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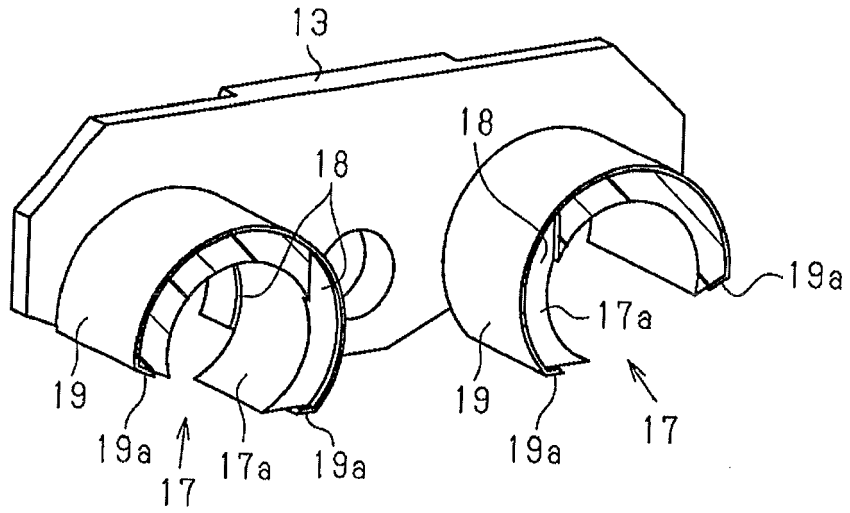
(54) DETACHING TOP ROLLER SUPPORTING PORTION FOR COMBER

(57) A detaching top roller supporting portion for a comber supports a detaching top roller via a bearing. The detaching top roller supporting portion includes a holding portion, which detachably holds the bearing. At least a part of the holding portion that is in contact with the bearing is made of synthetic polymer. The detaching top roller supporting portion is characterized by a metal spring, which assists holding force with which the holding portion holds the bearing.

Fig.2A



EP 3 031 962 A1

Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a detaching top roller supporting portion for a comber.

[0002] A comber includes a plurality of combing heads. Each of the combing heads includes a nipper device, a combing cylinder, and a detaching roller. The nipper device holds a lap fed by the combing heads. The leading end of the lap is combed by the combing cylinder. This removes short fiber and the like from the lap to form a fleece. The nipper device moves forward in a direction in which the lap is fed from the holding position of a lap to move the fleece toward the detaching roller. Corresponding to the forward movement of the fleece, the detaching roller rotates backward and moves backward the fleece that has been received by the detaching roller (preceding fleece). The trailing end of the preceding fleece and the leading end of a newly combed fleece (following fleece) are overlaid with each other. After that, the detaching roller rotates forward to receive the following fleece from the nipper device, and the top comb combs the trailing end of the following fleece while the preceding fleece and the following fleece are put together. Operation of the detaching roller in the comber has great influence on sliver quality (the presence or absence of unevenness) and machinery load during a cycle of cut, combing, and piecing (putting together) of a fiber fleece.

[0003] In a configuration disclosed in Japanese Laid-Open Patent Publication No. 5-214615, as shown in Fig. 6, detaching rollers 41 and 42 and detaching top rollers 41a and 42a (hereinafter, referred to as simply top rollers 41 a and 42a) hold fleece (not shown) while a pressing mechanism 43 presses the top rollers 41 a and 42a to the rear and front detaching rollers 41 and 42. The pressing mechanism 43 includes a roller holder (yoke) 45 and a block 48. The roller holder 45 rotationally supports the top rollers 41 a and 42a via respective bearings 44. The block 48 includes a piston 46, which is coupled to the roller holder 45, and a chamber 47, which supplies compressed air to the piston 46.

[0004] Japanese Laid-Open Patent Publication No. 5-214615 does not disclose the material of the roller holder 45. However, the roller holder 45 is usually made of plastic to avoid abrasion of metal parts contacting each other, which is caused by the machine vibration peculiar to combers. As shown in Fig. 7A, the roller holder 45 has claw portions 45a, which hold the respective bearings 44 by the elasticity of plastic.

[0005] Moreover, for easy maintenance of the detaching rollers 41 and 42 and the top roller 41a and 42a, as shown in Fig. 7B, the roller holder 45 is configured to be able to move between the pressing position (a position indicated by long dashed two short dashed lines), at which the top rollers 41a and 42a press the fleece 49, and a releasing position indicated by solid lines. In a state in which the roller holder 45 is separated from the detaching rollers 41 and 42, i.e., a state in which the roller holder 45 is placed at a releasing position, an operator can manually detach the top rollers 41a and 42a from the roller holder 45 or attach the top rollers 41a and 42a to the roller holder 45.

[0006] In the claw portions 45a of the roller holder 45, which hold the bearings 44 for a long period of time, the elasticity decreases due to temporal change. Along with that, the holding force with which the claw portions 45a hold the bearings 44 decreases. In this condition, when the pressing mechanism 43 is vigorously opened to separate the roller holder 45 from the detaching rollers 41 and 42, the momentum overcomes the holding force of the claw portions 45a, and the top rollers 41 a and 42a may fall off the roller holder 45 due to the own weights of the top rollers 41a and 42a as shown in Fig. 7C. If the top rollers 41a and 42a fall, the top rollers 41a and 42a and the surrounding parts may be damaged.

[0007] In a state in which the elasticity of the claw portions 45a decreases due to temporal change and the like, if the claw portions 45a are thickened to keep the necessary holding force, the holding force of the claw portions 45a is too strong before the elasticity decreases. Thus, it may be difficult for an operator to attach the top rollers 41a and 42a to the roller holder 45 or detach the top rollers 41a and 42a from the roller holder 45 without using a tool.

SUMMARY OF THE INVENTION

[0008] It is an objective of the present invention to provide a detaching top roller supporting portion for a comber that allows an operator to detach a detaching top roller from a roller holder without using a tool and that can hold bearings even if holding force with which a plastic portion holds bearings decreases due to temporal change and the like.

[0009] A detaching top roller supporting portion for a comber that achieves the objective supports a detaching top roller via a bearing. The detaching top roller supporting portion includes a holding portion, which detachably holds the bearing. At least a part of the holding portion that is in contact with the bearing is made of synthetic polymer. The detaching top roller supporting portion is characterized by a metal spring, which assists holding force with which the holding portion holds the bearing.

[0010] In this description, "synthetic polymer" refers to plastics or synthetic rubber.

[0011] Other aspects and advantages of the present 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

[0012] 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 is a perspective view of a roller holder according to a first embodiment;
Fig. 2A is a perspective view of the roller holder of Fig. 1, with parts cut away;
Fig. 2B is a perspective view of the roller holder without the metal spring of Fig. 2A, with parts cut away;
Fig. 2C is a perspective view of the metal spring of Fig. 2A;
Fig. 3 is a perspective view of a roller holder according to a second embodiment;
Fig. 4 is a perspective view of the roller holder of Fig. 3, with parts cut away;
Fig. 5 is a perspective view of a roller holder according to a third embodiment, with parts cut away;
Fig. 6 is a side view of a detaching top roller in the prior arts, illustrating the supporting structure;
Fig. 7A is a schematic side view of the detaching top roller of Fig. 6, illustrating the supporting structure;
Fig. 7B is a schematic side view of Fig. 6 in the prior arts, illustrating the roller holder placed at a releasing position; and
Fig. 7C is a schematic side view of Fig. 6 in the prior arts, illustrating a state in which a detaching top roller has fallen off.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

First Embodiment

[0013] A first embodiment of the present invention will now be described with reference to Figs. 1 to 2C.

[0014] As shown Fig. 1, a roller holder 11, which is a detaching top roller supporting portion, is symmetrically formed. An insert portion 12 is formed in the middle of the roller holder 11. The insert portion 12 receives one end of a plunger or a piston (not shown), which constitutes a pressing mechanism. A pair of supporting walls 13 is arranged to sandwich the insert portion 12. Each of the supporting walls 13 includes an insert hole 14. A fixing screw (not shown), which fixes the plunger or the piston inserted in the insert portion 12 to the roller holder 11, is inserted into the insert hole 14. A detaching top roller 15 (hereinafter, referred to as simply a top roller 15) and a bearing 16 are indicated by long dashed two short dashed lines in Fig. 1. The roller holder 11 includes holding portions 17 on both sides of the insert hole 14. The holding portions 17 detachably hold bearings 16. The insert portion 12, the supporting walls 13, and the holding portions 17 are made of plastic.

[0015] As shown in Figs. 2A and 2B, each holding portion 17 is shaped like an arc. Each bearing 16 is attachable to and detachable from the holding portion 17 by moving the bearing 16 with the top roller 15 in a direction perpendicular to the axial direction of the holding portion 17. The holding portion 17 is formed such that the inner face (an arc face) of the holding portion 17 has a central angle of 180° or more, i.e., the inner face (the arc face) of the holding portion 17 is larger than a half circle. The bearing 16 is attached to or detached from the holding portion 17 by moving the bearing 16 in the direction perpendicular to the axial direction of the holding portion 17 while the space between the circumferential ends of the holding portion 17 is widened.

[0016] As shown in Fig. 2B, the holding portions 17 are integrally formed with the two supporting walls 13. Each holding portion 17 includes cutouts formed between the ends in the axial direction of the holding portion 17 and the respective supporting walls 13, which face the ends. In detail, the entire circumference at either end in the axial direction of the holding portion 17 is not integrally formed with the supporting walls 13. As shown in Fig. 2B, the holding portions 17 include arc portions 17a, which are portions that face each other. Spaces 18 are formed between the arc portions 17a and the respective supporting walls 13. The arc portions 17a, which extend in parallel with these spaces18, are deformable. Each holding portion 17 is formed such that the inner surface of the holding portion 17 that contacts the outer surface of the bearing 16 has a curvature radius substantially the same as that of the outer surface of the bearing 16. In a state in which the holding portion 17 holds the bearing 16, the corresponding arc portion 17a, which extends in parallel with the corresponding spaces 18, are pushed and widened radially outward. Thus, the arc portions 17a exert a bias that presses the bearing 16 with its own elastic force.

[0017] A metal spring 19 is attached to the outer circumferential surface of the holding portion 17. The metal spring 19 assists the holding force with which the holding portion 17 holds the bearing 16. The metal spring 19 is a plate spring made of spring steel. As shown in Fig. 2C, the metal spring 19 is curved to form an arc. The circumferential length of the metal spring 19 is longer than the circumferential length of the outer circumferential surface of the holding portion 17. The metal spring 19 has hook portions 19a, which are opposed to each other at the circumferential ends. The hook portions 19a are formed by bending the circumferential ends of the metal spring 19. The inner surface of the metal spring 19 is in contact with the outer circumferential surface of the holding portion 17. The hook portions 19a are hooked to the respective ends of the holding portion 17 to mount the metal spring 19 to the holding portion 17. The metal spring 19 is a separate member from the holding portion 17.

[0018] Operation of the above-illustrated roller holder 11 will now be described.

[0019] The roller holder 11 is used in a state in which the roller holder 11 is fixed to a plunger (not shown), which is inserted in the insert portion 12. Basically in the similar way to the prior arts (a roller holder 45 shown in Fig. 6), the roller holder 11 supports the top roller 15 via

the bearing 16 held by the holding portion 17, and the plunger presses the top roller 15 against a detaching roller (not shown). At this time, the roller holder 11 is placed at a pressing position at which the top roller 15 presses a fleece (not shown).

[0020] The holding portion 17 presses and holds the bearing 16 with the elastic force of the corresponding arc portions 17a, which are pressed and widened radially outward. An operator manually attaches the top roller 15 to the holding portion 17 or detaches the top roller 15 from the holding portion 17 while the roller holder 11 is separated from the detaching roller, i.e., the roller holder 11 is placed at a released position.

[0021] When the holding portion 17 continuously holds the bearing 16 for a long period of time or temporal change occurs, the elasticity of the plastic of which the holding portion 17 is made is decreased. As in the prior arts, in a case in which the holding portion 17 is made of only plastic, when the elasticity of the plastic decrease due to temporal change and the like, the holding force of the holding portion 17 decreases. Thus, in placing the roller holder 11 at the released position for maintenance work and the like, when vigorous release of the pressing mechanism separates the roller holder 11 from the detaching roller, the top roller may fall off the holding portion 17.

[0022] In the present embodiment, the metal spring 19 arranged to cover the outer circumference of the plastic-made holding portion 17 assists the holding force of the holding portion 17. Even when the elasticity of the plastic-made holding portion 17 decreases due to temporal change and the like, the elasticity of the metal spring 19 does not decrease. Even after long-term use, the holding portion 17 stably holds the bearing 16. Thus, in releasing the pressing mechanism for maintenance work and the like, the top roller 15 is prevented from falling off the holding portion 17 even if releasing operation is not carefully and slowly performed.

[0023] According to the present embodiment, the following advantages are achieved.

(1) The roller holder 11 (the detaching top roller supporting portion) for the comber supports the top roller 15 via the bearing 16. The roller holder 11 includes the holding portion 17, which detachably holds the bearing 16. Moreover, at least a part of the holding portion 17 that contacts the bearing 16 is made of synthetic polymer (plastic in the present embodiment). The roller holder 11 has the metal spring 19, which assists the holding force of the holding portion 17. Thus, it is possible to detach the top roller 15 from the holding portion 17 without using a tool. Even if the holding force of the holding portion 17, which holds the bearing 16, decreases due to temporal change and the like, the holding portion 17 can holds the bearing 16 without difficulty.

(2) The metal spring 19 is a plate spring. The metal spring 19 is not limited to the plate spring. The metal spring 19 may be formed by a plurality of C-shaped (an arc shape) wires. However, it is easier to manufacture and attach the plate spring.

(3) The metal spring 19 is a separate member from the holding portion 17. Thus, the metal spring 19 can be retrofitted to the detaching top roller supporting portion of an existing comber.

(4) The metal spring 19 is curved like an arc and has the hook portions 19a at the circumferential ends. The hook portions 19a are hooked to the circumferential ends of the holding portion 17 and attached to the holding portion 17. Thus, the metal spring 19 is easily attached to the holding portion 17. Change in the attaching position of the metal spring 19, which is caused by the machine vibration, and fall of the metal spring 19 off the holding portion 17 are prevented after the metal spring 19 is attached.

Second Embodiment

[0024] A second embodiment will now be described with reference to Figs. 3 and 4. In the second embodiment, a manner in which the metal spring 19 is attached to the holding portion 17 according to the first embodiment is modified. The description of components that are the same as the corresponding components of the first embodiment is omitted.

[0025] The two metal springs 19 are integrally formed with the roller holder 11. In detail, the holding portions 17 are formed by insert molding such that the metal springs 19 are embedded in the holding portions 17. As shown in Fig. 3, the metal springs 19 are not visible from the outside of the roller holder 11.

[0026] Fig. 4 is a cross-sectional perspective view of the roller holder 11 taken along a plane that contains the two holding portions 17. As shown in Fig. 4, each of the metal springs 19 is shaped like a simple arc and arranged over the entire circumferential length of the corresponding holding portion 17 and inside the holding portion 17. In other words, the metal spring 19 does not have the hook portions 19a, and the entirety of the metal spring 19 is embedded in the holding portion 17.

[0027] In the present embodiment, in the similar manner to the first embodiment, the top roller 15 can be detached from the holding portion 17 without using a tool. Even if the holding force of the holding portion17, which holds the bearing 16, decreases due to temporal change and the like, the bearing 16 can be held without difficulty.

[0028] The metal spring 19 is integrally formed with the holding portion 17. Thus, the metal spring 19 cannot be lost.

[0029] The present invention is not limited to the above-illustrated embodiments, but may be embodied in the following forms.

[0030] In the first and second embodiments, the metal spring 19 is not limited to a plate spring. For example, the metal spring 19 may be formed by aligning C-shaped wires or bonding C-shaped wires to each other with ad-

hesive.

[0031] In the first embodiment, the hook portions 19a are arranged at circumferential ends of a plate spring as the metal spring 19. The arrangement of the hook portions 19a is not limited to this. For example, a hook portion 19a may be arranged only at one of the circumferential ends of the plate spring, or the hook portions 19a may be omitted.

[0032] In the first embodiment, the metal spring 19 does not need to cover the entire circumference of the holding portion 17. The configuration of the metal spring 19 may be modified as long as the arc-shaped metal spring 19 has the central angle of 180° or more. In a case in which the metal spring 19 is shaped not to cover the entire circumference of the holding portion 17, a hook portion 19a is arranged only at one of circumferential ends of the metal spring 19.

[0033] Also in the second embodiment, the metal spring 19 may have the length shorter than the entire circumference of the holding portion 17 as long as the central angle is 180° or more.

[0034] The configuration of the metal spring 19 may be modified as long as the metal spring 19 functions to assist the holding force of the holding portion 17. The configuration of the metal spring 19 is not limited to, as in the above illustrated embodiments, the configuration in which the arc-shaped metal spring 19 is arranged along the outer circumferential surface of the arc-shaped holding portion 17 and the configuration in which the metal spring 19 is embedded in the holding portion 17. For example, as in a third embodiment shown in Fig. 5, a metal spring 19 may be bent to be shaped like a channel or U-shape and mounted between the holding portions 17 in a state in which the metal spring 19 is in contact with the outer circumferential surfaces of the arc portions 17a of the holding portions 17. In fixing the roller holder 11 to a plunger or a piston, the metal spring 19 includes a clearance 19b so that the metal spring 19 does not interrupt a plunger or a piston. In this case, one metal spring 19 can assist the holding force in the arc portions 17a of the two holding portions 17.

[0035] In the above-illustrated embodiments, a part of the holding portion 17 that is in contact with the bearing 16 is not limited to a smooth surface, but may be a rough surface.

[0036] In the above-illustrated embodiments, the arc portions 17a, which have spaces 18 between the holding portions 17 and the supporting walls 13, may be arranged in portions other than the portions in which the holding portions 17 are opposed to each other.

[0037] In the above-illustrated embodiments, each of the holding portions 17 may have two arc portions 17a, which are opposed to each other, and spaces 18 may be formed between the arc portions 17a and the respective supporting walls 13.

[0038] In the above-illustrated embodiments, each of the holding portions 17 does not necessarily need to be shaped like an arc.

[0039] In the above-illustrated embodiments, the roller holder 11 may be made of synthetic rubber instead of plastic.

[0040] In the above-illustrated embodiments, the entirety of the roller holder 11 does not necessarily need to be made of synthetic polymer. The embodiments may be modified as long as at least a portion of the holding portion 17 that contacts the bearing 16 is made of synthetic polymer. For example, the other portion of the holding portion 17 may be made of metal or ceramics.

[0041] In the third embodiment, the metal spring 19 is shaped like a channel as shown in Fig. 5. The shape of the metal spring 19 is not limited to the channel. The metal spring 19 may have two curved portions that come into planar contact with two arc portions 17a. Even in this case, one metal spring 19 can press the arc portions 17a of the two holding portions 17.

[0042] The material of the metal spring 19 is not limited to spring steel. Metal that has a desired elasticity other than the spring steel may be used.

[0043] The following is a technical idea that can be obtained from the above illustrated embodiments.

(1) A metal spring, which is attached to a detaching top roller supporting portion for a comber, wherein:

the detaching top roller supporting portion includes two holding portions, which hold two detaching top rollers via bearings; and

the metal spring is arranged between the two holding portions and urges the holding portions to assist holding force with which the holding portions hold the bearings.

[0044] Therefore, the present examples and embodiments are to be considered as illustrative and not restrictive and the invention is not to be limited to the details given herein, but may be modified within the scope and equivalence of the appended claims.

[0045] A detaching top roller supporting portion for a comber supports a detaching top roller via a bearing. The detaching top roller supporting portion includes a holding portion, which detachably holds the bearing. At least a part of the holding portion that is in contact with the bearing is made of synthetic polymer. The detaching top roller supporting portion is characterized by a metal spring, which assists holding force with which the holding portion holds the bearing.

Claims

1. A detaching top roller supporting portion for a comber that supports a detaching top roller via a bearing, the detaching top roller supporting portion comprising a holding portion, which detachably holds the bearing, wherein at least a part of the holding portion that is in contact with the bearing is made of synthetic pol-

ymer,
the detaching top roller supporting portion being **characterized by** a metal spring, which assists holding force with which the holding portion holds the bearing.

2. The detaching top roller supporting portion according to claim 1, wherein the metal spring is a plate spring.

3. The detaching top roller supporting portion according to claim 1 or 2, wherein the metal spring is a separate member from the holding portion.

4. The detaching top roller supporting portion according to claim 1 or 2, the metal spring is integrally formed with the holding portion.

5. The detaching top roller supporting portion according to any one of claims 1 to 4, wherein:

the holding portion is one of two holding portions; the metal spring is arranged between the holding portions and urges the holding portions to assist the holding force.

Fig.1

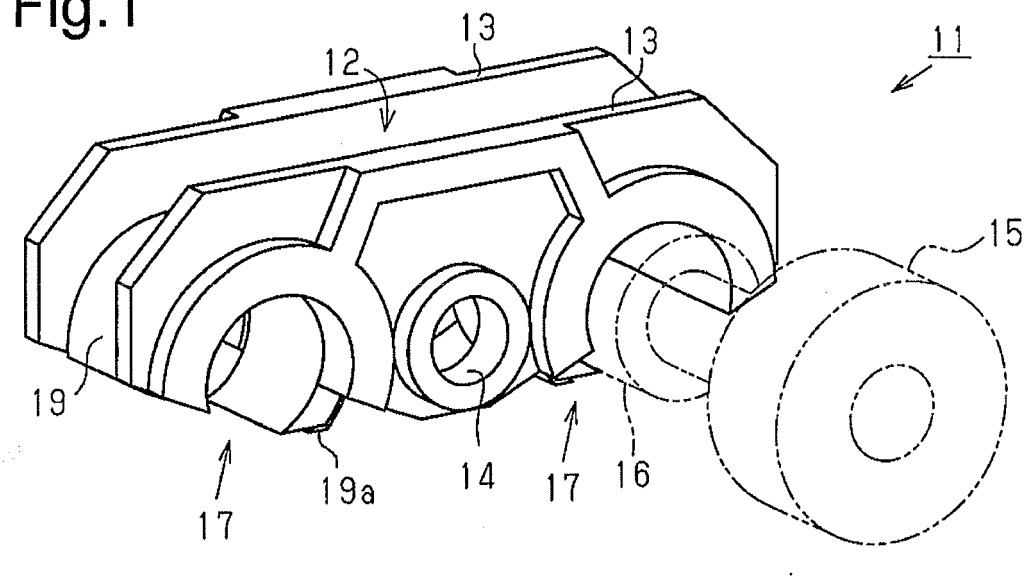


Fig.2A

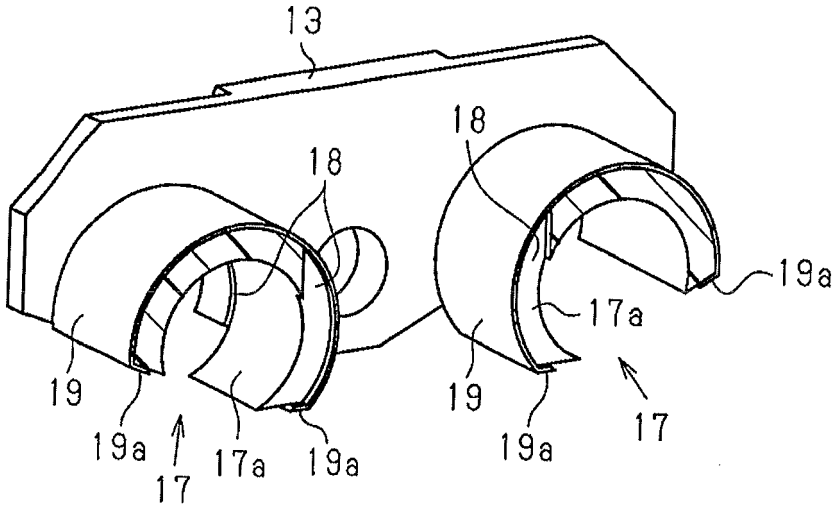


Fig.2B

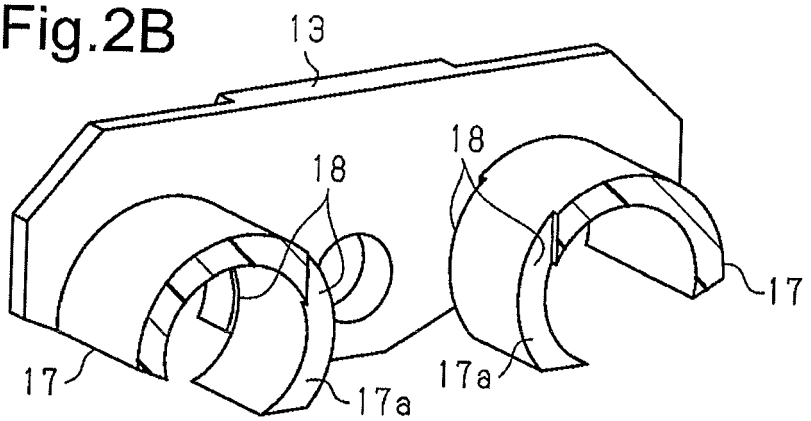


Fig.2C

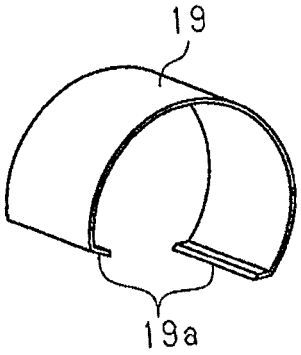


Fig.3

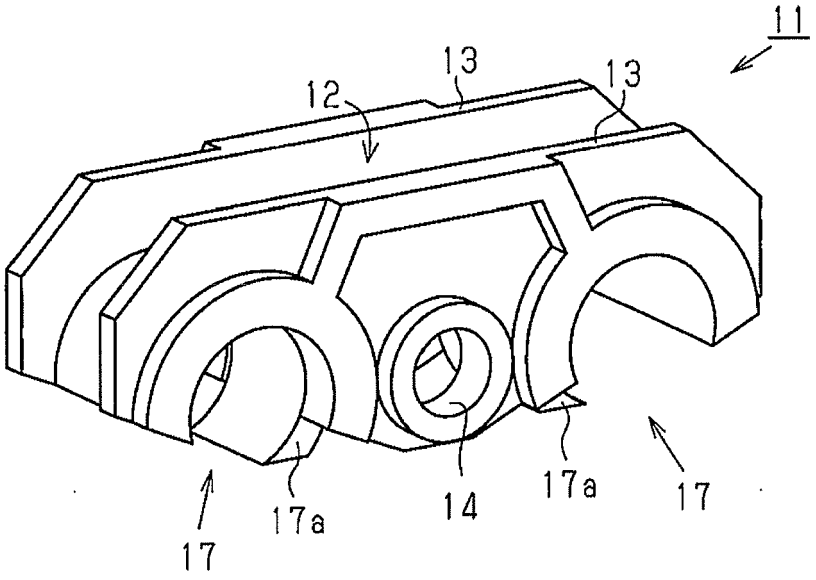


Fig.4

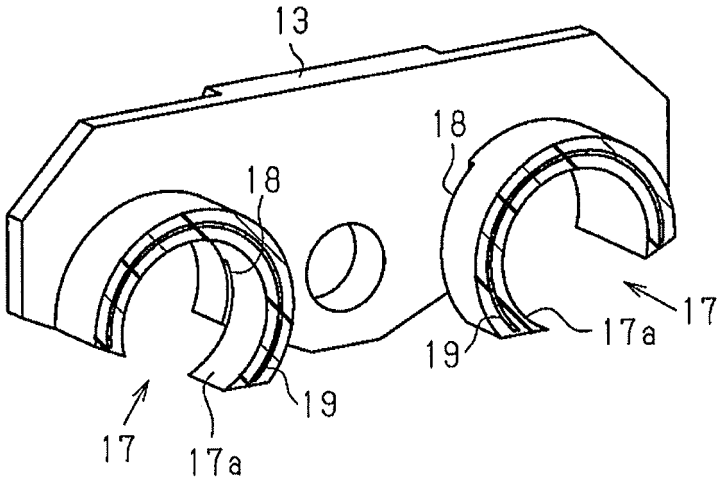


Fig.5

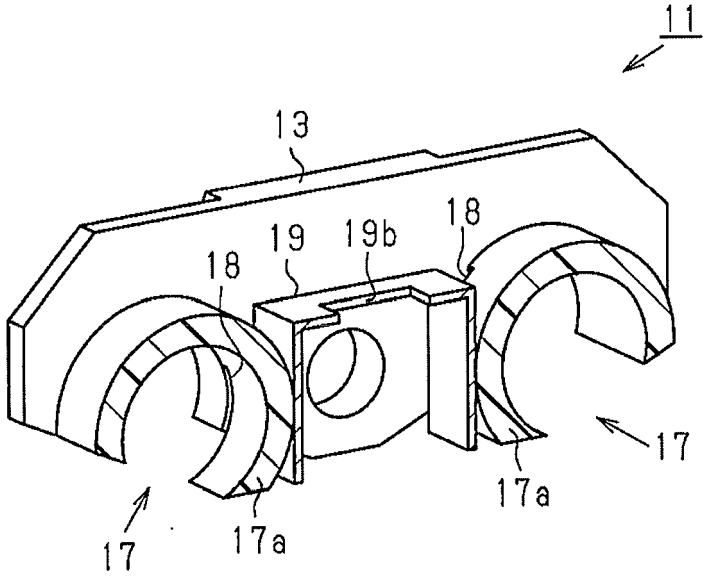


Fig.6

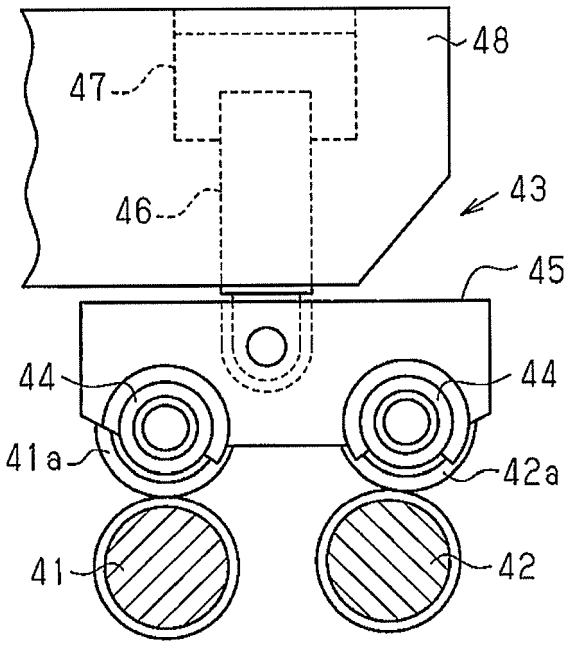


Fig.7A

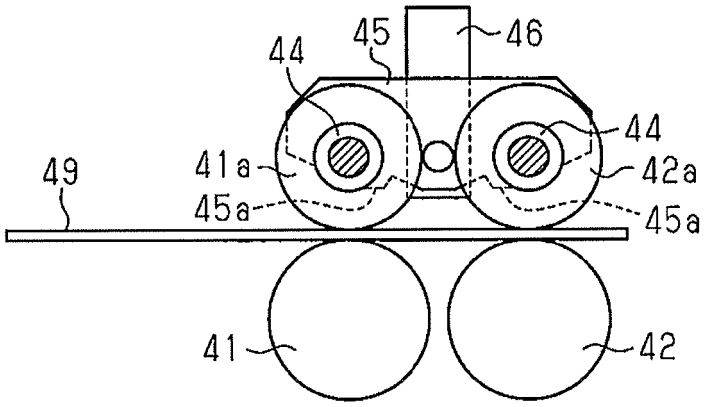


Fig.7B

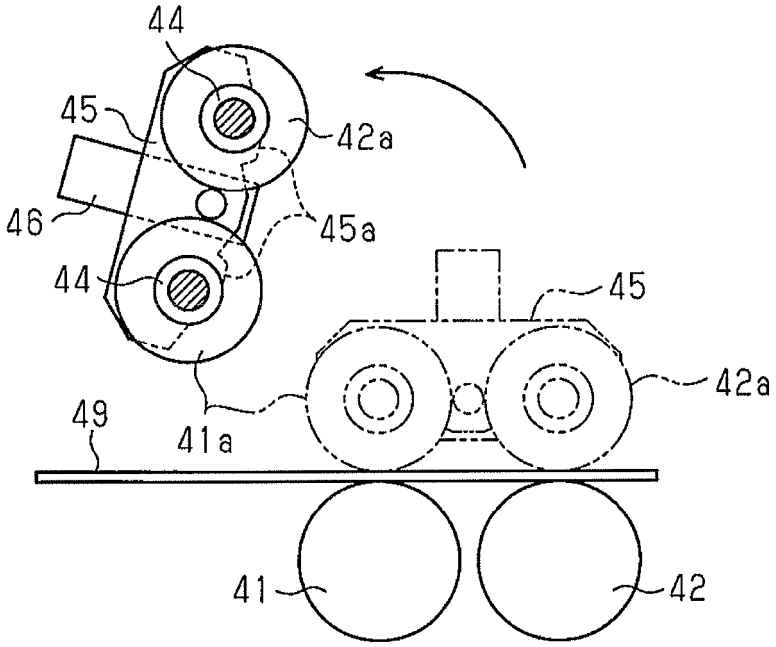
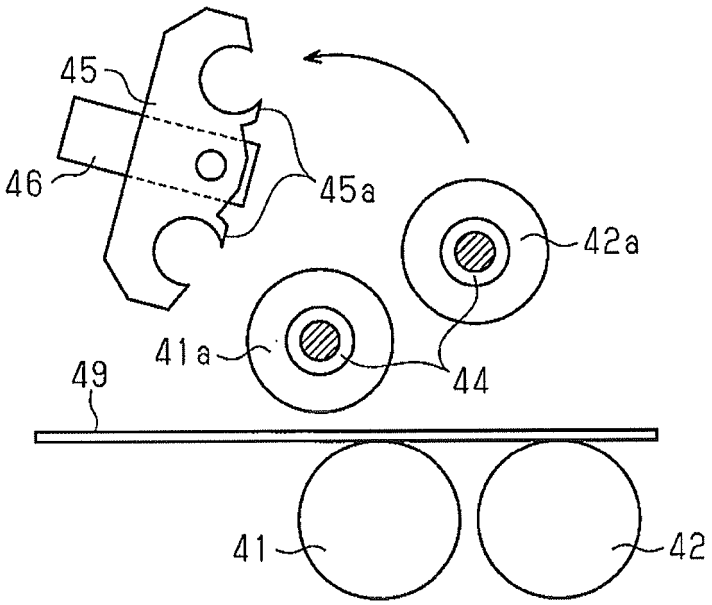


Fig.7C



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EUROPEAN SEARCH REPORT

Application Number
EP 15 19 8175

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y,D	US 5 271 126 A (CLEMENT HEINZ [CH] ET AL) 21 December 1993 (1993-12-21) * column 2, line 35 - column 4, line 44; figures 1-5 *	1-5	INV. D01G19/18 D01H5/74
Y	GB 607 400 A (HOYT METAL COMPANY OF GREAT BR; JOHN CAMPBELL HART) 30 August 1948 (1948-08-30) * page 2, line 84 - page 3, line 14; figures 1-6 *	1-5	
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Y	GB 724 483 A (TEXTILE ENGINEERING CORP) 23 February 1955 (1955-02-23) * page 3, line 45 - page 4, line 130; figures 1-4 *	1-5	TECHNICAL FIELDS SEARCHED (IPC)
A	US 5 283 621 A (HASHIZUME HIROSHI [JP]) 1 February 1994 (1994-02-01) * column 4, line 3 - column 9, line 35; figures 1-11 *	1-5	D01G D01H
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 April 2016	Herry-Martin, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 19 8175

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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08-04-2016

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