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Bottom stop applying and gapping apparatus for a slide fastener chain

This invention relates to an apparatus for gapping a slide fastener chain at predetermined intervals along its length substantially simultaneously with applying a bottom end stop to the chain adjacent to the gapped section thereof.

A gapping apparatus known in the art comprises a cutting punch and a die co-operating in removing a group of fastener coupling elements from selected portions of a continuous slide fastener chain. The apparatus further comprises means for positioning and holding the coupling elements from opposite sides thereof during the gapping operation to prevent twisting or misalignment of the elements which would otherwise occur under the influence of pressure applied by the punch. However, in the case where applying of bottom end stops simultaneously with gapping is desired as often done in the conventional practice, it was further necessary to provide means for retracting or otherwise moving the holding means out of the path of the bottom stop when advancing the fastener chain, because the bottom stop to be attached to the stringer tapes astride coupled pairs of fastener elements is sized larger than the coupled pair of fastener elements and would therefore impinge upon the holding means, blocking the feeding of the fastener chain.

There is disclosed in GB-A-2 021 681 a bottom stop applying and gapping mechanism which comprises a pair of slidable plates for positioning and holding the fastener elements, the plates being movable toward and away from each other and connected to a camming rod which operates in response to the lowering and raising of the punch to move the plates in the transverse direction of a slide fastener chain. This mechanism is not only complicated but also requires the plates to be retracted away from the element once a cycle of gapping operation is completed so as to permit advancing of the fastener chain.

Retraction of the plates creates a time lag between completion and initiation of a gapping and bottom stop applying operation. This time lag may be only appreciable when measured per cycle of operation but would aggregate considerably when measured over so many cycles required to finish the whole continuous length of a slide fastener chain.

US-A-3 776 078 describes an apparatus for cutting a continuous slide fastener chain to individual fastener lengths. This prior art apparatus comprises a guide means consisting of a lever pivotally mounted at a pin secured to a frame with the free end of said pin bearing on the upper side of the stringer tapes supported on a table. The free end of the lever is provided with a longitudinal slot.

But such a prior art guide means is not adapted for use as a holding-down means in an apparatus for applying bottom end stops. When

such an end stop passes the free end of the lever this free end is raised from the end stop, so that the coupling elements are no longer pressed orderly against the die.

The invention is based on the object of developing the apparatus according to the first part of claim 1 in a manner for the holding-down means to closely contact the coupling element rows even when passing a lower end stop.

The solution to this problem is revealed in the second part of claim 1.

Due to the second axis, namely the two triangular plates are movable so as to be able to move upwardly in a manner for the bottom end stop to pass freely, which bottom end stop is attached to the slide fastener chain.

US-A-2 096 685 discloses a pressing means which somewhat resembles to the application subject matter. Although not explicitly revealed in the specification one might suppose by the drawings that a presser shoe is pivotally connected to a corresponding lever. But arrangement is made such at the presser shoe normally is held at a distance from the fastener elements by the action of a spring and is compulsorily pressed down against the coupling elements by a cam actuating upon the lever not before the correct point of time. The rotary movement of the cam shaft therefore must be synchronized with the advance of the slide fastener chain and with the attachment of the end stops, but this necessitates a complicated drive system.

The above and other objects, advantages and features of the invention will become apparent from the detailed description taken with reference to the accompanying drawings illustrating by way of example a preferred embodiment which the invention may assume in practice.

In the drawings wherein like reference numerals refer to like or corresponding parts throughout the several views:

Figure 1 is a side elevational, partly sectional view of an apparatus according to the invention;

Figure 2 is a perspective view of an element holding means mounted on the apparatus of Figure 1;

Figure 3 is a view similar to Figure 1 but showing the fastener chain in advancing movement with the attached bottom stop half-way in under the holding means;

Figure 4 is a view similar to Figure 1 or Figure 3 but showing the attached bottom half-way out under the holding means; and

Figure 5 is a plan view of a portion of slide fastener chain which has been provided with a bottom stop and simultaneously gapped.

Referring now to the drawings and Figures 1 and 2 in particular, there is shown a combination bottom stop applying and gapping apparatus which essentially comprises a punch

assembly 11 mounted on a machine frame (not shown) for vertical movement along a path registering with a die assembly 12 mounted stationarily on a machine base (not shown). The punch assembly 11 comprises a clamping punch 13 and a cutting punch 14 both being of an integral formation. The die assembly 12 comprises a clamping die 15 and a cutting die 16 both also being of an integral formation.

Staple-like bottom end stops 17 are supplied from a chute 18 of any conventional form and each held in a nest or pocket (not shown) at a position registering with the path of movement of the clamping punch 13 as shown in Figure 1. A downward stroke of the punch assembly 11 urges bottom stops 17 one at a time against a slide fastener chain 19 (hereafter referred to simply as a chain) and clamps the same thereon in the well known manner, for which purpose the die 15 is arcuately recessed for facilitating curling of the bottom stop 17 along its ends. During the same downward stroke of the punch assembly 11, gapping of the chain 19 takes place substantially simultaneously as the bottom stop 17 is applied, for which purpose the cutting punch 14 extends slightly beyond the clamping surface of the companion punch 13 so as to ensure removal of a selected group of coupling elements 19' from the chain 19 by the time the bottom stop 17 has been clamped in place. To permit the cutting punch 14 to thrust through the chain 19, the coacting die 16 has an opening complementary in shape and size with the operating edge of the cutting punch 14.

Since all the foregoing and structural members are well known for their construction and function, no further detailed discussion thereon will therefore be required.

Now, according to the invention, there is provided a means 20 for positioning and holding the chain 19, or particularly fastener elements 19' over a selected length thereof, during the bottom stop applying and gapping operation. To eliminate the drawbacks of the prior art or to achieve the objects of the invention as noted above, the element positioning and holding means 20 incorporates structural features such that the means 20 per se need not be retracted or moved away from the path of movement of the chain 19 upon application of the bottom stop 17.

The element positioning and holding means 20 comprises a cranked arm 21 mounted on a pin 22 rotatably supported by the machine base and extending transversely through a shank portion thereof. The cranked arm 21 has one of its ends bifurcated substantially in the form of a fork having two parallel prongs 24, 24'.

The cranked arm 21 has at its other end a horizontally extending portion 23 connected by an extension spring 26 to the machine frame, the extension spring 26 normally biasing the cranked arm 21 toward the die assembly 12. Designated at 27 is an adjusting bolt threadedly

engaged with the portion 23 and having one of its ends normally rested against the machine frame. Although this adjusting bolt 27 is not absolutely necessary, it is preferred for the purpose of limiting the lowermost position of the cranked arm 21 with respect to the die assembly 12.

A pair of parallel triangular plates 30, 30' are pivotally mounted at their respective apices 31, 31' on a pin 32 provided at the distal ends of the two prongs 24, 24'. The plates 30, 30' have their respective base 33, 33' spaced apart to hold therebetween the rows of elements 19' from opposite sides thereof. The bases 33, 33' have their respective lower surface portions 28 tapered or sloped upward toward their respective free ends.

As the chain 19 advances in the direction of the arrow (Figures 3 and 4), the bottom stop 17 applied thereto enters inbetween the die assembly 12 and the plates 30, 30', urging the latter to pivot about the pin 32 and the pin 22 in a plane perpendicular to the plane of the chain 19 initially clockwise until the bottom stop 17 registers in position with the pivotal axis of the plates 30, 30' as shown in Figure 3. As the bottom stop 17 moves past the pivotal axis of the plates 30, 30', the latter are inverted in their pivoting direction; i.e. counterclockwise in the manner illustrated in Figure 4. Upon departure of the bottom stop 17 from the die assembly 12, the plates 30, 30' return to their normal position (Figure 1) under the influence of the biasing force of the spring 26. Thus, the rows of fastener elements 19' are continuously guided by portions of or the whole of the bases 33, 33' of the plates 30, 30'.

For purposes of illustration, Figure 5 is provided to depict the slide fastener chain 19 which has been gapped and applied with the bottom stop 17.

Claims

1. A bottom stop applying and gapping apparatus (10) for a slide fastener chain (19) having a pair of support tapes (19", 19") each carrying on and along one of its longitudinal edges a row of fastener coupling elements (19'), which apparatus comprises a punch assembly (11) including a clamping punch (13) and a cutting punch (14) integral therewith, a die assembly (12) including a clamping die (15) and a cutting die (16) integral therewith, said punch assembly (11) and said die assembly (12) cooperating in applying a bottom stop (17) to the fastener chain (19) and simultaneously gapping the chain at predetermined intervals, and a means (20) for positioning and holding a group of fastener coupling elements on the die assembly (12), characterized in that said means (20) comprises a lever (21) resiliently supported on a machine frame for pivotal movement about a first axis (22) parallel to the plane of and at right angles to the feeding direction of the slide

assembly 11 mounted on a machine frame (not shown) for vertical movement along a path registering with a die assembly 12 mounted stationarily on a machine base (not shown). The punch assembly 11 comprises a clamping punch 13 and a cutting punch 14 both being of an integral formation. The die assembly 12 comprises a clamping die 15 and a cutting die 16 both also being of an integral formation.

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The cranked arm 21 has at its other end a horizontally extending portion 23 connected by an extension spring 26 to the machine frame, the extension spring 26 normally biasing the cranked arm 21 toward the die assembly 12. Designated at 27 is an adjusting bolt threadedly

engaged with the portion 23 and having one of its ends normally rested against the machine frame. Although this adjusting bolt 27 is not absolutely necessary, it is preferred for the purpose of limiting the lowermost position of the cranked arm 21 with respect to the die assembly 12.

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fastener chain (19), a pair of substantially triangular plates (30,30') supported at the free forward end of said lever (21) for pivotal movement about a second axis (32) parallel to said first axis (22), said pair of plates (30,30') being spaced by a distance corresponding to the transverse width of a coupled set of fastener elements and having respective flat bottoms engageable with the support tapes (19",19") and sloped upwardly at the forward end portion (28) thereof, and a spring (26) connecting said lever (21) to the machine frame and normally biasing said lever (21) toward said die assembly (12).

2. The apparatus of claim 1, wherein the lever is provided with an adjustable abutment means (27) normally resting against the machine frame for adjusting the lowermost position of the triangular plates (30,30').

3. The apparatus of claim 1 or 2, wherein said lever (21) has a first and a second arm extending forwardly and backwardly from said first axis (22) respectively, said spring (26) connecting the backwardly extending second arm to the machine frame.

4. The apparatus of claim 3, wherein said adjusting means is a bolt (27) threadedly engaged with the backwardly extending second arm of said lever (21) and having its upwardly projecting end normally rested against the machine frame.

Revendications

1. Appareil (10) pour appliquer des butées d'extrémité inférieure et pour former des espaces exempts d'éléments d'accouplement dans une chaîne (19) de fermeture à glissière comportant une paire de rubans supports (19',19") portant chacun sur et le long d'un de ses bords longitudinaux une rangée d'éléments (19') d'accouplement, cet appareil comprenant un ensemble (11) de poinçons comportant un poinçon (13) de fixation et un poinçon (14) de découpage faisant corps avec ce dernier, un ensemble (12) de matrices comportant une matrice (15) de fixation et une matrice (16) de découpage faisant corps avec cette dernière, cet ensemble (11) de poinçons et cet ensemble (12) de matrices coopérant pour appliquer une butée (17) d'extrémité inférieure sur la chaîne (19) de fermeture à glissière et pour former en même temps des espaces exempts d'éléments d'accouplement dans la chaîne à des intervalles prédéterminés, et un moyen (20) pour positionner et maintenir en place un groupe d'éléments d'accouplement de fermeture à glissière sur l'ensemble (12) de matrices, cet appareil étant caractérisé en ce que le moyen (20) comprend un levier (21) supporté élastiquement par un bâti de machine de manière à pouvoir effectuer un mouvement de pivotement autour d'un premier axe (22) parallèle au plan de et formant un angle droit avec la direction d'avancement de la chaîne (19)

de fermeture à glissière; deux plaques (30, 30') sensiblement triangulaires et supportées à l'extrémité avant libre du levier (21) de manière à pouvoir effectuer un mouvement de pivotement autour d'un deuxième axe (32) parallèle au premier axe (22), ces deux plaques étant espacées l'une de l'autre d'une distance qui correspond à la largeur transversale d'un ensemble d'éléments d'accouplement en prise et comportant des surfaces inférieures planes respectives qui peuvent entrer en contact avec les rubans supports (19', 19") et qui présentent une pente ascendante vers leur extrémité avant (28); et un ressort (26) reliant le levier (21) au bâti de machine et rappelant normalement ce levier (21) vers l'ensemble (12) de matrices.

2. Appareil suivant la revendication 1, dans lequel le levier est pourvu d'un moyen (27) d'appui réglable portant normalement contre le bâti de machine afin de régler la position limite inférieure des plaques triangulaires (30, 30').

3. Appareil suivant l'une des revendications 1 ou 2, dans lequel le levier (21) comprend un premier et un deuxième bras qui se prolongent respectivement vers l'avant et vers l'arrière par rapport au premier axe (22), le ressort (26) reliant au bâti de machine le deuxième bras qui se prolonge vers l'arrière.

4. Appareil suivant la revendication 2, dans lequel le moyen de réglage est un boulon (27) vissé dans le deuxième bras qui se prolonge vers l'arrière du levier (21), et dont l'extrémité supérieure s'appuie normalement contre le bâti de machine.

Patentansprüche

1. Vorrichtung (10) zum Anbringen unterer Begrenzungssteile an einer Reißverschlußkette (19) und zum Erzeugen von kuppelgliederfreien Bereichen in der Reißverschlußkette, die zwei an einem Längsrand jeweils eine Kuppelgliederreihe (19') tragende Tragbänder (19", 19") aufweist, bestehend aus einer Stempelbaugruppe (11) mit einem Stauchstempel (13) und einem mit diesem integrierten Stanzstempel (14), einer Gesenkbaugruppe (12) mit einem Stauchgesenk (15) und einem mit diesem integrierten Stanzgesenk (16), wobei die Stempelbaugruppe (11) und die Gesenkbaugruppe (12) zusammenwirken, um ein unteres Begrenzungssteil (17) an der Reißverschlußkette (19) anzubringen und gleichzeitig die Reißverschlußkette in vorbestimmten Intervallen mit kuppelgliederfreien Bereichen zu versehen, und aus einer Einrichtung (20) zum Positionieren und Halten einer Gruppe von Kuppelgliedern (19') auf der Gesenkbaugruppe (12), dadurch gekennzeichnet, daß die Einrichtung (20) aus einem Hebel (21), der an einem Maschinenrahmen zu einer Schwenkbewegung um eine zur Ebene der Reißverschlußkette (19) parallele und zu deren Vorschubrichtung rechtwinklige erste Achse (22) federnd aufgehängt ist, aus zwei im wesentlichen dreieckigen Platten (30, 30'), die



am freien vorderen Ende des Hebels (21) um eine zur ersten Achse (22) parallele zweite Achse (32) schwenkbar gelagert sind, wobei die beiden Platten (30, 30') unter einem der Breite einer gekuppelten Gruppe von Kuppelgliedern entsprechenden Abstand voneinander angeordnet sind und zugeordnete ebene Unterseiten aufweisen, die mit den Tragbändern (19', 19') in Eingriff bringbar und an ihrem vorderen Endbereich (28) nach oben geneigt sind, und aus einer Feder (26) besteht, die den Hebel (21) mit dem Maschinenrahmen verbindet und den Hebel (21) normalerweise zur Gesenkbaugruppe (12) hin belastet.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Hebel mit einem einstellbaren Anschlag (27) versehen ist, der normalerweise am Maschinenrahmen anliegt, um die tiefste Stellung der dreieckigen Platte (30, 30') einzustellen.

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3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Hebel (21) einen ersten und zweiten Arm aufweist, der von der ersten Achse (22) nach vorne bzw. nach hinten ragt, und daß die Feder (26) den nach hinten ragenden zweiten Arm mit dem Maschinenrahmen verbindet.

4. Vorrichtung nach Anspruch 3, dadurch gekennzeichnet, daß der Anschlag ein Gewindebolzen (27) ist, der in den nach hinten ragenden zweiten Arm des zweiten Hebels (21) eingeschraubt ist und dessen nach oben ragendes Ende normalerweise am Maschinenrahmen anliegt.



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