

SPECIFICATION

Device for Spreading Apart a Pair of Tapes

Description

The present invention relates to a device for spreading apart a pair of tapes such as a pair of sliding clasp fastener stringer tapes.

Sliders are installed onto a sliding clasp fastener chain through coupling-element-free gaps or spaces located at intervals in the chain, each of such spaces being widened by spreading apart the stringer tapes for accommodating the sliders one at a time therein. One known tape spreading device comprises a pair of tape gripping arms pivotally supported for moving the tapes away from each other. Such pivotally mounted arms, however, have a functional limitation such that they cannot be opened widely enough to permit easy mounting and removal of coupled fastener stringers, respectively, on and from the slider applying apparatus before and after a slider attaching operation.

According to the invention there is provided a device for spreading a pair of tapes apart, comprising: a frame having a table for supporting thereon the pair of tapes along a path; a pair of first grip members slidably mounted on said table and movable away from each other in a direction across said path, the pair of tapes being locatable on said first grip members, respectively; a shaft movably supported on said frame and drivable toward said table; a pair of second grip members operatively coupled with said shaft and facing said first grip members, respectively, said second grip members away from each other along said other along said direction; and means on said shaft for converting the motion of said shaft toward said table into the motion of said second grip members away from each other along said direction while said second grip members are pressed against said first grip members with the pair of tapes held therebetween.

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

Figure 1 is a front elevational view of a slider attaching apparatus having a tape spreading device constructed in accordance with the present invention;

Figure 2 is an enlarged perspective view of the tape spreading device;

Figure 3 is a front elevational view of the tape spreading device;

Figure 4 is a perspective view of a slider supplying unit;

Figures 5A to 5F inclusive are fragmentary rear elevational views of the tape spreading device, illustrative of successive positions of the working parts of the device; and

Figures 6A to 6D inclusive are fragmentary plan view successively showing the way in which a pair of stringer tapes are displaced away from and toward each other at a coupling-element-free space while the stringer chain is equipped with a slider.

The present invention is particularly useful when embodied in a device such as shown in Figure 1, generally indicated by the numeral 10.

The device 10 is employed for spreading apart a pair of tapes 12, 12 (Figure 3) such as a pair of sliding clasp fastener stringer tapes, and is contained in a slider attaching apparatus 11 including a slider supplying unit 13 operatively associated with the device 10. The slider attaching apparatus 11 has a frame 14, a first guide 15 having a pair of upper and lower guide plates 16, 17, a second guide 18 having a movable upper guide plate 19 and a fixed lower guide plate 20. The stringer tapes 12, 12 are transported through the first guide 15, the device 10, and the second guide 18 by a discharge roll unit 21 rotatably mounted on the frame 14. A motor housing 22 mounted on the frame 14 contains a motor (not shown) operatively coupled with a vertically reciprocable drive arm or shaft 23 through a suitable cam or link mechanism (not shown). The motor housing 22 is equipped with a vertical chute 24 along which a series of sliders 25 are fed to the slider supplying unit 13.

As shown in Figures 2 and 3, the device 10 essentially comprises an upper grip 27 supported on the drive shaft 23, a lower grip 28 slidably mounted on a table 29 fixed to the frame 14. The table 29 has a groove 30 for guiding the pair of stringer tapes 12, 12 to move therealong, a recess 31 in which the lower grip 28 is slidable, and a slot 26 located at the recess 31 in alignment with the groove 30. The lower grip 28 includes a pair of grip members 32, 33 horizontally movable toward and away from each other in a direction substantially perpendicular to the groove 30. The grip members 32, 33 are confined to such a motion by a retainer 34 and a pair of spaced retainers 35, 36, all bolted to the table 29. The retainer 34 has a central projection 37 acting as a spacer between the lower grip members 32, 33, the spacer 37 extending into the slot 26 in alignment with the groove 30.

The lower grip members 32, 33 have a pair of projections 38, 39 extending toward each other and acting as tape-edge pressers, the function of which will be described in detail, the projections 38, 39 being normally held against the spacer 37 to keep the lower grip members 32, 33 spaced apart from each other. The projections 38, 39 have a pair of tapered upper surfaces 80, 81, respectively, that are inclined downwardly toward the groove 30. The lower grip members 32, 33 have knurled or otherwise roughened grip surfaces 40, 41, respectively, disposed just behind the projections 38, 39. The grip surfaces 40, 41 are located one on each side of the slot 26 in the table 29 and are directed upwardly toward the upper grip 27. The lower grip members 32, 33 also have a pair of upwardly projecting ridges or teeth 42, 43, respectively, spaced from the grip surfaces 40, 41. A tension spring 44 acts between a pair of pins 45, 46 extending downwardly from the lower grip members 32, 33, respectively, and normally urges the lower grip

members 32, 33, towards each other, there being a pair of openings 47, 48 in the table 29 for accommodating the pins 45, 46, respectively.

The upper grip 27 comprises a pair of grip members 50, 51 pivotally mounted by a pair of pivot pins 52, 53, respectively, on a pair of crossing links 54, 55, respectively, pivotally mounted by a pivot pin 56 on a lower end of the drive shaft 23. The links 54, 55 have a pair of horizontal end portions 57, 58, respectively, extending away from each other, on which a pair of pins 59, 60 are mounted, respectively. A tension spring 61 acts between the pins 59, 60 and normally urges the end portions 57, 58 and hence the upper grip members 50, 51 toward each other. A pair of setscrews 62, 63 threadedly extend through a pair of vertical portions 64, 65 of the links 54, 55, respectively into abutting engagement with the drive shaft 23. By turning the setscrews 62, 63, the distance by which the upper grip members 50, 51 are spaced can be varied. The upper grip members 50, 51 have a pair of projections 66, 67, respectively, also functioning as tape-edge pressers and extending toward each other. A pair of knurled grip surfaces 68, 69 are provided on the upper grip members 50, 51, respectively, and are directed downwardly so as to face the lower grip surfaces 40, 41, respectively. The setscrews 62, 63 are adjusted so that the upper projections 66, 67 are vertically aligned with the lower projections 38, 39, respectively, and the upper grip surfaces 68, 69 are vertically aligned with the lower grip surfaces 40, 41, respectively. The upper grip members 50, 51 have a pair of notches 70, 71 respectively, opening downwardly for receiving the teeth 42, 43 on the lower grip members 32, 33 when the upper grip 27 is lowered into abutment against the lower grip 28.

A pair of pins 74, 75 are fixed to the end portions 57, 58 of the links 54, 55, respectively, and a pair of pins 76, 77 are fixed to the upper grip members 50, 51, there being a pair of tension springs 72, 73 extending between the pins 74, 76 and between the pins 75, 77, respectively, and normally urging the upper grip members 50, 51 respectively against the ends of a pair of setscrews 78, 79 threadedly extending through the end portions 57, 58 of the links 54, 55. The upper grip members 50, 51 are held substantially parallel to the lower grip members 32, 33 by turning the setscrews 78, 79.

The slider supplying unit 13 shown in Figures 1 and 4 comprises an outer ring 82 and an inner ring 83 disposed concentrically within the outer ring 82, the outer ring 82 having a first slider support member 84 and the inner ring 83 having a second slider support member 85 extending through the slot 26 in the table 29. The outer and inner rings 82, 83 are independently angularly movable by a suitable drive mechanism (not shown), which may comprise a rack and pinion for each ring 82, 83. The first and second slider support members 84, 85 jointly hold therebetween one of the sliders 25 as it is discharged from the chute 24. A central disk 86 is

mounted coaxially within the inner ring 83 and supports thereon the upper guide plate 19, the central disk 86 being angularly movable as by a rack-and-pinion mechanism (not shown).

As illustrated in Figures 5C, 5D and 6B, 6C, the slider 25 is composed of a pair of upper and lower wings or shields 90, 91 interconnected by a neck or separator 92, each of the wings 90, 91 having a pair of side flanges 93, 94. The neck 92 and the side flanges 93, 94 on the wings 90, 91 jointly provide a generally Y-shaped channel 95 in the slider 25 for the passage therethrough of a pair of rows of coupling elements. As best shown in Figures 6B and 6C, the slider 25 has a widened front end 96 at which the neck 92 is disposed, and a contracted rear end 97 located remotely from the front end 96. The Y-shaped guide channel 95 has a pair of throats 87, 88 one on each side of the neck 92.

As best shown in Figure 6A, the stringer tapes 12, 12 have a chain 100 of interengaged rows of coupling elements 101, 102 mounted respectively on their opposed beaded or bulged edges 103, 104, which are relatively stiff to provide rigid support for the coupling elements 101, 102. There are a plurality of coupling-element-free gaps or spaces 105 (Figures 6A and 6D) in the chain 100 which are located at spaced intervals therealong.

The operation of the apparatus 10 will now be described. The stringer tapes 12, 12 are transported through the first and second tape guides 15, 18 until one of the element-free gaps 105 is positioned over the slot 26 in the table 29, that is, between the upper and lower grips 27, 28, at which time the tapes 12, 12 are disposed on the lower grip surfaces 40, 41, respectively, (Figures 5A and 6A) with the projections 38, 39 just behind the beaded edges 103, 104, respectively. The drive shaft 23 is lowered to cause the upper grip surfaces 68, 69 to be pressed against the tapes 12, 12 on the lower grip surfaces 40, 41, whereupon the teeth 42, 43 is received in the notches 70, 71, respectively (Figure 5B). At this time, the projections 66, 67 on the upper grips 50, 51 are positioned just behind the beaded tape edges 103, 104, respectively. The drive shaft 23 is further depressed to cause the links 54, 55 to start collapsing with the setscrews 62, 63 disengaged from the shaft 23 and the end portions 57, 58 moving apart, thereby enabling the upper grip members 50, 51 to horizontally move apart from each other against the bias of the spring 61. The lower grip members 32, 33, with their teeth 42, 43 in the notches 70, 71, move apart with the spreading movement of the upper grip members 50, 51, whereby the stringer tapes 12, 12 firmly sandwiched or gripped between the upper grip surfaces 68, 69 and the lower grip surfaces 40, 41 become spread open (Figure 5C).

Then, the inner ring 83 is angularly moved to allow the second slider support member 85 to pass through the slot 26 in the table 29 and the gap 105 held open toward the first slider support member 84 that is disposed below

the chute 24. One of the sliders 25 that is discharged from the chute 24 is held between the first and second grip members 84, 85, and then is brought downwardly by simultaneous angular movement of the outer and inner rings 82, 83 toward a position just between the separated tapes 12, 12 (Figures 5C and 6B). The drive shaft 23 is now raised to permit the upper grip members 50, 51 and hence the lower grip members 32, 33 to move toward each other under the force of the spring 61 until the set-screws 62, 63 on the links 54, 55 abut against the drive shaft 23. At this time, the stringer tapes 12, 12 move toward each other until the projections 38, 39 and 66, 67 press or urge the beaded edges 103, 104 closely together in front of the neck 92 of the slider 25 with portions of the beaded edges 103, 104 held against the side flanges 93, 94 and extending across the throats 87, 88 of the slider 25 (Figure 6C). The drive shaft 23 is then slightly lifted to raise the upper grip members 50, 51 (Figure 5D) to such an extent that the tapes 12, 12 can longitudinally move between the upper grip surfaces 68, 69 and the lower grip surfaces 40, 41 and at the same time the beaded edges 103, 104 can still be held together by the upper projections 66, 67 and the lower projections 38, 39.

The stringer tapes 12, 12 are pulled along by the discharge roll unit 21 in the direction of the arrow 89 (Figure 6C) until the end of the rows of coupling elements 101, 102 abuts against projections 38, 39 and 66, 67 (Figure 5E). The advancing movement of the tapes 12, 12 is temporarily stopped, and then the drive shaft 23 is retracted upwardly to lift the upper grip members 50, 51 further away from the lower grip members 32, 33 (Figure 5F). The stringer tapes 12, 12 are progressed again, whereupon the rows of coupling elements 101, 102 move onto and slide along the tapered surfaces 80, 81, and are separated by the slider neck 92 as they enter the slider 25 through the throats 87, 88, with the beaded edges 103, 104 being squeezed between the side flanges 93, 93 and between the side flanges 94, 94, respectively, into the slider 25. The stringer tapes 12, 12 are continuously pulled to cause the rows of coupling elements 103, 104 to become interengaged again as they are issued out of the slider 25 from its contracted rear end 97 (Figure 6D). The outer and inner rings 82, 83 then are angularly moved in opposite directions such that the slider support members 84, 85 move away from each other to release the slider 25. One cycle of operation is thus completed.

Claims

1. A device for spreading a pair of tapes apart, comprising; a frame having a tape for supporting thereon the pair of tapes along a path; a pair of first grip members slidably mounted on said table and movable away from each other in a direction across said path, the pair of tapes being locatable

on said first grip members, respectively; a shaft movably supported on said frame and drivable toward said table; a pair of second grip members operatively coupled with said shaft and facing said first grip members, respectively, said second grip members being movable away from each other along said direction; and means on said shaft for converting the motion of said shaft toward said table into the motion of said second grip members away from each other along said direction while said second grip members are pressed against said first grip members with the pair of tapes held therebetween.

2. A device according to claim 1, each of said first grip members having a first knurled surface, each of said second grip members having a second knurled surface, said first and second knurled surfaces confronting each other for jointly gripping corresponding one of the tapes therebetween when said first and second grip members are pressed against each other.

3. A device according to claim 1, including means on said first and second grip members for locking them together against their relative movement during the motion of said first grip members away from each other.

4. A device according to claim 3, said means comprising a pair of teeth respectively on said first grip members, said second grip members having a pair of notches for receiving said teeth, respectively.

5. A device according to claim 1, including spring means acting between said first grip members and urging them toward each other.

6. A device according to claim 1, said means comprising a pair of crossing links pivotally connected to said shaft at a position between their ends, said second grip members being supported on said links, respectively.

7. A device according to claim 6, each of said second grip members being pivotally mounted on one of said links, further including a setscrew extending through each of said links, and spring means acting between each of said links and corresponding one of said second grip members and urging said one of the second grip members against the end of said setscrew so as to keep said second grip members substantially parallel to said first grip members.

8. A device according to claim 6, including spring means acting between said links and urging said second grip members toward each other.

9. A device according to claim 8, including means on said links limiting the movement of said second grip members toward each other.

10. A device according to claim 9, said limiting means comprising a pair of setscrews extending through said links into abutment against said shaft.

11. A device substantially as herein described with reference to and as illustrated in the accompanying drawings.



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on said first grip members, respectively; a shaft movably supported on said frame and drivable toward said table; a pair of second grip members operatively coupled with said shaft and facing said first grip members, respectively, said second grip members being movable away from each other along said direction; and means on said shaft for converting the motion of said shaft toward said table into the motion of said second grip members away from each other along said direction while said second grip members are pressed against said first grip members with the pair of tapes held therebetween.

2. A device according to claim 1, each of said first grip members having a first knurled surface, each of said second grip members having a second knurled surface, said first and second knurled surfaces confronting each other for jointly gripping corresponding one of the tapes therebetween when said first and second grip members are pressed against each other.

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