

Description

The present invention relates to an apparatus for manufacturing slide fasteners which comprises a slider applying unit comprising a slider inventory means including a plurality of slider stockers arranged in spaced parallel relation to one another and tilted downwardly, each releasably holding sliders thereon, a slider transfer means including a slider transfer holder relatively movable transversely across said slider stockers to capture said sliders from a selected one of said slider stockers to capture said sliders from a selected one of said slider stockers, and a slider holder for applying the same to said stringer chain.

There are known methods of making slide fasteners from a continuous length chain of stringers to which various component parts are applied in a continuous cycle of operation. Typical examples of such methods are disclosed for example in EP-A-0 302 299. When assembling slide fasteners with component parts varying in type, material, color and other characteristics, it was necessary to use separate apparatus each time assigned to the assembling of specific like component parts, or alternatively to modify the manufacturing systems to enable the feeding and attachment of fastener component parts of different characteristics. These procedures are indeed tedious and economically unfeasible particularly where a wide variety of slide fasteners are to be manufactured in relatively small lots.

DE-A-1 913 873 discloses an apparatus of the type mentioned above which allows feeding and attachment of sliders of different characteristics to a stringer chain. This conventional apparatus is not suited, however, for automatically manufacturing complete slide fasteners provided with all necessary component parts such as sliders, bottom end stops and top end stops from a continuous slide fastener chain; in which these component parts vary in type, material, color and other characteristics.

It is the object of the invention to provide an apparatus satisfying this requirement.

According to the present invention, an apparatus of the type mentioned above is characterized in that an apparatus for manufacturing slide fasteners which comprises a slider applying unit comprising a slider inventory means including a plurality of slider stockers arranged in spaced parallel relation to one another and tilted downwardly, each releasably holding sliders thereon, a slider transfer means including a slider transfer holder relatively movable transversely across said slider stockers to capture said sliders from a selected one of said slider stockers to capture said sliders from a selected one of said slider stockers, and a slider

holder for applying the same to said stringer chain; characterized in that said slider applying unit further comprises a slider guide means receiving said sliders from said slider transfer holder and transferring them onto said slider holder; said slider stockers and said slider holder being stationary and said slider transfer holder being movable transversely across said slider stockers; and that said apparatus further comprises: (a) a gapping unit comprising a punch and a die anvil for gapping an elongate continuous stringer chain to provide element-free space portions at predetermined intervals therealong; (b) a bottom end stop applying unit comprising a first feed means movable back and forth in a direction parallel to the path of travel of said stringer chain and including a plurality of pressure rollers rotatably supported in spaced parallel relation to one another and engagable with a corresponding number of bottom end stop forming flat wire strips, a transfer means including a feed roller engagable selectively with one of said pressure rollers to feed a selected one of said wire strips, a second feed means including a pressure roller and a feed roller for feeding said selected one of wire strips, and a bottom end attaching means for attaching said selected one of wire strips to said stringer chain; (c) a top end stop applying unit for clamping top end stops on to said stringer chain immediately after said sliders are applied; and (d) a cutting unit comprising vertically disposed coacting cutters for cutting said stringer chain across said space portion into individual slide fastener products, all of said operative units being controlled by computer programs to selectively provide fastener component parts compatible with a selected characteristic of a slide fastener product.

Further developments of the invention are set forth in the dependent claims.

The invention will now be described in more detail with reference to an exemplifying embodiment thereof illustrated in the accompanying drawings in which

Figure 1 is a schematic perspective view diagrammatically illustrating the overall process steps involved in the manufacture of slide fasteners according to the invention;

Figure 2 is a block diagram showing the various stages of parts assembling for a non-separable slide fastener;

Figures 3(a) - 3(e) inclusive are plan views of a fastener stringer chain shown progressively assembled and finished;

Figure 4 is a segmentary plan view of a stringer chain;

Figure 5 is a perspective view of an apparatus for feeding and applying bottom end stops to the stringer chain;

Figure 6 is a longitudinal cross-sectional view of the apparatus of Figure 5;

Figure 7 is a plan view of the apparatus of Figure 5 shown in one phase of operation;

Figure 8 is a view similar to Figure 7 but showing the apparatus of Figure 5 in another phase of operation;

Figure 9 is a schematic perspective view showing a bottom end stop being applied to the stringer chain;

Figures 10(a) and 10(b) are cross-sectional views of a portion of the apparatus of Figure 5;

Figure 11 is a schematic perspective view showing a top end stop being applied to the stringer chain;

Figures 12(a) and 12(b) are partly sectional elevational views of a portion of the apparatus of Figure 5;

Figure 13 is a perspective view of an apparatus for feeding and applying sliders to the fastener stringer chain;

Figure 14 is a front elevational view of the same;

Figure 15 is a side elevational view of a portion of the apparatus of Figure 13;

Figure 16 is a cross-sectional view taken on the line XVI - XVI of Figure 15;

Figure 17(a) is a partly sectional elevational view of a gripper portion of the apparatus of Figure 13 shown in one phase of operation;

Figure 17(b) is a view similar to Figure 17(a) but showing the same in another phase of operation; Figures 18(a) and 18(b) are schematic views utilized to explain the operative relationship between the apparatus of Figures 17(a) and 17(b) and the slider;

Figures 19(a) - 19(d) inclusive are schematic views illustrating the manner of feeding the sliders;

Figure 20 is a block diagram showing the various stages of parts assembling for a separable slide fastener;

Figures 21(a) - 21(f) are plan views of a stringer chain shown progressively assembled and finished;

Figure 22 is a schematic perspective view of an apparatus for applying a reinforcing strip to the stringer chain;

Figures 23(a) - 23(d) are schematic views utilized to explain the manner of attaching the reinforcing strips to the stringer chain;

Figure 24 is a schematic perspective view of an apparatus for applying a pin member of a separator to the stringer chain;

Figure 25 is a partly sectional elevational view utilized to explain the manner of applying the pin member; and

Figure 26 is a schematic view utilized to explain the manner of applying a socket member of the

separator in relation to the pin member.

Referring now to the drawings and Figures 1 and 2 in particular there is shown an apparatus carrying the method of the invention into practice for manufacturing a non-separable type of slide fastener, which apparatus generally designated 10 essentially comprises a gapping unit 11, a bottom end stop applying unit 12, a slider applying unit 13, a top end stop applying unit 14, and a cutting unit 15. These units are represented by respective blocks in Figure 2.

A starting stringer chain F comprises a pair of oppositely disposed stringer tapes T, T and a row of fastener coupling elements E attached to an inner longitudinal edge of each of the tapes T, T. The coupling elements E may be formed from a metallic or plastics material into a continuous helical coil or meandering structure or into a discrete formation. For purposes of illustration, the stringer chain F is in the form of elongate continuous or substantially endless chain having tapes T, T and elements E of different colors, or in the form of such a chain which comprises a plurality of interconnected individual stringers of a predetermined length having tapes T, T and elements E of different forms and colors. Each of such interconnected stringers is joined with adjacent stringers by a connecting strip T₁ and marked or otherwise notched at an outer longitudinal edge of the tape T, as at T₂ as shown in Figure 4. The connecting strips T₁ may be utilized as a means of identifying the type or form of fastener component parts to be applied onto a stringer chain F. However, to ensure fool-proof identification of the stringer chain F, the notch or other suitable marking means T₂ may be effectively used for detection by for example a photoelectric sensor not shown.

The starting stringer chain F supplied from a source not shown is metered by a metering roll assembly 16 which meters the length of the chain F by counting the number of revolutions for instance of a roll 16', and the feeding of the stringer chain F is arranged to stop upon completion of a predetermined number of revolutions of the roll 16'. A reserve vessel V is provided for storing a plurality of stringer chains F of different lengths and product characteristics which have been metered and fed from the metering assembly 16. The chain F is advanced by feed rolls 17 into the gapping unit 11, which essentially comprises a punch 11a and a die anvil 11b disposed in vertical confronting relation to each other, and gapped at a predetermined position to remove a length of coupling elements E thereby providing an element-devoid space portion T' at predetermined intervals as shown in Figure 3b.

The stringer chain F is then introduced to the bottom end stop applying unit 12 whereby a bot-

tom end stop (W') is attached to the chain F at an endmost coupling element E' lying in the space portion T' which has been provided at the gapping unit 11.

The bottom end stop applying unit 12 which constitutes an important part of the invention is better shown in Figures 5 and 6. The unit 12 comprises a first feed means 18 including a feed table 19 movable back and forth in a direction parallel to the path of travel of the stringer chain F. A plurality of pressure rollers 20 are coaxially mounted on a shaft 21 journaled in opposed bearing plates 22 integral with the feed table 19 and selectively engageable with a feed roller 23 to feed a selected one of a plurality of bottom end stop forming elongate flat wire strips W₁ - W₆ in a manner hereinafter to be described. The feed table 19 includes a transverse guide member 24 located at a rear end remote from the path of the stringer chain F and adapted to hold the wire strips W₁ - W₆ in spaced parallel alignment as shown in Figure 5.

The feed table 19 has a number of longitudinal slits 25 (Figure 6) corresponding to the number of pressure rollers 20 which is six in all as in the illustrated embodiment but which is variable from two to any number desired depending upon the types or colors of the wire strips W to be applied to the stringer chain F. The wire strips W₁ - W₆ are held in controlled relation to the peripheries of the pressure rollers 20 across the slits 25 in the feed table 19 and are selectively fed one at a time when the feed roller 23 is brought into nipping engagement with a selected one of the pressure rollers 20.

Designated at 26 is a backlash stopper pivotably connected to the table 19 and underlying each of the wire strips W₁ - W₆. The stopper 26 has at one of its ends a finger portion 26' which is normally urged by a spring 27 toward the wire strip W to prevent the latter from moving back inadvertently during operation of the apparatus.

A transfer means generally designated at 28 is provided for transferring the wire strips W₁ - W₆ selectively one at a time from the first feed means 18 onto a second feed means later described. The transfer means 28 comprises a support block 29 which is vertically movable by means of a pneumatic cylinder 30 and on which the feed roller 23 is rotatably supported, and a reversible motor 31 adapted to drive the feed roller 23 both in forward and reverse directions. The support block 29 on actuation of the cylinder 30 brings the feed roller 23 into and out of nipping engagement with a selected one of the pressure rollers 20.

The pressure rollers 20 are selectively engageable with the feed roller 23 by the movement of the feed table 19 which takes place in a direction transversely across the array of wire strips W₁

- W₆ or parallel to the path of the stringer chain F.

The above movement of the table 19 is effected by a table drive means 32 comprising a reciprocating piston 33 actuated by a pneumatic cylinder 34 and a pair of stationary support rods 35 extending horizontally from oppositely disposed frame members 36. The bearing plates 22, one of which is connected to the piston 33, are slidably mounted on the support rods 35 so that the feed table 19 integral with the bearing plates 22 can be moved back and forth and relative to and between the frame members 36. The stroke of the piston 33 is controlled by a computer program system not shown so that the feed table 19 move intermittently a preset distance to bring a particular selected one of the pressure rollers 20 into registry peripherally with the feed roller 23.

A second feed means 37 is connected directly to a bottom end stop attaching means 38 of a known construction which is designed to cut the wire strip W into a staple-like end stop W' and attach the same to the endmost coupling element E' at a leading end of the space portion T' of the stringer chain F as illustrated in Figure 9. The second feed means 37 comprises a transfer table 39 having a longitudinal slit 40 and a pressure roller 41 disposed above the table 39 and a feed roller 42 disposed under the table 39 in confronting relation to the pressure roller 41. The pressure roller 41 is vertically movable toward and away from the feed roller 42 as shown in Figure 6 and engageable with the latter across the slit 40 which is disposed in alignment with the periphery of the feed roller 23 in the transfer means 28.

A vertical retainer rod 43 is provided under the feed table 19 at the front end thereof adjacent to the transfer table 39 and is engageable selectively with one of lock grooves 44 formed in the lower surface of the feed table 19 in a corresponding number to and are located in registry with the pressure rollers 20 or the number of passageways for the wire strips W₁ - W₆ in the first feed means 18 as better shown in Figures 12(a) and 12(b). The retainer rod 43 is normally biased by a spring 45 downwardly away from the feed table 19 and is movable upwardly by the action of a pneumatic cylinder 46 into locking engagement with one of the grooves 44 so as to retain the feed table 19 in position against displacement as shown in Figure 12(a).

A release finger member 47 extends from the support block 29 into abutting engagement with the backlash stopper 26 and is adapted with upward movement of the support block 29 to rotate the stopper 26 against the tension of the spring 27 so as to release the stopper finger portion 26' from the particular wire strip W which has been selected for attachment to the stringer chain F as shown in

Figure 10(a).

The bottom end stop applying unit 12 thus constructed operates in accordance with preset computer programs whereby a particular one of the wire strips $W_1 - W_6$ differing for example in color is selectively fed and formed into an individual bottom end stop W' for attachment to the stringer chain F. The wire strips $W_1 - W_6$ are fed from respective spools not shown and, introduced into the first feed means 18 in equally spaced relation to one another and in registry with the corresponding pressure rollers 20. They are arranged with their respective leading ends held in alignment at a front end of the feed table 19 facing the path of the stringer chain F. In this preparatory operation, the backlash stoppers 26 are disposed with their respective finger portions 26' in sliding contact with the respective wire strips $W_1 - W_6$, but the feed roller 23 in the transfer means 28 is held apart from any of the pressure rollers 20 as shown in Figure 10(b) and the retainer rod 43 is also disengaged from any of the lock grooves 44 as shown in Figure 12(b). The feed table 19 is now moved in a direction parallel to the path of the chain F, by the cylinder piston 33 for instance from the position of Figure 7 to the position of Figure 8 at which the wire strip W_4 alone amongst the other strips W is brought into alignment with the slit 40 of the transfer table 39 in the second feed means 37. This is detected and followed by ascending the retainer rod 43 into engagement with the lock groove 44 as shown in Figure 12(a) thereby locking the feed table 19 in position against displacement, whereupon the feed roller 23 ascends and comes into nipping engagement with the particular pressure roller 20 which is associated with the selected wire strip W_4 , and the release finger member 47 releases the backlash stopper 26 from the wire strip W_4 . The feed roller 23 then rotates and advances the selected wire strip W_4 toward the second feed means 37, the arrival of the strip W_4 at the slit 40 in the transfer table 39 being detected whereupon the feed roller 23 is stopped and lowered to allow the backlash stopper 26 to rotate back into abutting engagement with the wire strip W_4 to arrest the latter against backward movement. The pressure roller 41 in the second feed means 37 then descends and comes into nipping engagement with the feed roller 42 in the zone of the slit 40 to feed the wire strip W_4 into the end stop attaching machine 38 wherein the strip W_4 is cut into a staple-like end stop and attached onto the stringer chain F.

Preparatory to changing the feed of wire strips $W_1 - W_6$, the feed roller 42 in the second feed means 37 is discontinued and the pressure roller 41 is moved upwardly away from the transfer table 39. The feed roller 23 in the transfer means 28 is

moved upwardly into nipping engagement with the pressure roller 20 in the first feed means 18 and rotated in the reverse direction until the leading end of the wire strip W_4 , which has been cut, reaches back in alignment with those leading ends of the remaining wire strips W in the feed table 19. The feed roller 23 is stopped and the retainer rod 43 disengaged from the lock groove 44, so that the feed table 29 is ready to move to commence a next cycle of operation according to a given computer program.

The above-described bottom end stop applying unit 12 can be utilized equally to feed and attach a top end stop Y to the stringer chain F at an inner edge thereof as illustrated in Figure 11.

The stringer chain F having a selected one of the bottom end stops W thus attached thereon is further advanced into the slider applying unit 13 wherein a slider S of a particular characteristic, for example, a specific color compatible with the stringer chain F is selectively applied.

The slider applying unit 13 essentially comprises a slider inventory means 48, a slider transfer means 49 and a slider guide means 50. The slider inventory means 48 comprises a plurality of slider stockers 51a - 51p each releasably holding sliders S thereon, arranged in spaced parallel relation to one another and supported at one end on a first stocker holder 52 and at the opposite end on a second stocker holder 53, both holders 52, 53 being in the form of an elongated rod. The second stocker holder 53 is located at a level higher than the first stocker holder 52 such that the slider stockers 51a - 51p are tilted downwardly to facilitate sliding downward movement of individual sliders S by own gravity in and along the stockers 51a - 51p. The first and second stocker holders 52, 53 each extend horizontally between and secured to vertical support columns 54, 55 and each have coaxial cores 52a and 53a exposed through peripheral grooves 52b and 53b provided at intervals corresponding to the slider stockers 51a - 51p. Each of the slider stocker 51a - 51p has a notch 56 at its lower end for hooked engagement with the cores 52a of the first stocker holder 52 and another notch 57 formed in a downwardly projecting lug 58 at its upper end portion for hooked engagement with the core 53a of the second stocker holder 53 as shown in Figure 15, the arrangement being that the slider stockers 51a - 51p may be readily removed for exchange or replacement. Each slider stocker has a longitudinal rail 59 along which the sliders S slide down by own gravity. More specifically, the slider has an upper wing S_1 and a lower wing S_2 defining therebetween a guide channel S_3 terminating at a neck S_4 , and the slider is mounted with its upper and lower wings S_1, S_2 astride the rail 59 of each of the slider stockers 51a - 51p as

better shown in Figure 16. The slider stockers each has a longitudinal inverted L-shaped cover 60 overlying and preventing the sliders S from falling out or derailing. The slider stocker may be in the form of a typical chute devoid of such cover 60 as shown at the extreme left of Figure 13, in which instance the sliders S are fed to the chute conveniently from a vibratory feeder 61 (Figure 14) as is well known in the art.

The slider stockers 51a - 51p each have at their respective lower end portions a stopper block 62 configured to hold a leading or lowermost slider S' straight and upright for delivery to the slider transfer means 49. The cover 60 of each slider stocker is cut off adjacent to the stopper block 62 to define therewith an opening 63 for the passage of the leading slider S' as shown in Figure 15.

The slider transfer means 49 essentially comprises a slider transfer holder 64 and a slider transfer holder drive 65. The transfer holder 64 includes a casing 66 accommodating therein a first pneumatic or hydraulic cylinder 67 and associated piston rod 68, a pair of front grippers 69, 69 and a rear gripper 70 both pivotally connected to the casing 66 as better shown in Figures 17(a) and 17-(b). The piston rod 68 is reciprocated vertically to spread apart and bring together the coaxing front grippers 69, 69 and rear gripper 70. The piston rod 68 has a first cam 68a at one end and a second cam 68b at the opposite end, the first cam 68a having a conical, downwardly convergent peripheral surface 68a' and the second cam 68b having a conical, downwardly divergent peripheral surface 68b'. The front grippers 69, 69 and the rear gripper 70 each have first cam follower surfaces 69a, 69a, and 70a and second cam follower surfaces 69b, 69b and 70b at their respective inner edges in confronting relation to the first cam 68a and the second cam 68b respectively of the piston rod 68. This camming arrangement allows, with reciprocal movement of the piston rod 68, the grippers 69, 69 and 70 to spread apart to let the slider S fall as shown in Figures 17(a) and 19(a) and to meet together to grip the slider S as shown in Figures 17-(b) and 19(b). The pair of front grippers 69, 69 are arranged with their jaws 69', 69' to come into abutting engagement with the upper surface of the upper wing S₁ on opposite sides of the neck portion S₄ as shown in Figure 18(b), while the rear gripper 70 has its jaw 70' abutting against the majority of the lower surface of the lower wing S₂ of the slider S. Since the pair of grippers 69, 69 are arranged to move obliquely downwardly toward each other by means not shown, this movement will correct the posture of the slider S should there be any misalignment, as illustrated in Figure 18(a).

The slider transfer holder 64 is connected via connecting plate 71 to a piston rod 72 of a second

pneumatic or hydraulic cylinder 73 and is thus vertically movable with the piston rod 72 toward and away from the array of slider stockers 51a - 51p. The cylinder 73 is connected to a movable support block 74 which is movably supported on a pair of horizontal guide rods 75 extending transversely across the array of slider stockers 51a - 51p between the oppositely disposed vertical support columns 54, 55.

The slider transfer holder 64 is reciprocally movable transversely across the array of slider stockers 51a - 51p by means of its drive 65 which comprises an endless timing drive belt 76 spanning between opposed pulleys 77 in parallel with the guide rods 75, one of which pulleys is connected to and driven by an encoder-controlled reversible motor 78. The motor 78 is controlled so that the slider transfer holder 64 reciprocates between the position of a selected one of the slider stockers 51a - 51p and the position of the slider guide means 50. To facilitate smooth sliding movement of the slider transfer holder 64, there are provided a pair of guide rollers 79 rotatably secured to the movable support block 74 and disposed in rotating relation to one of the guide rods 75.

The slider guide means 50 comprises a vertically disposed guide plate 80 having an elongate guide slit 81 defined by confronting inner longitudinal edges 80a. The upper end of the guide plate 80 is located in close proximity to an endmost stocker holder 51 adjacent to the support column 55 and is preferably flared to provide increased opening for receiving the slider S from the slider transfer holder 64. Operatively connected to the lower end of the guide plate 80 is a slider holder 82 of conventional construction having a nest (not shown) communicating with the guide slit 81 and connected to a swing arm 83 pivotally movable toward and away from the path of the stringer chain F. The slider S, when transferred from the transfer holder 64, slides down the guide plate 80 with its channel S₃ received at the inner edges 80a and with its neck portion S₄ received in the guide slit 81 as shown in Figure 13. The sliders S are then further transferred one at a time onto the slider holder 82 for threading through the stringer chain F in a manner well known.

The slider applying unit 13 thus constructed operates in accordance with preset computer programs, whereby the slider transfer holder 64 is assigned to capturing the sliders S stored for instance in the slider stocker 51_n which has an inventory of sliders S having a particular form of pull tabs, a particular color, or a particular type of function which is compatible with the stringer chain F entering the unit 13. The slider transfer holder 64 moves by rotation of the pulleys 77 clockwise over to and stops at the position of the slider stocker

51_n as shown in Figure 19(a), whereupon the piston 72 of the cylinder 73 is actuated to lower the transfer holder 64 and at the same time the piston 68 of the cylinder 67 is actuated to bring the grippers 69, 69 and 70 together thereby gripping therebetween the lowermost or leading slider S' as shown in Figure 19(b). The slider transfer holder 64 thus picks up the leading slider S' and moves up, followed by rotation of the pulleys 77 counterclockwise to carry the transfer holder 64 over to the position of the slider guide means 50, at which the slider S' on the transfer holder 64 is held in alignment with the slit 81 of the guide plate 80 as shown in Figure 19(c). This is followed by downward movement of the transfer holder 64 and then by actuation of the piston 68 to spread the grippers 69, 69 70 apart, whereupon the slider S' drops onto the guide plate 80 as shown in Figure 19(d) and is picked up by the slider holder 82 for attachment onto the stringer chain F, as illustrated in Figure 3-(e) in a well known manner.

The above operation of the slider applying unit 13 is automatically carried out under computer program control to selectively feed the sliders S one at a time from among a plurality of slider stockers 51a - 51p.

The stringer chain F thus assembled with selected ones of sliders S and selected ones of bottom end stops W' is now provided at the top end stop applying unit 14 with top end stops Y supplied from a parts feeder 83 via chutes 84, the top end stop Y being attached to the inner edge of the stringer tape T immediately after the slider S is applied, in a manner well known and shown in Figure 11. Since the top end stops Y are relatively small in size and are substantially concealed from view when the slider S is pulled all way up, they may all be of the same type and color. However, if desired, top end stops Y of different types or colors may be selectively applied to the fastener chain F by utilizing the above-described bottom end stop applying unit 12.

The fastener chain F now fully assembled is cut centrally across the space portion T' of the stringer tapes T, T, as shown in Figure 3(d), into an individual slide fasteners product F'. This cutting is performed at the cutting unit 15 located downstream of the slider applying unit 13 and comprising vertically disposed coacting cutters 85 of any conventional construction.

Designated at 86 are a pair of feed grippers which are arranged to move reciprocally along the path of the stringer chain F to hold the ensuing leading portion of the stringer chain F and bring the latter into position for the next cycle of parts assembling operation in a manner well known. Designated at 87 is a withdrawal gripper which draws the finished slide fastener F' out for storage.

All of the foregoing units 11 - 15 are correlated in operation and controlled by computer programs as schematically shown in Figure 2.

The invention will now be further described in connection with the method of making slide fasteners of a separable type contrastive to the non-separable slide fastener hereinabove dealt with. The separable slide fastener generally designated F'' has a separator Z typically comprising a guide pin member P and a socket pin B_p integral with a socket member B as shown in Figure 21(f) which are releasably engageable with each other.

In order to provide the stringer chain F at predetermined intervals with pins P and sockets B of selected forms, color and other characteristics, the production system further incorporates a reinforcing strip applying unit 16, a punching unit 17 and a separator applying unit 18 which are interposed between the gapping unit 11 and the slider applying unit 13 as shown in Figure 20, wherein the bottom end stop applying unit 12 is excluded as the bottom end stop W' is replaced by the separator Z which likewise functions as a bottom end stop.

The stringer chain F is now provided with a reinforcing strip R at the element-free space portion T' which has been previously formed at the gapping unit 11. The reinforcing strip applying unit 16 includes a strip stocker 88 in the form of a horizontally disposed rectangular box containing a plurality of reinforcing strips R₁ - R₆ differing for instance in form, color, material or other characteristics which are supported in parallel spaced relation to one another.

For purposes of illustration, the reinforcing strips R are formed from an elongate plastics material. The strip stocker 88 has a plurality of slits 89 arranged in two rows and directed toward the path of the stringer chain F for feeding therethrough a pair of like reinforcing strips R in superimposed relation. The strip stocker 88 is movable reciprocally by means not shown along a horizontal path parallel with the path of the stringer chain F. The unit 16 further includes a pair of feed rollers 90 for feeding a selected pair of like reinforcing strips R from among the slits 89 in the strip stocker 88 upon arrival thereof at a position instructed as per preset computer program at which the feed rollers 90 register for instance with a pair of slits 89 associated with the corresponding pair of reinforcing strips R₃ as shown in Figure 22. The reinforcing strips R₃ are withdrawn a predetermined length from the stocker 88 and thereafter cut by cutters 91. The thus cut pair of strips R₃ are gripped by a gripper 92 which is movable reciprocally transversely across the stringer chain F and are brought one above and the other below the chain F at the space portion T'.

The two reinforcing strips R_3 thus superposed across the space portion T' of the stringer chain F are attached thereto by fusion with use of a super-sonic or high frequency energy applying horn 93 and an anvil 94 both movable vertically toward and away from each other in the path of the stringer chain F as shown in Figures 22, 23(a) and 23(b), whereupon the material of the strips R_3 melts and forms a beaded edge T'' at the space portion T' . The strips R_3 are then bonded to the respective stringer tapes T , T with heat and pressure by means of a pair of heaters 95, as shown in Figures 21(c), 22, 23(c) and 23(d).

The stringer chain F is then provided at its reinforced portion with a transverse aperture 96 by means of a punch 97 and a die 98 both movable toward and away from each other in the path of the stringer chain F at the punching unit 17 shown in Figures 22 and 21(c).

The stringer chain F is now attached with a guide pin member P and a socket member B having a socket pin B_p at the separator applying unit 101 shown in Figures 24, 25 and 26 inclusive. There are provided a plurality of parts feeders 99 which contain guide pins P of for instance different colors tailored to selected characteristics of the stringer chain F . The guide pins P from the respective parts feeders 99 are collectively received at a feed converter 100 which is computer-controlled to feed guide pins P of a particular color to a separator applying means 101 through a vertically disposed chute 102. The separator applying means 101 includes a guide pin holder 103 having a pocket 104 for receiving the guide pin P from the chute 102 and transferring the same onto the stringer chain F . The guide pin holder 103 is rotatable between a horizontal position (indicated by phantom line in Figure 25) in which the holder 103 receives the guide pin P at its pocket 104 and a vertical position in which the holder 103 transfers the guide pin P onto the stringer chain F as shown in Figure 25. More specifically, as the holder 103 rotates into the vertical position, the pocket 104 is held in alignment with the path of the stringer chain F so that the guide pin P is inserted through the aperture 95 and thrust through one of the beaded inner edges T'' of the stringer tapes T , T which have been reinforced with the reinforcing strip R at the space portion T' . The guide pin P is then clamped in place on the stringer chain F by means of a punch 105 cooperating with a cam roller 106 as shown in Figure 25 and Figure 2(d). The stringer chain F having the guide pin P attached to the one inner beaded edge T'' of the stringer tapes T , T is thereafter attached with a selected socket pin B_p with socket B fed from parts feeder (not shown) similar to the guide pin parts feeders 98, the operation of attaching the socket pin B_p being substan-

tially the same as attaching the guide pin P already described, except that the socket pin B_p is clamped to the other beaded inner edge T'' confronting the guide pin P .

The stringer chain F is thereafter advanced to the slider applying unit 13, the top end stop applying unit 14 and the cutting unit 15 respectively and finished to provide a separable type of slide fastener F'' as shown in Figures 21(e) and 21(f) which has component parts of harmonious characteristics.

Claims

1. An apparatus for manufacturing slide fasteners which comprises a slider applying unit (13) comprising a slider inventory means (48) including a plurality of slider stockers (51a - 51p) arranged in spaced parallel relation to one another and tilted downwardly, each releasably holding sliders (S) thereon, a slider transfer means (49) including a slider transfer holder (64) relatively movable transversely across said slider stockers (51a - 51p) to capture said sliders (S) from a selected one of said slider stockers (51a - 51p), and a slider holder (82) for applying the same to said stringer chain (F); characterized in that said slider applying unit further comprises a slider guide means (50) receiving said sliders (S) from said slider transfer holder (64) and transferring them onto said slider holder (82); said slider stockers (51a - 51p) and said slider holder (82) being stationary and said slider transfer holder (64) being movable transversely across said slider stockers (51a - 51p); and that said apparatus further comprises:

(a) a gapping unit (11) comprising a punch (11a) and a die anvil (11b) for gapping an elongate continuous stringer chain (F) to provide element-free space portions (T') at predetermined intervals therealong;

(b) a bottom end stop applying unit (12) comprising a first feed means (18) movable back and forth in a direction parallel to the path of travel of said stringer chain (F) and including a plurality of pressure rollers (20) rotatably supported in spaced parallel relation to one another and engagable with a corresponding number of bottom end stop forming flat wire strips ($W_1 - W_6$), a transfer means (28) including a feed roller (23) engagable selectively with one of said pressure rollers (20) to feed a selected one of said wire strips (W), a second feed means (37) including a pressure roller (41) and a feed roller (42) for feeding said selected one of wire strips (W), and a bottom end stop attaching means (38) for attaching said



The two reinforcing strips R_3 thus superposed across the space portion T' of the stringer chain F are attached thereto by fusion with use of a super-sonic or high frequency energy applying horn 93 and an anvil 94 both movable vertically toward and away from each other in the path of the stringer chain F as shown in Figures 22, 23(a) and 23(b), whereupon the material of the strips R_3 melts and forms a beaded edge T'' at the space portion T' . The strips R_3 are then bonded to the respective stringer tapes T , T with heat and pressure by means of a pair of heaters 95, as shown in Figures 21(c), 22, 23(c) and 23(d).

The stringer chain F is then provided at its reinforced portion with a transverse aperture 96 by means of a punch 97 and a die 98 both movable toward and away from each other in the path of the stringer chain F at the punching unit 17 shown in Figures 22 and 21(c).

The stringer chain F is now attached with a guide pin member P and a socket member B having a socket pin B_p at the separator applying unit 101 shown in Figures 24, 25 and 26 inclusive. There are provided a plurality of parts feeders 99 which contain guide pins P of for instance different colors tailored to selected characteristics of the stringer chain F . The guide pins P from the respective parts feeders 99 are collectively received at a feed converter 100 which is computer-controlled to feed guide pins P of a particular color to a separator applying means 101 through a vertically disposed chute 102. The separator applying means 101 includes a guide pin holder 103 having a pocket 104 for receiving the guide pin P from the chute 102 and transferring the same onto the stringer chain F . The guide pin holder 103 is rotatable between a horizontal position (indicated by phantom line in Figure 25) in which the holder 103 receives the guide pin P at its pocket 104 and a vertical position in which the holder 103 transfers the guide pin P onto the stringer chain F as shown in Figure 25. More specifically, as the holder 103 rotates into the vertical position, the pocket 104 is held in alignment with the path of the stringer chain F so that the guide pin P is inserted through the aperture 95 and thrust through one of the beaded inner edges T'' of the stringer tapes T , T which have been reinforced with the reinforcing strip R at the space portion T' . The guide pin P is then clamped in place on the stringer chain F by means of a punch 105 cooperating with a cam roller 106 as shown in Figure 25 and Figure 2(d). The stringer chain F having the guide pin P attached to the one inner beaded edge T'' of the stringer tapes T , T is thereafter attached with a selected socket pin B_p with socket B fed from parts feeder (not shown) similar to the guide pin parts feeders 98, the operation of attaching the socket pin B_p being substan-

tially the same as attaching the guide pin P already described, except that the socket pin B_p is clamped to the other beaded inner edge T'' confronting the guide pin P .

The stringer chain F is thereafter advanced to the slider applying unit 13, the top end stop applying unit 14 and the cutting unit 15 respectively and finished to provide a separable type of slide fastener F'' as shown in Figures 21(e) and 21(f) which has component parts of harmonious characteristics.

Claims

1. An apparatus for manufacturing slide fasteners which comprises a slider applying unit (13) comprising a slider inventory means (48) including a plurality of slider stockers (51a - 51p) arranged in spaced parallel relation to one another and tilted downwardly, each releasably holding sliders (S) thereon, a slider transfer means (49) including a slider transfer holder (64) relatively movable transversely across said slider stockers (51a - 51p) to capture said sliders (S) from a selected one of said slider stockers (51a - 51p), and a slider holder (82) for applying the same to said stringer chain (F); characterized in that said slider applying unit further comprises a slider guide means (50) receiving said sliders (S) from said slider transfer holder (64) and transferring them onto said slider holder (82); said slider stockers (51a - 51p) and said slider holder (82) being stationary and said slider transfer holder (64) being movable transversely across said slider stockers (51a - 51p); and that said apparatus further comprises:

(a) a gapping unit (11) comprising a punch (11a) and a die anvil (11b) for gapping an elongate continuous stringer chain (F) to provide element-free space portions (T') at predetermined intervals therealong;

(b) a bottom end stop applying unit (12) comprising a first feed means (18) movable back and forth in a direction parallel to the path of travel of said stringer chain (F) and including a plurality of pressure rollers (20) rotatably supported in spaced parallel relation to one another and engagable with a corresponding number of bottom end stop forming flat wire strips ($W_1 - W_5$), a transfer means (28) including a feed roller (23) engagable selectively with one of said pressure rollers (20) to feed a selected one of said wire strips (W), a second feed means (37) including a pressure roller (41) and a feed roller (42) for feeding said selected one of wire strips (W), and a bottom end stop attaching means (38) for attaching said



- selected one of wire strips (W) to said stringer chain (F);
 (c) a top end stop applying unit (14) for clamping top end stops (Y) onto said stringer chain (F) immediately after said sliders (S) are applied; and
 (d) a cutting unit (15) comprising vertically disposed coacting cutters (85) for cutting said stringer chain (F) across said space portion (T') into individual slide fastener products (F'), all of said operative units being controlled by computer programs to selectively provide fastener component parts compatible with a selected characteristic of a slide fastener product (F').
2. An apparatus according to claim 1, characterized by a reinforcing strip applying unit (16) comprising a strip stocker (88) containing a plurality of reinforcing strips ($R_1 - R_6$), a pair of feed rollers (90) for feeding a selected pair of like reinforcing strips (R) from said strip stocker (88) and means (94, 95) for attaching said selected pair of strips (R) to said stringer chain (F) at said space portion (T').
3. An apparatus according to claim 1 or 2, said bottom end stop applying unit (12) comprises:
 (a) said first feed means (18) including a feed table (19) movable back and forth in a direction parallel to the path of travel of said stringer chain (F) and having a plurality of lock grooves (44) and a plurality of pressure rollers (20) coaxially mounted on a shaft (21) in spaced parallel relation to one another and peripherally registering with a corresponding number of wire strips (W);
 (b) said transfer means (28) including said feed roller (23) vertically movable into nipping engagement with a selected one of said pressure rollers (20);
 (c) a reversible motor (31) driving said feed roller (23) in forward and reverse directions;
 (d) a table drive means (32) for moving said feed table (19) a predetermined distance intermittently to bring a selected one of said pressure rollers (20) into registry peripherally with said feed roller (23); and
 (e) said second feed means (37) including a transfer table (39) having a longitudinal slit (40), a feed roller (42) and a pressure roller (41) movable toward and away from and engagable with said feed roller (42) across said slit (40) which is disposed in alignment with the periphery of said feed rollers (23) in said transfer means (28).
4. An apparatus according to claim 3, said bottom end stop applying unit (12) further including a backlash stopper (26) pivotally connected to said feed table (19) and underlying each of said wire strips (W), said backlash stopper (26) being normally biased toward each of said wire strips (W) to prevent the latter from inadvertently moving back.
5. An apparatus according to claim 4, said bottom end stop applying unit (12) further including a release finger member (47) engagable with said backlash stopper (26), said release finger member (47) rotating said backlash stopper (26) away from said wire strip (W).
6. An apparatus according to claim 3, said bottom end stop applying unit (12) further including a retainer rod (43) selectively engagable with one of said lock grooves (44) said retainer rod (43) retaining said feed table (19) in position against displacement.
7. An apparatus according to one of the preceding claims, said slider applying unit (13) comprises:
 (a) said slider transfer means (49) including a slider transfer holder (64) having a casing (66), coacting grippers (69, 70) pivotally connected to said casing (66), a drive cylinder (67) accommodated in said casing (66) and having a piston rod (68) vertically reciprocating to spread apart and bring together said coacting gripper (69, 70), and a second drive cylinder (73) having a piston rod (72) arranged to move said slider transfer holder (64) vertically toward and away from said slider stockers (51a - 51p);
 (b) said slider guide means (50) including a vertically disposed guide plate (80) having its upper end in close proximity to an end-most one of said slider stockers (51) for receiving sliders (S) therefrom;
 (c) said slider holder (82) being operatively connected to the lower end of said guide means (50) for applying said sliders (S) one at a time to said stringer chain (F); and
 (d) a slider transfer holder drive means (65) driving said transfer holder (64) to move reciprocally transversely across said slider stockers (51a - 51p) between said slider guide means (50) and a selected one of said slider stockers (51a - 51p).
8. An apparatus according to claim 7, characterized in that said slider transfer holder drive means (65) is an endless timing drive belt (76).



9. An apparatus according to claim 7, characterized in that said piston rod (68) has a first cam (68a) at one end and a second cam (68b) at the opposite end, and said coacting grippers (69, 70) each have first cam followers (69a, 70a) engagable with said first and second cams (68a, 68b), respectively.

10. An apparatus according to claim 7 further including a first stocker holder (52) and a second stocker holder (53) characterized in that said slider stockers (51a - 51p) are removably connected between said stock holders (52) and (53).

Patentansprüche

1. Vorrichtung zur Herstellung von Reißverschlüssen mit einer Schieberanbringeinheit (13), die eine Schiebervorratseinrichtung (48) aufweist, umfassend eine Vielzahl von Schiebermagazinen (51a - 51p), die im Abstand parallel zueinander und nach unten geneigt angeordnet sind und auf denen jeweils Schieber (S) lösbar gehalten sind, eine Schieberüberführungseinrichtung (49), die einen Schieberüberführungshalter (64) aufweist, der quer zu den Schiebermagazinen (51a - 51p) bewegbar ist, um die Schieber (S) von einem ausgewählten Schiebermagazin (51a - 51p) zu erfassen, und einen Schieberhalter (82) aufweist, um die Schieber an der Reißverschlußkette (F) anzubringen; dadurch gekennzeichnet, daß die Schieberanbringeinheit ferner eine Schieberüberführungseinrichtung (50) aufweist, die die Schieber (S) von dem Schieberüberführungshalter (64) aufnimmt und auf den Schieberhalter (82) überführt; wobei die Schiebermagazine (51a - 51p) und der Schieberhalter (82) stationär sind und der Schieberüberführungshalter (64) quer zu den Schiebermagazinen (51a - 51p) bewegbar ist; und daß die Vorrichtung ferner umfaßt:

(a) eine Lückenbildungseinheit (11), umfassend einen Stempel (11a) und einen Gesenkamboß (11b), um in einer langgestreckten fortlaufenden Reißverschlußkette (F) in bestimmten Längsabständen kuppelgliederfreie Bereiche (T') zu bilden;

(b) eine Einheit (12) zum Anbringen von unteren Begrenzungsteilen, umfassend eine erste Zuführeinheit (18), die parallel zur Bewegungsbahn der Reißverschlußkette (F) vor und zurück bewegbar ist und eine Vielzahl von Andrückwalzen (20) aufweist, die in paralleler Anordnung drehbar abgestützt und mit einer entsprechenden Anzahl von unteren Begrenzungsteile bildenden flachen Drahtstreifen (W₁ - W₆) in Eingriff bringbar

sind, eine Überführungseinrichtung (28), die eine Zuführwalze (23) aufweist, die wahlweise mit einer der Andrückwalzen (20) in Eingriff bringbar ist, um einen ausgewählten Drahtstreifen (W) zuzuführen, eine zweite Zuführeinrichtung (37), die eine Andrückwalze (41) und eine Zuführwalze (42) zum Zuführen des ausgewählten Drahtstreifens (W) aufweist, und eine Begrenzungsteil-Befestigungseinrichtung (38) zum Befestigen des ausgewählten Drahtstreifens (W) an der Reißverschlußkette (F);

(c) eine Begrenzungsteil-Anbringeinheit (14) zum Anklemmen von oberen Begrenzungsteilen (Y) an der Reißverschlußkette (F) unmittelbar nach dem Anbringen der Schieber (S); und

(d) eine Schneideinheit (15), umfassend vertikal angeordnete, zusammenwirkende Messer (85) zum Durchschneiden der Reißverschlußkette (F) quer über den kuppelgliederfreien Bereich (T') in einzelne Reißverschlußerzeugnisse (F'), wobei alle diese Betriebseinheiten durch Computerprogramme gesteuert sind, um wahlweise Reißverschlußbestandteile bereitzustellen, die einer ausgewählten Eigenschaft eines Reißverschlußerzeugnisses (F') entsprechen.

2. Vorrichtung nach Anspruch 1, gekennzeichnet durch eine Verstärkungsband-Anbringeinheit (16), umfassend ein Bandmagazin (88), das eine Vielzahl von Verstärkungsbändern (R₁ - R₆) enthält, zwei Zuführwalzen (90) zum Zuführen von zwei ausgewählten Verstärkungsbändern (R) von dem Bandmagazin (88) und Mittel (94, 95) zum Befestigen der beiden ausgewählten Bänder (R) an der Reißverschlußkette (F) in dem kuppelgliederfreien Bereich (T').

3. Vorrichtung nach Anspruch 1 oder 2, wobei die Einheit (12) zum Anbringen von unteren Begrenzungsteilen umfaßt:

(a) wobei die erste Zuführeinrichtung (18) einen Zuführtisch (19) aufweist, der parallel zur Bewegungsbahn der Reißverschlußkette (F) vor und zurück bewegbar ist und mehrere Rastnuten (44) hat und eine Vielzahl von Andrückwalzen (20) aufweist, die im Abstand parallel zueinander auf einer Welle (21) koaxial angeordnet sind und in Umfangsrichtung mit einer entsprechenden Anzahl von Drahtstreifen (W) fluchten;

(b) wobei die Überführungseinrichtung (28) die besagte Zuführwalze (23) aufweist, die zum Klemmeingriff mit einer ausgewählten Andrückwalze (20) vertikal bewegbar ist;



- (c) einen umsteuerbaren Motor (31), der die Zuführwalze (23) in Vorwärts- und Rückwärtsrichtung antreibt;
- (d) eine Tischantriebseinrichtung (32) zum schrittweisen Bewegen des Zuführtisches (19) über eine bestimmte Entfernung, um eine ausgewählte Andrückwalze (20) in Umfangsrichtung mit der Zuführwalze (23) zur Deckung zu bringen; und
- (e) wobei die zweite Zuführeinrichtung (37) einen Überführungstisch (39) mit einem Längsschlitz (40), eine Zuführwalze (42) und eine Andrückwalze (41) umfaßt, die durch den Schlitz (40) hindurch, der zum Umfang der Zuführwalze (23) der Überführungseinrichtung (28) fluchtend angeordnet ist, zu der Zuführwalze (42) hin zum Eingriff mit dieser und von dieser weg bewegbar ist.
4. Vorrichtung nach Anspruch 3, wobei die Einheit (12) zum Anbringen von unteren Begrenzungsteilen ferner eine Rücklaufsperr (26) umfaßt, die mit dem Zuführtisch (19) schwenkbar verbunden ist und jeden der Drahtstreifen (W) untergreift, wobei die Rücklaufsperr (26) normalerweise gegen jeden Drahtstreifen (W) hin vorgespannt ist, um diesen an einer unbeabsichtigten Rückwärtsbewegung zu hindern.
5. Vorrichtung nach Anspruch 4, wobei die Einheit (12) zum Anbringen von unteren Begrenzungsteilen ferner einen Ausrückfinger (47) umfaßt, der mit der Rücklaufsperr (26) in Eingriff bringbar ist, wobei der Ausrückfinger (47) die Rücklaufsperr (26) vom dem Drahtstreifen (W) weg verdreht.
6. Vorrichtung nach Anspruch 3, wobei die Einheit (12) zum Anbringen von unteren Begrenzungsteilen ferner eine Raststange (43) umfaßt, die wahlweise mit einer der Rastruten (44) in Eingriff bringbar ist, wobei die Raststange (43) den Zuführtisch (19) gegen eine Verlagerung arretiert.
7. Vorrichtung nach einem der vorhergehenden Ansprüche, wobei die Schieberanbringeinheit (13) umfaßt:
- (a) wobei die Schieberüberführungseinrichtung (49) einen Schieberüberführungshalter (64) aufweist, umfassend ein Gehäuse (66), zusammenwirkende Greifer (69, 70), die mit dem Gehäuse (66) schwenkbar verbunden sind, einen Antriebszylinder (67), der in dem Gehäuse (66) angeordnet ist und eine Kolbenstange (68) aufweist, die vertikal hin- und herbewegbar ist, um die zusammenwirkenden Greifer (69, 70) zu spreizen und zusammenzuführen, und einen zweiten Antriebszylinder (73), der eine Kolbenstange (72) aufweist, die den Schieberüberführungshalter (64) zu den Schiebermagazinen (51a - 51p) hin und von diesen weg vertikal bewegen kann;
- (b) wobei die Schieberüberführungseinrichtung (50) eine vertikal angeordnete Führungsplatte (80) umfaßt, deren oberes Ende sich in geringem Abstand von einem endseitigen Schiebermagazin (51) befindet, um von diesem Schieber (S) aufzunehmen;
- (c) wobei der Schieberhalter (82) mit dem unteren Ende der Führungseinrichtung (50) betriebsmäßig verbunden ist, um die Schieber (S) einzeln an der Reißverschlußkette (F) anzubringen; und
- (d) eine Antriebseinrichtung (65) für den Schieberüberführungshalter (64), um diesen quer zu den Schiebermagazinen (51a - 51p) zwischen der Schieberüberführungseinrichtung (50) und einem ausgewählten Schiebermagazin (51a - 51p) hin- und herzubewegen.
8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Antriebseinrichtung (65) für den Schieberüberführungshalter ein endloser Zahnriemen (76) ist.
9. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Kolbenstange (68) eine erste Steuerkurve (68a) an einem Ende und eine zweite Steuerkurve (68b) am gegenüberliegenden Ende hat und daß die zusammenwirkenden Greifer (69, 70) jeweils erste Kurvennachläufer (69a, 70a) haben, die mit den ersten bzw. zweiten Steuerkurven (68a, 68b) in Eingriff bringbar sind.
10. Vorrichtung nach Anspruch 7, ferner umfassend einen ersten Magazinhalter (52) und einen zweiten Magazinhalter (53), dadurch gekennzeichnet, daß die Schiebermagazine (51a - 51p) mit den Magazinhaltern (52 und 53) lösbar verbunden sind.

Revendications

1. Appareil de fabrication de fermetures à glissière qui comprend une unité (13) de pose de curseur comprenant un moyen (48) d'approvisionnement en curseurs qui inclut une pluralité de magasins à curseurs (51a-51p) disposés en étant parallèles et espacés les uns par rapport aux autres et basculés vers le bas, retenant chacun des curseurs (S) de façon libérable, un moyen (49) de transfert de curseur qui inclut un support (64) de transfert de curseur relatif



vement déplaçable transversalement auxdits magasins à curseurs (51a-51p) pour prendre lesdits curseurs (S) de l'un sélectionné desdits magasins à curseurs (51a-51p), et un porte-curseur (82) pour mettre en place ce dernier sur ladite bande d'accrochage (F), caractérisé en ce que ladite unité de pose de curseur comprend en outre un moyen de guidage de curseur (50) qui reçoit lesdits curseurs (S) en provenance dudit support de transfert de curseur (64) et les transfère sur ledit porte-curseur (82), lesdits magasins à curseurs (51a-51p) et ledit porte-curseur (82) étant immobiles et ledit support de transfert de curseur (64) étant déplaçable transversalement auxdits magasins à curseurs (51a-51p), et en ce que ledit appareil comprend en outre:

(a) une unité (11) de création d'intervalles qui comprend un poinçon (11a) et une enclume (11b) pour réaliser des intervalles sur une bande d'accrochage (F) allongée et continue afin de produire des parties vides (T') exemptes d'éléments à des intervalles prédéterminés le long de celle-ci,

(b) une unité (12) de pose de butée d'extrémité inférieure qui comprend un premier moyen d'amenée (18) déplaçable en va-et-vient dans une direction parallèle au trajet de déplacement de ladite bande d'accrochage (F) et qui inclut une pluralité de rouleaux presseurs (20) supportés de façon rotative en étant parallèles et espacés les uns des autres et pouvant venir en contact avec un nombre correspondant de bandes métalliques (W_1 - W_6) plates de formation des butées d'extrémité inférieure, un moyen de transfert (28) qui inclut un rouleau d'alimentation (23) pouvant se mettre en prise de façon sélective avec l'un des rouleaux presseurs (20) pour faire avancer l'une sélectionnée desdites bandes métalliques (W), un second moyen d'amenée (37) qui inclut un rouleau presseur (41) et un rouleau d'alimentation (42) pour faire avancer celle sélectionnée desdites bandes métalliques (W) et un moyen (38) de fixation de butée d'extrémité inférieure pour fixer celle sélectionnée desdites bandes métalliques (W) sur ladite bande d'accrochage (F),

(c) une unité (14) de pose de butée d'extrémité supérieure destinée à pincer des butées d'extrémité supérieure (Y) sur ladite bande d'accrochage (F) immédiatement après la mise en place desdits curseurs (S), et

(d) une unité de coupe (15) qui comprend des couteaux (85) à action conjointe, placés verticalement, destinés à couper ladite ban-

de d'accrochage (F) dans ladite partie vide (T') et donner des produits (F') formant des fermetures à glissière individuelles,

toutes lesdites unités opérationnelles étant commandées par des programmes d'ordinateur pour donner de façon sélective des pièces constituant de fermeture compatibles avec une caractéristique sélectionnée d'un produit formant fermeture à glissière (F').

2. Appareil selon la revendication 1, caractérisé par une unité (16) de pose de bande de renfort qui comprend un magasin (88) à bandes de renfort contenant une pluralité de bandes de renfort (R_1 - R_6), une paire de rouleaux d'alimentation (90) pour amener une paire sélectionnée de bandes de renfort identiques (R) en provenance dudit magasin (88) à bandes de renfort et des moyens (94, 95) pour fixer ladite paire sélectionnée de bandes de renfort (R) sur ladite bande d'accrochage (F) au niveau de ladite partie vide (T').

3. Appareil selon la revendication 1 ou 2, ladite unité de pose (12) de butée d'extrémité inférieure comprenant:

(a) ledit premier moyen d'amenée (18) qui inclut une table d'amenée (19) déplaçable en va-et-vient dans une direction parallèle au trajet de déplacement de ladite bande d'accrochage (F) et présentant une pluralité de rainures (44) de blocage, et une pluralité de rouleaux presseurs (20) montés coaxialement sur un arbre (21) en étant parallèles et espacés les uns des autres et placés en coïncidence périphérique avec un nombre correspondant de bandes métalliques (W),
(b) ledit moyen de transfert (28) qui inclut ledit rouleau d'alimentation (23) déplaçable verticalement pour venir en contact pinçant avec l'un sélectionné desdits rouleaux presseurs (20),

(c) un moteur réversible (31) qui entraîne ledit rouleau d'alimentation (23) en marche avant et arrière,

(d) un moyen (32) d'entraînement de table destiné à déplacer ladite table d'amenée (19) d'une distance prédéterminée et par intermittence pour amener l'un sélectionné desdits rouleaux presseurs (20) en coïncidence périphérique avec ledit rouleau d'alimentation (23), et

(e) ledit second moyen d'amenée (37) qui comprend une table de transfert (39) ayant une fente longitudinale (40), un rouleau d'alimentation (42) et un rouleau presseur (41) déplaçable sur ladite fente (40) pour se rapprocher et s'éloigner dudit rouleau d'ali-



mentation (42) avec lequel il peut se mettre en prise, qui est placé dans l'alignement de la périphérie desdits rouleaux d'alimentation (23) dudit moyen de transfert (28).

4. Appareil selon la revendication 3, ladite unité (12) de pose de butée d'extrémité inférieure comprenant en outre un butoir de retenue (26) relié de façon pivotante à ladite table d'amenée (19) et s'étendant en-dessous de chacune desdites bandes métalliques (W), ledit butoir de retenue (26) étant normalement poussé vers chacune desdites bandes métalliques (W) pour empêcher ces dernières de reculer par inadvertance.

5. Appareil selon la revendication 4, ladite unité (12) de pose de butée d'extrémité inférieure comprenant en outre un élément formant doigt de déclenchement (47) qui peut se mettre en prise avec ledit butoir de retenue (26), ledit élément formant doigt de déclenchement (47) faisant tourner ledit butoir de retenue (26) pour l'éloigner de ladite bande métallique (W).

6. Appareil selon la revendication 3, ladite unité (12) de pose de butée d'extrémité inférieure comprenant en outre une tige de retenue (43) qui peut se mettre en prise de façon sélective avec l'une desdites rainures de blocage (44), ladite tige de retenue (43) maintenant en position ladite table d'amenée (19) en l'empêchant de se déplacer.

7. Appareil selon l'une quelconque des précédentes revendications, ladite unité (13) de pose de curseur comprenant:

(a) ledit moyen (49) de transfert de curseur qui inclut un support (64) de transfert de curseur comprenant un carter (66), des dispositifs formant pinces (69, 70) à action conjointe, reliés de façon pivotante audit carter (66), un vérin d'entraînement (67) logé dans ledit carter (66) et ayant une tige de piston (68) qui va et vient verticalement pour écarter et refermer lesdits dispositifs (69, 70) formant pinces à action conjointe et un second vérin d'entraînement (73) ayant une tige de piston (72) disposée pour déplacer ledit support (64) de transfert de curseur verticalement afin de l'éloigner et le rapprocher desdits magasins à curseurs (51a-51p),

(b) ledit moyen (50) de guidage de curseur qui inclut une plaque de guidage (80) placée verticalement ayant son extrémité supérieure au proche voisinage du plus extrême desdits magasins à curseurs (51) afin d'en

recevoir des curseurs (S),

(c) ledit porte-curseur (82) qui est relié de façon opérationnelle à l'extrémité inférieure dudit moyen de guidage (50) pour mettre en place les curseurs (S) un par un sur ladite bande d'accrochage (F), et

(d) un moyen d'entraînement (65) du support de transfert de curseur qui entraîne ledit support de transfert (64) pour qu'il se déplace en va-et-vient transversalement auxdits magasins à curseurs (51a-51p), entre ledit moyen (50) de guidage de curseur et l'un sélectionné desdits magasins à curseurs (51a-51p).

8. Appareil selon la revendication 7, caractérisé en ce que ledit moyen d'entraînement (65) du support de transfert de curseur est une courroie sans fin (76) d'entraînement cadencé.

9. Appareil selon la revendication 7, caractérisé en ce que ladite tige de piston (68) comprend une première came (68a) en une extrémité et une seconde came (68b) en l'extrémité opposée et lesdits dispositifs (69, 70) formant pinces à action conjointe comportent chacun des premiers suiveurs de came (69a, 69b) qui peuvent se mettre en prise avec respectivement lesdites première et seconde comes (68a, 68b).

10. Appareil selon la revendication 7, comprenant en outre un premier support (52) de magasin et un second support (53) de magasin, caractérisé en ce que lesdits magasins à curseurs (51a-51p) sont fixés de façon amovible entre lesdits supports (52) et (53) de magasins.