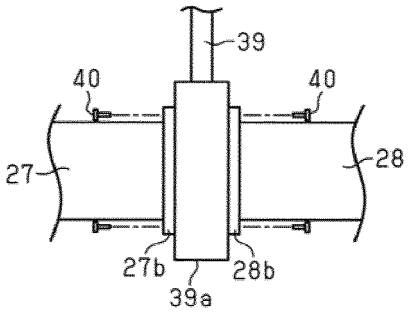

39
40
40
27
28
27b
28b
39a

FIG. 2

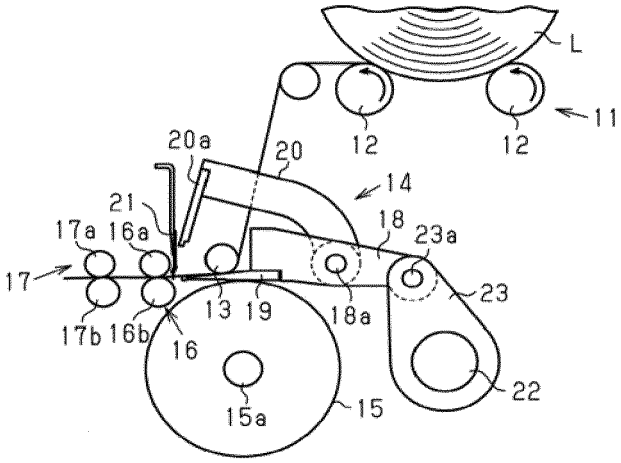

L
11
12
12
20a
20
14
21
17a
16a
18
23a
17
23
13
19
18a
17b
16b
16
22
15a
15

FIG. 3

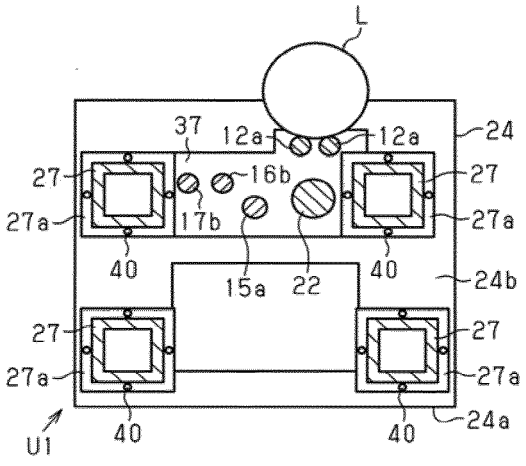

L
37
12a
12a
24
27
16b
27
27a
17b
27a
40
15a
22
40
24b
27
27
27a
27a
U1
40
40
24a

FIG. 4

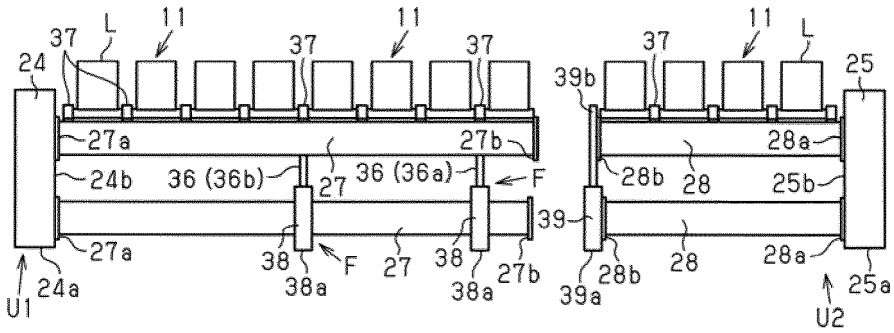

24
37
L
11
37
11
37
37
11
L
39b
25
27a
27b
28a
24b
36 (36b)
27
36 (36a)
F
28b
28
25b
39
27a
38
38a
F
27
38
38a
27b
39a
28b
28
28a
25a
U1
24a
U2

FIG. 5

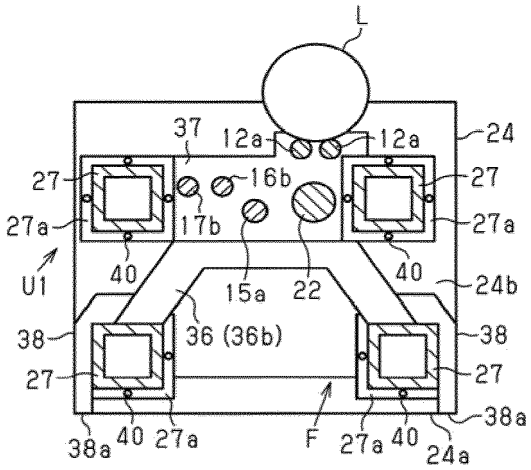

L
37
12a
12a
24
27
16b
27
27a
17b
27a
U1
40
40
24b
15a
22
38
36 (36b)
38
27
27
38a
38a
40
27a
F
27a
40
24a

FIG. 6

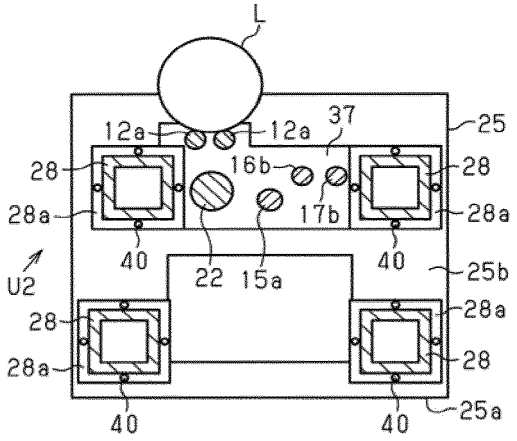

L
12a
12a
37
25
28
16b
28
28a
17b
28a
40
40
U2
22
15a
25b
28
28a
28a
28
40
40
25a

FIG. 7

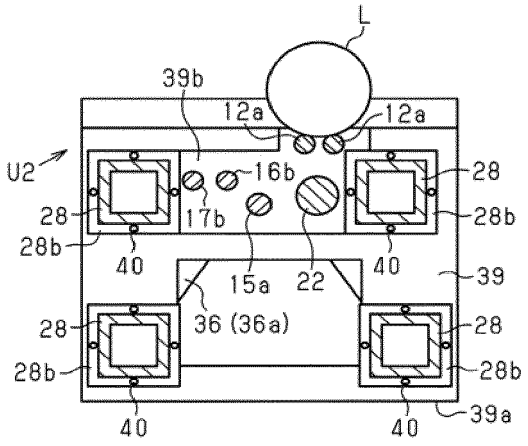
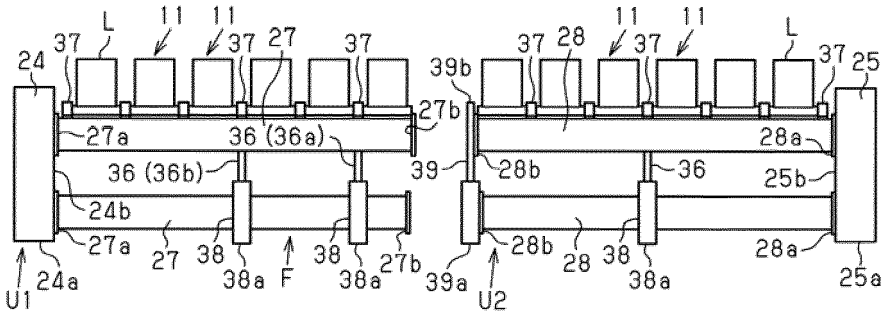

L
39b
12a
12a
U2
16b
28
28
17b
28b
28b
40
40
39
15a
22
36 (36a)
28
28
28b
28b
40
40
39a

FIG. 8


24
37
L
11
11
37
27
37
27a
36 (36a)
36 (36b)
24b
27a
27
38
38a
F
38
38a
27b
U1
24a
39b
37
28
11
11
37
L
37
25
27b
28a
39
28b
36
25b
28b
28
38
38a
28a
39a
U2
25a

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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 4224

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 2 793 109 Y (DONGTAI TEXTILE MACHINERY CO [CN]) 5 July 2006 (2006-07-05) * page 3 - page 4; figures 1-2 *	1	INV. D01G19/24
A,D	EP 2 397 583 A2 (TOYOTA JIDOSHOKKI KK [JP]) 21 December 2011 (2011-12-21) * paragraph [0014] - paragraph [0017]; figures 1a-1b *	1	
A	DE 10 2006 026850 A1 (RIETER AG MASCHF [CH]) 8 February 2007 (2007-02-08) * paragraph [0007] - paragraph [0009] * * paragraph [0058]; figure 9 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

D01G
D01H
B23Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 August 2018	Pollet, Didier

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 2793109 Y	05-07-2006	NONE	
EP 2397583 A2	21-12-2011	CN 102286808 A	21-12-2011
		EP 2397583 A2	21-12-2011
		JP 5648333 B2	07-01-2015
		JP 2012001844 A	05-01-2012
DE 102006026850 A1	08-02-2007	CH 698054 B1	15-05-2009
		CN 1904163 A	31-01-2007
		DE 102006026850 A1	08-02-2007

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Patent documents cited in the description

- JP 2012001844 A **[0002]**