

SPECIFICATION

Apparatus for applying bottom end stops for sliding clasp fasteners

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The present invention relates to an apparatus for applying bottom end stops for sliding clasp fasteners and, more particularly, to an apparatus for applying bottom end stops of a substantially H-shaped cross section across or astride confronting edges of a pair of stringer tapes at ends of spaced chains of interengaged coupling elements.

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According to the invention, there is provided an apparatus for applying bottom end stops having two pairs of spaced grip legs across confronting edges of a pair of sliding clasp fastener tapes, comprising a frame, a bottom end stop clincher mounted on said frame and including a pair of coacting punches, a bottom end stop clamp including a pair of clamping jaws pivotally mounted on said frame for cooperating with one of said punches to provide a holder pocket for receiving therein one of the grip legs in each pair of one of the bottom end stops at a time, a bottom end stop feeder mounted on said frame for supplying the bottom end stops one at a time into said holder pocket, and drive means disposed in said frame for actuating said feeder to supply one bottom end stop into said holder pocket, moving said one of the punches and said clamp with the bottom end stop held in place to a position for setting the stringer tapes around the clamped bottom end stop, and actuating both of said punches toward each other to clinch the grip legs of the bottom end stop about the confronting edges of the stringer tapes.

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The invention will now be described by way of example, with reference to the accompanying drawings, wherein:-

Figure 1 is an enlarged perspective view of a bottom end stop to be applied to a pair of sliding clasp fastener stringer tapes;

Figure 2 is a fragmentary plan view of a pair of sliding clasp fastener stringers with a bottom end stop of Figure 1 attached in position;

Figure 3 is a fragmentary front elevational view of a bottom end stop applying apparatus constructed in accordance with the present invention;

Figure 4 is a fragmentary side elevational view of the apparatus shown in Figure 3;

Figure 5 is a front elevational view with parts cut away of a central portion of the apparatus;

Figure 6 is a cross-sectional view taken along line VI-VI of Figure 5;

Figure 7 is an enlarged plan view showing the position of a lower punch and a clamp in which a bottom end stop is about to be supplied into a holder pocket;

Figure 8 is a cross-sectional view taken along line VIII-VIII of Figure 7;

Figure 9 is an enlarged cross-sectional view of a bottom end stop just before being clinched onto a pair of stringer tapes; and

Figure 10 is an enlarged cross-sectional view illustrating the bottom end stop of Figure 9 that has been attached in position.

A bottom end stop applying apparatus 12 shown in Figures 3 and 4 applies a bottom end stop 13 (Fig-

ure 1) adjacent to an end of one of a plurality of longitudinally spaced chains 14 of (Figure 2) sliding clasp fastener coupling elements of a pair of interlocked fastener stringers 15, 16 which include a plurality of element-free gaps or spaces 17 (only one shown in Figure 2) located between the longitudinally spaced chains 14. The bottom end stop 13 extends over one of the spaces 17 across or astride a pair of confronting beaded or reinforced edges 22,23 (Figure 9) of a pair of stringer tapes 18,19, respectively.

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The bottom end stop 13 includes two pairs of upper and lower grip legs 20,21, as shown in Figure 1, spaced from each other, one pair of the grip legs 20,21 being directed away from the other pair of the grip legs 20,21. The grip legs 20,21 in each pair grip or sandwich one of the confronting tape edges 22,23 as will be described later on.

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The apparatus 12 generally comprises a frame 24 including an upper housing 25 and a front housing 26 that is cross-sectionally U-shaped, a clincher 27 including an upper punch 28 vertically reciprocally supported in the upper housing 25 and a lower punch 29 vertically reciprocally mounted on the front housing 26, there being a space or opening 30 in the upper housing 25 wherein the upper and lower punches 28,29 coact with each other to crimp the bottom end stop 13 onto the sliding clasp fastener stringers 15,16. A bottom end stop clamp 31 is mounted on the front housing 26 for holding bottom end stop 13 on the lower punch 29, and a bottom end stop feeder 32 is disposed in the upper housing 25 for supplying the bottom end stop 13 onto a top surface 33 (Figure 8) of the lower punch 29.

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As shown in Figures 5 and 6, a punch holder 35 on which the punch 29 is supported is vertically slidably mounted in the front housing 26 and has a vertical slot 36 into which extends a projection 37 on a front wall 38 of the frame 24. A compression coil spring 39 acts between the projection 37 and the lower end of the slot 36, and normally urges the punch holder 35 downwardly. A lever 40 which is operatively coupled to a drive mechanism (not shown) disposed in the frame 24 extends through a slot 41 in the front wall 38 and engages the punch holder 35 to move the same vertically upwardly.

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A clamp holder 43 supporting the clamp 31 thereon is also slidably received in the front housing 26, and is normally spaced at 45 upwardly from a lateral shoulder 42 of the punch holder 35 by a compression coil spring 44 acting between the clamp holder 43 and the punch holder 35. The clamp holder 43 has a lateral projection 46 extending into a slot 47 in the front housing 26 and engageable with a vertical stop bolt 48 threadedly extending through a portion of the front housing 26 into the slot 47. Accordingly, the punch holder 35 and the clamp holder 43 move together upwardly until the projection 46 engages the stop bolt 48, and upon abutting engagement of the projection 46 with the stop bolt 48, the upward movement of the clamp holder 43 is arrested and the punch holder 35 continues to be driven upwardly for the distance of the spacing 45 until the lateral projection 42 engages the clamp holder 43 against the bias of the spring 44.

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A support plate 49 is fixed to the clamp holder 43 by means of a pair of machine screws 50. The clamp 31 is composed of a pair of clamping jaws 51,52 pivotally mounted on the support plate 49 by a pair of pins 53,54, respectively. A pair of compression coil springs 55,55 act between the clamp holder 43 and the clamping jaws 51,52 and normally bias the jaws 51,52 in a direction to cause their upper ends remote from the spring-loaded ends to move toward each other.

As illustrated in Figures 7 and 8, the clamping jaws 51,52 jointly provide a cavity 57 receiving the punch 29 therein. A first pair of corner projections 58,58 and a second pair of corner projections 59,59 spaced from the corner projections 58,58 are integrally formed with the upper ends of the clamping jaws 51,52 and extend into the punch-receiving cavity 57. Each of the corner projections 58,58 and 59,59 has a downwardly facing slanted surface 60. When the clamp holder 43 is vertically spaced from the lateral shoulder 42 of the punch holder 35, there is formed a holder pocket 56 between the top surface 33 of the punch 29 and the corner projections 58,58 and 59,59. The clamping jaws 51,52 have a pair of vertical chamfered faces 61,61, respectively, facing toward a guide member 62 mounted on the frame 24.

The bottom end stop feeder 32 includes a passageway 63 in the guide member 62 and a pusher 64 slidable in the passageway 63 toward and away from the holder pocket 56. The pusher 64 has a prong or tongue 65 insertable between one pair of the legs 20,21 of the bottom end stop 13. The pusher 64 is pivotally connected to and driven by a link 66 which is operatively coupled to the drive mechanism.

An arcuate chute 67 (Figure 1) for supplying a plurality of bottom end stops 13 to the feeder 32 is supported on a chute support 68 mounted on the frame 24.

The drive mechanism is of a known construction including a motor, a group of first, second and third cam plates for driving the lever 40, the upper punch 28, and the lever 66 respectively, and a one-revolution clutch for connecting the motor drivingly to the cam plates.

One cycle of operation of the apparatus will be described. At the time of starting the operation, it is assumed that the projection 46 of the clamp holder 43 is engaged by the stop bolt 48 and that the shoulder 42 of the punch holder 35 is spaced from the clamp holder 43, and further that one of the bottom end stops 13 is held in the pocket 56 with the grip legs 21, 21 engaged by the corner projections 58, 58 and 59,59. At this time, the bottom end stop 13 is in a stand-by position in which the stringer tapes 18,19 are placed around the supported bottom end stop 13 to put the beaded edges 22,23 between the grip legs 20,21 in one pair and between the grip legs 20,21 in the other pair, as shown in Figure 9, and the bottom end stop 13 is located at a proper position on the sliding clasp fastener stringers 15,16. The stand-by position is located substantially vertically centrally in the opening 30 and downwardly of the upper punch 28 as it is de-energized. When the one-revolution clutch is actuated, the lever 40 is driven by the first cam to move the punch holder 35 upwardly, where-

upon the punch 29 forcibly pushes the bottom end stop 13 upwardly as the grip legs 21,21 displace the corner projections 58,58 and 59,59 sideways until the clamp jaws 51,52 are spread apart against the force of the springs 55,55. At the same time, the upper punch 28 is lowered by the second cam into engagement with the bottom end stop 13. As the upper and lower punches 28,29 are moved toward each other, the grip legs 20,21 in each pair are pressed toward each other by the upper and lower punches 28,29 until the grip legs 20,21 grip or clinch the beaded edges 22,23 of the stringer tapes 18,19 as shown in Figure 10. After attachment of the bottom end stop 13, the upper punch 28 is retracted to its upper limit position, and the lower punch 29 and hence the clamp 31 are allowed to move downwardly under the resiliency of the spring (39) to their lower limit position.

Then, the third cam actuates the lever 66, which enables the pusher 64 to move a next one of the bottom end stops 13 forwardly along the passageway 63. The bottom end stop 13 as it is pushed by the pusher 64 engages the chamfered faces 61,61 of the clamping jaws 51,52. Continued advancement of the bottom end stop 13 forces the clamping jaws 51,52 laterally away from each other against the bias of the spring 55,55. When the bottom end stop 13 is moved past the corner projections 58,58 and 59,59, the clamping jaws 51, 52 are allowed to come together under the force from the spring 55,55, whereupon the bottom end stop 13 is stably supported in the holder pocket 56 with the grip legs 21,21 held by the corner projections 58,58 and 59,59 down against the top surface 33 of the punch 29.

After the pusher 64 is moved back away from the bottom end stop 13 retained in the pocket 56, the lever 40 is again actuated by the first cam to cause the punch holder 35 and the clamp holder 43 to be raised together until the projection 46 of the clamp holder 43 engages the stop bolt 48. Then, the clutch is disconnected and one cycle of operation of the apparatus 12 is thus completed.

With such an arrangement, the bottom end stop 13 can be stably supported on the lower punch 29 until the bottom end stop 13 is applied to the sliding clasp fastener stringers 15,16. Accordingly, the process steps such as putting the beaded tape edges 22,23 between the grip legs 20,21 of the bottom end stop 13 and locating the bottom end stop 13 at a proper position on the sliding clasp fastener stringers 15,16 can be greatly speeded up, and can be easily and reliably accomplished in foolproof operation. Further, with the bottom end stop 13 held in the stand-by position centrally in the opening 30, the above-mentioned process steps can be carried out unobstructedly. When the bottom end stop 13 is attached to the fastener stringers 15,16, it has already been released from the holder pocket 56 and therefore the fastener stringers 15, with the bottom end stop 13 mounted fixedly thereon can be readily moved along merely by pulling the fastener stringers 15,16.

CLAIMS

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upon the punch 29 forcibly pushes the bottom end stop 13 upwardly as the grip legs 21, 21 displace the corner projections 58, 58 and 59, 59 sideways until the clamp jaws 51, 52 are spread apart against the force of the springs 55, 55. At the same time, the upper punch 28 is lowered by the second cam into engagement with the bottom end stop 13. As the upper and lower punches 28, 29 are moved toward each other, the grip legs 20, 21 in each pair are pressed toward each other by the upper and lower punches 28, 29 until the grip legs 20, 21 grip or clinch the beaded edges 22, 23 of the stringer tapes 18, 19 as shown in Figure 10. After attachment of the bottom end stop 13, the upper punch 28 is retracted to its upper limit position, and the lower punch 29 and hence the clamp 31 are allowed to move downwardly under the resiliency of the spring (39) to their lower limit position.

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CLAIMS

1. An apparatus for applying bottom end stops having two pairs of spaced grip legs across confront-

- ing edges of a pair of sliding clasp fastener tapes, comprising a frame, a bottom end stop clincher mounted on said frame and including a pair of coacting punches, a bottom end stop clamp including a
- 5 pair of clamping jaws pivotally mounted on said frame for cooperating with one of said punches to provide a holder pocket for receiving therein one of the grip legs in each pair of one of the bottom end stops at a time, a bottom end stop feeder mounted
- 10 on said frame for supplying the bottom end stops one at a time into said holder pocket, and drive means disposed in said frame for actuating said feeder to supply one bottom end stop into said holder pocket, moving said one of the punches and said
- 15 clamp with the bottom end stop held in place to a position for setting the stringer tapes around the clamped bottom end stops, and actuating both of said punches toward each other to clinch the grip legs of the bottom end stop about the confronting
- 20 edges of the stringer tapes.

2. An apparatus according to claim 1, said frame having an opening in which said punches can coact with each other for attachment of the bottom end stop, said position being situated in said opening
- 25 and away from said punches before their actuation.

3. An apparatus according to claim 1 or 2, including stop means mounted on said frame for stopping said clamp at said position.

4. An apparatus according to claim 1, said clamping jaws being pivotally movable toward and away from each other and normally jointly defining a cavity receiving said one of the punches therein, and having projections which extend into said cavity and cooperate with said one of the punches in providing
- 35 said holder pocket.

5. An apparatus according to claim 4, said one of the punches being movable beyond said projections of said clamping jaws when said clamp is held in said position and said clamping jaws are moved
- 40 away from each other.

6. An apparatus substantially as herein described with reference to and as illustrated in Figures 3 to 10 inclusive of the accompanying drawings.

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