

Description

The invention relates to an apparatus for feeding and transferring discrete coupling elements each having a head portion and a pair of bifurcated leg portions successively one at a time onto a stringer tape, which apparatus comprises a feed unit including a vertically disposed feed chute having an elongate vertical opening, a transfer unit including a first slide and a second slide both supported on a base for horizontal reciprocating movement and defining therebetween a pocket registrable with said vertical opening a transfer chute integral with said base and having a vertical opening for receiving an element from said pocket and transferring the same onto said tape, and means connected to said second slide and adapted to effect horizontal reciprocating movement of said slides. An apparatus of this type is disclosed in US-A-2 003 146 which forms the base of independent claim 1. In this conventional apparatus for feeding and transferring discrete coupling elements both first and second slides are disposed on the upstream side of the chute and the bottom end of the chute is spaced from the base by a distance slightly longer than the height of the coupling elements. A difficulty of this prior art is that the coupling elements are susceptible to damage. This problem would be more critical when handling coupling elements which are chemically treated or plated.

The present invention seeks to provide an apparatus for feeding slide fastener elements which is capable of transferring a series of discrete coupling elements successively one at a time efficiently and accurately onto a stringer tape without impairing the elements.

An apparatus of the kind mentioned above satisfying this requirement is characterized in claim 1.

In the apparatus according to the invention the bottom end of the chute is spaced from the upper surface of the base with an upstream half end portion spaced by a distance slightly shorter than the height of the element and a downstream half end portion spaced by a distance slightly longer than the height of the element such that the first slide can move a leading or lowermost element forwardly without interference to a next ensuing element and that the second slide can move clear past the downstream side of the chute and cause the first slide to retract to the original feed position.

Preferred embodiments of the invention are set out in dependent claims 2,3,4.

The above and other objects and features of the invention will be more apparent from the following detailed description taken in conjunction with the accompanying drawings.

Figure 1 is a perspective view of an apparatus for feeding and attaching a series of coupling elements onto a stringer tape which is constructed

in accordance with the principles of the invention; Figure 2 is a diagrammatic sectional view of a major portion of the apparatus of Figure 1;

Figure 3 is a diagrammatic sectional view of a portion of the apparatus of Figure 1, schematically showing the apparatus in one phase of operation;

Figure 4 is a view similar to Figure 3 but showing the apparatus in another phase of operation;

Figure 5 is a diagrammatic elevational view of a coupling element mounted astride a tape edge;

Figure 6 is a diagrammatic elevational view of the coupling element shown clamped onto the tape;

Figure 7 is a diagrammatic sectional view of a lower portion of a supply chute, schematically showing a succession of coupling elements arrayed out of alignment; and

Figure 8 is a diagrammatic sectional view similar to Figure 7 but showing a series of coupling elements configured to fit snugly with each other.

Referring now to the drawings and Figure 1 in particular, there is shown an apparatus 10 embodying the invention which comprises a feed unit 11 and a transfer unit 12. The feed unit 11 includes a vertically disposed feed chute 13 having an elongate vertical opening 13a dimensioned to accommodate a number of vertically aligned coupling elements E supplied from a parts feeder or hopper located up above (not shown). The elements E are made of a metallic or other pliable material and each have a coupling head portion Ea and a pair of bifurcated leg portions Eb. They are let fall by own gravity in succession with the leg portions Eb of one element E directed downwardly in confrontation with the head portion Ea of a preceding element E.

The transfer unit 12 comprises a first or feed slide 14 and a second or feedback slide 15 both supported on a base 16 for horizontal reciprocating movement thereon. The first slide 14 has a rear end 14a recessed from both sides to form abutments 17 for abutting engagement with respective ends of a pair of spaced longitudinal arms 18 integral with the second slide 15 and defining therebetween and with a transverse shoulder wall 19 a rectangular opening 20 for receiving the first slide 14. When the arms 18 are brought into abutting engagement with the abutments 17, the first slide 14 is disposed with its front end wall 14b spaced from the shoulder wall 19 of the second slide 15 so as to provide a pocket 21 dimensioned to receive a coupling element E of a given size.

An elongate longitudinal slot 22 is formed in the second slide 15 in communication with the square opening 20 for receiving therethrough a vertically movable positioning bar 23 later described.

A compression spring 24 is connected to the rear end 14a of the first slide 14 for normally urging the latter toward the second slide 15.

As better shown in Figures 3 and 4, the bottom

end of the chute 13 is spaced from the upper surface of the base 16 with an upstream or left side half end portion 13b (as viewed in the drawings) spaced by a distance slightly shorter than the height of the element E and a downstream or right side half end portion 13c spaced by a distance slightly longer than the height of the element E such that the first slide 14 can move a leading or lowermost element E₁ forwardly without interference to a next ensuing element E₂ and that the second slide 15 can move clear past the downstream side of the chute 13 and cause the first slide 14 to retract to the original feed position against the tension of the spring 24. To this end, the thickness of the first slide 14 is substantially equal to the height of the leg portions Eb of the element E.

Horizontal movement of the second slide 15 is effected by a controlled drive means comprising a drive cam 25 and its associated cam follower 26 as shown in Figure 2. The cam 25 is in the form of a generally rectangular plate having a downwardly sloped cam surface 25a and vertical straight cam surfaces 25b and 25c and the cam follower 26 is in the form of a roller supported rotatably on one end of a vertical bar 27 whose other end is secured to the rear end of the second slide 15. The cam 25 is vertically moved by suitable drive means not shown.

When the cam 25 moves upwardly with its sloped cam surface 25a coming into sliding engagement with the cam follower 26, the second slide 15 is moved rightward (as viewed in the drawings) or progressively retracted away from the chute 13 by the action of the compression spring 24. Conversely, downward movement of the cam 25 with its sloped cam surface 25a in contact with the cam follower 26 causes the second slide 15 to move leftward (as viewed in the drawings) or progressively advance toward the chute 13.

Designated at 28 is an element receiving and transfer chute integral with and extending downwardly from the base 16 and having a vertical opening 29 for receiving an element E and an elongate slot 30 registrable with the slot 22 in the second slide 15 for the passage therethrough of the positioning bar 23.

Designated at 31 is a slit formed in the base 16 in registry with the opening 13a of the feed chute 13 for providing a suction air from a suction device (not shown) whereby a leading element E₁ is attracted into the pocket 21 in the second slide 15.

With this construction of the apparatus 10, a leading fastener element E₁ is let fall by gravity (with the aid of the suction air through the slit 31) into the pocket 21 as shown in Figure 3, whereupon the cam 25 is actuated in one direction so as to move the slides 14 and 15 forwardly until the leading element E₁ comes in registry with and falls through the opening 29 as shown in Figure 4. The element E₁ is then mounted on a stringer tape T with its bifurcated legs Eb astride over a longitudinal beaded edge Ta of the

tape as shown in Figure 5. The element E, as it is mounted on the tape T, is held in place by the positioning bar 23 which has descended through the slots 22 and 30 and by a pair of retaining bars 32, 32 and clamped firmly to the tape T by a pair of punches 33, 33 as shown in Figure 6. This is followed by inching movement of the tape T for a distance substantially corresponding to one element E in the direction of the arrow as shown in Figure 1. This inching movement is timed with the actuation of the cam 25 in the other direction so as to move the slides 14 and 15 backwardly to their original positions shown in Figures 2 and 3 with the pocket 21 aligned with the opening 13a of the feed chute 13 for receiving the next succeeding element E₂ from the feed chute 13.

The above cycle of operation is repeated whereby discrete coupling elements E are fed, transferred and attached in succession to the stringer tape T, and this operation can be carried out efficiently and accurately even in the event that the elements E are misaligned as shown in Figure 7, or the elements E are shaped to fit snugly over each other as shown in Figure 8.

Claims

1. An apparatus (10) for feeding and transferring discrete coupling elements (E) each having a head portion (Ea) and a pair of bifurcated leg portions (Eb) successively one at a time onto a stringer tape (T), which apparatus comprises a feed unit (11) including a vertically disposed feed chute (13) having an elongate vertical opening (13a), a transfer unit (12) including a first slide (14) and a second slide (15) both supported on a base (16) for horizontal reciprocating movement and defining therebetween a pocket (21) registrable with said vertical opening (13a), a transfer chute (28) integral with said base (16) and having a vertical opening (29) for receiving an element (E) from said pocket (21) and transferring the same onto said tape (T), and means (25, 26) connected to said second slide (15) and adapted to effect horizontal reciprocating movement of said slides (14, 15), characterized in that said chute (13) has its bottom end spaced from said base (16) with an upstream half end portion (13b) spaced by a distance slightly shorter than the height of said element (E) and with a downstream half end portion (13c) spaced by a distance slightly longer than the height of said element (E).
2. An apparatus according to claim 1 characterized in that the thickness of said first slide (14) is substantially equal to the height of the leg portions (Eb) of said element (E).



end of the chute 13 is spaced from the upper surface of the base 16 with an upstream or left side half end portion 13b (as viewed in the drawings) spaced by a distance slightly shorter than the height of the element E and a downstream or right side half end portion 13c spaced by a distance slightly longer than the height of the element E such that the first slide 14 can move a leading or lowermost element E_1 forwardly without interference to a next ensuing element E_2 and that the second slide 15 can move clear past the downstream side of the chute 13 and cause the first slide 14 to retract to the original feed position against the tension of the spring 24. To this end, the thickness of the first slide 14 is substantially equal to the height of the leg portions Eb of the element E.

Horizontal movement of the second slide 15 is effected by a controlled drive means comprising a drive cam 25 and its associated cam follower 26 as shown in Figure 2. The cam 25 is in the form of a generally rectangular plate having a downwardly sloped cam surface 25a and vertical straight cam surfaces 25b and 25c and the cam follower 26 is in the form of a roller supported rotatably on one end of a vertical bar 27 whose other end is secured to the rear end of the second slide 15. The cam 25 is vertically moved by suitable drive means not shown.

When the cam 25 moves upwardly with its sloped cam surface 25a coming into sliding engagement with the cam follower 26, the second slide 15 is moved rightward (as viewed in the drawings) or progressively retracted away from the chute 13 by the action of the compression spring 24. Conversely, downward movement of the cam 25 with its sloped cam surface 25a in contact with the cam follower 26 causes the second slide 15 to move leftward (as viewed in the drawings) or progressively advance toward the chute 13.

Designated at 28 is an element receiving and transfer chute integral with and extending downwardly from the base 16 and having a vertical opening 29 for receiving an element E and an elongate slot 30 registrable with the slot 22 in the second slide 15 for the passage therethrough of the positioning bar 23.

Designated at 31 is a slit formed in the base 16 in registry with the opening 13a of the feed chute 13 for providing a suction air from a suction device (not shown) whereby a leading element E_1 is attracted into the pocket 21 in the second slide 15.

With this construction of the apparatus 10, a leading fastener element E_1 is let fall by gravity (with the aid of the suction air through the slit 31) into the pocket 21 as shown in Figure 3, whereupon the cam 25 is actuated in one direction so as to move the slides 14 and 15 forwardly until the leading element E_1 comes in registry with and falls through the opening 29 as shown in Figure 4. The element E_1 is then mounted on a stringer tape T with its bifurcated legs Eb astride over a longitudinal beaded edge Ta of the

tape as shown in Figure 5. The element E, as it is mounted on the tape T, is held in place by the positioning bar 23 which has descended through the slots 22 and 30 and by a pair of retaining bars 32, 32 and clamped firmly to the tape T by a pair of punches 33, 33 as shown in Figure 6. This is followed by inching movement of the tape T for a distance substantially corresponding to one element E in the direction of the arrow as shown in Figure 1. This inching movement is timed with the actuation of the cam 25 in the other direction so as to move the slides 14 and 15 backwardly to their original positions shown in Figures 2 and 3 with the pocket 21 aligned with the opening 13a of the feed chute 13 for receiving the next succeeding element E_2 from the feed chute 13.

The above cycle of operation is repeated whereby discrete coupling elements E are fed, transferred and attached in succession to the stringer tape T, and this operation can be carried out efficiently and accurately even in the event that the elements E are misaligned as shown in Figure 7, or the elements E are shaped to fit snugly over each other as shown in Figure 8.

Claims

1. An apparatus (10) for feeding and transferring discrete coupling elements (E) each having a head portion (Ea) and a pair of bifurcated leg portions (Eb) successively one at a time onto a stringer tape (T), which apparatus comprises a feed unit (11) including a vertically disposed feed chute (13) having an elongate vertical opening (13a), a transfer unit (12) including a first slide (14) and a second slide (15) both supported on a base (16) for horizontal reciprocating movement and defining therebetween a pocket (21) registrable with said vertical opening (13a), a transfer chute (28) integral with said base (16) and having a vertical opening (29) for receiving an element (E) from said pocket (21) and transferring the same onto said tape (T), and means (25, 26) connected to said second slide (15) and adapted to effect horizontal reciprocating movement of said slides (14, 15), characterized in that said chute (13) has its bottom end spaced from said base (16) with an upstream half end portion (13b) spaced by a distance slightly shorter than the height of said element (E) and with a downstream half end portion (13c) spaced by a distance slightly longer than the height of said element (E).
2. An apparatus according to claim 1 characterized in that the thickness of said first slide (14) is substantially equal to the height of the leg portions (Eb) of said element (E).



3. An apparatus according to claim 1 characterized in that said base (16) has a vertical slit (31) located in registry with said opening (13a) and adapted to provide a suction air to attract a leading one (E₁) of said elements (E) into said pocket (21).
4. An apparatus according to claim 1 characterized in that said means (25, 26) comprise a vertically movable plate cam (25) having a downwardly sloped cam surface (25b) and a cam follower (26) in the form of a roller rotatable in contact with said cam (25).

Patentansprüche

1. Vorrichtung (10) zum aufeinanderfolgenden einzelnen Zuführen und Überführen einzelner Kuppelglieder (E), die jeweils einen Kopfbereich (Ea) und zwei gegabelte Schenkelbereiche (Eb) haben, zu einem Reißverschlußband (T), umfassend eine Zuführeinheit (11) mit einer vertikal angeordneten Zuführrrutsche (13), die eine längliche vertikale Öffnung (13a) hat, eine Überführungseinheit (12) mit einem ersten Schlitten (14) und einem zweiten Schlitten (15), die beide auf einer Basis (16) zu einer hin- und hergehenden horizontalen Bewegung abgestützt sind und zwischen sich eine Tasche (21) begrenzen, die mit der vertikalen Öffnung (13a) zur Deckung bringbar ist, eine Überführungsrrutsche (28), die mit der Basis (16) einstückig ausgebildet ist und eine vertikale Öffnung (29) zur Aufnahme eines Kuppelglieds (E) von der Tasche (21) und zur Überführung desselben auf das Tragband (T) aufweist, und Mittel (25, 26), die mit dem zweiten Schlitten (15) verbunden und geeignet sind, eine hin- und hergehende horizontale Bewegung der Schlitten (14, 15) zu bewirken, dadurch gekennzeichnet, daß das untere Ende der Rutsche (13) von der Basis (16) im Abstand angeordnet ist, wobei ein stromaufwärts liegender Halbbereich (13b) in einem Abstand angeordnet ist, der geringfügig kürzer ist als die Höhe des Kuppelglieds (E) und wobei ein stromabwärts liegender Halbbereich (13c) in einem Abstand angeordnet ist, der geringfügig länger ist als die Höhe des Kuppelglieds (E).
2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Dicke des ersten Schlittens (14) im wesentlichen der Höhe der Schenkelbereiche (Eb) des Kuppelglieds (E) entspricht.
3. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Basis (16) einen vertikalen Schlitz (31) hat, der mit der Öffnung (13a) fluchtet

und geeignet ist, Luft anzusaugen, um ein vorderes (E₁) der Kuppelglieder (E) in die Tasche (21) zu ziehen.

4. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die besagten Mittel (25, 26) eine vertikal bewegliche Steuerkurvenplatte (25) mit einer nach unten abfallenden Steuerkurvenfläche (25b) und einen Kurvennachläufer (26) in Form einer auf der Steuerkurve (25) abrollenden Rolle umfassen.

Revendications

1. Appareil (10) pour amener et transférer des éléments d'accouplement distincts (E) ayant chacun une partie formant tête (Ea) et une paire de parties dérivées formant branches (Eb), les uns après les autres et un à la fois, sur un ruban support (T), appareil qui comprend une unité d'amenée (11) incluant une goulotte d'amenée (13) disposée verticalement avec une ouverture (13a) verticale et allongée, une unité de transfert (12) incluant une première coulisse (14) et une seconde coulisse (15) toutes deux supportées sur une base (16) en vue d'un mouvement horizontal en va-et-vient et définissant entre elles une poche (21) qui peut être mise en correspondance avec ladite ouverture verticale (13a), une goulotte de transfert (28) intégrée à ladite base (16) et comportant une ouverture verticale (29) pour recevoir un élément (E) en provenance de ladite poche (21) et transférer celui-ci sur ledit ruban (T), et des moyens (25, 26) reliés à ladite seconde coulisse (15) et aptes à provoquer le mouvement horizontal en va-et-vient desdites coulisses (14, 15),
caractérisé en ce que ladite goulotte (13) a son extrémité inférieure espacée de ladite base (16) avec une partie formant demi-extrémité amont (13b) située à une distance légèrement inférieure à la hauteur dudit élément (E) et avec une partie formant demi-extrémité aval (13c) située à une distance légèrement supérieure à la hauteur dudit élément (E).
2. Appareil selon la revendication 1, caractérisé en ce que l'épaisseur de ladite première coulisse (14) est sensiblement égale à la hauteur des parties formant branches (Eb) dudit élément (E).
3. Appareil selon la revendication 1, caractérisé en ce que ladite base (16) comporte une fente verticale (31) située en correspondance avec ladite ouverture (13a) et apte à fournir de l'air d'aspiration pour attirer l'élément menant (E₁) desdits éléments (E) dans ladite poche (21).



4. Appareil selon la revendication 1, caractérisé en ce que lesdits moyens (25, 26) comprennent une came plate (25) déplaçable verticalement qui comporte une surface (25a) de came inclinée vers le bas et un suiveur de came (26) ayant la forme d'un rouleau qui peut tourner au contact avec ladite came (25).

5

10

15

20

25

30

35

40

45

50

55

5