Apparatus for manufacturing a continuous slide fastener stringer chain with element-free space portions.

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Description

The present invention relates to an apparatus for manufacturing a continuous slide fastener stringer chain including space portions devoid of coupling elements at longitudinal intervals, the apparatus comprising:
(a) a sewing machine driveable to sew a pair of interengaged rows of continuous coupling elements to a pair of continuous slide fastener stringer tapes along respective inner longitudinal edges, respectively;
(b) means for continuously feeding said pair of continuous slide fastener stringer tapes, in synchronism with said sewing machine, to a sewing area of said sewing machine along a first longitudinal path;
(c) a stationary guide member having a longitudinal guide channel for the passage therethrough of said pair of interengaged rows of coupling elements;
(d) a wheel having on its periphery means projecting into said guide channel for engaging and feeding said pair of interengaged rows of coupling elements, said wheel being rotatable for intermittently feeding said pair of interengaged rows of coupling elements, in synchronism with said sewing machine, to said sewing area along a second longitudinal path; and
(e) a cutter assembly disposed between said sewing area and said feeding means for cutting off a length of coupling elements from said pair of rows of coupling elements each time the latter stops moving, said cutter assembly comprising a stationary die having a guide groove extending in alignment with said guide channel and a die surface extending transversely across said guide groove, a movable cutter slidably movable along said die surface across said guide groove, and a pin responsive to coaction with said movable cutter for positioning said pair of interengaged rows of coupling elements in a predetermined cutting position, said pin having a top normally held in a position close to said pair of interengaged rows of coupling elements and projectable into a space between two adjacent coupling elements of one of said rows of coupling elements as said movable cutter moves across said guide groove.

An apparatus of this type is disclosed in CH—A—439 834. It is true, the apparatus according to this publication does not serve for cutting a pair of coupled element rows but for cutting a single element row instead. Besides, the die surfaces of the cutter extend parallel with the longitudinal direction of the element row rather than transversely. The cutter has three needle-like projections for penetrating into the spacings between the coupling elements, so as to align the latter before the die surfaces of the tool engage the coupling elements. The needle-like projections being rigidly connected with the tool there is also the danger for them to hit the coupling elements as the cutter is being lowered, rather than penetrate into the spacings between adja-

cent ones of coupling elements, as desired. In this manner the trim line may be inexact. If so, it is difficult to couple this slide fastener stringer with an associated slide fastener stringer after the respective coupling element length has been sewn to the stringer tape.

DE—B—1 126 334 and FR—A—1225 206 disclose apparatus of the type mentioned above comprising features (a) to (d) and a cutter assembly including a movable and a stationary cutter. With these prior art apparatus, however, no provisions are made to ensure that the interengaged coupling element rows take a predetermined position relative to the surface of the stationary die. Accordingly, when the movable cutter is moved along the surface of the die transversely of the guide channel, it may occur that the arms and coupling heads of the coupling elements are severed rather than the connecting portions thereof, that which impairs the quality of the slide fasteners.

The invention aims are developing the apparatus of this species in a manner to safeguard that the interengaged pair of coupling element rows take a predetermined relative position in respect of the surface of the stationary die when the movable cutter is being moved for severing the coupling element rows.

According to the invention an apparatus satisfying this requirement is characterized in that said movable cutter has a guide slot normally held in alignment with the guide groove and the guide channel, that said stationary die has a hole opening to the guide slot, and that said pin is resiliently received in the hole and projects into the guide slot.

As the two coupling rows are moved upwards by the movable cutter upon actuation of the cutter assembly, the pin resiliently penetrates into the space between two adjacent ones of coupling elements of an element row, so as to exactly dispose the interengaged coupling element rows in a predetermined position in which a cutting line defined by the die surface extends between the coupling heads and the arms of a pair of interengaged coupling elements. This will ensure the severing of the connecting portions of the coupling elements, while the arms and the coupling heads will not be damaged.

A preferred embodiment of the invention will be described hereinbelow, reference being made to the accompanying drawings, wherein:

Figure 1 is a fragmentary plan view of a continuous slide fastener stringer chain of the present invention;

Figure 2 is an enlarged front elevational view of a portion of the slide fastener stringer chain shown in Figure 1;

Figure 3 is a fragmentary front elevational view, partly in cross section, of an apparatus according to the present invention;

Figure 4 is a fragmentary plan view, partly in cross section, of the apparatus shown in Figure 3, the apparatus being partly omitted for clarification;
Figure 5 is an enlarged fragmentary plan view of the interengaged rows of coupling elements as being positioned in a cutting unit; 

Figure 6 is an enlarged fragmentary plan view of a coupling element feeding unit of the apparatus shown in Figure 3, a toothed wheel of the feeding unit being omitted for clarification except several teeth thereof; 

Figure 7 is a longitudinal cross-sectional view of the feeding unit shown in Figure 6, only a peripheral portion of the toothed wheel being shown; 

Figure 8 is a fragmentary transverse cross-sectional view taken along the line VIII—VIII of Figure 6; and 

Figure 9 is an enlarged, fragmentary transverse cross-sectional view of a sewing station of a sewing machine of the apparatus shown in Figure 3. 

As shown in Figures 1 and 2, a continuous slide fastener stringer chain 11 of the present invention comprises a pair of continuous slide fastener stringer tapes 12, 13 and a series of longitudinally spaced pairs of interengaged rows of coupling elements 14 of individual slide fastener length secured to the stringer tapes 12, 13 on and along respective doubled, inner longitudinal edges as by a pair of lines of stitching 15, 15, there being space portions 16 devoid of coupling elements in the slide fastener stringer chain 10 at longitudinal intervals. As clearly shown in Figure 2, the line of stitching 15 tightly stitches the stringer tape 13 longitudinally across the space portions 16 (only one shown). With this arrangement, even endmost coupling elements 14E (Figure 2) adjacent to the space portion 16 are fixed in position and remain substantially the same shape and pitch as the other continuous coupling elements 14, allowing a slider (not shown) to slide smoothly over the endmost coupling elements 14E. 

As shown in Figure 3 and 4, an apparatus 20 for manufacturing the slide fastener stringer chain 11 generally comprises a sewing machine or mechanism 21, feed means 22 for continuously feeding the pair of continuous slide fastener stringer tapes 12, 13 to a sewing area or station 23, a combined feeding and cutting unit 24 for intermittently feeding a pair of interengaged rows of continuous coupling elements 14' to the sewing area 23, and for cutting off a length of coupling elements 14 from the continuous coupling elements 14', and withdrawal means 25 for withdrawing the stringer tapes 12, 13 from the sewing area 22. 

The sewing machine 21 is a conventional two needle sewing machine and comprises a pair of needles 26, 26 adapted to be driven to sew the interengaged rows of coupling element 14 to the stringer tapes 12, 13 along respective inner longitudinal edges, respectively. The sewing machine 21 includes a table 27 having a guide groove 28 (Figure 9) extending longitudinally therethrough across the sewing area 23 for the passage therethrough of the coupling elements 14, and a guide plate 29 mounted on the table 27 and having a pair of needle holes 30, 30 for the passage therethrough of the respective needles 26, 26. The guide plate 29 further has a recess 31 (Figure 9) for the passage therethrough of the stringer tapes 12, 13. 

The stringer tape feeding means 22 comprises a cooperating pair of drive and driven rollers 32, 33 disposed upstream of the sewing machine 21. The drive roller 32 is rotatable in synchronism with the sewing machine 21 so as to continuously feed the stringer tapes 12, 13 to the sewing area 23 of the sewing machine 21 along a first longitudinal path 34, the path 34 being inclined with respect to the plane of the table 27. 

The stringer tape withdrawal means 25 comprises an adjustable drive roller 35 held in driving contact with a fixed, driven roller 36, the rollers 35, 36, being disposed downstream of the sewing machine 21. The drive roller 35 is driven by a suitable driving means (not shown) to rotate in synchronism with the sewing machine 21 for continuously withdrawing the stringer tapes 12, 13 from the sewing area 23 of the sewing machine 21. 

The combined intermittently feeding and cutting unit 24 comprises a stationary guide member 37 disposed upstream of the sewing machine 21 and having a guide channel 38 extending in alignment with the guide groove 28 (Figure 9) in the table 27 of the sewing machine 21, for the passage therethrough of the interengaged rows of coupling elements 14'. The guide member 37 has a slot 39 opening to the guide channel 38 for the purpose described below. A fixed, rotatable toothed member or wheel 40 is disposed above the guide member 37 adjacent to the slot 39 thereof. The wheel 40 has a pair of rows of teeth or projections 41 arranged around the periphery thereof at equal intervals and project through the slot 39 into the guide channel 39 for engaging and feeding the interengaged coupling elements 14' along a second longitudinal path 42. As shown in Figure 4, the toothed wheel 40 is driven in synchronism with the drive roller 35 of the withdrawal means 25 by means of a belt 43 which is trained around pulleys 44, 45. The pulley 44 is connected to a drive shaft of the roller 35, and the pulley 45 is connected via a clutch means 46 to a shaft of the wheel 40 for intermittently feeding the interengaged rows of coupling elements 14' upon energization and de-energization of the clutch means 46. 

The combined feeding and cutting unit 24 further includes a cutter assembly 47 disposed between the sewing machine 21 and the wheel 40. The cutter assembly 47 comprises a stationary die 48 having a guide groove 49 extending in alignment with the guide channel 38 in the guide member 37 for the passage therethrough of the rows of coupling elements 14', and a die surface 50 extending transversely across the guide channel 49. A movable cutter 51 is supported on one end of a pivot lever 52 connected at the other end to a solenoid 53 for pivotal movement. The movable cutter 51 is vertically movable along the die surface 50 across the guide groove 49 in
response to the pivotal movement of the pivot lever 52. The movable cutter 51 has a horizontal guide slot 54 normally held in alignment with the guide groove 49 and the guide channel 53 and a vertical hole 55 opening to the guide slot 54 for the purpose described below. The stationary die 48 has a vertical hole 57 in alignment with the vertical hole 55 in the movable cutter 51. A pin 56 is resiliently received in the hole 57 and normally held in a position of Figure 3 where the tip of the pin 56 projects through the hole 56 into the guide slot 54 and is located close to the rows of coupling elements 14′ in the guide slot 54. The pin 56 has a diameter projectable into every adjacent pair of coupling elements of one of the two rows of coupling elements 14′.

In operation, the slide fastener stringer tapes 12, 13 are introduced into recess 31 in the sewing area 23 of the sewing machine 21 along the path 34, and the interengaged rows of coupling elements 14′ are also introduced into the groove 25 in the sewing area 23 along the path 42 through the guide channel 38, through the guide slot 54 and through the guide groove 49. In the sewing area 23, the coupling element rows 14′ and the slider tapes 12, 13 are set in a position of Figure 9 where the former 14′ are held on doubled, inner longitudinal edges of the latter. Then the sewing machine 21 is driven to continuously sew the rows of coupling elements 14′ to the slider tapes 12, 13 along respective longitudinal edges at a predetermined speed of sewing. Simultaneously therewith, the drive rollers 32, 35 and the toothed wheel 40 are driven to rotate in the clockwise direction in Figure 3 in synchronism with the sewing machine 21 so that the coupling elements 14′ and the slider tapes 12, 13 are fed to the sewing area 23 at the same speed as the speed of sewing and the slider tapes 12, 13 with the coupling elements 14′ sewn thereto are withdrawn from the sewing area 23 at the same speed as the speed of sewing. When a predetermined length of coupling elements 14′ are fed to the sewing area 23, the clutch 46 is energized to disengage the toothed wheel 40 from driven engagement with the pulley 45, stopping the feed of the coupling elements 14, the pulley 45 being continuously driven to rotate in synchronism with the drive roller 35. At the same time, the solenoid 53 is energized to actuate the pivot lever 52 to rotate in clockwise direction, causing the movable cutter 51 to slidably move upwardly along the die surface 50 across the rows of coupling elements 14′ in the guide slot 54. Thus, a length of coupling element 14 is cut off from the interengaged rows of continuous coupling elements 14′. During that time, as the rows of coupling elements 14′ is moved upwardly by the movable cutter 51, the pin 56 projects into a space between two adjacent coupling elements 14′ of one row of coupling element to thereby position the rows of coupling elements in a predetermined position where a cutting line C (Figure 5) defined by the die surface 50 extends transversely across the rows of coupling elements between the coupling heads of an interengaged pair of coupling elements. With continued sewing of the sewing machine 21, the length of coupling elements 14 are introduced into the sewing area 23 and sewn to the slider tapes 12, 13 which are continuously fed to the sewing area 23 by the tape feed means 22. Upon lapsing of a predetermined interval of time, the clutch 46 is de-energized to engage the pulley 45 into drive relation with the toothed wheel 40 for feeding the rows of coupling elements 14′ in synchronism with the withdrawal means 25 and the sewing machine 21. At the same time, the solenoid 53 is de-energized to bring the movable cutter 51 in the position shown in Figure 3. The foregoing cycle of operation is repeated to thereby produce the continuous slide fastener stringer chain 11 with element-free space portions 16 at longitudinal intervals, shown in Figures 1 and 2.

With the apparatus of the present invention, the rows of coupling elements 14′ fed out in interengaged fashion are deformed to remain uniformly and pitch, and the endmost coupling elements 14E adjacent element-free space portions 16 are fixed in position by means of the lines of stitching extending tightly over the coupling element rows 14 longitudinally across the space portions 16 with the result that the sliders can be mounted smoothly on the rows of coupling elements 14 over the endmost coupling elements 14E. With the provision of the pin 56, the continuous slide fastener chain 11 has alternate element-containing and element-free portions with uniform length.

Claims

1. An apparatus for manufacturing a continuous slide fastener stringer chain including space portions devoid of coupling elements at longitudinal intervals, the apparatus comprising:
   (a) a sewing machine (21) drivable to sew a pair of interengaged rows of continuous coupling elements (14′) to a pair of continuous slide fastener stringer tapes (12, 13) along respective inner longitudinal edges, respectively;
   (b) means (22) for continuously feeding said pair of continuous slide fastener stringer tapes, in synchronism with said sewing machine, to a sewing area of said sewing machine along a first longitudinal path (34);
   (c) a stationary guide member (37) having a longitudinal guide channel (38) for the passage therethrough of said pair of interengaged rows of coupling elements;
   (d) a wheel (40) having on its periphery means (41) projecting into said guide channel for engaging and feeding said pair of interengaged rows of coupling elements, said wheel being rotatable for intermittently feeding said pair of interengaged rows of coupling elements, in synchronism with said sewing machine, to said sewing area (23) along a second longitudinal path (42); and
   (e) a cutter assembly (47) disposed between said sewing area (23) and said feeding means (40).
for cutting off a length of coupling elements (14) from said pair of rows of coupling elements (14') each time the latter stops moving, said cutter assembly (47) comprising a stationary die (48) having a guide groove (49) extending in alignment with said guide channel (38) and a die surface (50) extending transversely across said guide groove (49), a movable cutter (51) slidably movable along said die surface (50) across said guide groove (49), and a pin (56) responsive to coaction with said movable cutter (51) for positioning said pair of interengaged rows of coupling elements (14') in a predetermined cutting position, said pin (56) having a tip normally held in a position close to said pair of interengaged rows of coupling elements and projectable into a space between two adjacent coupling elements of one of said rows of coupling elements as said movable cutter (51) moves across said guide groove (49), characterized in that said movable cutter (51) has a guide slot (54) normally held in alignment with the guide groove (49) and the guide channel (38), that said stationary die (48) has a hole (57) opening to the guide slot (54), and that said pin (56) is resiliently received in the hole (57) and projects into the guide slot (54).

2. An apparatus according to claim 1, said movable cutter (51) having a hole (55) in alignment with the hole (57) of the stationary die (48) and opening to the guide slot (54), the tip of said pin (56) received in said hole (55) having a diameter projectable into every adjacent pair of coupling elements of one of the two rows of coupling elements (14').

Patentansprüche

1. Vorrichtung zur Herstellung einer fortlaufenden Reißverschlußkette mit im Längsabstand angeordneten kuppelgliederfreien Bereichen, bestehend aus

a) einer Nähmaschine (21), die antreibbar ist, um zwei miteinander gekoppelte fortlaufende Kuppelgliederreihen (14') an zwei fortlaufenden Reißverschlußtragbändern (12, 13) entlang der inneren Längsränder derselben anzunähern,

b) einer Vorschubeinrichtung (22) zum steigten Zuführen der zwei fortlaufenden Reißverschlußbänder in zeitlicher Übereinstimmung mit der Arbeitsweise der Nähmaschine längs einer ersten geradlinigen Bahn (34) zu einem Nähbereich der Nähmaschine,

c) einem ortsfesten Führungsteil (37) mit einem geradlinigen Führungskanal (38) für den Durchtritt der beiden gekoppelten Kuppelgliederreihen,

d) einem Rad (40), das an seinem Umfang Eingriffsmittel (41) aufweist, die in den Führungskanal (38) hineinlaufen, um mit den beiden gekoppelten Kuppelgliederreihen in Eingriff zu gelangen und diese zuzuführen, wobei das Rad verdreher ist, um die beiden gekoppelten Kuppelgliederreihen in zeitlicher Übereinstimmung mit der Arbeitsweise der Nähmaschine längs einer zweiten geradlinigen Bahn (42) schrittweise zu dem Nähereich zuzu führen, und

e) einer Schneideinrichtung (47), die zwischen dem Nähbereich (23) und dem Zuführung (40) angeordnet ist, um jedesmal einen Längenabschnitt der Kuppelgliederreihen (14') abzuschneiden, wenn diese angehoben werden, wobei die Schneideinrichtung (47) aus einem ortsfesten Gesenk (48), das eine mit dem Führungskanal (38) fluchtende Führungsnut (49) und eine sich quer zu der Führungsnut (49) erstreckende Gesenksfläche (50) aufweist, aus einem beweglichen Messer (51), das quer zu der Führungsnut (49) längs der Gesenksfläche (50) bewegbar ist, und aus einem mit dem beweglichen Messer (51) zusammenwirkenden Stift (56) besteht, um die beiden gekoppelten Kuppelgliederreihen (14') in einer vorbestimmten Lage zum Zerschneiden zu positionieren, wobei der Stift (56) eine Spitze hat, die normalerweise nahe bei den beiden gekoppelten Kuppelgliederreihen angeordnet ist, und in einen Zwischenraum zwischen zwei benachbarten Kuppelgliedern der einen Kuppelgliederreihe eindringen kann, wenn sich das bewegliche Messer (51) quer zur Führungsnut (49) bewegt, dadurch gekennzeichnet, daß das bewegliche Messer (51) einen Führungsschlitze (54) aufweist, der mit der Führungsnut (49) und dem Führungskanal (38) normalerweise in Dekkung gehalten ist, daß das ortsfeste Gesenk (48) eine in den Führungsschlitze (54) mündende Öffnung Bohrung (57) aufweist, und der Stift (56) in der Bohrung (57) federnd angeordnet ist und in den Führungsschlitze (54) hineinragt.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das bewegliche Messer (51) eine Bohrung (55) aufweist, die mit der Bohrung (57) des ortsfesten Gesenks (48) fluchtet und in den Führungsschlitze (54) mündet, wobei die in die Bohrung (55) eingreifende Spitze des Stiftes (56) einen Durchmesser aufweist, so daß sie zwischen je-weils zwei benachbarte Kuppelglieder der beiden Kuppelgliederreihen (14') eindringen kann.

Revendications

1. Appareil pour fabriquer une chaîne continue de bandes-supports de fermeture à glissière comprenant, à des intervalles longitudinaux, des parties d'espacement exemptes d'éléments d'accouplement, l'appareil comprenant:

(a) une machine à coudre (21) pouvant être entraînée de manière à coudre respectivement une paire de rangées mutuellement accolées d'éléments d'accouplement continus (14') à une paire de rubans continus (12, 13) de bandes-supports de fermeture à glissière le long des bords longitudinaux intérieurs respectifs;

(b) un moyen (22) pour avancer de façon continue ladite paire de rubans continus de bandes-supports de fermeture à glissière le long d'un premier trajet longitudinal (34);

(c) un élément de guidage fixe (37) comportant un couloir de guidage longitudinal (38) pour le passage à travers ce dernier de ladite paire de
rangées mutuellement accouplées d'éléments d'accouplement;

d) une roue (40) comportant sur sa périphérie des moyens (41) faisant saillie dans ledit couloir de guidage pour venir en prise avec ladite paire de rangées mutuellement accouplées d'éléments d'accouplement et pour avancer cette paire de rangées, ladite roue pouvant être entraînée en rotation pour avancer de façon intermittente ladite paire de rangées mutuellement accouplées d'éléments d'accouplement, en synchronisme avec ladite machine à coudre, jusqu'à ladite zone d'exécution de couture (23) le long d'un second trajet longitudinal (42); et

e) un dispositif de coupe (47) disposé entre ladite zone (23) d'exécution de couture et ladite roue (40) pour éliminer par découpage une longueur d'éléments d'accouplement (14) de ladite paire de rangées d'éléments d'accouplement (14') chaque fois que celle-ci s'arrête, le dispositif de coupe précité (47) comprenant une matrice fixe (48) comportant une rainure de guidage (49) s'étendant en alignement avec ledit couloir de guidage (38) et une surface (50) de matrice s'étendant transversalement en travers de ladite rainure de guidage (49), et un axe (56) asservi de manière à agir conjointement avec ladite lame de coupe mobile (51) pour positionner ladite paire de rangées mutuellement accouplées d'éléments d'accouplement (14') dans une position de coupe prédéterminée, ledit axe (56) ayant une extrémité normalement maintenue dans une position voisine de ladite paire de rangées mutuellement accouplées d'éléments d'accouplement et pouvant être introduits dans un espace entre deux éléments d'accouplement adjacents d'une des durées rangées d'éléments d'accouplement au fur et à mesure que ladite lame de coupe mobile (51) se déplace en travers de ladite rainure de guidage (49), caractérisé en ce que ladite lame de coupe mobile (51) comporte une fente de guidage (54) maintenue normalement en alignement avec la rainure de guidage (49) et avec le couloir de guidage (38), que ladite matrice fixe (48) comporte un trou (57) débouchant dans la fente de guidage (54) et que ledit axe (56) est reçu de façon élastique dans ledit trou (57) et fait saillie dans la fente de guidage (54).

2. Appareil selon la revendication 1, ladite lame de coupe mobile (51) comportant un trou (55) aligné avec le trou (57) de la matrice fixe (48) et débouchant dans la fente de guidage (54), l'extrémité dudit axe (56) reçu dans ledit trou (55) ayant un diamètre tel qu'il peut pénétrer dans chaque paire adjacente d'éléments d'accouplement d'une des deux rangées d'éléments d'accouplement (14').