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(54) **Frame structure for comber**

Rahmenstruktur für eine Kämmmaschine

Structure de cadre pour peigne

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(56) References cited:
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Description

BACKGROUND OF THE INVENTION

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

[0002] Atypical comber has an operational portion, in which eight combing heads are arranged. Each combing head includes a nipper and a combing cylinder. The nipper holds distal end of lap fed by a predetermined amount at a time. The distal end of the lap is combed with the combing cylinder. This turns the lap into fleece. As the nipper advances, the fleece is moved toward detaching rollers. The detaching rollers are rotated in the reverse direction in response to the advance of the fleece, and fleece that has been taken before (preceding fleece) is retreated. Then, the trailing end of the preceding fleece and the advancing end of the newly combed fleece (succeeding fleece) are overlapped. Subsequently, the detaching rollers are rotated forward to take the fleece from the nipper, and the trailing end of the fleece is combed with a top comb, which is stuck into the fleece. Then, the fleeces made by repeating this process in the combing heads are bundled and drafted, and thereafter compressed by calender rollers so as to become sliver.

[0003] Modern combers are operated in such a manner that the rotational speed of combing cylinders is about 200 to 300 rpm. The advance and retreat of nippers and swinging motion (back-and-forth pivoting) of detaching rollers are executed as quickly as 200 to 300 times per minute, accordingly. The quality of the obtained fleeces is influenced by the sticking amount of needles of a combing cylinder into the lap when the lap is combed by the combing cylinder. Specifically, when the depth of the sticking amount is changed by approximately 0.3 mm (penetration depth), the quality of obtained sliver changed. Therefore, all the combing heads must have the same positional relationship among the nipper shaft, the combing cylinder, and the detaching rollers.

[0004] As shown in Fig. 3A, typically, the frame structure for a comber includes machine frames (middle frames) that partitions combing heads 50 from one another (Japanese Laid-Open Utility Model Publication No. 6-12483). According to the publication, the frame structure for a comber includes a plurality of base surface plates 51 and eight middle frames 52 arranged on the base surface plates 51 to extend upright. As shown in Fig. 3B, a nipper shaft 53, a cylinder shaft 54, detaching rollers 55, and lap rollers 56 are rotatably supported by the middle frames 52 with non-illustrated bearings, while extending through the middle frames 52. In Fig. 3A, the nipper shaft 53, the cylinder shaft 54, and the detaching rollers 55 are omitted.

[0005] Conventionally, a frame structure is designed such that, the distances between a base surface plate 51 and each of the nipper shaft 53, the cylinder shaft 54, and the detaching rollers 55 in a part corresponding to each combing head 50 are common to all the combing heads 50. This requires the base surface plates 51 and the middle frames 52 to be highly accurately machined. Also, high assembly accuracy is required. For example, the positional tolerance of the holes for receiving the nipper shaft 53 and other shafts needs to be one hundredth of a millimeter or less. To meet this requirement, constant temperature machining needs to be performed. This results in a larger number of manufacturing steps and increased costs.

[0006] FR 2 206 395 discloses a frame for a textile machine such as a spinning frame, a twisting machine or a rewinding machine, which includes a series of similar stations, said frame comprising a hollow rectilinear central girder having support elements, such as bosses, webs, notches, and bores, which are integral parts of the girder and are adapted to support, directly and with great accuracy, the parts of the various stations of the machine. The girder is preferably made up of a plurality of lengths fitted together end to end, preferably with end faces perfectly perpendicular to the general direction of the girder. The girder may be cast or extruded.

SUMMARY OF THE INVENTION

[0007] Accordingly, it is an objective of the present invention to provide a frame structure for a comber that reliably supports components such as a nipper shaft, a cylinder shaft, and a detaching roller without using surface plates and middle frames, which require high machining accuracy.

[0008] To achieve the foregoing objective and in accordance with one aspect of the present invention, a frame structure for a comber includes a left frame, a right frame, and two front and rear upper rails. The left frame and the right frame are arranged so that all the combing heads are between the left and right frames. The front and rear upper rails extend between and are coupled to upper parts of the left and right frames. At least a nipper shaft, a cylinder shaft, and a detaching roller are supported by the upper rails.

[0009] At least the nipper shaft, the cylinder shaft, and the shaft of the detaching roller each have such a length that it extends over all the combing heads, and require highly accurate positional relationship thereamong. According to the present invention, these shafts are supported by the upper rails. The upper rails are bent between the left frame and the right frame, causing the distance from the frame structure installation surface and each of the nipper shaft, the cylinder shaft, and the detaching roller to be different between combing heads located close to the center of the frame structure and combing heads located close to an end of the frame structure. The amount of difference is greater than that in a case where surface plates and middle frames used that are formed with a high machining accuracy of one hundredth of a millimeter or less. However, between combing heads, the positional relationship among the nipper shaft, the cylinder shaft, and the detaching roller are maintained

to the same within a required accuracy. Therefore, unlike the conventional frame structure, no highly accurate machining needs to be performed for uniform distances between the frame installation surface and each of a nipper shaft, a cylinder shaft, and a detaching roller at the combing heads. In other words, according to the present invention, a nipper shaft, a cylinder shaft, and a detaching roller can be reliably supported without using surface plates and middle frames, which require high machining accuracy (accuracy within one hundredth of a millimeter).

[0010] 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

[0011] The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings in which:

Fig. 1 A is a diagrammatic front view illustrating a frame structure for a comber according to one embodiment of the present invention;
Fig. 1 B is an enlarged diagrammatic cross-sectional view taken along line 1 B-1 B in Fig. 1A;
Fig. 2 is a schematic side view illustrating the combing heads of Fig. 1A;
Fig. 3A is a diagrammatic front view illustrating a conventional frame structure for a comber; and
Fig. 3B is an enlarged diagrammatic cross-sectional view taken along line 3B-3B in Fig. 3A.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] One embodiment of the present invention will now be described with reference to Figs. 1A to 2.

[0013] As shown in Fig. 1A, a comber has an operational portion, in which eight combing heads are arranged. As shown in Fig. 2, a combing head 11 includes a nipper device 14 having a pair of lap rollers 12 and a feed roller 13, a combing cylinder 15 that rotates integrally with a cylinder shaft 15a, and two pairs of detaching rollers 16, 17, each pair of which are arranged along the front-back direction. The detaching rollers 16 and 17 have detaching top rollers 16a and 17a, respectively. The nipper device 14 has a nipper frame 18, which is located above the combing cylinder 15 to be swingable along the advancing and retreating directions. A bottom nipper 19 is provided at the bottom of the nipper frame 18. A nipper arm 20 is pivotably connected to the nipper frame 18 with a support shaft 18a, and a top nipper 20a is fixed to the distal end of the nipper arm 20. In synchronization with the motion of the nipper frame 18 in the advancing and retreating directions, the top nipper 20a opens and closes at predetermined timing to hold lap L in cooperation with the bottom nipper 19. Atop comb 21 is attached to the nipper frame 18. The top comb 21 is located forward of the bottom nipper 19 and performs a predetermined action in synchronization with the nipper frame 18.

[0014] A nipper shaft 22 is arranged at the rear of the combing cylinder 15 and below the nipper frame 18 to be able to pivot back and forth. A first end of a nipper frame drive arm 23 is secured to the nipper shaft 22 to pivot integrally with the nipper shaft 22, and the rear end of the nipper frame 18 is pivotably supported on a second end of the nipper frame drive arm 23 via a support shaft 23a. The nipper frame 18 is configured to be swung back and forth such that the distal end of the bottom nipper 19 approaches and separates from the detaching rollers 16, 17 by back-and-forth pivoting (swinging motion) of the nipper shaft 22.

[0015] The frame structure for the comber will now be described with reference to Figs. 1A and 1B.

[0016] As shown in Figs. 1Aand 1B, the frame structure includes a left frame 31, a right frame 32, a front upper rail 33a, and a rear upper rail 33b. The left frame 31 and the right frame 32 are arranged so that all the combing heads 11 are between the left and right frames. The upper rails 33a, 33b extend parallel to the longitudinal direction of the comber (left-right direction in Fig. 1A) and extend between and are coupled to the upper ends of the left and right frames 31, 32. The upper rails 33a, 33b are provided at the same height. The upper rails 33a, 33b are formed into tubular shapes (rectangular tubes in the present embodiment).

[0017] The frame structure further includes a front lower rail 34a and a rear lower rail 34b. The lower rails 34a, 34b are extend between and coupled to the lower parts of the left frame 31 and the right frame 32. The lower rails 34a, 34b are parallel to each other at the same height. The lower rails 34a, 34b are formed into the same tubular shape as the upper rails 33a, 33b. The lower rails 34a, 34b are supported by base members 35 at a middle position along the longitudinal direction. In the present embodiment, the base members 35 support the lower rails 34a, 34b at positions that divide the length between the left frame 31 and the right frame 32 into quarters.

[0018] Middle frames 36 are located between and coupled to the upper rails 33a, 33b and the lower rails 34a, 34b. The middle frames 36 are formed into rectangular frames and have an upper end and lower corners. The upper ends are coupled to the lower surfaces of the upper rails 33a, 33b. The lower corners correspond to the corners of the lower rails 34a, 34b and are formed as cutouts. The lower corners are coupled to the corners of the lower rails 34a, 34b. The middle frames 36 are coupled to the lower rails 34a, 34b at positions corresponding to the base members 35.

[0019] As shown in Fig. 1B, the detaching rollers 16, 17 (the shafts thereof, to be exact) are supported by the front upper rail 33a via brackets 37 fixed to the front upper rail 33a. The cylinder shaft 15a is supported by the front

upper rail 33a via brackets 38 fixed to the front upper rail 33a. The nipper shaft 22 is supported by the rear upper rail 33b via brackets 39 fixed to the rear upper rail 33b. The lap rollers 12 (the shafts thereof, to be exact) are supported by the rear upper rail 33b via brackets 40 fixed to the rear upper rail 33b. The lap rollers 12 (the shafts thereof, to be exact), the cylinder shaft 15a, the detaching rollers 16, 17 (the shafts thereof, to be exact), and the nipper shaft 22 all have a length that extend over all of the combing heads 11.

[0020] The brackets 37 to 40 are each arranged between an adjacent pair of the combing heads 11. The brackets 37 for the detaching rollers 16, 17 and the brackets 38 for the cylinder shafts 15a are fixed to the upper rail 33a, while being displaced from each other along a direction perpendicular to the sheet of Fig. 1 B, so as not to contact each other. Although not illustrated, other shafts such as brush shafts are supported between the left frame 31 and the right frame 32.

[0021] Operation of the frame structure configured as described above will now be described.

[0022] At each combing head 11, when the distal end of a lap held by the top nipper 20a and the bottom nipper 19 is combed with the combing cylinder 15, the quality of the sliver obtained by the comber is improved if the combing cylinder 15 is rotated with non-illustrated comber needles stuck into the lap to as great a depth as possible. Therefore, when the lap is combed with the combing cylinder 15, the bottom nipper 19 is preferably moved to a position as close as possible to the combing cylinder 15. At each combing head 11, the nipper shaft 22, which is a drive source for swinging motion of the bottom nipper 19, and the cylinder shaft 15a, which is a rotational drive source of the combing cylinder 15, need to be parallel to each other and maintain a predetermined positional relationship. At each combing head 11, if the nipper shaft 22 and the cylinder shaft 15a are parallel to each other and maintain a predetermined positional relationship, sliver of a desired high quality can be obtained even if the distance from the comber installation surface and each of the nipper shaft 22 and the cylinder shaft 15a varies among the combing heads 11.

[0023] The frame structure does not have surface plates that are formed with high machining accuracy for positional tolerance within one hundredth of a millimeter, or middle frames that are each provided between combing heads 11 and formed with high machining accuracy. Therefore, the upper rails 33a, 33b and the lower rails 34a, 34b, which form the frame structure, are bent between the left frame 31 and the right frame 32. In the upper rails 33a, 33b and the lower rails 34a, 34b, the amount of bending is different between a part close to the left frame 31 or the right frame 32 and a central part. The values of distances from the comber installation surface to each of the cylinder shaft 15a, the detaching rollers 16, 17, and the nipper shaft 22 vary among the combing heads 11. These values in the present embodiment vary by a greater amount than in a case where surface plates and middle frames that are formed with high machining accuracy. However, in each of the combing heads 11, the degree of parallelism and the positional relationship (distances) among the cylinder shaft 15a, the detaching rollers 16, 17, and the nipper shaft 22 satisfy the demanded levels. Thus, the quality of product slivers that are formed by spinning eight slivers spun by the eight combing heads 11 and bundling and drafting the eight slivers is as high quality as a case where a frame structure is used that uses surface plates and middle frames that are formed with high machining accuracy for a positional tolerance within one hundredth of a millimeter.

[0024] The present embodiment has the following advantages.

(1) The frame structure for the comber includes the left frame 31 and the right frame 32 arranged so that all the combing heads 11 are located between the frames 31 and 32, and the two front and rear upper rails 33a, 33b, which are coupled to the upper parts of the left frame 31 and the right frame 32. The nipper shaft 22, the cylinder shaft 15a, and the detaching rollers 16, 17 are supported by the upper rails 33a, 33b via the brackets 37 to 39 fixed to the upper rails 33a, 33b. The positional relationship among the nipper shaft 22, the cylinder shaft 15a, and the detaching rollers 16, 17 thus does not vary among the combing heads 11. The nipper shaft 22, the cylinder shaft 15a, and the detaching rollers 16, 17 can be reliably supported without using surface plates and middle frames that require high machining accuracy. Therefore, constant temperature machining is not necessary.

(2) The frame structure further includes two front and rear lower rails 34a, 34b coupled to the lower parts of the left frame 31 and the right frame 32. Compared to a case where no lower rails 34a, 34b are provided, the frame structure is more robust as a whole. Thus, for example, if the frame structure is carried, for example, by a forklift and installed in a predetermined installation position after being assembled at a place different from an installation position in a factory, the upper rails 33a, 33b are prevented from being bent to a detrimental level.

(3) The middle frames 36 are located between and coupled to the upper rails 33a, 33b and the lower rails 34a, 34b. The entire frame structure therefore has a robust ladder structure. The structure thus reduces machine vibration and is suitable for increasing the speed of the comber. The machining accuracy of the middle frames 36 used in the embodiment can be lowered to less than that of middle frames used in conventional frame structures. Therefore, the middle frames 36 of the present embodiment do not require constant temperature machining.

(4) The upper rails 33a, 33b and the lower rails 34a, 34b are formed into tubular shapes. Compared to a case where the upper rail 33a, 33b and the lower rails 34a, 34b are formed to be solid, the weight of the frame structures can be reduced and yet still have the same strength.

(5) The lower rails 34a , 34b are supported by the base members 35 at intermediate positions, and the middle frames 36 are located at positions corresponding to the base members 35. Therefore, machine vibration can be more reduced compared to a case where no base members 35 are provided or a case where base members 35 are provided but the middle frames 36 are located at positions that do not correspond to the base members 35.

[0025] The present invention is not restricted to the illustrated embodiments but may be embodied in the following modifications.

[0026] The number and the positions of the middle frames 36 are not limited to those presented in the above illustrated embodiment, but may be reduced or increased. Alternatively, the positions of the middle frames 36 may be changed without changing the number thereof.

[0027] The frame structure needs to have at least the left frame 31 and the right frame 32, and the two front and rear upper rails 33a, 33b, which are coupled to the upper parts of the left frame 31 and the right frame 32. However, with the lower rails 34a, 34b, the second advantage (2) is achieved. Also, with the middle frames 36 or the base members 35, the frame structure can be robust as a whole, so that the machine vibration is reduced.

[0028] The upper rails 33a, 33b and the lower rails 34a, 34b are not limited to rectangular tubes, but may be tubes of other polygon or cylindrical. Also, the rails 33a, 33b, 34a, 34b are not limited to tubular shaped, but may be solid. For example, the rails 33a, 33b, 34a, 34b may be solid bodies having I-shaped or L-shaped cross-sections.

[0029] The upper rails 33a, 33b and the lower rails 34a, 34b do not need to have the same shape or size. However, the upper rails 33a, 33b preferably have the same bending strength, and the lower rails 34a, 34b preferably have the same bending strength.

[0030] The brackets 37 for supporting the detaching rollers 16, 17 and the brackets 38 for supporting the cylinder shaft 15a may be formed integrally.

[0031] The middle frames 36 do not need to have a substantially rectangular shape, but may have other shapes. For example, the frame structure may include a middle frame coupling only the front upper rail 33a and the lower rail 34a to each other, a middle frame coupling only the rear upper rail 33b and the lower rail 34b to each other, a middle frame coupling only the upper rails 33a, 33b to each other, and a middle frame coupling only the lower rails 34a, 34b to each other.

[0032] A frame structure for a comber includes a left frame, a right frame, and two front and rear upper rails. The left frame and the right frame are arranged so that all the combing heads are between the left and right frames. The front and rear upper rails extend between and are coupled to upper parts of the left and right frames. At least a nipper shaft, a cylinder shaft, and a detaching roller are supported by the upper rails.

Claims

1. A frame structure for a comber, the structure being **characterized by** comprising a left frame (31), a right frame (32), and two front and rear upper rails (33a, 33b), the left frame (31) and the right frame (32) being arranged so that all combing heads (11) are between the left and right frames (31, 32), the front and rear upper rails (33a, 33b) extending between and are coupled to upper parts of the left and right frames (31, 32),
   wherein at least a nipper shaft (22), a cylinder shaft (15a), and a detaching roller (16; 17) are supported by the upper rails.

2. The frame structure for a comber according to claim 1, **characterized by** two front and rear lower rails (34a, 34b), which extend between and are coupled to lower parts of the left frame (31) and the right frame (32).

3. The frame structure for a comber according to claim 2, **characterized by** a middle frame (36), which is located between and coupled to the upper rail (33a; 33b) and the lower rail (34a; 34b).

4. The frame structure for a comber according to claim 3, **characterized in that** the lower rail (34a; 34b) is supported by a base member (35) at a middle position along the longitudinal direction, and the middle frame (36) is located at a position that corresponds to the base member (35).

5. The frame structure for a comber according to any one of claims 1 to 4, **characterized in that** at least one of the upper rail (33a; 33b) and the lower rail (34a; 34b) is formed to be tubular.

6. The frame structure for a comber according to any one of claims 1 to 5, **characterized in that** at least a bracket (37) for supporting the detaching roller (16, 17), a bracket (39) for supporting the nipper shaft (22), and a bracket (38) for supporting the cylinder shaft (15a) are fixed to the upper rail (33a; 33b).

Patentansprüche

1. Rahmenstruktur für eine Kämmmaschine, wobei die

Struktur **gekennzeichnet ist durch** einen linken Rahmen (31), einen rechten Rahmen (32) und zwei vordere und hintere obere Schienen (33a, 33b), wobei der linke Rahmen (31) und der rechte Rahmen (32) derart angeordnet sind, dass alle Kämmköpfe (11) zwischen dem linken und dem rechten Rahmen 31, 32) angeordnet sind, wobei sich die vordere und hintere obere Schiene (33a, 33b) zwischen oberen Teilen des linken und rechten Rahmens (31, 32) erstrecken und an diese gekoppelt sind,
wobei zumindest eine Zangenwelle (32), eine Zylinderwelle (15a) und eine Lösewalze (16; 17) **durch** die oberen Schienen gestützt sind.

2. Rahmenstruktur für eine Kämmmaschine nach Anspruch 1, **gekennzeichnet durch** zwei vordere und hintere untere Schienen (34a, 34b), welche sich zwischen unteren Teilen des linken Rahmens (31) und des rechten Rahmens (32) erstrecken und an diese gekoppelt sind.

3. Rahmenstruktur für eine Kämmmaschine nach Anspruch 2, **gekennzeichnet durch** einen Mittelrahmen (36), der sich zwischen der oberen Schiene (33a; 33b) und der unteren Schiene (34a; 34b) befindet.

4. Rahmenstruktur für eine Kämmmaschine nach Anspruch 3, **dadurch gekennzeichnet, dass** die untere Schiene (34a; 34b) durch ein Basisbauteil (35) an einer Mittelposition entlang der Längsrichtung gestützt ist und sich der Mittelrahmen (36) an einer Position befindet, die dem Basisbauteil (35) entspricht.

5. Rahmenstruktur für eine Kämmmaschine nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** zumindest eine von der oberen Schiene (33a; 33b) und der unteren Schiene (34a; 34b) ausgebildet ist, um röhrenförmig zu sein.

6. Rahmenstruktur für eine Kämmmaschine nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** zumindest ein Halter (37) zum Stützen der Lösewalze (16, 17), ein Halter (39) zum Stützen der Zangenwelle (22) und ein Halter (38) zum Stützen der Zylinderwelle (15a) an der oberen Schiene (33a; 33b) befestigt sind.

Revendications

1. Structure de cadre pour un peigne, la structure étant **caractérisée en ce qu'**elle comprend un cadre gauche (31), un cadre droit (32), et deux rails supérieurs avant et arrière (33a, 33b), le cadre gauche (31) et le cadre droit (32) étant arrangés de sorte que toutes têtes de peignage (11) sont entre les cadres gauche et droit (31, 32), les rails supérieurs avant et arrière (33a, 33b) s'étendant entre et sont couplés à des parties supérieures des cadres gauche et droit (31, 32),
dans laquelle au moins un arbre de serrage (22), un arbre de cylindre (15a), et un rouleau arracheur (16 ; 17) sont soutenus par les rails supérieurs.

2. Structure de cadre pour un peigne selon la revendication 1, **caractérisée par** deux rails inférieurs avant et arrière (34a, 34b), qui s'étendent entre et sont couplés à des parties inférieures du cadre gauche (31) et du cadre droit (32).

3. Structure de cadre pour un peigne selon la revendication 2, **caractérisée par** un cadre intermédiaire (36), qui est localisé entre et couplé au rail supérieur (33a ; 33b) et au rail inférieur (34a ; 34b).

4. Structure de cadre pour un peigne selon la revendication 3, **caractérisée en ce que** le rail inférieur (34a ; 34b) est soutenu par un élément de base (35) à une position intermédiaire le long de la direction longitudinale, et le cadre intermédiaire (36) est localisé à une position qui correspond à l'élément de base (35).

5. Structure de cadre pour un peigne selon l'une quelconque des revendications 1 à 4, **caractérisée en ce qu'**au moins un du rail supérieur (33a ; 33b) et du rail inférieur (34a ; 34b) est formé pour être tubulaire.

6. Structure de cadre pour un peigne selon l'une quelconque des revendications 1 à 5, **caractérisée en ce qu'**au moins une fixation (37) pour soutenir le rouleau arracheur (16, 17), une fixation (39) pour soutenir l'arbre de serrage (22), et une fixation (38) pour soutenir l'arbre de cylindre (15a) sont fixés au rail supérieur (33a, 33b).

Fig.1A

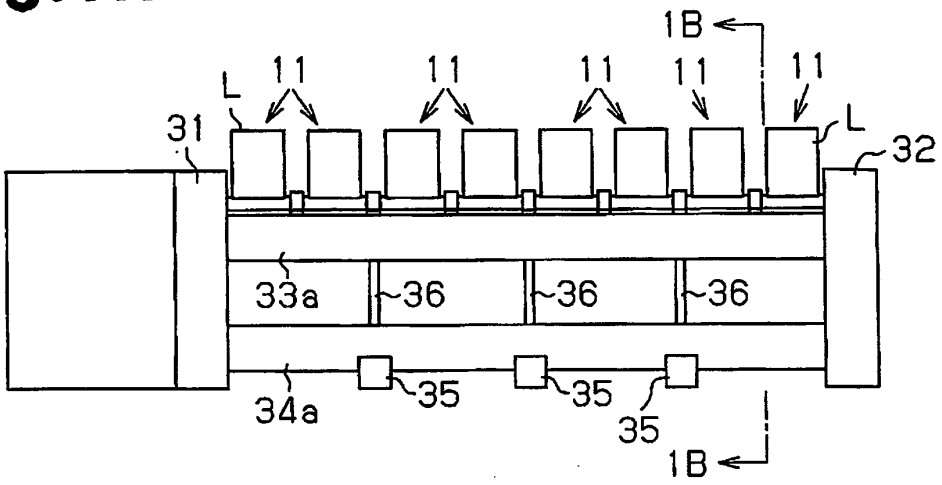


Fig.1B

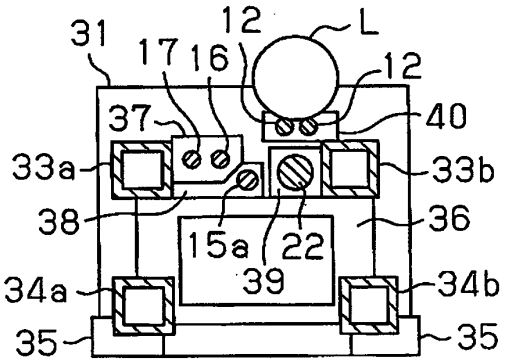


Fig.2

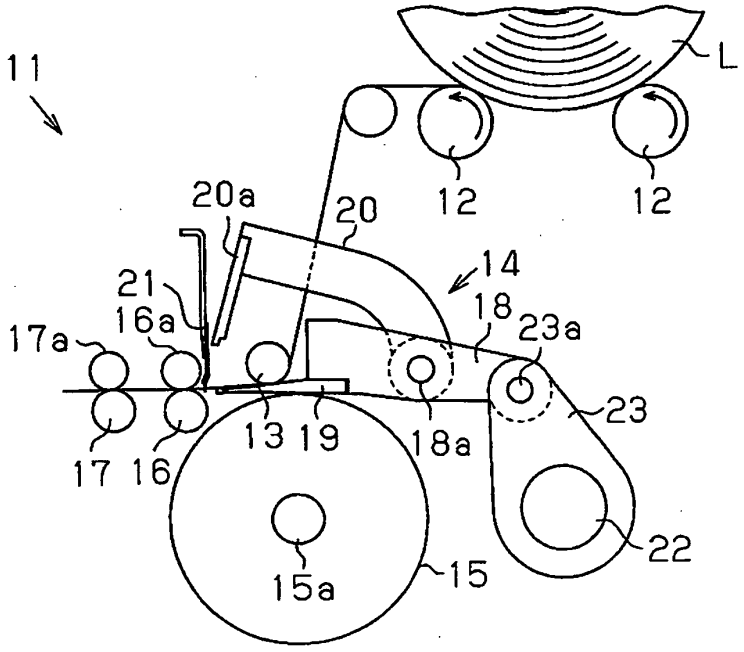


Fig.3A

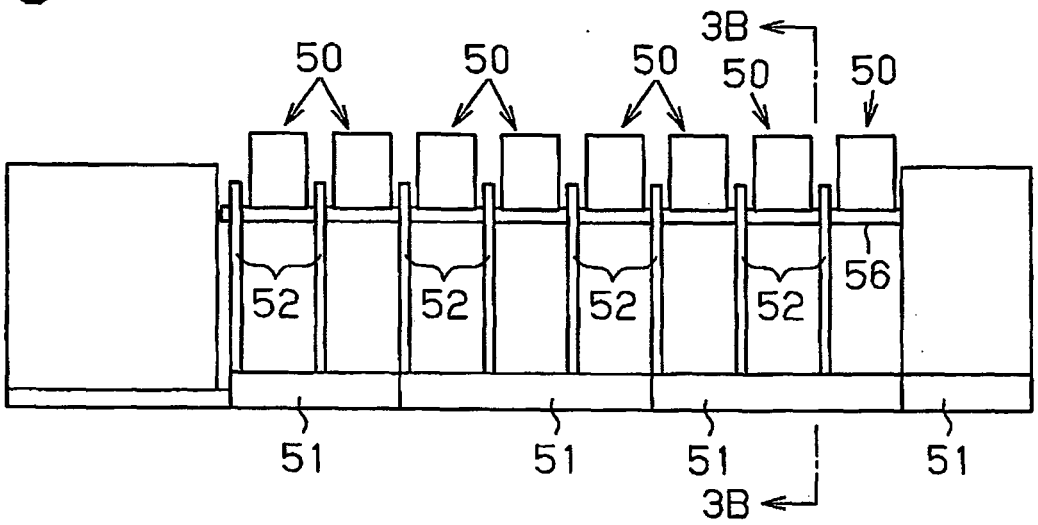
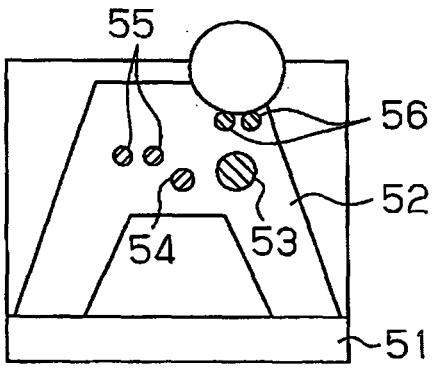


Fig.3B



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 6012483 U **[0004]**
- FR 2206395 **[0006]**