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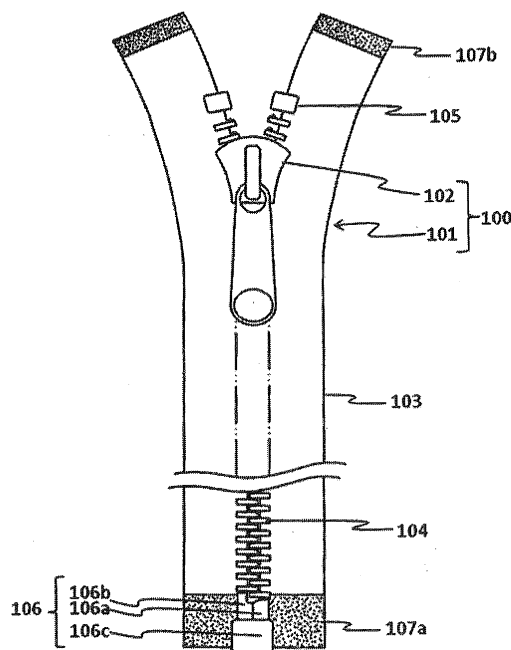
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(54) **ZIPPER CHAIN WITH BOTTOM STOP AND PRODUCTION METHOD FOR SAID ZIPPER CHAIN**

(57) There are provided an fastener chain with a separable bottom end stop capable of increasing the reinforcement force of a portion to which the separable bottom end stop is attached without using a reinforcing tape and keeping aesthetic appearance, and a method for producing the fastener chain. The fastener chain with a separable bottom end stop which includes reinforced portions (107a, 107b) at portions to which the separable bottom end stop (106) is attached, the reinforced portions into which a curing adhesive (205, 308, 402) has penetrated and cured, and that has a misalignment-free strength of 100 N or more at the reinforced portion. The method for producing a fastener chain with the separable bottom end stop which includes a process A for preparing a fastener chain including a plurality of element intermittent portions, a process B for attaching a separable bottom end stop to each of the element intermittent portions, a process C for impregnating each of the element intermittent portions with a curing adhesive having a viscosity of 100 to 2000 mPa·S before or after the process B, and a process D for curing the curing adhesive which has penetrated into the element intermittent portions by the process C.

【Figure 1】



Description

TECHNICAL FIELD

5 **[0001]** The present invention relates to a fastener chain with a separable bottom end stop and a method for producing the fastener chain.

BACKGROUND ART

10 **[0002]** An end of a slide fastener is sometimes equipped with a separable bottom end stop which is capable of connecting and separating a fastener chain. The separable bottom end stop generally includes a box pin, a box body, and an insert pin, and is attached to and contacted with a lower end of an element row of the fastener chain. As for a slide fastener with a separable bottom end stop, a portion of a fastener tape to which the separable bottom end stop is attached is reinforced in order to prevent a damage of the tape. In the past, it has been generally conducted that a reinforcing tape such as a plain-woven fabric (taffeta tape) or a transparent synthetic resin film is attached on the tape and thereafter the separable bottom end stop is attached thereon to reinforce the tape.

15 **[0003]** However, there are problems in that the cost of materials of the reinforcing tape is relatively high and this increases the production cost and in that the portion to which the reinforcing tape is attached is rigid and this easily breaks the needle when the tape is sewn. Further, there is a problem in that if a transparent synthetic resin is used, the transparent synthetic resin film may be partially peeled while the tape is repeatedly washed and dried and this makes the peeled portion cloudy. There is also a problem in that the available colors of the taffeta tape are limited and thus some colors of the fastener tape are highly uncoordinated with the limited colors of the taffeta tape.

20 **[0004]** In light of the foregoing background, a method for reinforcing a fastener tape without using a reinforcing tape has been proposed. For example, Japanese Patent Application Laid-Open No. 6-189811 discloses a method for producing a slide fastener chain with a separable bottom end stop including a process for continuously reinforcing ends of fastener tapes with the separable bottom end stop. In the process, the fastener tapes are continuously supplied and element rows and the separable bottom end stop are sequentially and integrally formed on the fastener tapes. After the element rows and the separable bottom end stop are formed, a periphery of the fastener tape at which the separable bottom end stop is formed is impregnated and fixed with a fiber curing agent. Further, Japanese Patent Application Laid-Open No. 6-245806 discloses a method for attaching and forming a separable bottom end stop to a hidden slide fastener. In the method, a space is formed on a fastener chain of the hidden slide fastener by removing fastener elements assigned on a portion corresponding to an opening portion and entire tape of the space is impregnated with a synthetic resin solution. The tape is hot formed and cured such that opposite edges of the tape is reversed into a U shape. Then, the tape is cut at the space. A synthetic resin insert pin of the separable bottom end stop is attached to an edge of the tape by injection-molding in such a way as to be contacted with the fastener element. An acceptor is attached to the other edge of the tape by injection-molding in such a way as to be contacted with the fastener element.

[Citation List]

40 [Patent Literature]

[0005]

[Patent Literature 1] Japanese Patent Application Laid-Open No. 6-189811

45 [Patent Literature 2] Japanese Patent Application Laid-Open No. 6-245806

SUMMARY OF INVENTION

50 **[0006]** As described above, there are Patent Literatures disclosing that the reinforcement of a fastener tape is achieved by impregnating the fastener tape with a synthetic resin solution or with a fabric curing agent and curing them. However, these literatures do not sufficiently optimize the synthetic resin solution to be used and the reinforcement process. Especially, there is a room for improvement because a frayed reinforced portion impairs the product performance, or the synthetic resin solution spreads when the fastener tape is impregnated with the synthetic solution and this impairs the aesthetic appearance. Accordingly, an objective of the present invention is to provide a fastener chain with a separable bottom end stop that can increase the reinforcement force of the portion to which the separable bottom end stop is attached without using a reinforcing tape and can also keep aesthetic appearance. Another objective of the present invention is to provide a method for producing the fastener chain.

[0007] While the inventors of the present invention have studied earnestly to solve the above-mentioned problems,

they have improved the frayed reinforced portion by finding an optimal misalignment-free strength. Further, they have found that it is efficient to impregnate a portion of the fastener tape to which a separable bottom end stop is attached with a curing adhesive having a viscosity within a specific range and to cure the adhesive. Then, the inventors have completed the present invention.

[0008] In accordance with an aspect of the present invention, a fastener chain with a separable bottom end stop includes a pair of fastener tapes, rows of fastener elements attached to both edges of the fastener tapes facing each other, a separable bottom end stop attached to ends of the fastener tapes and contacted with the rows of elements, a reinforced portion provided on at least portions of the fastener tapes to which the separable bottom end stop is attached, the reinforced portion into which a curing adhesive has penetrated and cured, and wherein the reinforced portion has a misalignment-free strength of 100 N or more.

[0009] In an embodiment of the fastener chain with the separable bottom end stop according to the present invention, the curing adhesive has a viscosity of 100 to 2000 mPa·S when penetrating into the fastener tapes.

[0010] In another embodiment of the fastener chain with the separable bottom end stop according to the present invention, the curing adhesive includes a two-component curing adhesive.

[0011] In still another embodiment of the fastener chain with the separable bottom end stop according to the present invention, a weight of the curing adhesive in the reinforced portions is 50 to 300 g (dry weight) per 1 m² of a fastener tape.

[0012] In accordance with another aspect of the present invention, a method for producing a fastener chain with a separable bottom end stop includes a process A for preparing a fastener chain including a plurality of element intermittent portions, a process B for attaching a separable bottom end stop to each of the element intermittent portions, a process C for impregnating each of the element intermittent portions with a curing adhesive before or after the process B, and a process D for curing the curing adhesive that has penetrated into the element intermittent portions by the process C.

[0013] In an embodiment of the method for producing the fastener chain according to the present invention, the curing adhesive has a viscosity of 100 to 2000 mPa·S at the process C.

[0014] In another embodiment of the method for producing the fastener chain according to the present invention, the process C is performed while the fastener chain is masked with a masking member that is sequentially provided from a direction intersecting with a conveying direction where the fastener chain is continuously conveyed.

[0015] In still another embodiment of the method for producing the fastener chain according to the present invention, the masking member has a polygonal or circular cylinder shape, has a central axis as a rotational axis and sequentially rotates at regular time intervals, the masking member having an opening at a side surface of the member and, in the process C, the fastener chain is conveyed in a direction from one bottom surface to another bottom surface of the member such that the element intermittent portions pass through an inside of the side surface, and a masking is performed by providing the adhesive from an outside toward the opening formed at the side surface when the element intermittent portions pass through the side surface.

[0016] In another embodiment of the method for producing the fastener chain according to the present invention, the masking member rotates every time when each of the element intermittent portions is conveyed with the conveyance of the fastener chain such that the masking is performed sequentially using different openings.

[0017] In still another embodiment of the method for producing the fastener chain according to the present invention, the adhesive attached to a periphery of the opening is removed from each of the openings of the masking member during a time between a completion of a masking and a next masking.

[0018] In still another embodiment of the method for producing the fastener chain according to the present invention, the masking member is a masking tape for masking which includes an opening and which is sequentially paid out by a wind off and on device which including a wind off unit and a wind on unit and, in the process C, the fastener chain is conveyed such that the element intermittent portions pass under the masking tape that moves between the wind off unit and the wind on unit.

[0019] In still another embodiment of the method for producing the fastener chain according to the present invention, the curing adhesive includes a two-component curing adhesive.

[0020] In still another embodiment of the method for producing the fastener chain according to the present invention, the process C is performed on the fastener chain that has been heated in advance.

[0021] In still another embodiment of the method for producing the fastener chain according to the present invention, the fastener chain is hot pressed after the process C.

[0022] In still another embodiment of the method for producing the fastener chain according to the present invention, a weight of the curing adhesive penetrating into the element intermittent portions is 50 to 300 g (dry weight) per 1 m² of a fastener tape.

[0023] According to the present invention, a fastener chain with a separable bottom end stop that can increase the reinforcement force of the portion to which the separable bottom end stop is attached without using a reinforcing tape and can also keep aesthetic appearance can be provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Fig. 1 is an elevation view for schematically illustrating a portion of a fastener chain with a separable bottom end stop according to an embodiment of the present invention;
 Fig. 2 is a schematic diagram for describing a measurement method of a misalignment-free strength;
 Fig. 3 is a schematic view for illustrating an example of a polygonal cylinder shaped masking member;
 Fig. 4 is an enlarged view of an opening of the polygonal cylinder shaped masking member;
 Fig. 5 is a schematic view for illustrating an example of a tape shaped masking member;
 Fig. 6 is an enlarged view of an opening of the tape shaped masking member; and
 Fig. 7 is a schematic view for illustrating an exemplary fastener chain conveyor.

DETAILED DESCRIPTION OF THE INVENTION

<1. Fastener chain with a separable bottom end stop>

[0025] Hereinafter, a fastener chain with a separable bottom end stop of the present invention will specifically be described with reference to the drawings. In the present invention, an upper-lower direction is referred to as a sliding direction of a slider. A direction to which the slider is slid so as to engage element rows with each other is defined as an upper direction and a direction to which the slider is slid so as to separate the element rows with each other is defined as a lower direction.

[0026] Fig. 1 is an elevation view of a slide fastener 100 obtained by attaching a slider 102 to a fastener chain 101 with a separable bottom end stop according to the present invention. The a fastener chain 101 with a separable bottom end stop includes a fastener tape 103, a row of fastener elements 104, a top stopper 105, and a separable bottom end stop 106. The lower end and the upper end of the fastener tapes 103 are provided with reinforced portions 107a and 107b, respectively. The fastener tapes 103 are in pairs. Each of the fastener tape 103 to which the row of the fastener elements 104 is attached is referred to as a fastener stringer.

[0027] Each of the fastener tapes 103 is woven from or is knitted out of synthetic fibers or natural fibers. The row of the fastener elements 104 including a plurality of fastener elements 104 engageable and separable with the slider 102 is attached along the longitudinal edge of the fastener tape 103. There is no limitation on the type of the elements 104. Any conventional types, for example, separate elements as typified by a metallic element and a resin element injection-molded at the tape or connected elements as typified by a coiled resin element can be used as the elements 104. The slider 102 is slid as the rows of the fastener elements 104 are inserted into the inside of the slider 102 so that the rows of the fastener elements 104 can be engaged with or separated from each other. The top stopper 105 is a unit for preventing the slider from dropping upwardly. The top stopper 105 is contacted with each upper ends of the rows of the fastener elements 104 and is fixed at the bottom end of the fastener tape by swaging or injection-molding.

[0028] The separable bottom end stop 106 is contacted with the lower ends of the rows of the fastener elements 104 and attached to the lower ends of the fastener tapes 103. For example, as described in Japanese Patent Application Laid-Open No. 6-189811 and Japanese Patent Application Laid-Open No. 6-245806, the separable bottom end stop 106 is known. A given separable bottom end stop that is known by a person having ordinary skill in the art can be used. Generally, the separable bottom end stop 106 includes a box pin 106a, an insert pin 106b and a box body 106c. The box pin 106a and the insert pin 106b are attached to the bottom ends of the fastener tapes 103 in such a way as to face each other. The box body 106c is inserted from the lower end of the box pin 106a in such a way as to be engaged with and fixed at the box pin 106a. The box body 106c includes an insertion hole (not shown in the drawings) for inserting the insert pin 106b. Inserting and removing the insert pin 106b into and from the box body 106c can connect and separate the lower ends of the fastener chains. Note that the box pin 106a and the box body 106c can be integrally formed although the box pin 106a and the box body 106c are separately formed in such a way as to be engaged with each other and fixed in the present embodiment.

[0029] Although the separable bottom end stop is attached only to the lower end of the slide fastener in the present embodiment, a reverse opening assembly including a box pin and an insert pin can be used as the separable bottom end stop as shown in another embodiment of the present invention, for example, as described in Japanese Patent Application Laid-Open No. 2005-245859. Two sliders are placed such that the bottoms of the two sliders face each other and thus the slide fastener can reversely be opened.

[0030] A reinforced portion 107a into which a curing adhesive penetrates and is cured is provided at a portion of the fastener tape 103 to which the separable bottom end stop 106 is attached. Further, in the present embodiment, the reinforced portion 107a is provided not only at the portion to which the separable bottom end stop 106 is attached but also from the upper end of the separable bottom end stop 106 to the lower end of the fastener tape 103 and across a

full width of the fastener tape 103. As described above, providing the reinforced portion 107a across the full width of the fastener tape 103 can provide a high reinforcing effect on the fastener tape 103. It is not necessary to conform the upper end of the reinforced portion 107a to the upper end of the separable bottom end stop 106. The reinforced portion 107a can reach the row of the elements 104 through the upper end of the separable bottom end stop 106 and does not need to reach the upper end of the separable bottom end stop 106. However, an excessive extension of the range of the reinforced portion to the row of the elements impairs a smooth opening and closing operation of the fastener. Excessively short reinforced portion in a longitudinal direction cannot obtain a desired strength. Thus, a typical longitudinal range of the reinforced portion 107a may be 5 to 100 mm upward from the lower end of the fastener tape 103.

[0031] Otherwise, a reinforced portion 107b can be provided at the upper end of the fastener tape 103. This can prevent the thread of the upper end of the fastener tape 103 from fraying.

[0032] The curing adhesive reinforces the fastener tape 103 by curing after penetrating into the fastener tape 103. An excessively low misalignment-free strength easily frays the cut surface and softens the reinforced portion. This reduces the operability of the separable bottom end stop. Thus, the reinforced portion preferably has a misalignment-free strength of 100 N or more. However, an excessively large misalignment-free strength hardens the reinforced portion too much although the fraying is improved. This reduces the operability of the separable bottom end stop. Further, this possibly breaks the reinforced portion or makes it difficult to sew the portion. In light of the foregoing, the reinforced portion more preferably has a misalignment-free strength of 300 N or less.

[0033] A measurement method of the misalignment-free strength of the present invention will be described. While a needle is inserted into a fastener tape and a downward tensile load is gradually given, the fastener tape eventually becomes incapable of withstanding the load and the grain of the fabric where the needle has been inserted opens downwardly at some point (misalignment). A misalignment-free strength is the limit of strength enough to withstand the load without misalignment in such a case. The misalignment-free strength can easily be measured from the stress-strain curve because the stress rapidly decreases at the time when the grain opens.

[0034] Next, a specific measurement condition of the misalignment-free strength of the present invention will be described. The parts including the separable bottom end stop, the top stopper, the row of elements, and the slider are removed from the fastener chain in order to leave only the two separate fastener tapes 103. Next, as described in Fig. 2, the lower ends of the fastener tapes 103 are cut in such a way as to have a size of 80 mm in the longitudinal length $\times$ about 14 mm in the width direction length and then the cut tapes are used as test pieces. Needles 110 of which tips have a J shape and a diameter of 1 mm (in the present examples, "Beha 78.75 B10/3 manufactured by ORGAN NEEDLE CO., LTD." is used) are inserted into a reinforced portion 107a where a curing adhesive has penetrated and cured. A first needle is inserted into a position 3 mm above the lower end of the fastener tape and 3 mm far from the edge to which the row of elements has not been attached toward the opposite edge. Two more needles are inserted toward the opposite edge and evenly spaced 3 mm apart. The area 30 mm below the upper end of the fastener tape is held using a tensile test machine (in the present examples, "INSTRON. 5565 manufactured by INSTRON" is used). Further, the fastener tape is pulled downwardly at a rate of 200 mm/min as the three needles are held (the distance between the upper and lower held portions is 70 mm). The areas surrounded by dotted lines in Fig. 2 are held portions 111 and are held with a pneumatic clasper or the like. A maximum stress until misalignment is generated is obtained from the stress-strain curve and the obtained stress is regarded as a misalignment-free strength. The tests are conducted twice for each of the fastener tapes and the total is four times. The average value of the tests is regarded as the misalignment-free strength of the fastener chain.

[0035] The viscosity of the curing adhesive when penetrating into the fastener tape is important in obtaining a desired misalignment-free strength and an aesthetic appearance. An excessively small viscosity causes the curing adhesive to spread without penetrating into a predetermined position when the curing adhesive penetrates. This impairs the external appearance. Further, the adhesive constituent is excessively diluted with a solvent and thus the adhesive constituent insufficiently remains in the fastener tape after being cured, so that a desired misalignment-free strength cannot be obtained. On the other hand, an excessively large viscosity cannot obtain a desired misalignment-free strength because the adhesive does not penetrate into the inside of the fastener tape. In light of the foregoing, the viscosity of the curing adhesive when penetrating into the fastener tape is preferably 100 to 2000 mPa·S and more preferably 200 to 700 mPa·S.

[0036] In the present invention, a BM viscometer (in the present examples, "a viscometer manufactured by TOKYO KEIKI INC." is used) is used for measuring the viscosity. The measurement is conducted under the condition where a No. 2 is used as an attached rotor, the rotation frequency is set at 30 rpm, and the temperature is set at 25°C.

[0037] To obtain a desired misalignment-free strength, the weight of the curing adhesive remaining in the reinforced portion is preferably large per 1 m² of the fastener tape. However, an excessively large weight causes the reinforced portion to be hard too much. Thus, the weight may be preferably 50 to 300 g (dry weight), and more preferably 70 to 200 g (dry weight).

[0038] An excessively thick reinforced portion has problems, for example, first, in that it impairs the operability of the separable bottom end stop, second, in that it causes a crack on the reinforced portion, and third in that it becomes difficult to be sewn to another fabric. On the other hand, an excessively thin reinforced portion, first, impairs the operability

of the separable bottom end stop, and second, easily causes the edge to be frayed. In light of the foregoing, the thickness of the reinforced portion after the curing adhesive is cured and dried may be preferably within a range of 100 to 200% on the assumption that its original thickness of the fabric is 100%.

[0039] There is not a specific limitation on the curing adhesive to be used. A given conventional curing adhesive can be used. For example, a one-component curing adhesive, a two-component curing adhesive, an instant adhesive, a hot melt adhesive, an emulsion adhesive, or an optical (ultraviolet or electron beam) curing adhesive can be used. Among them, in view of the cost, the reinforcement force, the workability, and the quality, the one-component curing adhesive and the two-component curing adhesive are preferable. The one-component curing adhesive has beneficial effects on the external appearance of the product, the prevention from fraying due to washing and drying, and the improvement of the misalignment-free strength although taking a slightly longer time to dry because of the large amount of solvent and having a slightly less permeability into the reverse side than that of the two-component curing adhesive. The two-component curing adhesive has beneficial effects on the external appearance of the product and the improvement of the misalignment-free strength although having a slightly less effect of the prevention from fraying due to washing and drying than that of the one-component curing adhesive. A polyurethane adhesive, an epoxide-based adhesive, and an acrylic adhesive are cited as the examples of the one-component curing adhesive and the two-component curing adhesive. Polyol, ester, ether polyol, and acrylic can typically be used as the base compound of the two-component curing adhesive. Aromatic/aliphatic isocyanate, epoxy, melamine, oxazoline, aziridine, carbodiimide or the like can be used as the curing agent. To increase the misalignment-free strength, it is useful to increase the curing agent content relative to the base compound.

[0040] While there is not a specific limitation on the diluent of the adhesive and a given conventional diluent can be used, the use of an organic solvent including toluene, alcohol, methyl ethyl ketone (MEK), ethyl acetate, dimethylformamide can generally increase the drying efficiency. Especially, toluene, alcohol, and methyl ethyl ketone are preferable because they have low toxicity and are easily controlled to dry. An amount of the diluent can be used such that the viscosity of the adhesive is within the above-mentioned range when the element intermittent portions of the fastener tape are impregnated with the adhesive.

<2. Method for producing a fastener chain with a separable bottom end stop>

[0041] Next, a method for producing a fastener chain with a separable bottom end stop according to the present invention will specifically be described with reference to the drawings.

[0042] In an embodiment, the method for producing a fastener chain with a separable bottom end stop according to the present invention includes a process A for preparing a fastener chain having a plurality of element intermittent portions, a process B for attaching a separable bottom end stop to each of the element intermittent portions, a process C for impregnating each of the element intermittent portions with a curing adhesive before or after the process B, and a process D for curing the curing adhesive that has penetrated into the element intermittent portions in the process C.

[0043] In the process A, a fastener chain having a plurality of element intermittent portions is prepared. The fastener chain, for example, is obtained by forming a plurality of element intermittent portions at a long fastener chain that has been formed by engaging and combining the rows of elements of a pair of fastener stringers. The element intermittent portions are formed by a removal of the fastener elements from the portions to which a separable bottom end stop is to be attached. The element intermittent portions can also be formed by a provision of positions where the elements are not attached from the beginning when the elements are attached to the fastener tape.

[0044] In the process B, a separable bottom end stop is attached to each of the element intermittent portions. The separable bottom end stop can be attached, for example, by injection-molding a synthetic resin material or a metal, or by folding a metal plate and swaging the plate to the tape. The process B can be performed after the reinforced portion is formed, or can also be performed before the reinforced portion is formed.

[0045] In the process C, each of the element intermittent portions is impregnated with a curing adhesive, for example, having a viscosity of 100 to 2000 mPa·S. The process C can be performed before or after the process B. The process C can be performed while a masking member is sequentially provided from a direction intersecting with a conveying direction where the fastener chain is continuously conveyed such that the fastener chain is masked. This can cause the element intermittent portions to continuously be impregnated with the curing adhesive and can cause a desired area to accurately be impregnated.

[0046] The masking member, for example, can be a polygonal cylinder shaped member 201 that has a central axis as the rotational axis and sequentially rotates at regular time intervals, as described in Fig. 3. The masking member has an octagonal shape in Fig. 3. However, the shape is not limited to the octagonal shape. An opening 202 is formed at the side surface of the member 201. In the process C, a fastener chain 203 is conveyed in a direction from a bottom surface toward the other bottom surface of the member (in the direction of an arrow in the drawing) such that the element intermittent portions 204 can pass through the inside of the side surface. The masking is performed by providing an adhesive 205 by a dispenser 208 from outside toward the opening 202 formed at the side surface when the element

intermittent portions 204 pass through the side surface. Fig. 4 is an enlarged view of the opening 202 of the polygonal cylinder shaped member 201 in the present embodiment. Here, the opening 202 has a rectangular shape. However, there is not a specific limitation on the shape of the opening as long as a position to be masked is masked and the adhesive is provided at a position to be impregnated with the adhesive. In other words, a masking member provided with a plurality of openings 202 at a polygonal cylindrical body is described in Fig. 3. However, for example, a pair of polygonal cylindrical bodies is longitudinally placed at an interval in the conveying direction of the fastener chain and the pair of bodies is rotated in synchronization, so that the space between the bodies can be used as an opening. Further, the masking member can have a circular cylindrical body instead of the polygonal cylindrical body.

[0047] The masking member 201 can rotate after masking a plurality of (for example, two to four) element intermittent portions 204 such that an opening 202 at an adjoining side surface can be used for the next impregnating operation. Alternatively, the masking member rotates every time when each of the element intermittent portions 204 is conveyed with the conveyance of the fastener chain 203 such that the masking can be performed sequentially using different openings 202.

[0048] The adhesive 205 attached to the periphery of the opening 202 is preferably removed during the time between the completion of a masking and the next masking because a repeat of masking accumulates an excess adhesive 205 on the periphery of the opening 202 and this adhesive is possibly attached to a portion of the fastener tape where the adhesive is not necessary. Blowing the adhesive with the wind force of a blower, sucking the adhesive with a vacuum, immersing the side surface in a washing tank 206 with washings such as an organic solvent, spraying washings, and wiping the adhesive with a wiping tool 207 such as a scraper or a brush are cited as the examples of a method for removing the adhesive. The operations can be combined. Different process for removing the adhesive can sequentially be performed with the rotation of the masking member.

[0049] In another method, a masking member, for example, is a masking tape 305 for masking that includes an opening 303 and that is sequentially paid out by a wind off and on device 300 having a wind off unit 301 and a wind on unit 302, as described in Fig. 5. In the process C, a fastener chain 306 is conveyed in the direction of the arrow in the drawing such that element intermittent portions 304 pass under the masking tape 305 that moves between the wind off unit and the wind on unit. The masking is performed by providing an adhesive 308 using a dispenser 307 toward the opening 303 from above when the element intermittent portions 304 pass under the opening 303. Fig. 6 is an enlarged view of the opening 303 in the present embodiment. Here, the belt-shaped opening 303 is formed using a pair of masking tapes installed parallel to each other. However, there is not a specific limitation on the shape of the opening as long as a position to be masked is masked and the adhesive is provided at a position to be impregnated with the adhesive. For example, a pair of masking tapes 305 is not necessarily required. For example, a plurality of openings is provided at a masking tape and the masking can be performed on the fastener tape at each of the openings.

[0050] The process C is preferably performed on a fastener chain that has been heated in advance. This can increase the speed of drying the adhesive that has penetrated into the element intermittent portion and thus the productivity is increased. As for the heating condition, an excessively high temperature causes the adhesive to incompletely penetrating into the fastener tape because of fast drying. On the other hand, it takes time to dry the adhesive at an excessively low temperature. Thus, the temperature is preferably 30 to 80°C, and more preferably 40 to 60°C.

[0051] The process D for curing the curing adhesive that has penetrated into the element intermittent portion by the process C is performed after the process C. The curing means vary depending on the used adhesive. For example, the adhesive is cured by heating and by the light illumination of ultraviolet, electron beam, or the like, or is cured by the reaction with water in the air. The adhesive can also be cured by mixture of the base compound and the curing agent at ordinary temperatures as a two-component curing adhesive.

[0052] The fastener chain can be hot pressed after the process C, before or after the process D, or at the same time as the process D. This has benefits including smoothing the surface of the fastener tape and deeply impregnating the inside of the fastener tape with the adhesive.

[0053] An exemplary fastener chain conveyor 400 for performing the process C is illustrated in Fig. 7. The fastener chain conveyor 400 includes a coating unit, a first drying unit, and a second drying unit. A long fastener chain 401 having a plurality of element intermittent portions is conveyed in the right direction in the drawing using a plurality of feed rollers (not shown in the drawings) that are controlled and driven such that a curing adhesive 402 is provided using a dispenser 403 to an element intermittent portion at the coating unit. Spraying, pad printing, screen printing, gravure printing, ink jet printing, roll printing, and dye printing are cited as the examples of a method for providing the adhesive 402. Spraying is preferable because the amount and width of the coating is easily controlled and the spraying can be done in a short time. Especially, using a dispenser capable of accurately providing liquid at constant quantity is preferably used for the spraying. A liquid tank 404 is placed under the dispenser 403 such that the adhesive 402 flying from above can be recovered. The fastener chain 401 from the coating unit is dried in a dryer 405 of the first drying unit. The first drying unit is movable in such a way as to move back and forth in the conveying direction according to a set amount necessary to be dried. After that, the fastener chain is stored in a storage box 406. The fastener chain can further be dried in a dryer 407 of the second drying unit as necessary. A curing adhesive is generally cured in the first drying unit and, as

necessary, in the second drying unit. However, for adhesives requiring specific means for curing, such as a light curing adhesive, a process for curing can separately be provided. An exhaust device 408 such as a fan is installed at each of the coating unit, the first drying unit, and the second drying unit.

[0054] After the reinforced portion is formed as described above, the fastener tape is cut at the lower portion of the reinforced portion. Then, a finishing process including the attachment of a separable bottom end stop, the attachment of a top stopper, the attachment of a slider is properly performed such that the slide fastener can be completed. The finishing process can be performed before the reinforced portion is formed.

[Examples]

[0055] Hereinafter, Examples will be described for a better understanding of the present invention and its advantages. However, the present invention is not limited to the Examples.

<Measurement method of various characteristics>

[0056] The external appearance of the product (the spread and the permeability into the reverse side) and the cloudiness and the fraying after industrially washing and drying were evaluated with the criteria below, as evaluation items of examples and comparative examples. (1) and (2) were evaluated by tests of the external appearance after coating (after impregnating and drying). (3) and (4) were evaluated by tests of the external appearance after industrially washing and drying.

(1) Spread

[0057]

- ⊙ There is no spread (the edge of the coated portion is straight line).
- : The edge has a slight wave shape and is not perfectly straight line.
- xx: The adhesive spreads over the width to be coated and the edge has a wave shape.

(2) Permeability into the reverse side

[0058]

- ⊙ The impregnated portion on the reverse side is wet similarly to the front side (coated side) and the reverse side and the front side have the same color.
- : Some of the impregnated portions on the reverse side have slightly lighter colors than the color of the front side.
- x: A portion on the reverse side is not wet.
- xx: The reverse side is not wet at all.

(3) Cloudiness

[0059]

- ⊙ There is no cloudiness.
- : There is a slight cloudiness (less than one sixth of the area).
- △: There is a little cloudiness (one sixth of the area or more and less than one fourth).
- x: There is cloudiness in some degree (one fourth of the area or more and less than one third).
- xx: There is considerable cloudiness (one third or more).

(4) Fraying

[0060]

- ⊙: There is no fraying.
- : There is fluff.
- △: A weft frays (falls off).
- x: Two or three wefts fray (fall off).
- xx: Four or more wefts fray (fall off).

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[0061] The misalignment-free strength was measured by the above-mentioned measurement method. The INSTRON 5565 manufactured by INSTRON was used as the tensile test machine.

[0062] The viscosity of the adhesive was measured using a BM viscometer manufactured by TOKYO KEIKI INC. The measurement was conducted under the condition where the temperature was set at 25°C, a No. 2 rotor was used, and the rotation frequency was set at 30 rpm.

<Example 1A>

[0063] Ester urethane polyol (made by The Nippon Synthetic Chemical Industry Co., Ltd.) and hexamethylene diisocyanate (HDI, the trade name is CORONATE HL made by NIPPON POLYURETHANE INDUSTRY Co., Ltd.) of which solid content mass ratio was equal to 86/14 were mixed and stirred. Toluene was used as a diluent in order to dilute the mixture such that the mass ratio of the above-mentioned two resins and the diluent became 62/38. A two-component curing adhesive solution having a viscosity of 250 mPa·S (25°C) was prepared.

[0064] Meanwhile, a long fastener tape that was made from woven polyester tapes of which threads having a thickness of 330 T and that had a width of about 14 mm and a thickness of about 0.53 mm was prepared. Next, elements were attached to the fastener tape such that each of the element intermittent portions had a length of 30 mm. A pair of the fastener tapes was manufactured in order to prepare a fastener chain.

[0065] The prepared fastener chain with the element intermittent portions was continuously provided using a conveyor and a rectangular-shaped masking member having an opening of which area was 30 mm × 12 mm was used, such that the element intermittent portions were impregnated and coated with the two-component curing adhesive solution through a spray dispenser (the trade name is 781-SS-45F manufactured by Nordson EDF) at a coated amount of 170 g/m² (dry weight). The coating condition was set at the atomization air pressure of 0.035 MPa and the clearance of 10 mm.

[0066] Next, the adhesive was dried at 90°C for five seconds before matured at 55°C for a day in such a way as to be cured, and a reinforced portion was formed. The reinforced portion had a thickness of 0.7 mm. After that, the reinforced portion was cut with a force-cutting blade and a separable bottom end stop was attached to the reinforced portion by injection-molding in order to make a fastener chain with a separable bottom end stop.

<Example 1B>

[0067] A fastener chain with a separable bottom end stop was manufactured with the same process as Example 1A except that the amount of the adhesive coated to the element intermittent portions was 170 g/m² (dry weight).

<Example 2>

[0068] The same two resins and diluent as Example 1 were used in order to dilute the mixture such that the mass ratio of the above-mentioned two resins and the diluent became 72/28. A two-component curing adhesive solution having a viscosity of 500 mPa·S (25°C) was prepared. After that, a fastener chain with a separable bottom end stop was manufactured in reference to Example 1 except that the atomization air pressure of the dispenser was increased to 0.07 MPa. The reinforced portion had a thickness of 1.1 mm.

<Example 3>

[0069] Polycarbonate polyurethane (NE8811 made by Dainichiseika Color & Chemicals Mfg. Co., Ltd.) was diluted with a combined solvent of toluene and isopropyl alcohol (IPA) of which mass ratio was 50/50 as a diluent such that mass ratio of the resin and the diluent became 24/76. A one-component curing adhesive solution having a viscosity of 300 mPa·S (25°C) was prepared. After that, the same fastener chain with the element intermittent portions as Example 1 was prepared and a rectangular-shaped masking member having an opening of which area was 30 mm × 12 mm was used, such that the element intermittent portions were impregnated and coated with the one-component curing adhesive solution through a spray dispenser (the trade name is 781-SS-46F manufactured by San-Ei Tech Ltd.) at a coated amount of 85 g/m² (dry weight). The coating condition was set at the atomization air pressure of 0.035 MPa and the clearance of 10 mm. The reinforced portion had a thickness of 0.85 mm. Next, the adhesive was dried at 90°C for 10 seconds. Then, a fastener chain with a separable bottom end stop was provided with the same process as Example 1.

<Example 4>

[0070] A fastener chain with a separable bottom end stop was manufactured in reference to Example 1 except that toluene was used as a diluent in order to dilute the mixture such that the mass ratio of the same two resins and the diluent solvent as Example 1 became 51/49 and a two-component curing adhesive composition solution having a viscosity

of 100 mPa·S (25°C) was prepared.

<Comparative example 1>

[0071] The same two resins and diluent as Example 1 were used in order to dilute the mixture such that the mass ratio of the above-mentioned two resins and the diluent became 26/74. A two-component curing adhesive solution having a viscosity of 15 mPa·S (25°C) was prepared. After that, a fastener chain with a separable bottom end stop was manufactured in the same process as Example 1. The reinforced portion had a thickness of 0.53 mm.

<Comparative example 2>

[0072] To obtain reference values, the pieces of fastener tape fabric used in Examples 1 to 4 and the comparative example 1 were cut without being coated with an adhesive and were used for the observation of the fraying and the measurement of the misalignment-free strength.

[0073] The result is shown in Table 1. In the Example where an adhesive having a proper viscosity was used, the external appearance of the product was good, there was no cloudiness and fraying after industrially washing and high-temperature drying, and the misalignment-free strength was high. On the other hand, the comparative example 1 had inferior results of the spread, the fraying after industrially washing and high-temperature drying, and the misalignment-free strength in comparison to Examples because the viscosity in the comparative example 1 was too low. It was found that each of the Examples had a higher misalignment-free strength using the curable resin of the present invention in comparison with the comparative example 2 calculated as the reference values. Example 1 had a misalignment-free strength about 20 times stronger than the comparative example 2. Example 2 had a misalignment-free strength about 17 times stronger than the comparative example 2. Example 3 had a misalignment-free strength about 18 times stronger than the comparative example 2. Example 4 had a misalignment-free strength about 14 times stronger than the comparative example 2.

[0074]

[Table 1]

	After coating		After industrially washing and drying		Misalignment-free strength (N)	Total
	Spread	Permeability into reverse side	Cloudiness	Fraying		
Example 1A	◎	◎	◎	◎	200	◎
Example 1B	◎	◎	◎	◎	205	◎
Example 2	◎	◎	◎	◎	175	◎
Example 3	◎	○	◎	◎	183	◎
Example 4	○	◎	◎	○	145	○
Comparative example 1	××	◎	◎	×	95	×
Comparative example 2	NA	NA	NA	××	10	××

DESCRIPTION OF REFERENCE NUMBERS

[0075]

- 100 Slide fastener
- 101 Fastener chain with a separable bottom end stop
- 102 Slider
- 103 Fastener tape
- 104 Element
- 105 Top stopper
- 106 Separable bottom end stop
- 106a Box pin

	106b	Insert pin
	106c	Box body
	107a	Reinforced portion
	107b	Reinforced portion
5	110	Needle
	111	Held portion
	201	Masking member
	202	Opening
	203	Fastener chain
10	204	Element intermittent portion
	205	Adhesive
	206	Washing tank
	207	Wiping tool
	208	Dispenser
15	300	Wind off and on device
	301	Wind off unit
	302	Wind on unit
	303	Opening
	304	Element intermittent portion
20	305	Masking member (Masking tape)
	306	Fastener chain
	307	Dispenser
	308	Adhesive
	400	Fastener chain conveyor
25	401	Fastener chain
	402	Adhesive
	403	Dispenser
	404	Liquid tank
	405	Dryer
30	406	Storage box
	407	Dryer
	408	Exhaust device

35 Claims

1. A fastener chain (101) with a separable bottom end stop comprising:

40 a pair of fastener tapes (103);
rows of fastener elements (104) attached to both edges of the fastener tapes which face each other;
a separable bottom end stop (106) attached to ends of the fastener tapes (103) and contacted with the rows of elements;
a reinforced portion (107a, 107b) provided on at least portions of the fastener tapes (103) to which the separable bottom end stop (106) is attached, the reinforced portion into which a curing adhesive (205, 308, 402) has
45 penetrated and cured; and
wherein the reinforced portion has a misalignment-free strength of 100 N or more.

2. The fastener chain with the separable bottom end stop according to claim 1, wherein the curing adhesive (205, 308, 402) has a viscosity of 100 to 2000 mPa·S when penetrating into the fastener tapes (103).

50 3. The fastener chain with the separable bottom end stop according to claim 1 or 2, wherein the curing adhesive (205, 308, 402) comprises a two-component curing adhesive.

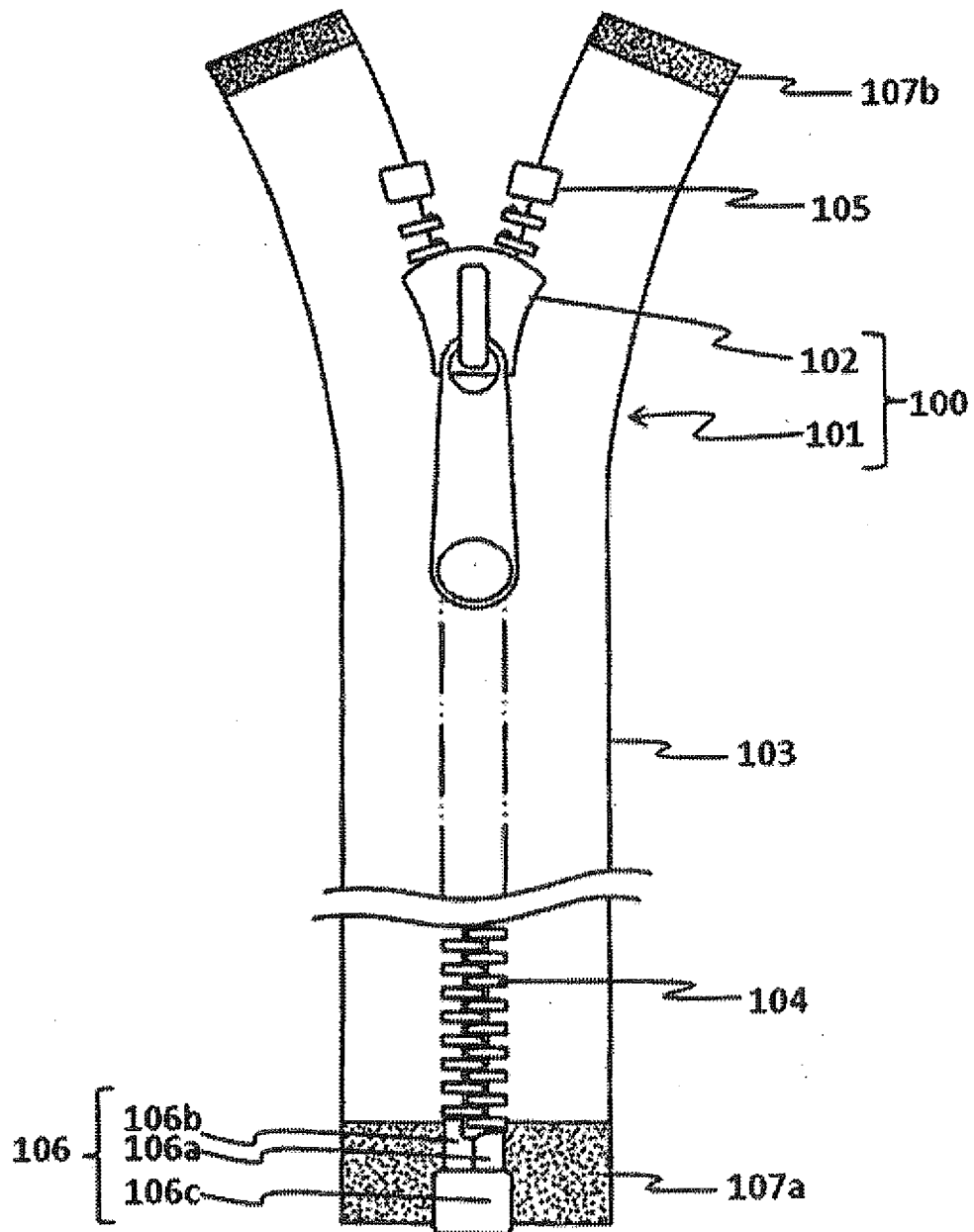
4. The fastener chain with the separable bottom end stop according to any one of claims 1 to 3, wherein a weight of
55 the curing adhesive (205, 308, 402) remaining in the reinforced portions (107a, 107b) is 50 to 300 g (dry weight) per 1 m² of a fastener tape.

5. A method for producing a fastener chain with a separable bottom end stop comprising:

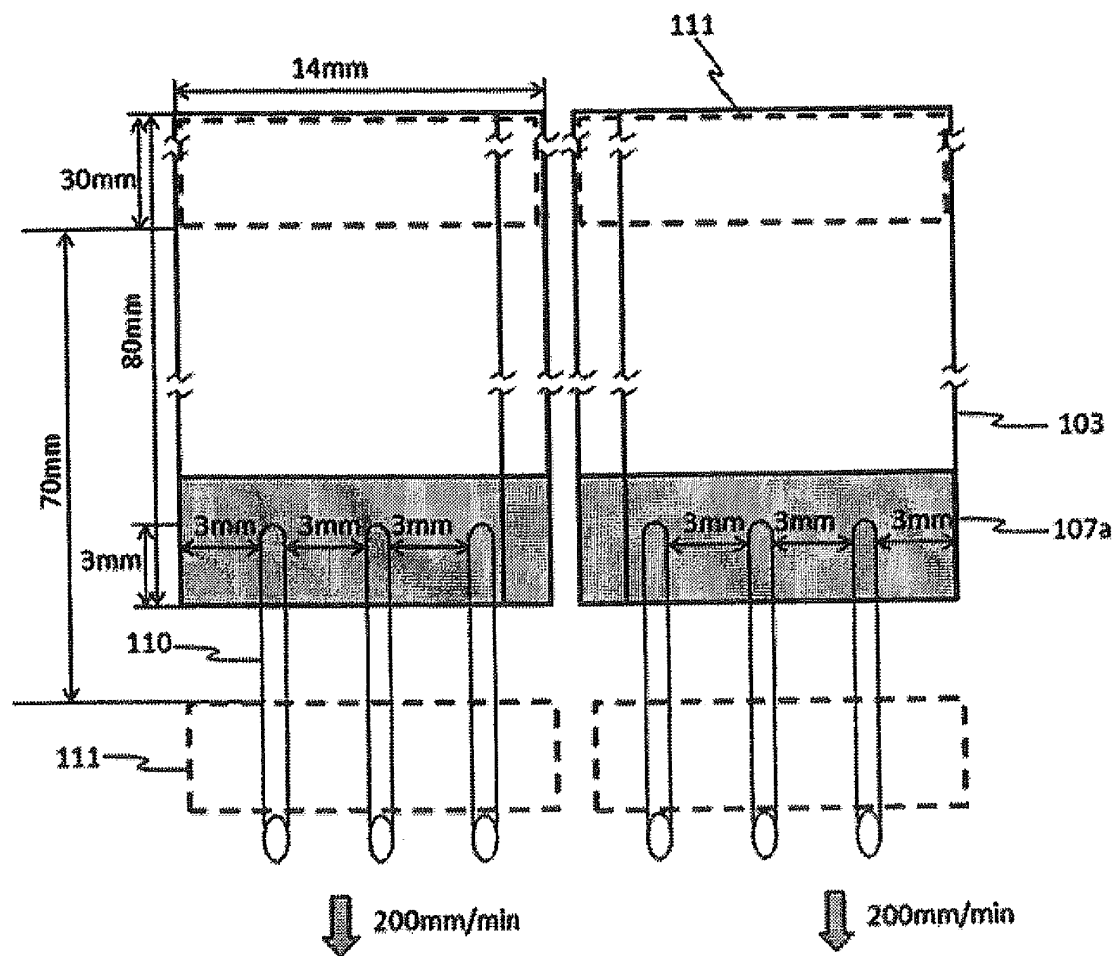
a process A for preparing a fastener chain (203, 306, 401) including a plurality of element intermittent portions (204, 304);
a process B for attaching a separable bottom end stop (106) to each of the element intermittent portions (204, 304);
5 a process C for impregnating each of the element intermittent portions (204, 304) with a curing adhesive (205, 308, 402) before or after the process B; and
a process D for curing the curing adhesive (205, 308, 402) that has penetrated into the element intermittent portions by the process C.

- 10 6. The method for producing the fastener chain with the separable bottom end stop according to claim 5, wherein the curing adhesive (205, 308, 402) has a viscosity of 100 to 2000 mPa·S at the process C.
7. The method for producing the fastener chain with the separable bottom end stop according to claim 5 or 6, wherein the process C is performed while the fastener chain (203, 306, 401) is masked with a masking member (201, 305)
15 that is sequentially provided from a direction intersecting with a conveying direction where the fastener chain (203, 306, 401) is continuously conveyed.
8. The method for producing the fastener chain with the separable bottom end stop according to claim 7,
20 wherein the masking member (201) has a polygonal or circular cylinder shape, has a central axis as a rotational axis and sequentially rotates at regular time intervals, the masking member (201) having an opening (202) at side face thereof,
and wherein, in the process C, the fastener chain (203) is conveyed in a direction from one bottom surface of the member to another bottom surface of the member such that the element intermittent portions (204) pass through
25 an inside of the side surface, and a masking is performed by providing the adhesive (205) from an outside toward the opening (202) formed at the side surface when the element intermittent portions (204) pass through the side surface.
9. The method for producing the fastener chain with a separable bottom end stop according to claim 8, wherein the masking member (201) rotates every time when each of the element intermittent portions (204) is conveyed with
30 the conveyance of the fastener chain (203) such that the masking is performed sequentially using different openings (202).
10. The method for producing the fastener chain with the separable bottom end stop according to claim 8 or 9, wherein the adhesive (205) attached to a periphery of the opening (202) is removed from each of the openings (202) of the
35 masking member (201) during a time between a completion of a masking and a next masking.
11. The method for producing the fastener chain with the separable bottom end stop according to claim 7,
wherein the masking member (305) comprises a masking tape for masking which includes an opening (303) and which is sequentially paid out by a wind off and on device (300) which comprises a wind off unit (301) and a wind
40 on unit (302),
and wherein, in the process C, the fastener chain (306) is conveyed such that the element intermittent portions (304) pass under the masking tape which moves between the wind off unit (301) and the wind on unit (302).
12. The method for producing the fastener chain with the separable bottom end stop according to any one of claims 7
45 to 11, wherein the curing adhesive (205, 308, 402) comprises a two-component curing adhesive.
13. The method for producing the fastener chain with the separable bottom end stop according to any one of claims 5 to 12, wherein the process C is performed on the fastener chain (203, 306, 401) that has been heated in advance.
- 50 14. The method for producing the fastener chain with the separable bottom end stop according to any one of claims 5 to 13, wherein the fastener chain (203, 306, 401) is hot pressed after the process C.
15. The method for producing the fastener chain with the separable bottom end stop according to any one of claims 5
55 to 14, wherein the weight of the curing adhesive (205, 308, 402) penetrating into the element intermittent portions (204, 304) is 50 to 300 g (dry weight) per 1 m² of a fastener tape.

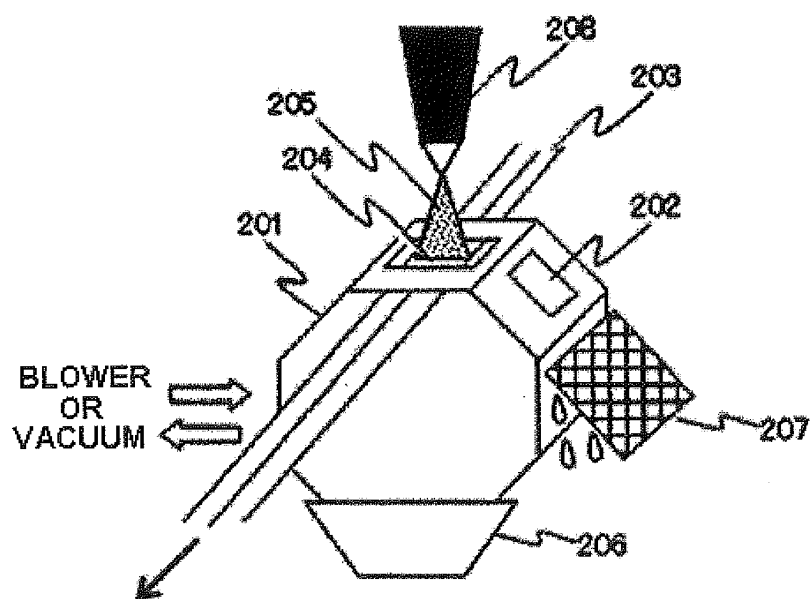
【Figure 1】



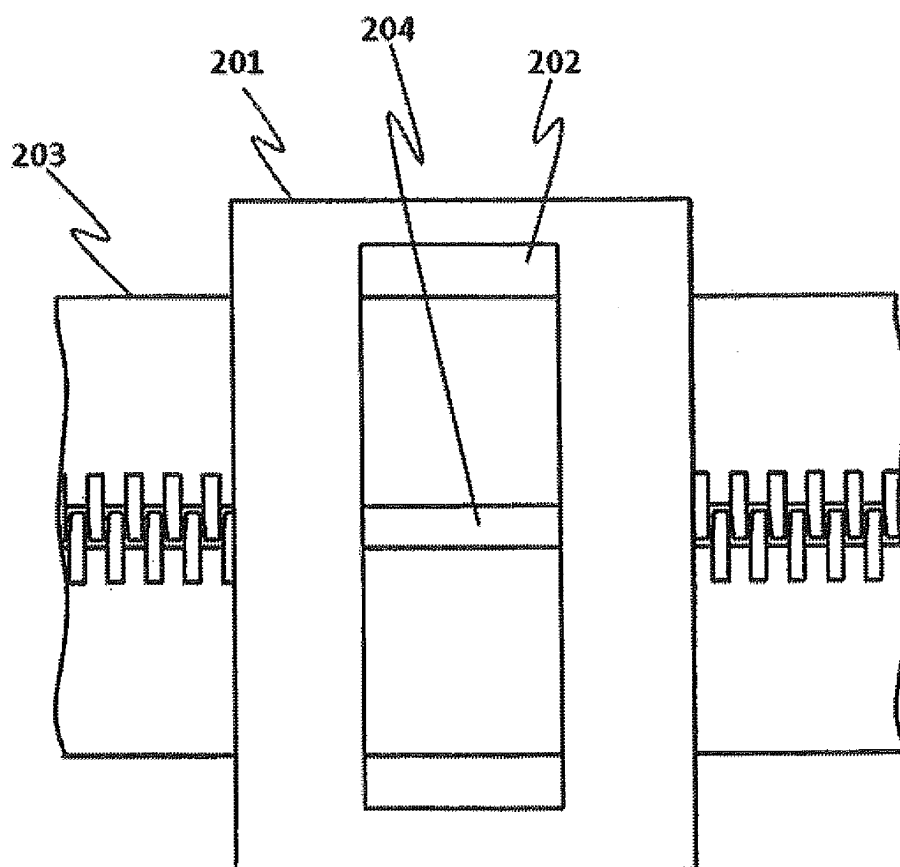
【Figure 2】



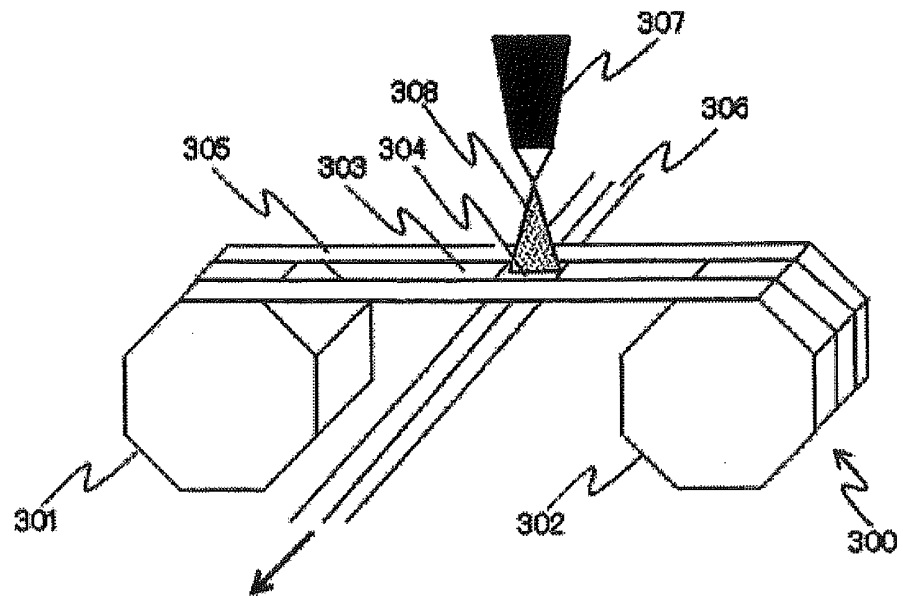
【Figure 3】



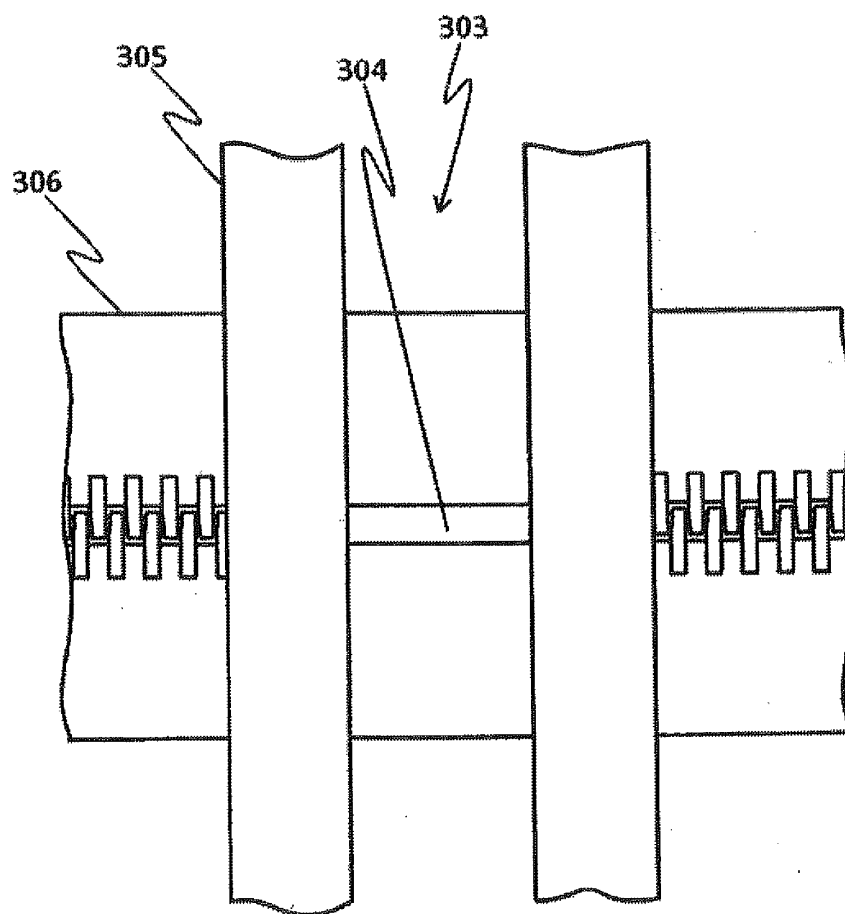
【Figure 4】



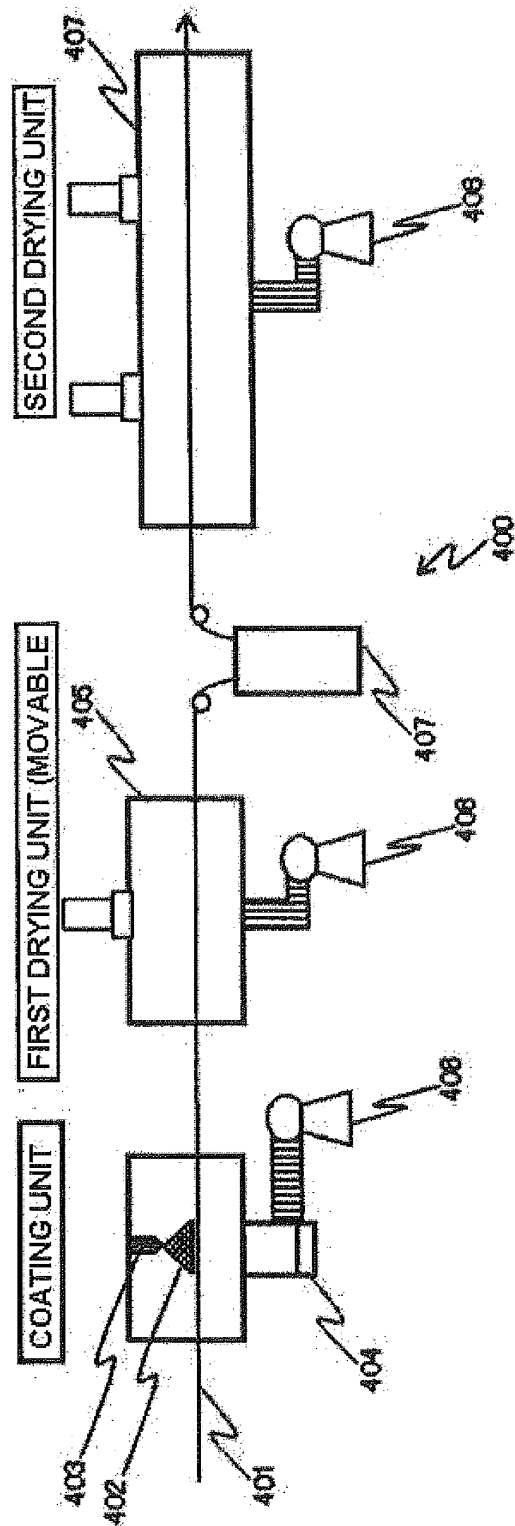
【Figure 5】



【Figure 6】



【Figure 7】



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/078810

A. CLASSIFICATION OF SUBJECT MATTER

A44B19/60 (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)

A44B19/60, A44B19/36-19/38

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 1996-2012

Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012

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.
X Y A	JP 6-189811 A (Yoshida Kogyo Co., Ltd.), 12 July 1994 (12.07.1994), entire text; all drawings & US 5472652 A & EP 603732 A3 & BR 9305346 A & SG 44549 A	1-4 14, 15 5-13
X Y A	JP 6-245806 A (Yoshida Kogyo Co., Ltd.), 06 September 1994 (06.09.1994), entire text; all drawings & US 5470516 A & EP 612487 A1 & DE 69409559 C & CA 2116390 A & HK 1006489 A & KR 10-1996-0001553 B	5-7, 12 14, 15 1-4, 8-11, 13
A	JP 50-10888 Y1 (Yoshida Kogyo Co., Ltd.), 05 April 1975 (05.04.1975), entire text; all drawings (Family: none)	1-15

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

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Date of the actual completion of the international search
01 March, 2012 (01.03.12)Date of mailing of the international search report
13 March, 2012 (13.03.12)Name and mailing address of the ISA/
Japanese Patent Office

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/078810

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 175594/1976 (Laid-open No. 92406/1978) (Yoshida Kogyo Co., Ltd.), 28 July 1978 (28.07.1978), entire text; all drawings (Family: none)	1-15

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 6189811 A [0004] [0005] [0028]
- JP 6245806 A [0004] [0005] [0028]
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