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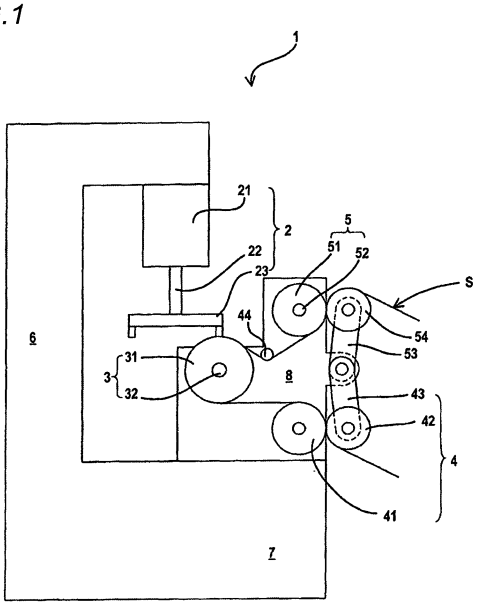
(54) DEVICE FOR POLISHING SLIDE FASTENER ELEMENT, AND SLIDE FASTENER ELEMENT

(57) Provided is a device for polishing a slide fastener element, the polishing device being capable of high-efficiency polishing with the fastener element in a stable orientation, and without reducing the quality of the polished product.

This polishing device is provided with: a transport path for the slide fastener (S); a support part (3, 3a, 13) disposed along the transport path and disposed opposite either the rear surface or the front surface of a fastener element (E) so as to support the orientation of the fastener element (E); and a polishing part (2, 2a, 2b) on either side of the transport path, disposed opposing the support part (3, 3a, 13). The polishing part (2, 2a, 2b) has a rotation shaft (22) and a polishing member (25) secured to the rotation shaft (22) and capable of rotating by means of the rotation of the rotation shaft. The polishing member (25) contacts and polishes either the front surface or the back surface of the fastener element (E). The rotation shaft (22) of the polishing member (25) extends parallel to the direction perpendicular to the support part (3, 3a, 13).

FIG.1



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Description

Technical Field

[0001] The present invention relates to a slide fastener element polishing device for polishing a front surface or a back surface of a fastener element attached to a fastener tape of a slide fastener, and to a slide fastener element polished by the slide fastener element polishing device.

Background Art

[0002] In general, when manufacturing a slide fastener, a front or back surface of a fastener element attached to a fastener tape needs to be polished by a polishing device. As such a polishing device, a device which has a rotation shaft and a disk-shaped polishing member (polishing wheel 34) fixed to a leading end of the rotation shaft and performs polishing by rotating the rotation shaft and thus coming in contact with the polishing member (polishing wheel 34) to a surface of the fastener element is disclosed from Patent Document 1.

Prior Art Document

Patent Document

[0003] Patent Document 1: Chinese Patent No. 101461589

[0004] According to Patent Document 1, as shown in Fig. 17, the rotation shaft extends in a direction parallel to a front or back surface of a slide fastener. Thus, when the polishing member rotates, a peripheral edge portion (curves surface) of the polishing wheel, which is the polishing member, comes in contact with a front or back surface of the fastener element. Namely, when the polishing member polishes the fastener element, the polishing member is approached to or separated from the surface of the fastener element along a curved path.

[0005] When the polishing member is moved along the curved path, there is a risk that the quality of the polished product is reduced. Specifically, if the polishing member is moved along the path, the surface of the fastener element is polished in a curved surface shape. As a result, excessive edge portions are formed on the surface of the fastener element, thereby causing a bad feel. Also, when a slider is moved, the edge portions are caught on the slider so that the slide fastener can be hardly smoothly moved. In addition, the surface of the fastener element is excessively cut, thereby reducing strength of the fastener element.

Summary of Invention

Problems to Be Solved by Invention

[0006] The present invention has been made keeping in mind the above problems, and an object thereof is to provide a slide fastener element polishing device, in which can perform polishing at a high efficiency while keeping the fastener element in a stabilized posture and without reducing the quality of the polished product.

Means for Solving Problems

[0007] To achieve the above object, the present invention is configured as follows.

[0008] According to claim 1 of the present invention, there is provided a slide fastener element polishing device for polishing a fastener element in a slide fastener which has a fastener tape and the fastener element attached to the a fastener tape, the fastener element having a front surface and a back surface, the polishing device including: a transport path for the slide fastener; a support part arranged along the transport path and arranged to face one of the front surface and the back surface of the fastener element to support a posture of the fastener element; and a polishing part arranged to face the support part across the transport path; wherein the polishing part includes a rotation shaft, and a polishing member fixed to the rotation shaft and being rotatable by rotating the rotation shaft; and wherein the polishing member is configured to come in contact with the other of the front surface and the back surface of the fastener element and polish the front surface or the back surface of the fastener element, and the rotation shaft for the polishing member extends parallel to a direction perpendicular to the support part.

[0009] According to the slide fastener element polishing device of claim 2 of the present invention, in addition to the configuration as described in claim 1, the polishing part includes a plate body fixed to the rotation shaft and extending in a direction perpendicular to an axial direction of the rotation shaft, and the polishing member is fixed to the plate body.

[0010] According to the slide fastener element polishing device of claim 3 of the present invention, in addition to the

configuration as described in claim 2, the polishing part comprises a protrusion protruding from the plate body, and the polishing member is attached to a leading end of the protrusion.

[0011] According to the slide fastener element polishing device of claim 4 of the present invention, in addition to the configuration as described in claim 2 or 3, the plate body is a circular plate extending from the center of the rotation shaft in a radial direction of the rotation shaft, and a plurality of polishing members are arranged at predetermined intervals along a peripheral edge portion of the plate body.

[0012] According to the slide fastener element polishing device of claim 5 of the present invention, in addition to the configuration as described in claim 2 or 3, the plate body is a rectangular plate extending from the center of the rotation shaft in a radial direction of the rotation shaft, and one end of the plate body is fixed to the rotation shaft and the polishing member is arranged on the other end of the plate body.

[0013] According to the slide fastener element polishing device of claim 6 of the present invention, in addition to the configuration as described in claim 1, the polishing member is made of diamond.

[0014] According to the slide fastener element polishing device of claim 7 of the present invention, in addition to the configuration as described in claim 1, the slide fastener includes a pair of fastener tapes and fastener elements attached to opposing edge portions of the fastener tapes, and the support part supports the fastener elements engaged with each other.

[0015] According to the slide fastener element polishing device of claim 8 of the present invention, in addition to the configuration as described in claim 1, the support part includes a support surface configured to come in contact with one of the front surface and the back surface of the fastener element.

[0016] According to the slide fastener element polishing device of claim 9 of the present invention, in addition to the configuration as described in claim 8, the support part includes a guide groove for guiding movement of the fastener element, and a bottom surface of the guide groove is the support surface.

[0017] According to the slide fastener element polishing device of claim 10 of the present invention, in addition to the configuration as described in claim 1, the support part is a roller having a rotation shaft extending in a direction perpendicular to the rotation shaft of the polishing part and being rotatable about the rotation shaft.

[0018] According to the slide fastener element polishing device of claim 11 of the present invention, in addition to the configuration as described in claim 1, the support part includes a first member having a first surface and a second member having a second surface, the first member and the second member are arranged to face each other across the transport path, a gap for allowing the fastener tape to pass therethrough is provided between the first member and the second member, and when the fastener tape is passing through the gap, the first surface faces a back surface of the fastener tape and the second surface faces a front surface of the fastener tape.

[0019] According to the slide fastener element polishing device of claim 12 of the present invention, in addition to the configuration as described in claim 10, the support part includes a first roller and a second roller, and the first roller is arranged upstream of the second roller in the transport path.

[0020] According to the slide fastener element polishing device of claim 13 of the present invention, in addition to the configuration as described in claim 12, the support part includes a first support surface for supporting the fastener element in a first posture and a second support surface for supporting the fastener element in a second posture, the first support surface is inclined in a direction approaching to the polishing member and the second support surface is flat, wherein the fastener element includes a base end portion coming in contact with an edge portion of the fastener tape and a leading end portion away from the edge portion, and the first support surface displaces the leading end portion of the fastener element in a direction approaching to the polishing member.

[0021] According to the slide fastener element polishing device of claim 14 of the present invention, in addition to the configuration as described in claim 13, the first support surface is formed on the first roller and the second support surface is formed on the second roller.

[0022] According to the slide fastener element polishing device of claim 15 of the present invention, in addition to the configuration as described in claim 1, the polishing device further includes a transport part for the slide fastener arranged downstream of the support part in the transport path; and a tensioning part for tensioning the slide fastener, arranged upstream of the support part in the transport path.

[0023] According to claim 16 of the present invention, there is provided a slide fastener element polished by the slide fastener element polishing device as described in any one of claims 1 to 15.

Advantageous Effects of Invention

[0024] Due to the above configurations, the following effects can be achieved.

[0025] According to claim 1 of the present invention, because the rotation shaft for the polishing member extends parallel to a direction perpendicular to the support part and the polishing member comes in contact with and polishes the front surface or the back surface of the fastener element, the polishing member when polishing the fastener element can be approached to or separated from the surface of the fastener element along a linear path. Therefore, the surface

of the fastener element is not cut in a curved surface shape. As a result, after polishing, the quality of the product is not reduced.

[0026] According to claim 2 of the present invention, because the polishing part incudes the plate body fixed to the rotation shaft and extending in the direction perpendicular to the axial direction of the rotation shaft and the polishing member is fixed to the plate body, the polishing member can be easily attached to the rotation shaft.

[0027] According to claim 3 of the present invention, because the polishing member is attached to the leading end of the protrusion, the minimum polishing member can be placed to polish the fastener element. Thus, manufacturing cost of the slide fastener is reduced.

[0028] According to claim 4 of the present invention, because a plurality of polishing members are arranged on the circular plate, the fastener element can be polished at a high efficiency.

[0029] According to claim 5 of the present invention, because the plate body may be such a rectangular plate, a degree of freedom in design of the polishing part is enhanced.

[0030] According to claim 6 of the present invention, because the polishing member is made of diamond and thus has a high hardness, the fastener element can be surely polished.

[0031] According to claim 7 of the present invention, because the support part supports the fastener elements engaged with each other, the fastener elements engaged with each other can be simultaneously polished. Thus, polishing can be performed at a high efficiency.

[0032] According to claim 8 of the present invention, because the support part includes the support surface configured to come in contact with one of the front surface and the back surface of the fastener element, when the fastener element comes in contact with the polishing member, the fastener element is supported by the supported surface even if the fastener element is pressed by the polishing member and attempts to move in a direction opposite to the polishing member, thereby preventing a posture of the fastener element from being lost.

[0033] According to claim 9 of the present invention, because the support part includes the guide groove for guiding movement of the fastener element, and the bottom surface of the guide groove is the support surface, when the fastener element comes in contact with the polishing member, the fastener element is restrained by the guide groove even if the fastener element is dragged by the polishing member and attempts to move, together with the polishing member, in a rotation direction of the polishing member, thereby preventing a posture of the fastener element from being lost.

[0034] According to claim 10 of the present invention, because the support part is the rotatable roller, transportation of a fastener chain can be quickly performed. Also, the slide fastener is wound around the roller to be tensioned, thereby becoming in a stabilized posture. Thus, the posture of the slide fastener during polishing is not lost.

[0035] According to claim 11 of the present invention, because the support part includes the first member and the second member, the gap for allowing the fastener tape to pass therethrough is provided between the first member and the second member, and also when the fastener tape is passing through the gap, the first surface of the first member faces a back surface of the fastener tape and the second surface of the second member faces a front surface of the fastener tape, the fastener tape can be protected so that the polishing member is prevented from coming in contact with the fastener tape. Thus, no flaw is occurred on the fastener tape.

[0036] According to claim 12 of the present invention, because the support part includes two rollers arranged on forward and rearward sides of the transport path, the polishing member can polish the fastener element at two locations on the support part. Thus, polishing can be performed at a high efficiency.

[0037] According to claim 13 of the present invention, because the support part includes the first support surface and the second support surface, the second support surface is flat, and the first support surface displaces the leading end portion of the fastener element in the direction approaching to the polishing member, the polishing device can polish only a surface on the leading end portion side of the fastener element, in addition to polishing the entire surface of the fastener elements. Because the fastener element is curved to be tapered at the leading end side thereof, there is a case where the leading end side is not polished upon polishing of the entire surface. Due to this configuration, the leading end portion can be surely polished by changing a posture of the leading end portion.

[0038] According to claim 14 of the present invention, because the first support surface is formed on the first roller and the second support surface is formed on the second roller, a configuration, which in addition to polishing the entire surface of the fastener elements, allows to polish only a surface on the leading end portion side of the fastener element, can be implemented by a simple structure.

[0039] According to claim 15 of the present invention, because the polishing device further includes the transport part for the slide fastener and the tensioning part for tensioning the slide fastener, the polishing device can easily tension the slide fastener when the slide fastener is transported to the support part, thereby preventing a posture of the slide fastener from being lost.

[0040] According to the foregoing, a slide fastener element polishing device can be provided in which can perform polishing at a high efficiency while keeping the fastener element in a stabilized posture and without reducing the quality of the polished product.

Brief Description of Drawings

[0041]

Fig. 1 is a schematic front view showing a polishing device according to a first embodiment of the present invention;
Fig. 2 is an enlarged perspective view showing a main portion of a polishing part of the polishing device according to the first embodiment;
Fig. 3 is a sectional view showing main portions of the polishing part and a support part of the polishing device according to the first embodiment;
Fig. 4 is an enlarged sectional view showing main portions of the polishing part and the support part of the polishing device according to the first embodiment;
Fig. 5 is a sectional view showing main portions of a slide fastener and a support part according to a variant 1 of the polishing device of the first embodiment;
Fig. 6 is a perspective view showing a main portion of a polishing part according to a variant 2 of the polishing device of the first embodiment;
Fig. 7 is a perspective view showing a main portion of a polishing part according to a variant 3 of the polishing device of the first embodiment;
Fig. 8 is a front view showing a main portion of a tensioning part according to a variant 4 of the polishing device of the first embodiment;
Fig. 9 is a front view showing a main portion of a support part according to a variant 5 of the polishing device of the first embodiment;
Fig. 10 is a sectional view showing a main portion of the support part according to the variant 5 of the polishing device shown in Fig. 9;
Fig. 11 is a schematic front view showing a variant 6 of the polishing device of the first embodiment;
Fig. 12 is a schematic front view showing a polishing device according to a second embodiment of the present invention;
Fig. 13 is an enlarged sectional view showing main portions of a polishing part and a support part (first support roller) of the polishing device according to the second embodiment;
Fig. 14 is an enlarged sectional view showing main portions of the polishing part and the support part (second support roller) of the polishing device according to the second embodiment;
Fig. 15A is an enlarged view showing a polished surface of a faster element before being polished by the polishing device of the invention, and Fig. 15B is an enlarged view showing the polished surface of the faster element after being polished by the polishing device of the invention;
Fig. 16A is an enlarged photograph showing the polished surface of the faster element before being polished by the polishing device of the invention, and Fig. 16B is an enlarged photograph showing the polished surface of the faster element after being polished by the polishing device of the invention; and
Fig. 17 is a perspective view showing a polishing device according to the related art.

Embodiments of Invention

[0042] Embodiments of a polishing device for a slide fastener element of the present invention will be now described in detail with reference to the accompanying drawings. Hereinafter, unless otherwise specified, the term "upstream" means an upstream side in a transport direction of a slide fastener and the term "downstream" means a downstream side in the transport direction of the slide fastener.

(First Embodiment)

[0043] Fig. 1 is a schematic front view showing a polishing device according to a first embodiment of the present invention. As shown in Fig. 1, the polishing device 1 includes, on a transport path of a slide fastener S, a polishing part 2 for polishing a fastener element E of the slide fastener S, a support part 3 for supporting the fastener element E when the fastener element E is polished, a transport part 5 for transporting the slide fastener S toward the support part 3, and a tensioning part 4 for applying a tension to the slide fastener S transported to the support part 3 to prevent the slide fastener S from slacking.

[0044] The polishing part 2 is fixed to a column 6 protruding upward from an top surface of a base 7, and has a motor 21, a rotation shaft 22 connected to the motor 21, and a plate body 23 fixed to a leading end of the rotation shaft 22. The motor 21 of the polishing part 2 is fixed to the column 6. The rotation shaft 22 of the polishing part 22 is located on an output end side of the motor 21 and is in a posture extending downward (vertical direction). The rotation shaft 22 is rotated by driving the motor 21. The plate body 23 rotates together with the rotation shaft 22 in a horizontal plane by

rotating the rotation shaft 22. The plate body 23 has a polishing member 25, as described below, fixed thereon.

[0045] A frame 8 is fixed to the top surface of the base 7, and the support part 3, the transport part 5 and the tensioning part 4 are attached to the frame 8. The tensioning part 4 is arranged on the most upstream side of the transport path. The transport part 5 is arranged on the most downstream side of the transport path. Thus, the support part 3 is arranged between the tensioning part 4 and the transport part 5 in the transport path. In addition, the polishing part 2 and the support part 3 are arranged to face each other in an upward-downward direction across the transport path. Herein, the upward-downward direction of the polishing direction corresponds to a front-back direction of the slide fastener.

[0046] The support part 3 has a support roller 31 and the support roller 31 is supported on the frame 8 via a support roller rotation shaft 32 and rotates about the support roller rotation shaft 32. As compared to the rotation shaft 22 of the polishing part 2 (i.e., a rotation shaft of the polishing member), the support roller rotation shaft 32 of the support part 3 is in a posture extending in a direction (horizontal direction) perpendicular thereto. The slide fastener S is wound around a peripheral surface of the support roller 31. In the embodiment shown in Fig. 1, the support roller 31 rotates clockwise about the support roller rotation shaft 32. Meanwhile, the rotation direction of the support roller 31 is not limited to the clockwise direction, but as long as the direction is a direction causing the slide faster to be moved toward the downstream side of the transport path, can be set in any manner depending on configurations thereof.

[0047] The transport part 5 has a transport roller shaft 52 supported on the frame 8, a transport roller 51 rotating about the transport roller shaft 52, a pressing roller 54 for pressing the slide fastener S against the transport roller 51. The transport roller shaft 52 is connected to a motor, not shown. By driving the motor, the transport roller 51 is rotated about the transport roller shaft 52 so that the slide fastener S is transported toward the downstream side of the transport path. A transport speed of the slide fastener is preferably set according to a rotation speed of the polishing member 25 to ensure that the entire of the fastener element E is polished by the polishing member 25, but for example, set to be 2.5~5.0m/min when the rotation speed of the polishing member is 5000~10000rpm.

[0048] The pressing roller 54 is pressed in a direction moving toward the transport roller 51 by an arm 53. Alternatively, the pressing roller 54 may be pressed in the direction moving toward the transport roller 51 by a biasing member, such as a spring.

[0049] In the transport path, a guide roller 44 for guiding transportation of the slide fastener S is arranged between the support part 3 and the transport part 5. The guide roller 44 is arranged below the most upper portion of the support roller 31 of the support part 3. Therefore, after passing over the most upper portion of the support roller 31 of the support part 3, the slide fastener S is transported downward to the guide roller 44 while being guided along a peripheral surface of the support roller 31. Thus, the slide fastener S is prevented from being floated upward between the support part 3 and the transport part 5 so that a posture of the slide fastener S is not lost. Namely, the slide fastener S is prevented from being moved in a direction separating from the support part 3, thereby stabilizing a posture of the fastener element E, in which the fastener element E is polished.

[0050] The tensioning part 4 has a shaft supported on the frame 8, a receiving roller 41 rotating about the shaft, a pressing roller 42 for pressing the slide fastener S against the receiving roller 41. The receiving roller 41 of the tensioning part 4 is freely rotated about the shaft by a frictional force caused by contact with the slide fastener S. The pressing roller 42 is pressed in a direction moving toward the receiving roller 41 by an arm 43. Alternatively, the pressing roller 42 may be pressed in a direction moving toward the receiving roller 41 by a biasing member, such as a spring. The tensioning part 4 exerts, on the slide fastener S which is being transported by the transport part 5, a tension which acts in a direction opposite to a transport direction thereof, and therefore, the slide fastener S is always kept in a tensioned state. Thus, when the slide fastener S has been wound around the support roller 31, the slide fastener S comes in tight contact with the peripheral surface of the support roller 31 without slacking (without creating a gap between the slide fastener S and the peripheral surface of the support roller 31).

[0051] Next, the polishing part of the polishing device according to the first embodiment will be described with reference to Fig. 2. In Fig. 2, an enlarged perspective view of a main portion of the polishing part is shown.

[0052] As shown in Fig. 2, the polishing part 2 has the plate body 23 fixed to the leading end of the rotation shaft 22 and rotatable together with the rotation shaft 22. The plate body 23 is a circular plate radially extending from the rotation shaft 22 as the center thereof. A protrusion 24 is fixed to a peripheral edge portion of the plate body 23. The protrusion 24 protrudes downward from a bottom surface of the plate body 23. On a leading end of the protrusion 24, the polishing member 25 for polishing the fastener element E is fixed. Fixation of the polishing member 25 can be implemented in any existing manner, but for example, may be implemented by adhesion using adhesives. The polishing member is made of diamond.

[0053] The protrusion 24 is fixed to the plate body 23 by a fixture (screw) 27. Namely, the protrusion 24 is removably fixed to the plate body 23. Thus, when the polishing member 25 needs to be replaced, the polishing member 25, together with the protrusion 24, can be removed from the plate body 23 by loosening the fixture 27. In this simple manner, replacing of the polishing member, which is a wearing article, can be implemented. Also, a hole 26 shown in Fig. 2 is a hole, through which the fixture 27 passes, and the protrusion 24 is fixed to the plate body 23 by fastening the fixture 27 to the plate body 23 after passing through the hole 26.

[0054] The rotation shaft is preferably rotated at 5000 rpm or more, and for example, is rotated at 5000rpm~10000rpm. The polishing part 2 has a plurality of polishing members 25 (two polishing members in the present embodiment). Namely, a plurality (two pieces) of protrusions 24 is fixed to the plate body. Also, the polishing members 25 are respectively fixed to a leading end of each protrusion 24. Each protrusion 24 is arranged at predetermined intervals in a circumferential direction of the plate body. Considering balance upon rotation, each protrusion 24 is arranged at 180 degree intervals in the shown example. The number of the protrusions 24 and the polishing members 25 is not limited to two pieces, but three pieces may be arranged at 120 degree intervals and four pieces may be arranged at 90 degree intervals.

[0055] Next, the support part of the polishing device according to the first embodiment will be described with reference to Figs. 3 and 4. Fig. 3 is a sectional view showing main portions of the polishing part and the support part of the polishing device according to the first embodiment, Fig. 4 is an enlarged sectional view of the main portions of the polishing part and the support part shown in Fig. 3.

[0056] Referring to Fig. 3, an axis of the rotation shaft 22 for the polishing member 35 extends parallel to a direction orthogonal (direction perpendicular) to an axis of the rotation shaft of the support roller 31 of the support part 3. In other words, the rotation shaft 22 for the polishing member 25 extends parallel to a direction orthogonal to a surface (top surface) of the fastener element E, with which the polishing member 25 comes in contact. When the polishing member 25 rotates together with the rotation shaft 22, the polishing member 25, as shown by a phantom line (two-dot chain line) in Fig. 3, moves in a direction (horizontal direction) parallel to the surface (top surface) of the fasten element E. Herein, although an example, in which the rotation shaft 22 of the polishing member 25 is directly connected to the motor 21, has been described, the rotation shaft for the polishing member may not be directly connected to the motor as long as the rotation shaft for the polishing member is configured to extend in a direction orthogonal to a front or back surface of the fastener element E, with which the polishing member comes in contact. In this case, a mechanism for transmitting a rotational driving force from the motor is arranged between the driving shaft of the motor and the rotation shaft of the polishing member.

[0057] A polishing surface of the polishing member 25 is preferably a flat polishing surface, but may be a curved surface. As long as the polishing member 25 during movement moves in a direction parallel to a surface of the fastener element to be polished, the surface of the fastener element to be polished can be flatly polished.

[0058] As shown in Figs 3 and 4, the support part 3 has a fist member 31 constituted by the support roller 31 and a second member 33 constituted by a plate material arranged to face the peripheral surface of the support roller 31. Also, a gap for allowing fastener tapes T of the slide fastener S to pass therethrough is provided between the first member 31 and the second member 33. When the fastener tapes T pass through the gap, the first member 31 (first surface of the first member) faces back surfaces of the fastener tapes T. Also, the second member 33 (second surface of the second member) faces front surfaces of the fastener tapes T. The second member 33 is adapted to cover the fastener tapes T from the outer side in a radial direction of the support roller 31.

[0059] On the peripheral surface of the support roller 31 (first member), a guide groove 34 for receiving the fastener elements E and also guiding movement of the fastener elements E is formed to extend in a circumferential direction of the support roller 31. The support roller 31 has a right portion and a left portion with the guide groove 34 interposed therebetween. The second member 33 has a right portion facing the right portion of the support roller 31 and a left portion facing the left portion of the support roller 31. A gap for allowing the fastener elements E to pass therethrough is provided between the right portion and the left portion of the second member 33. The guide groove 34 receives and guides the fastener elements E engaged with each other when the fastener elements E are passing therethrough. At this time, the fastener elements E come in contact with a support surface 34a, which is a bottom surface of the guide groove 34.

[0060] In this way, when the fastener elements E come in contact with the polishing member 25, the support surface 34a bears a vertical pressing force from the polishing member 25. Thus, upon polishing, a posture of the fastener elements E is not displaced (not moved in a direction separating from the polishing member 25). Also, when the polishing member 25 comes in contact with the fastener elements E, both side walls of the guide groove 34 bear a horizontal pressing force (force which exerts thereon in a direction dragged by the polishing member 25) from the polishing member 25. Thus, upon polishing, the posture of the fastener elements E is prevented from being displaced (meandered along the peripheral surface of the first member 31).

[0061] In addition, the fastener elements E have a front portion arranged on the front surface side of the fastener tapes T and a back portion arranged on the back surface side of the fastener tapes T. When front surfaces of the fastener elements E are polished, the back portions are received in the guide groove 34 and the front portions of the fastener elements E are exposed between the right portion and the left portion of the second member 33 (when back surfaces of the fastener elements E are polished, the front portions are received in the guide groove 34). Thus, the front portions of the fastener element E face the polishing member 25 of the polishing part 2 and come in contact with the polishing member 25. On the other hand, the front surfaces of the fastener tapes T are covered with the second member 33 and thus not in contact with the polishing member 25. Therefore, the fastener tapes T don't have flaws occurred by contact with the polishing member 25. In addition, the support roller rotation shaft 32 of the first member (support roller) is supported by the frames 8 arranged on left and right sides of the support roller 31. In addition, as shown in Fig. 3, the

second member 33 is also supported by the frames 8.

[0062] In the foregoing, although the polishing device according to the first embodiment of the present invention has been described, each component of the polishing device can be variously modified as long as functions thereof can be achieved. Next, several variants will be listed. Descriptions of the variants will be focused on differences from the first embodiment, and accordingly, the same members are designated by the same reference numerals and the repeated descriptions thereof will be omitted.

[0063] Fig. 5 shows a variant 1 of the polishing device of the first embodiment and is a sectional view of main portions of a slide fastener and a support part according thereto. As shown in Fig. 5, the slide fastener T is constituted of a fastener element E on one side, which has not engaged, and a fastener tape T. A guide groove 34 formed in a first member (support roller) 31 has a width allowing only the fastener element E on one side to be received therein. Thus, a polishing member 25 polishes only the fastener element E on one side.

[0064] The first member 31 has a right portion and a left portion with the guide groove 34 interposed therebetween. A second member 33 is arranged to face the left portion of the first member 31. A gap for allowing the fastener tape T to pass therethrough is provided between the left portion of the first member 31 and the second member 33. Herein, although the second member 33 is arranged to face the left portion of the first member 31 so that the gap for allowing the fastener tape to pass therethrough is formed on the left side, the second member 33 may be arranged to face the right portion of the first member 31 so that the gap for allowing the fastener tape to pass therethrough is formed on the right side.

[0065] Fig. 6 shows a variant 2 of the polishing device of the first embodiment and is a perspective view showing a main portion of a variant of the polishing part thereof. In the first embodiment as described above, the plate body 23 is formed by a circular plate, but may not be such a circular plate. As shown in Fig. 6, a plate body 23a in a polishing part 2a of the present variant is a rectangular plate. A rotation shaft 22 is fixed to one end of the plate body 23a. A protrusion 24a is integrally molded with the other end of the plate body 23a. The protrusion 24a cannot be removed from the plate body 23a. A polishing member 25 is fixed to a leading end of the protrusion 24a in the same manner as those in the first embodiment as described above. In this case, the polishing member 25 is rotated together with the rotation shaft 22 with the plate body 23a interposed therebetween, thereby polishing a fastener element E. Alternatively, the protrusion 24a may be eliminated. In this case, the polishing member (e.g., sandpaper) 25 is directly fixed to a bottom surface of the plate body 23a.

[0066] Fig. 7 shows a variant 3 of the polishing device of the first embodiment and is a perspective view showing a main portion of another variant of the polishing part thereof. In a polishing part 2b of the present variant, as shown in Fig. 7, a polishing member 25b may be directly fixed to a rotation shaft 22. In this case, there is no plate body. The polishing member 25 may be a grindstone.

[0067] Fig. 8 shows a variant 4 of the polishing device of the first embodiment and is a front view showing a main portion of a variant of the tensioning part thereof. As shown in Fig. 8, a tensioning part has one guide roller 46 arranged on an upstream side of a transport path, the other guide roller 47 arranged on a downstream side of the transport path, and a dancer roller 45 arranged between the guide rollers 46 and 47. The dancer roller 45 presses a slide fastener S from an upper side thereof to bend downward the slide fastener S in a U shape. In this case, the dancer roller 45, which is added to press the slide fastener S, always a tension on the slide fastener S. Thus, the slide fastener S is always kept in a tensioned state and therefore is wounded around a support roller 31 without slacking.

[0068] Figs. 9 and 10 show a variant 5 of the polishing device of the first embodiment, in which Fig. 9 is a front view showing a main portion of a variant of the support part thereof and Fig. 10 is a sectional view showing a main portion of a variant of the support part thereof. Although the support part 3 in the first embodiment as described above is constituted by a roller, as shown in Fig. 9, a support part 3a may be constituted by a plate, not a roller. In this case, an axis of a rotation shaft 22 for a polishing member extends parallel to a direction orthogonal to a surface of the plate.

[0069] As shown in Fig. 10, the support part 3a has a support plate 31a as a first member, on which a slide fastener S is placed, and a second member 33a. The support plate 31a is supported on a frame 8 and the second member 33a is supported on the support plate 31a. Also, on a top surface of the support plate 31a, a guide groove 34 for receiving and guiding the fastener elements E is formed similarly to the foregoing. The support plate 31a has a right portion and a left portion with the guide groove 34 interposed therebetween. The second member 33a has a right portion facing the right portion and a left portion facing the left portion. A gap for allowing fastener tapes T to pass therethrough is provided between the first member 31a and the second member 33a. Similarly to the foregoing, a gap for allowing the fastener elements E to pass therethrough is also provided between the right portion and the left portion of the second member 33a.

[0070] Also, although an example, in which the rotation shaft 22 for the polishing member is arranged in a vertical direction as described above, has been described, the rotation shaft 22 for the polishing member, as show in Fig. 11, may be arranged in a horizontal direction. Fig. 11 is a schematic front view showing a variant 6 of the polishing device of the first embodiment. Meanwhile, the rotation shaft 22 for the polishing member may be arranged in any manner, as long as the rotation shaft 22 for the polishing member is configured to extend parallel to a direction orthogonal to the support part 3.

(Second Embodiment)

[0071] Hereinafter, a polishing device according to a second embodiment of the present invention will be described with reference to Figs. 12 to 14. Descriptions of the second embodiment will be focused on differences from the first embodiment as described above, and accordingly, the same members are designated by the same reference numerals and the repeated descriptions thereof will be omitted. Fig. 12 is a schematic front view showing the polishing device according to the second embodiment of the invention, Fig. 13 is an enlarged sectional view showing main portions of a polishing part and a support part (first support roller) of the polishing device, and Fig. 14 is an enlarged sectional view showing main portions of the polishing part and the support part (second support roller) of the polishing device.

[0072] As shown in Fig. 12, the support part 13 of the polishing device 101 according to the second embodiment has a first support roller 131 and a second support roller 132. The first support roller 131 is arranged on an upstream side of a transport path. The second support roller 132 is arranged downstream of the first support roller 131 in the transport path. The first support roller 131 and the second support roller 132 are arranged at the substantially same horizontal level to share a polishing part 2.

[0073] Also, a guide roller 145 is arranged on a portion downstream of and close to the first support roller 131 and a guide roller 144 is arranged on a portion downstream of and close to the second support roller 132. Similarly to the guide roller 44 as described above, the guide rollers 144 and 145 are arranged below the most upper portions of the first support roller 131 and the second support roller 132. Therefore, after passing over the most upper portion of the first support roller 131, a slide fastener S is passed beneath the guide roller 145 while being guided along a peripheral surface of the first support roller 131, and then after passing along a peripheral surface of the guide roller 145, is climbed up to a peripheral surface of the second support roller 132. Subsequently, after passing over the most upper portion of the second support roller 132 while being guided along a peripheral surface of the second support roller 132, the slide fastener S is transported downward to the guide roller 144 and thus is transported to the downstream side via the guide roller 144.

[0074] Thus, the slide fastener S is prevented from being floated upward between the first support roller 131 and the second support roller 132 or between the second support roller 132 and the transport part 5 so that a posture of the slide fastener S is not lost. Namely, the slide fastener S is prevented from being moved in a direction separating from each of the first support roller 131 and the second support roller 132, thereby stabilizing a posture of the fastener elements E, in which the fastener elements E are polished. Meanwhile, although the guide roller 144 and the guide roller 145 in the present example are arranged at the same horizontal level, the guide roller 144 and the guide roller 145 may not be arranged at the same horizontal level, as long as the above actions can be achieved.

[0075] As shown in Figs. 13 and 14, the first support roller 131 and the second support roller 131 of the support part 13 have, respectively, first members 131 and 132 and second members 138 and 133 with a gap for allowing the fastener tapes T to pass therethrough interposed therebetween. Each first member is constituted by each of the first support roller 131 and the second support roller 132. Guide grooves 139 and 134 for receiving and guiding the fastener elements E are respectively provided on the peripheral surfaces of the first support roller 131 and the second support roller 132. The guide groove 139 of the first support roller 131 has, on a bottom of the groove, a first support surface 139a configured to come in contact with the fastener elements E. The first support surface 139a is inclined to be raised in a direction approaching to a polishing member 25.

[0076] As shown in Fig. 13, each fastener element E has a base end portion Ea close to an edge portion of the fastener tape T and a leading end portion (portion adapted to engage with the opposing fastener element E) Eb away from the edge portion of the fastener tape T. When the fastener elements E are received in the guide groove 139 and come in contact with the first support surface 139a, the fastener elements E are displaced to take a posture in which the leading end portions Eb are upwardly inclined toward the polishing member 25, because the first support surface 139a is inclined to be raised. Thus, the leading end portion Eb of the fastener elements E is polished by the polishing member 25.

[0077] Also, as shown in Fig. 14, the guide groove 134 of the second support roller 132 has, on a bottom of the groove, a second support surface 134a configured to come in contact with the fastener elements E. The second support surface 134a is flat (parallel to a rotation shaft of the second support roller 132). When the fasten elements E are received in the second guide groove 134 of the second support roller 132 and come in contact with the second support surface 134a after passing around the first support roller 131, the base end portion Ea and the leading end portion Eb become in a horizontal posture. Thus, the base end portion Ea and the leading end portion Eb of the fastener elements E are polished by the polishing member 25.

[0078] In the second embodiment as described above, the rotation shaft 22 for the polishing member, as shown in Figs. 12 and 14, extends to a direction orthogonal to a front or back surface of the fastener elements E in a horizontal posture, with which the polishing member comes in contact.

[0079] According to the polishing device 101 of the second embodiment, the polishing member can polish the fastener elements E at two locations, i.e., the first support roller 131 and the second support roller 132. Thus, polishing can be performed at a high efficiency. In addition, because the fastener elements E are curved to be tapered at the leading end

side thereof, there is a case where the leading end side is not polished upon polishing of the entire surface. The polishing device 101 of the second embodiment can also polish only a surface on the leading end portion side of the fastener elements E by changing a posture of the leading end portion thereof, in addition to polishing the entire surface of the fastener elements E. Thus, the leading end portion can be surely polished.

[0080] Also, as shown in Figs. 15A, 15B, 16A and 16B, linear polishing traces Ec, which extend in a longitudinal direction of the slide fastener S, are formed on a surface (polished surface) of the fastener element E polished by the polishing devices 1 and 101 as described above. Also, Fig. 15A shows as a dot pattern a state in which a surface (polished surface) of the fastener element E before polishing has minute unevenness and thus is rough, and Fig 15B shows a state in which such a rough surface becomes a smooth shiny surface by polishing and also polishing traces Ec are formed the shiny surface.

[0081] Next, features of each embodiment of the present invention and effects thereof will be described.

[0082] There is provided a slide fastener element polishing device for polishing a fastener element E attached to a fastener tape T of a slide fastener S, the fastener element E having a front surface and a back surface, the polishing device including: a transport path for the slide fastener S; a support part 3, 3a or 13 arranged along the transport path and arranged to face one of the front surface and the back surface of the fastener element E to support a posture of the fastener element E; and a polishing part 2, 2a or 2b arranged to face the support part 3, 3a or 13 across the transport path; wherein the polishing part 2, 2a or 2b includes a rotation shaft 22, and a polishing member 25 fixed to the rotation shaft 22 and rotatable by rotating the rotation shaft 22; and wherein the polishing member 25 is configured to come in contact with the other of the front surface and the back surface of the fastener element E and polishes the front surface or the back surface of the fastener element E, and the rotation shaft 22 for the polishing member 22 extends parallel to a direction perpendicular to the support part 3, 3a or 13.

[0083] According to this feature, because the rotation shaft 22 for the polishing member 22 extends parallel to a direction perpendicular to the support part 3, 3a or 13 and the polishing member 25 comes in contact with and polishes the front surface or the back surface of the fastener element E, the polishing member 25 when polishing the fastener element E can be approached to or separated from the surface of the fastener element E along a linear path. Therefore, the surface of the fastener element E is not cut in a curved shape. As a result, the quality of the polished product is not reduced.

[0084] In the above slide fastener element polishing device, the polishing part 2 or 2a incudes a plate body 23 or 23a fixed to the rotation shaft 22 and extending in a direction perpendicular to an axial direction of the rotation shaft 22, and the polishing member 25 is fixed to the plate body 22 or 23a.

[0085] According to this feature, because the polishing part 2 or 2a incudes the plate body 23 or 23a fixed to the rotation shaft 22 and extending in the direction perpendicular to the axial direction of the rotation shaft 22 and the polishing member 25 is fixed to the plate body 22 or 23a, the polishing member 25 can be easily attached to the rotation shaft 22.

[0086] In the above slide fastener element polishing device, the polishing part 2 or 2a includes a protrusion 24 or 24a protruding from the plate body 23 or 23a and the polishing member 25 is attached to a leading end of the protrusion 24 or 24a.

[0087] According to this feature, because the polishing member 25 is attached to the leading end of the protrusion 24 or 24a, the minimum polishing member 25 can be placed to polish the fastener element E. Thus, manufacturing cost of the slide fastener is reduced.

[0088] In the above slide fastener element polishing device, the plate body 23 is a circular plate extending from the center of the rotation shaft 22 in a radial direction of the rotation shaft 22, and a plurality of polishing members 25 are arranged at predetermined intervals along a peripheral edge portion of the plate body 23.

[0089] According to this feature, because a plurality of polishing members 25 are arranged on the circular plate, the fastener element E can be polished at a high efficiency.

[0090] In the above slide fastener element polishing device, the plate body 23a is a rectangular plate extending from the center of the rotation shaft 22 in a radial direction of the rotation shaft 22, and one end of the plate body 23a is fixed to the rotation shaft 22 and on the other end of the plate body 23a, the polishing member 25 is arranged.

[0091] According to this feature, because the plate body may be such a rectangular plate, a degree of freedom in design of the polishing part is enhanced.

[0092] In the above slide fastener element polishing device, the polishing member 25 is made of diamond.

[0093] According to this feature, because the polishing member is made of diamond and thus has a high hardness, the fastener element E can be surely polished.

[0094] In the above slide fastener element polishing device, the slide fastener S includes a pair of fastener tapes T and fastener elements E attached to opposing edge portions of the fastener tapes T, and the support part 3 supports the fastener elements E engaged with each other.

[0095] According to this feature, because the support part 3 supports the fastener elements E engaged with each other, the fastener elements E engaged with each other can be simultaneously polished. Thus, polishing can be performed at a high efficiency.

[0096] In the above slide fastener element polishing device, the support part 3, 3a or 13 includes a support surface 34a, 134a or 139a configured to come in contact with one of the front surface and the back surface of the fastener element E.

[0097] According to this feature, because the support part 3, 3a or 13 includes the support surface 34a, 134a or 139a configured to come in contact with one of the front surface and the back surface of the fastener element E, when the fastener element E comes in contact with the polishing member 25, the fastener element E is supported by the support surface 34a, 134a or 139a even if the fastener element E is pressed by the polishing member 25 and attempts to move in a direction opposite to the polishing member 25, thereby preventing a posture of the fastener element E from being lost.

[0098] In the above slide fastener element polishing device, the support part 3, 3a or 13 includes a guide groove 34, 134 or 139 for guiding movement of the fastener element E, and a bottom surface of the guide groove 34, 134 or 139 is the support surface 34a, 134a or 139a.

[0099] According to this feature, because the support part 3, 3a or 13 includes the guide groove 34, 134 or 139 for guiding movement of the fastener element E, and the bottom surface of the guide groove 34, 134 or 139 is the support surface 34a, 134a or 139a, when the fastener element E comes in contact with the polishing member 25, the fastener element E is restrained by the guide groove 34, 134 or 139 even if the fastener element E is dragged by the polishing member 25 and attempts to move, together with the polishing member 25, in a rotation direction of the polishing member 25, thereby preventing a posture of the fastener element E from being lost.

[0100] In the above slide fastener element polishing device, the support part 3 or 13 includes a rotation shaft (support roller rotation shaft) 32 extending in a direction perpendicular to the rotation shaft of the polishing part and is a roller (support roller) 31 rotatable about the rotation shaft (support roller rotation shaft) 32.

[0101] According to this feature, because the support part 3 or 13 is the rotatable roller, transportation of a fastener chain can be quickly performed. Also, the slide fastener S is wound around the roller (support roller) 31, 131 or 132 to be tensioned, thereby becoming in a stabilized posture. Thus, the posture of the slide fastener S during polishing is not lost.

[0102] In the above slide fastener element polishing device, the support part 3 or 13 includes a first member 31, 31a, 131 or 132 having a first surface and a second member 33, 33a, 138 or 133 having a second surface, wherein the first member 31, 31a, 131 or 132 and the second member 33, 33a, 138 or 133 are arranged to face each other across the transport path, wherein a gap for allowing the fastener tape T to pass therethrough is provided between the first member 31, 31a, 131 or 132 and the second member 33, 33a, 138 or 133, and wherein when the fastener tape T is passing through the gap, the first surface faces a back surface of the fastener tape T and the second surface faces a front surface of the fastener tape T.

[0103] According to this feature, because the support part 3 or 13 includes the first member 31, 31 a, 131 or 132 and the second member 33, 33a, 138 or 133, the gap for allowing the fastener tape T to pass therethrough is provided between the first member 31, 31a, 131 or 132 and the second member 33, 33a, 138 or 133, and also when the fastener tape T is passing through the gap, the first surface of the first member 31, 31a, 131 or 132 faces a back surface of the fastener tape T and the second surface of the second member 33, 33a, 138 or 133 faces a front surface of the fastener tape T, the fastener tape T can be protected so that the polishing member 25 is prevented from coming in contact with the fastener tape T. Thus, no flaw is occurred on the fastener tape T.

[0104] In the above slide fastener element polishing device, the support part 13 includes a first roller (first support roller) 131 and a second roller (second support roller) 132, and the first roller (first support roller) 131 is arranged upstream of the second roller (second support roller) 132 in the transport path.

[0105] According to this feature, because the support part 13 includes two rollers (the first support roller 131 and the second support roller 132) arranged on forward and rearward sides of the transport path, the polishing member 25 can polish the fastener element E at two locations on the support part 13. Thus, polishing can be performed at a high efficiency.

[0106] In the above slide fastener element polishing device, the support part 13 includes a first support surface 139a for supporting the fastener element E in a first posture and a second support surface 134a for supporting the fastener element E in a second posture, wherein the first support surface 139a is inclined in a direction approaching to the polishing member 25 and the second support surface 134a is flat, wherein the fastener element E includes a base end portion Ea close to an edge portion of the fastener tape T and a leading end portion Eb away from the edge portion, and wherein the first support surface 139a displaces the leading end portion Eb of the fastener element in the direction approaching to the polishing member 25.

[0107] According to this feature, the polishing device can polish only a surface on the leading end portion Eb side of the fastener element E, in addition to polishing the entire surface of the fastener elements E. Because the fastener element E is curved to be tapered at the leading end side thereof, there is a case where the leading end side is not polished upon polishing of the entire surface. Due to this configuration, the leading end portion Eb can be surely polished by changing a posture of the leading end portion Eb.

[0108] In the above slide fastener element polishing device, the first support surface 139a is formed on the first support roller 131 and the second support surface 134a is formed on the second support roller 132.

[0109] According to this feature, a configuration, which in addition to polishing the entire surface of the fastener elements

E, allows to polish only a surface on the leading end portion Eb side of the fastener element E, can be implemented by a simple structure.

[0110] In the above slide fastener element polishing device, the polishing device further includes a transport part 5 for the slide fastener S arranged downstream of the support part 3, 13 in the transport path and a tensioning part 4 for tensioning the slide fastener S and arranged upstream of the support part 3, 13 in the transport path.

[0111] According to this feature, because the polishing device further includes the transport part 5 for the slide fastener S and the tensioning part 4 for tensioning the slide fastener S, the polishing device can easily tension the slide fastener S when the slide fastener S is transported to the support part 3, 13, thereby preventing a posture of the slide fastener S from being lost.

[0112] In the foregoing, although the embodiments of the present invention and effects thereof have been described, the invention is not limited to the foregoing embodiments, and accordingly, various modifications thereof can be made without departing from the concept of the invention.

Description of Reference Numerals

[0113]

1, 101	Polishing Device
2, 2a, 2b	Polishing Part
21	Motor
22	Rotation Shaft
23, 23a	Plate Body
24, 24a	Protrusion
25, 25b	Polishing Member
26	Hole
27	Fixture
3, 3a, 13	Support Part
31	Support Roller (First Member)
31a	Support Plate (First Member)
32	Support Roller Rotation Shaft
33, 33a, 133, 138	Second Member
34, 134, 139	Guide Groove
131	First Support Roller (First Member)
132	Second Support Roller (First Member)
134a	Second Support Surface
139a	First Support Surface
4	Tensioning Part
41	Receiving Roller
42	Pressing Roller
43	Arm
44, 144, 145	Guide Roller
45	Dancer Roller
46, 47	Guide Roller
5	Transport Part
51	Transport Roller
52	Transport Roller Shaft
53	Arm
54	Pressing Roller
6	Column
7	Base
8	Frame
S	Slide Fastener
T	Fastener Tape
E	Fastener Element
Ea	Base End Portion
Eb	Leading End Portion

Claims

1. A slide fastener element polishing device for polishing a fastener element in a slide fastener which has a fastener tape and the fastener element attached to the fastener tape, the fastener element having a front surface and a back surface, the polishing device comprising:

   a transport path for the slide fastener;
   a support part arranged along the transport path and arranged to face one of the front surface and the back surface of the fastener element to support a posture of the fastener element; and
   a polishing part arranged to face the support part across the transport path;
   wherein the polishing part comprises a rotation shaft, and a polishing member fixed to the rotation shaft and being rotatable by rotating the rotation shaft; and
   wherein the polishing member is configured to come in contact with the other of the front surface and the back surface of the fastener element and polish the front surface or the back surface of the fastener element, and
   the rotation shaft for the polishing member extends parallel to a direction perpendicular to the support part.

2. The slide fastener element polishing device according to claim 1,
   wherein the polishing part comprises a plate body fixed to the rotation shaft and extending in a direction perpendicular to an axial direction of the rotation shaft, and
   wherein the polishing member is fixed to the plate body.

3. The slide fastener element polishing device according to claim 2,
   wherein the polishing part comprises a protrusion protruding from the plate body, and
   wherein the polishing member is attached to a leading end of the protrusion.

4. The slide fastener element polishing device according to claim 2 or 3,
   wherein the plate body is a circular plate extending from the center of the rotation shaft in a radial direction of the rotation shaft, and
   wherein a plurality of polishing members are arranged at predetermined intervals along a peripheral edge portion of the plate body.

5. The slide fastener element polishing device according to claim 2 or 3,
   wherein the plate body is a rectangular plate extending from the center of the rotation shaft in a radial direction of the rotation shaft, and
   wherein one end of the plate body is fixed to the rotation shaft and on the other end of the plate body, the polishing member is arranged.

6. The slide fastener element polishing device according to claim 1, wherein the polishing member is made of diamond.

7. The slide fastener element polishing device according to claim 1,
   wherein the slide fastener comprises a pair of fastener tapes and fastener elements attached to opposing edge portions of the fastener tapes, and
   wherein the support part supports the fastener elements engaged with each other.

8. The slide fastener element polishing device according to claim 1, wherein the support part comprises a support surface configured to come in contact with one of the front surface and the back surface of the fastener element.

9. The slide fastener element polishing device according to claim 8,
   wherein the support part comprises a guide groove for guiding movement of the fastener element, and
   wherein a bottom surface of the guide groove is the support surface.

10. The slide fastener element polishing device according to claim 1, wherein the support part is a roller having a rotation shaft extending in a direction perpendicular to the rotation shaft of the polishing part and being rotatable about the rotation shaft.

11. The slide fastener element polishing device according to claim 1,
    wherein the support part comprise a first member having a first surface and a second member having a second surface,

wherein the first member and the second member are arranged to face each other across the transport path,
wherein a gap for allowing the fastener tape to pass therethrough is provided between the first member and the second member, and
wherein when the fastener tape is passing through the gap, the first surface faces a back surface of the fastener tape and the second surface faces a front surface of the fastener tape.

12. The slide fastener element polishing device according to claim 10,
wherein the support part comprises a first roller and a second roller, and
wherein the first roller is arranged upstream of the second roller in the transport path.

13. The slide fastener element polishing device according to claim 12,
wherein the support part comprises a first support surface for supporting the fastener element in a first posture and a second support surface for supporting the fastener element in a second posture,
wherein the first support surface is inclined in a direction approaching to the polishing member and the second support surface is flat,
wherein the fastener element comprises a base end portion coming in contact with an edge portion of the fastener tape and a leading end portion away from the edge portion, and
wherein the first support surface displaces the leading end portion of the fastener element in a direction approaching to the polishing member.

14. The slide fastener element polishing device according to claim 13, wherein the first support surface is formed on the first roller and the second support surface is formed on the second roller.

15. The slide fastener element polishing device according to claim 1, further comprising:

a transport part for the slide fastener, arranged downstream of the support part in the transport path; and
a tensioning part for tensioning the slide fastener, arranged upstream of the support part in the transport path.

16. A slide fastener element polished by the slide fastener element polishing device according to any one of claims 1 to 15.

FIG.1

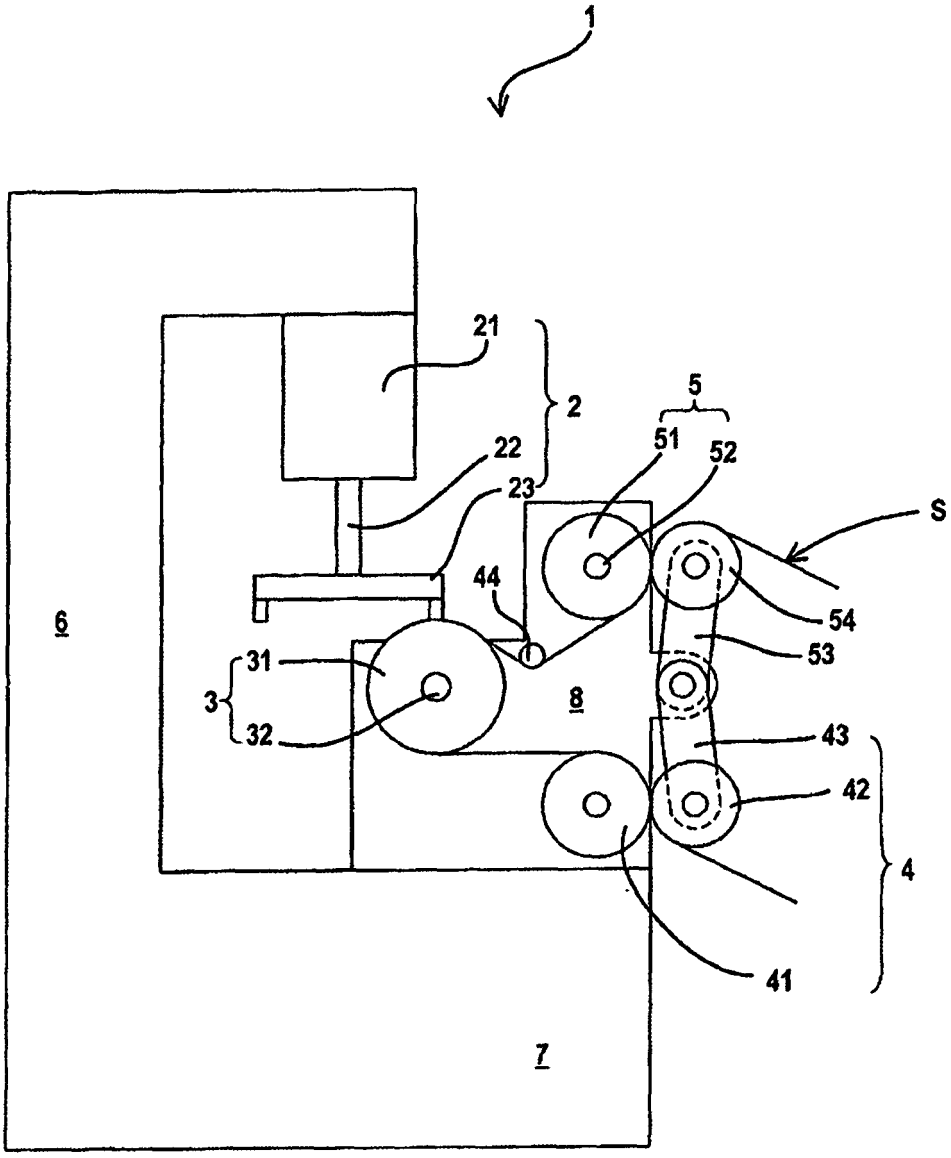


FIG.2

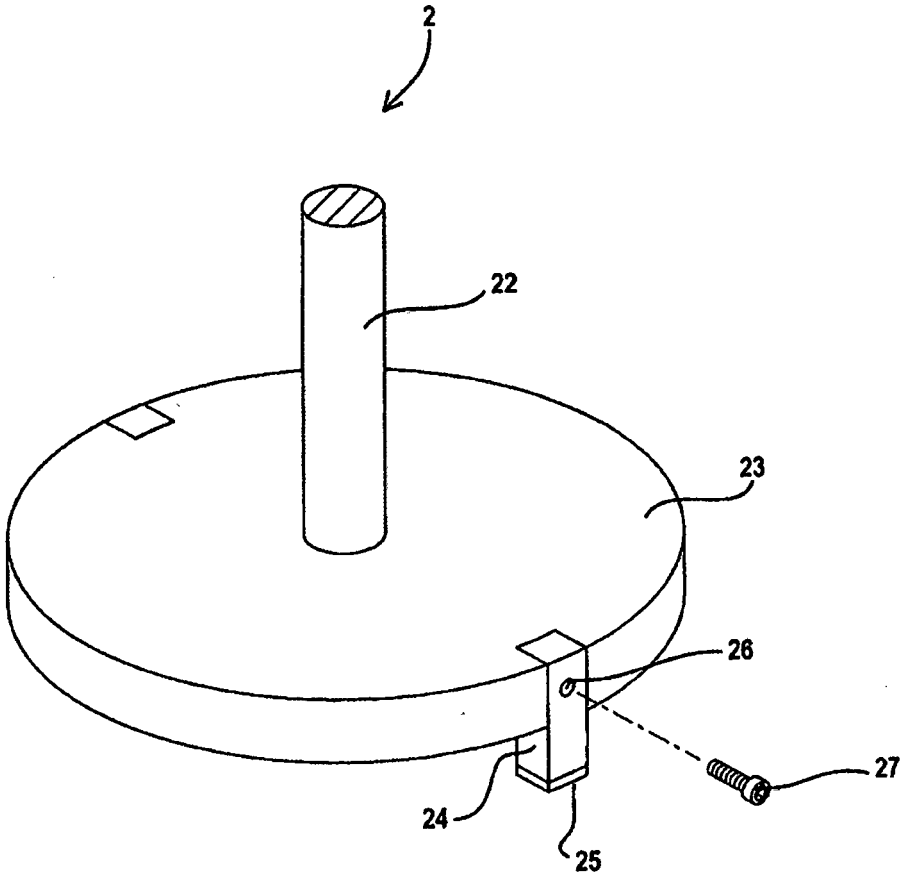


FIG.3

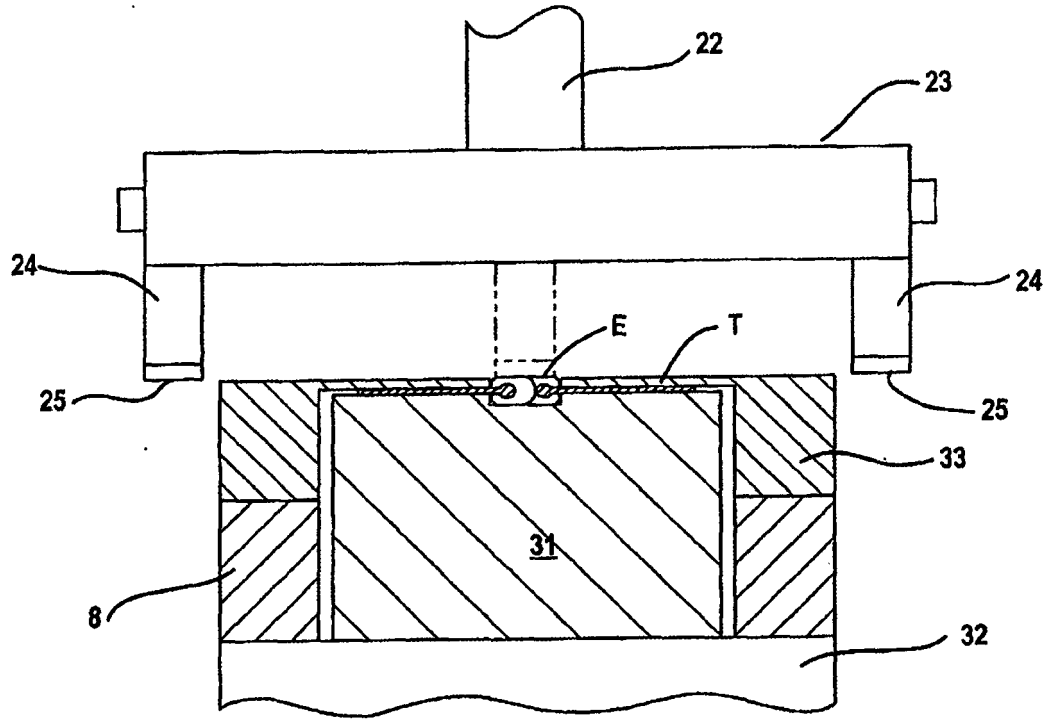


FIG.4

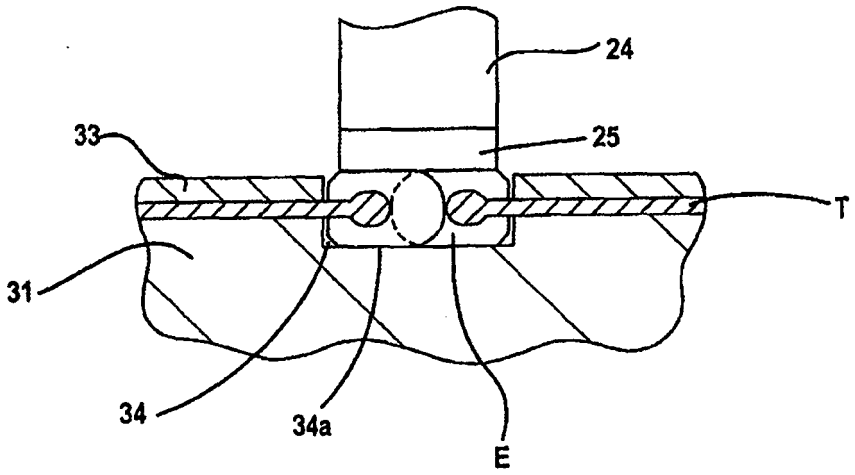


FIG.5

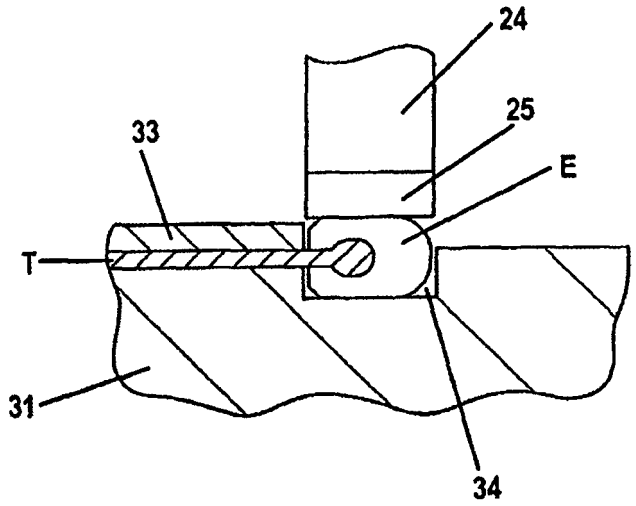


FIG.6

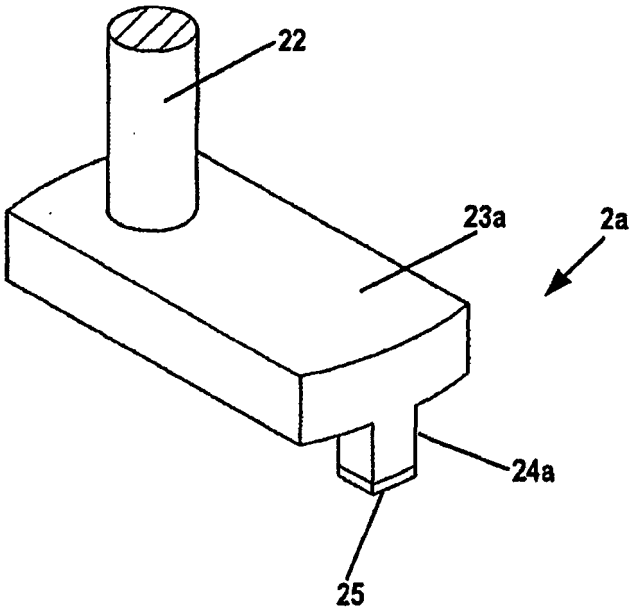


FIG.7

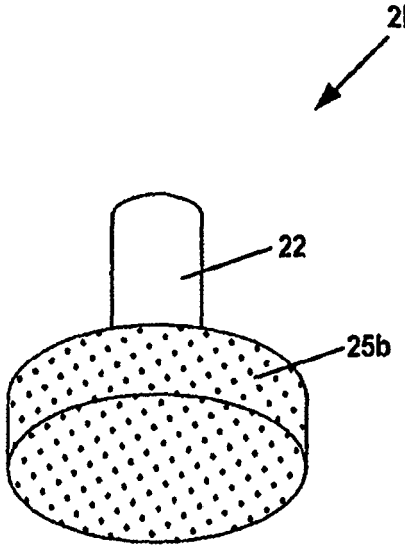


FIG.8

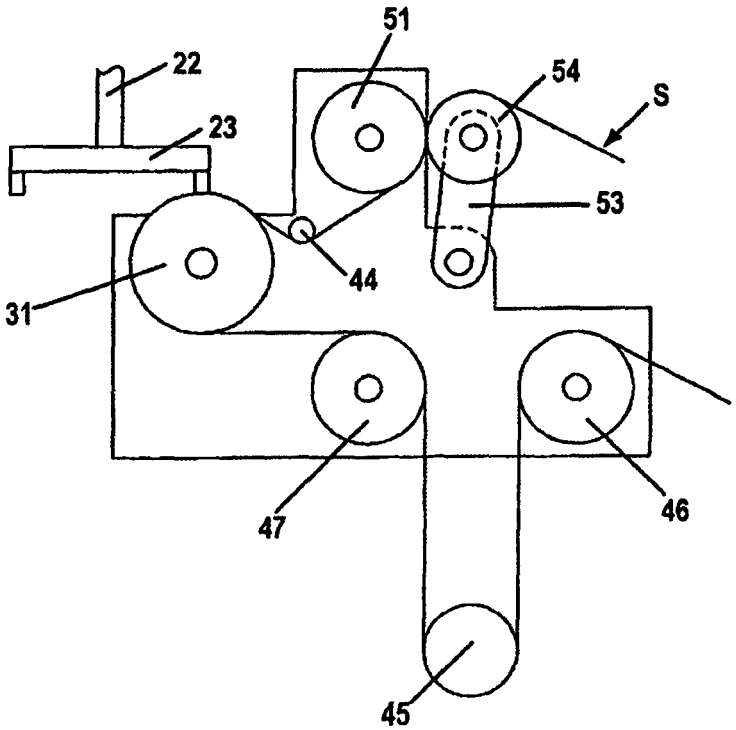


FIG.9

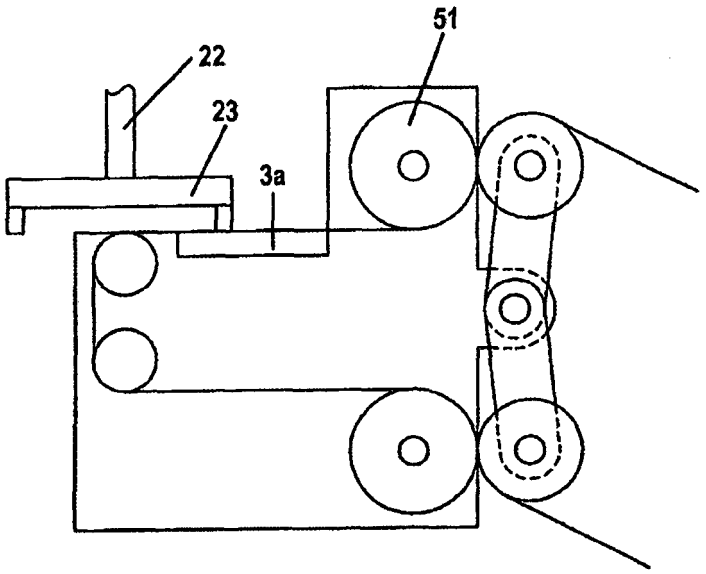


FIG.10

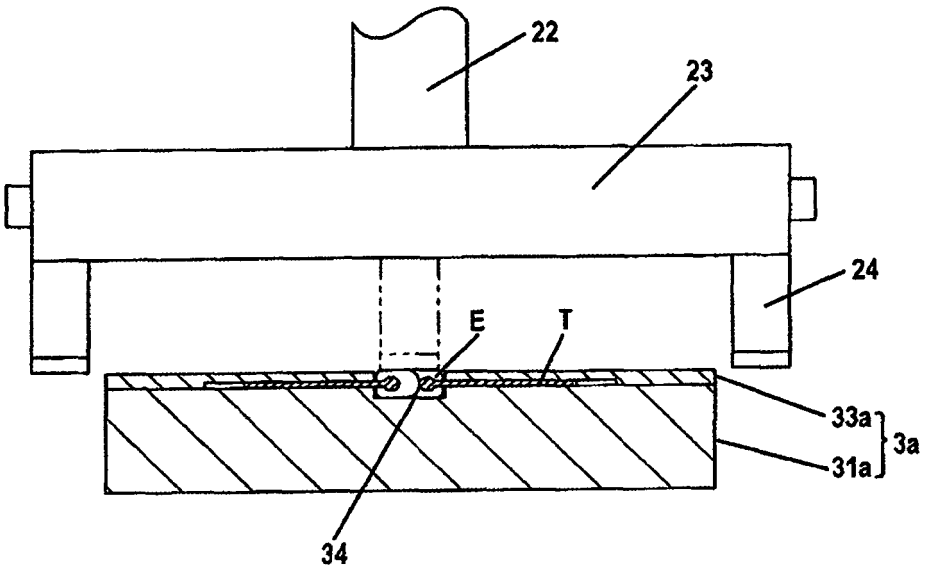


FIG.11

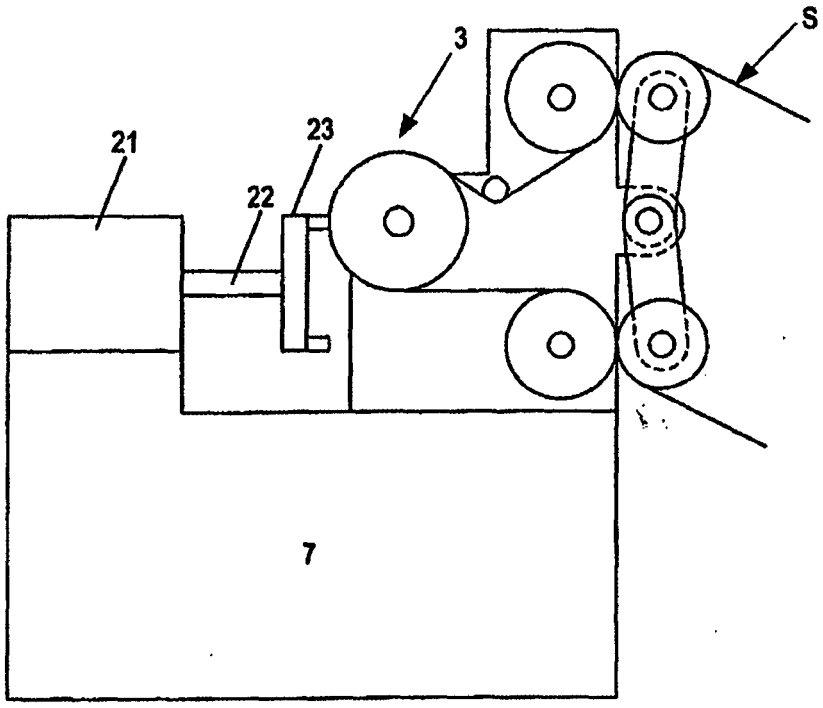


FIG.12

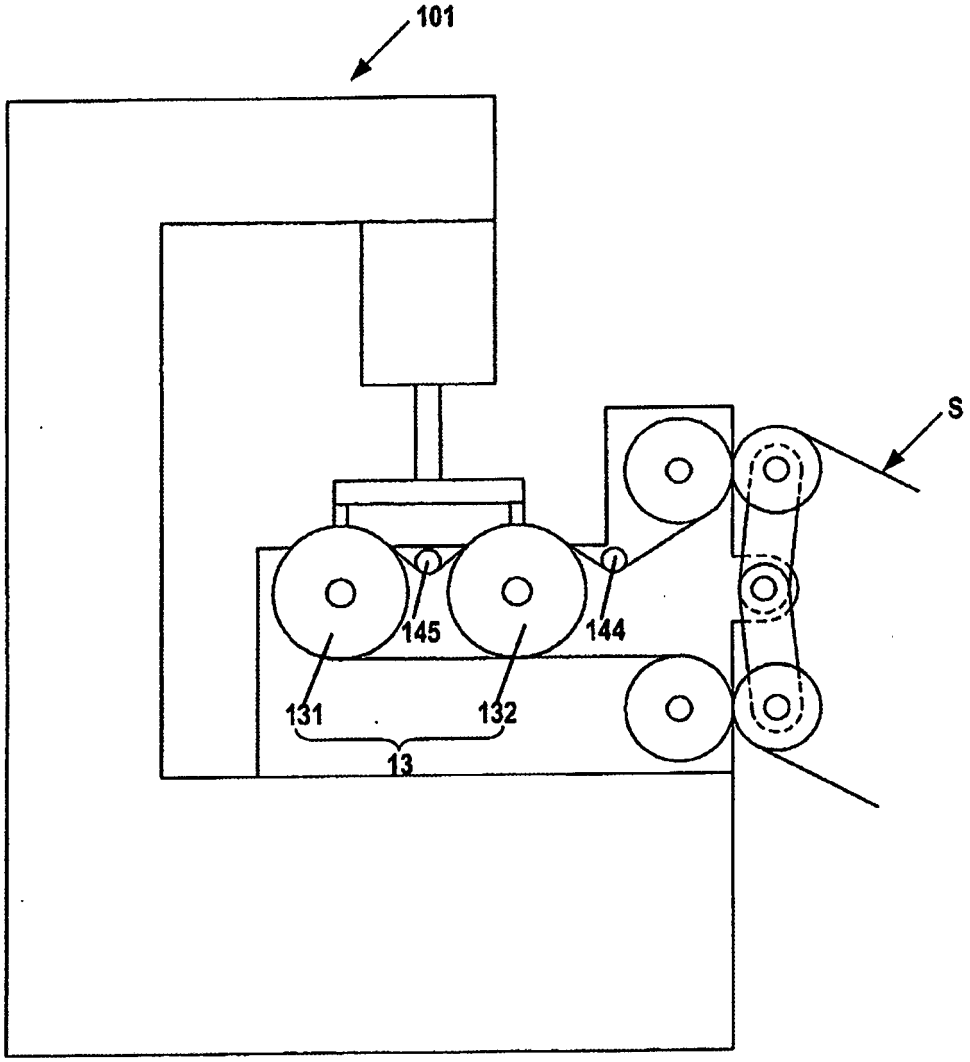


FIG.13

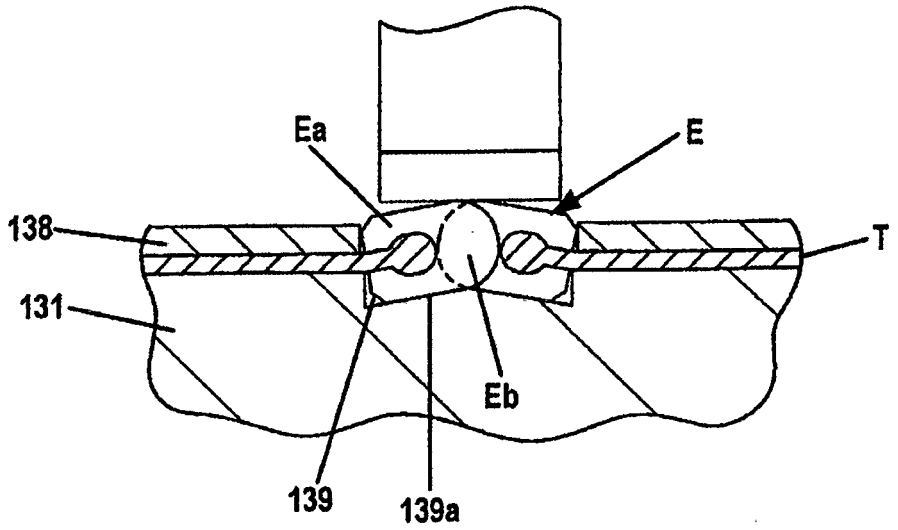


FIG.14

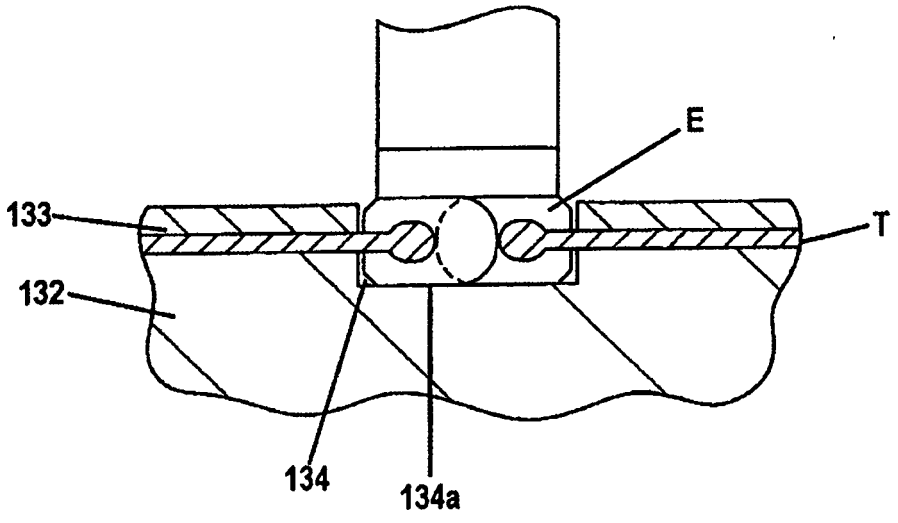


FIG.15A

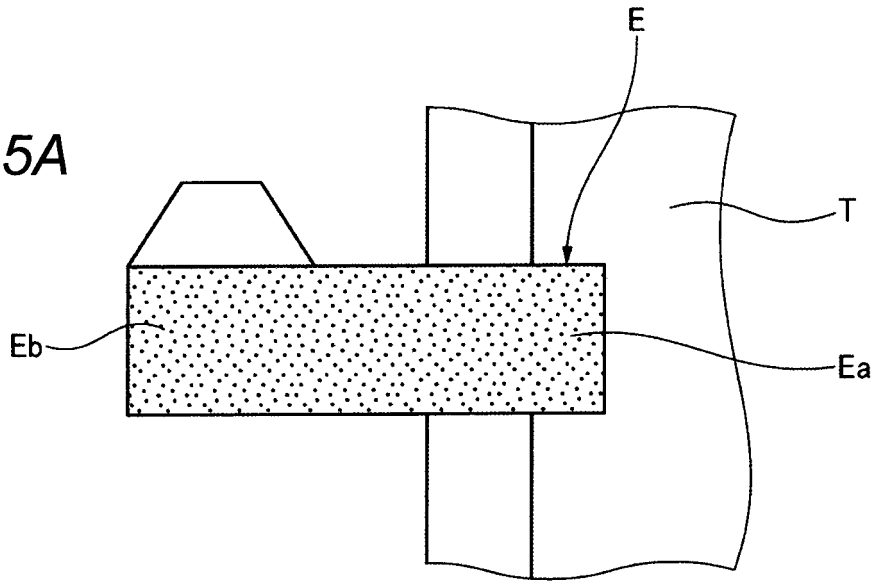


FIG.15B

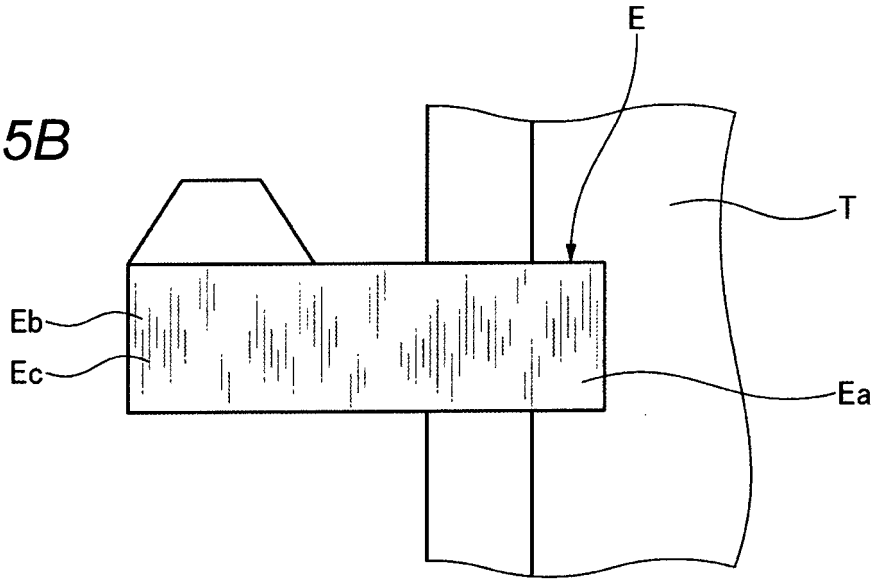


FIG.16A

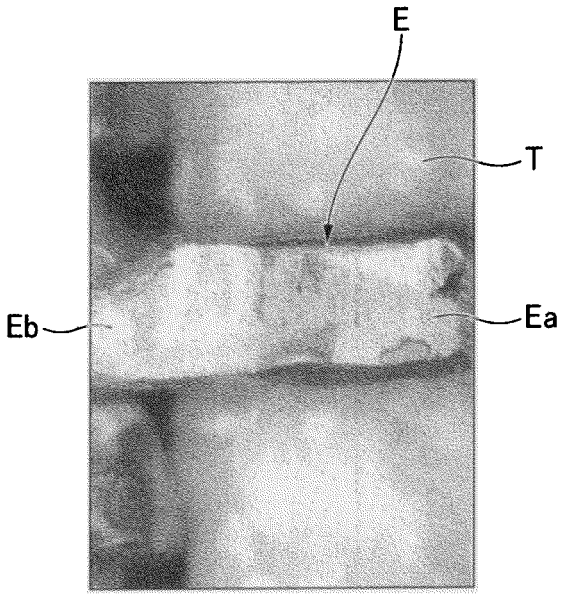


FIG.16B

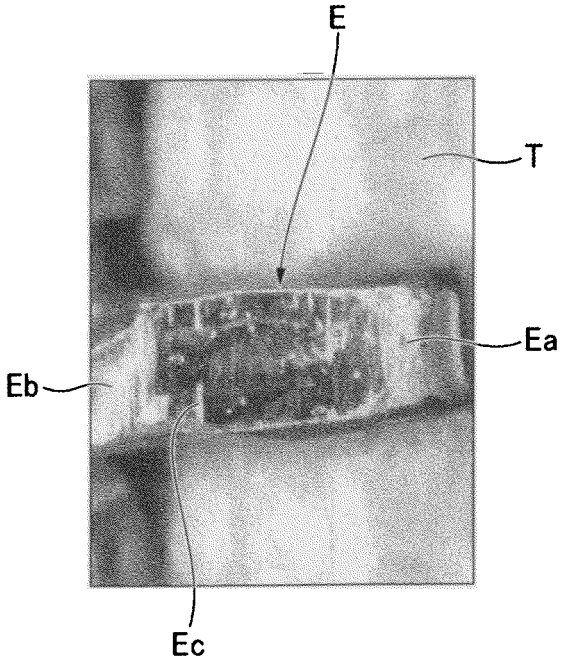
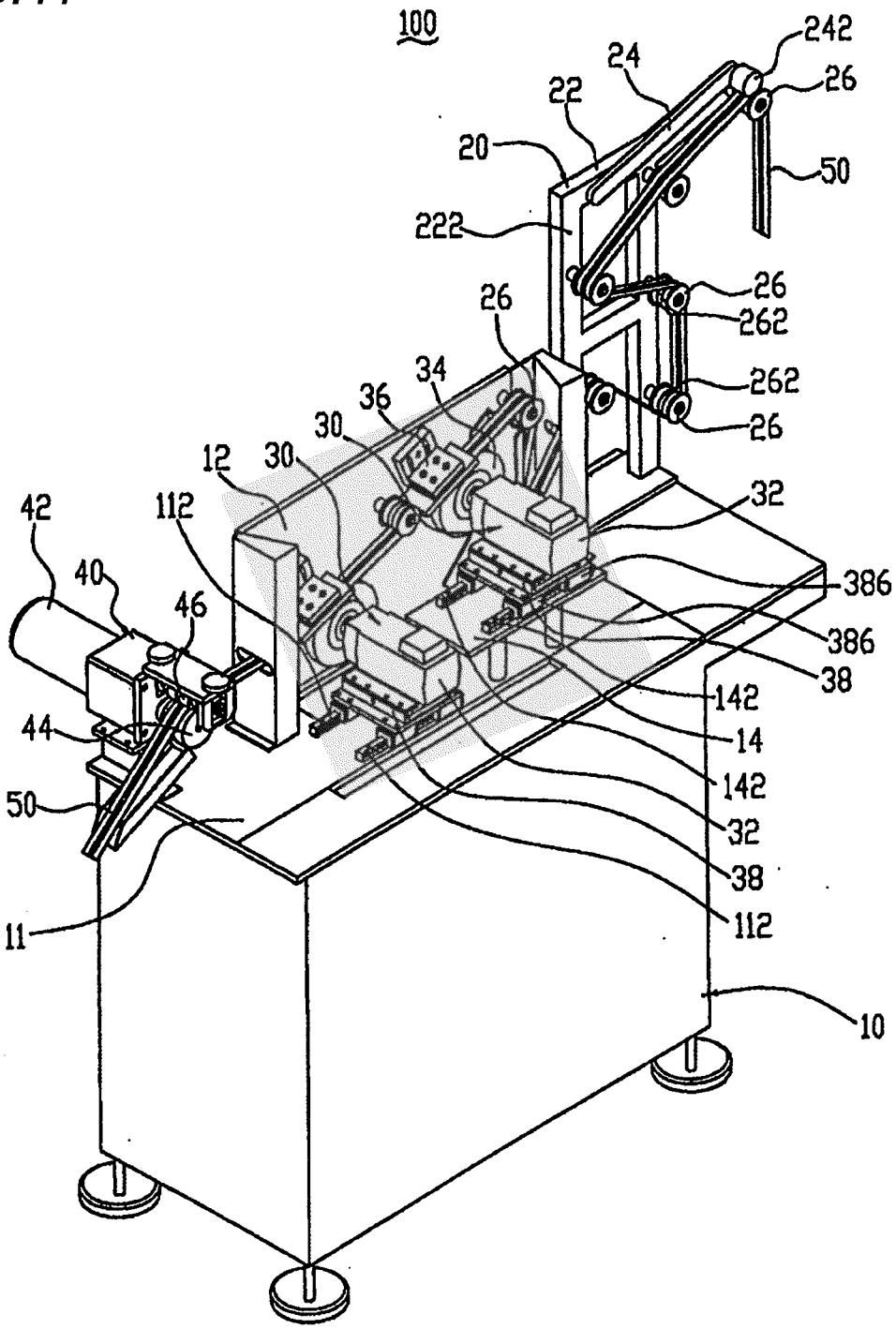


FIG.17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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/060866

A. CLASSIFICATION OF SUBJECT MATTER
A44B19/42(2006.01)i, *B24B7/12*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A44B19/42, B24B7/12

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2013
Kokai Jitsuyo Shinan Koho	1971-2013	Toroku Jitsuyo Shinan Koho	1994-2013

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	CN 101461589 A (Fujian SBS Zipper Science & Technology Co., Ltd.), 24 June 2009 (24.06.2009), entire text; all drawings (Family: none)	1-9,11,15,16 10,12-14
Y	JP 52-001590 A (Kenzaburo KONDO), 07 January 1977 (07.01.1977), entire text; all drawings (Family: none)	1,6-16
Y	JP 8-090426 A (Toshiba Ceramics Co., Ltd.), 09 April 1996 (09.04.1996), entire text; all drawings (Family: none)	1-16

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Date of the actual completion of the international search	Date of mailing of the international search report
08 May, 2013 (08.05.13)	21 May, 2013 (21.05.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/060866

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2007-276033 A (Koshin Special Glass Co., Ltd.), 25 October 2007 (25.10.2007), entire text; all drawings (Family: none)	1-16
Y	GB 2304149 A (YKK Europe Ltd.), 12 March 1997 (12.03.1997), entire text; all drawings (Family: none)	9,11,16
Y	US 2824319 A (Karl Friedrich NAGELE), 25 February 1958 (25.02.1958),	1-6,8-10, 12-14,16
A	entire text; all drawings (Family: none)	7,11,15
Y	JP 30-013189 Y1 (Yoshida Kogyo Co., Ltd.), 14 September 1955 (14.09.1955), entire text; all drawings (Family: none)	13,14,16
A	JP 51-001922 Y1 (Yoshida Kogyo Co., Ltd.), 21 January 1976 (21.01.1976), entire text; all drawings (Family: none)	1-16

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Patent documents cited in the description

- CN 101461589 **[0003]**