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~~Title:-~~ PULL TAB FEEDER FOR A MACHINE FOR
ASSEMBLING SLIDE FASTENER SLIDERS

~~Description:-~~

The present invention relates to a pull tab
5 feeder for automatically feeding pull tabs successively
by gravity to a machine for successively assembling
sliders for slide fasteners.

One known pull tab feeder for use with a machine
for assembling slide fastener sliders is disclosed in
10 Japanese Patent Publication No. 57-41243 published
September 2, 1982. The conventional pull tab feeder
which automatically delivers a pull tab by gravity to
the machine includes a first pin disposed for insertion
in a hole defined in the lowermost pull tab positioned
15 in the supply slot of a chute, a second pin disposed
for engaging the lower end of the lowermost pull tab in
the supply slot, and a third pin disposed for insertion
in a hole defined in a pull tab located immediately
above the lowermost pull tab.

20 The second and third pins are supported on a
swing bar which is angularly movable in response to
vertical movement of a cam for positioning each of the
pins between an engaging position and a releasing
position. When the swing bar is angularly moved, the
25 second and third pins are caused thereby to alternately
hold the corresponding pull tabs for thereby allowing
the pull tabs to drop one by one by gravity off the

chute onto the machine.

The swing bar is constructed as a unitary component, and the lowermost pull tab on the chute and the pull tab positioned immediately thereabove are held in position by the pins. It has
5 been difficult to establish precise timing for carrying out operation of the swing bar and hence the pins in synchronism with intermittent angular movement of slider bodies which is brought about by a drive shaft. The third pin which is required to extend through pull tab
10 holes must be changed in position if a different pull tab configuration or dimension is employed. Furthermore, the third pin has failed to provide sufficient forces to hold or press the pull tabs against the chute.

According to the present invention, there is provided a pull tab feeder for successively feeding pull tabs to a machine for
15 assembling sliders for slide fasteners, comprising: a chute having a supply slot for containing an array of pull tabs longitudinally therein; a first swing bar angularly movably supported on said chute and having a projection on one end thereof for engaging an end of an endmost pull tab of said array and a first roller on the other
20 end thereof; a second swing bar angularly movably supported on said chute parallel to said first swing bar and having an abutment piece on an end portion thereof for abutment against a surface of a next pull tab following said endmost pull tab and a second roller on the other end thereof; a first spring for normally urging said first
25 swing bar to keep said projection in engagement with the end of said endmost pull tab; a second spring for normally urging said second swing bar to keep said abutment piece in abutment against the surface of said next pull tab; a first cam including a raised portion and

movable for engaging said first roller against the resiliency of
said first spring; a second cam including a raised portion and movable
for engaging said second roller against the resiliency of said second
spring; and said raised portions of said first and second cams being
5 displaced from each other such that said projection and said abutment
piece will alternately engage and release said endmost and next pull
tabs, respectively.

It is believed possible by means of the present invention
to provide a pull tab feeder capable of reliably holding pull tabs
10 and then feeding them one by one by gravity onto a machine for
assembling slide fastener sliders.

The invention will be described by way of example with reference
to the accompanying drawings, wherein like references refer to like
parts unless the context requires otherwise and wherein

15 Figure 1 is a righthand side elevational view,

partly broken away, of a pull tab feeder embodying the present invention, showing a projection in an engaging position and an abutment piece in a releasing position;

Figure 2 is a view similar to Figure 1, illustrating the projection in a releasing position and the abutment piece in an engaging position;

Figure 3 is a lefthand side elevational view of the pull tab feeder;

Figure 4 is a cross-sectional view taken along line IV - IV of Figure 1;

Figure 5 is a cross-sectional view taken along line V - V of Figure 1;

Figure 6 is a perspective view of the pull tab feeder;

Figure 7A is a perspective view of a pull tab which is being fed by gravity toward a slider body;

Figure 7B is a perspective view of a pull tab which is attached to a slider body; and

Figure 8 is a front elevational view, partly broken away, of an array of pull tabs disposed in the supply slot of a chute.

The present invention is particularly useful when embodied in a pull tab feeder generally designated by the reference numeral 10 in Figures 1 through 3 and 6.

As shown in Figures 1 and 2, the pull tab feeder 10 includes a chute 11 mounted on and extending

upwardly from a machine base (not shown). The chute 11 has a supply slot 12 for accommodating an array of pull tabs A longitudinally therein, the supply slot 12 being preferably defined in a longitudinal side surface thereof by a pair of elongate plates or strips as better shown in Figure 6. The supply slot 12 has a lower end opening downwardly toward a rotatable base 13 having a plurality of recesses 14 (only one shown) defined on an upper surface thereof, the recesses 14 being arranged as a circular array. The lower end of the supply slot 12 is in registration with one of the recesses 14 when the base 13 is held at rest. The recesses 14 serve to receive slider bodies S (Figures 7A and 7B) respectively therein.

A substantially U-shaped bracket 15 is attached to the chute 11 in surrounding relation thereto, the bracket 15 having a pair of parallel legs 16, 17 (better shown in Figure 6) disposed against the opposite sides of the chute 11. The legs 16, 17 have free ends spaced from the chute 11 and interconnected by a pivot shaft 18 spaced from the chute 11 in overlying relation to the supply slot 12.

First and second parallel swing bars 19, 20 are pivotally mounted on the pivot shaft 18. The first and second bars 19, 20 are spaced from each other in the axial direction of the pivot shaft 18 and extend substantially along the chute 11.

A projection 21 (hereinafter called a "pin 21") is adjustably mounted on the lower end of the first swing bar 19 by means of a bolt 22. The pin 21 has a narrower free end 21a directed toward the supply slot 12. A first roller or cam follower 23 is rotatably mounted on the upper end of the first swing bar 19 by means of a shaft 24. An abutment piece 25 (hereinafter called a "plate 25") is adjustably mounted on a lower portion of the second swing bar 20 by means of a bolt 26. The abutment plate 25 is vertically aligned with the pin 21 and has a flat end 25a directed toward the supply slot 12. A second roller or cam follower 27 is rotatably mounted on the upper end of the second swing bar 20 by means of a shaft 28. The pin 21 and the abutment plate 25 are positionally adjustably with respect to the first and second swing bars 19, 20, respectively, in the longitudinal direction thereof to meet different shapes and dimensions of pull tabs to be fed by the pull tab feeder 10. Such positional adjustment may be accomplished, for example, by providing longitudinal slots in the first and second swing bars 19, 20, inserting the bolts 22, 26 in such slots, and tightening the bolts 22, 26 after they have been positioned appropriately.

As shown in Figure 3, a first tension spring 29 is attached to and extends between a bolt 30 fastened to the leg 17 of the bracket 15 and a bolt 31 fastened to the first swing bar 19 immediately above the bolt 22. Therefore, the pin 21 is normally urged by the

first spring 29 to move into the supply slot 12. As illustrated in Figures 1, 2 and 6, a second tension spring 32 is attached to and extends between a bolt 33 fastened to the leg 16 of the bracket 15 and a bolt 34 fastened to the second swing bar 20 immediately below the bolt 26. The second spring 32 normally urges the abutment plate 25 to move into the supply slot 12.

As shown in Figures 1 through 3, first and second parallel cams 35, 36 are mounted on a vertical arm 37 of a support 38 which is secured by a bolt 39 to an upper surface of a block 40 that is vertically moved by the central drive shaft (not shown) of the base 13. The first cam 35 has an upper raised portion 41 vertically extending over a substantially upper half of the first cam 35 for engagement with the first roller 23. Similarly, the second cam 36 has a lower raised portion 42 vertically extending over a substantially lower half of the second cam 36 for engagement with the second roller 27. Therefore, the upper and lower raised portions 41, 42 of the first and second cams 35, 36 are vertically displaced out of mutual horizontal alignment with each other.

Preferably, the first and second cams 35, 36 are individually adjustable in position with respect to the vertical arm 37 so that timing for angular movement of the first and second swing bars 19, 20 can be precisely adjusted to enable the first and second swing bars 19,

20 to operate in a well coordinated fashion for reliably dropping one pull tab at a time onto the base 13.

The pin 21 and the abutment plate 25 may be made of metal. However, the abutment plate 25 in particular is preferably made of a suitable elastomeric material such as rubber or soft synthetic resin. Use of elastomeric materials is advantageous since the abutment plate 25 can well hold the pull tab A especially where the surface of the pull tab A which is to be engaged by the abutment plate 25 has an irregular surface impressed with letters, numerals, and/or a pattern.

Operation of the pull tab feeder 10 thus constructed is as follows:

Individual pull tabs A are accommodated in a row in the supply slot 12 of the chute 11. In the position shown in Figures 1, 3, 4, 5 and 8, the first roller 23 is positioned out of engagement with the first cam 35, and the pin 21 on the first swing bar 19 is biased by the first spring 29 to engage the bottom of the supply slot 12 and hence the lower end of the lowermost pull tab A1 in the supply slot 12. At this time, the second roller 27 engages the lower raised portion 42 of the second cam 36 to lift the abutment plate 25 on the second swing bar 20 out of engagement with the following pull tab A2 located immediately above the

lowermost pull tab A1. The pull tabs A1, A2 are therefore successively positioned in the supply slot 12 near the lower end of the chute 11.

The base 13 is rotated by its central drive shaft to bring one of the recesses 14 with a slider body S received therein to a position directly below the lower end of the supply slot 12. In response to such turning movement of the drive shaft of the base 13, the block 40 is lowered as shown in Figure 2 to lower the first cam 35 to displace the upper raised portion 41 into engagement with the first roller 23. The first roller 23 is therefore laterally shifted by the upper raised portion 41 toward the chute 11, thus turning the first swing bar 19 clockwise (Figure 2) about the pivot shaft 18 to lift the pin 21 off the lower end of the lowermost pull tab A1. The pull tab A1 is therefore allowed to drop or slide by gravity from the supply slot 12 toward the slider body S in the recess 14, as shown in Figures 2 and 7A. The pull tab A1 thus fed by gravity from the supply slot 12 has its attachment frame 43 placed between lugs 44 on the slider body S. Then, the pull tab A1 falls against the upper surface of the slider body S. The pull tab A1 can subsequently be securely attached to the slider body S by deforming the lugs 44 into gripping engagement with the attachment frame 43, as shown in Figure 7B.

Simultaneously with that the first cam 35 displaces the first roller 23, the second cam 36 is also lowered to move the lower raised portion 42 thereof downwardly out of engagement with the second roller 27. The second swing bar 20 is now urged by the second spring 32 to turn counter-clockwise (Figure 2) about the pivot shaft 18 until the abutment plate 25 abuts against the surface of the next pull tab A2 to hold this pull tab in position in the supply slot 12.

Thereafter, the block 40 is raised again to cause the upper raised portion 41 of the first cam 35 to disengage from the first roller 23 and also to cause the lower raised portion 42 of the second cam 36 to engage the second roller 27, as shown in Figures 1 and 3. The first swing bar 19 is forced by the first spring 29 to turn clockwise (Figure 3) about the pivot shaft 18 to move the pin 21 into engagement with the bottom of the supply slot 12. Concurrently with this, the second swing bar 20 is turned clockwise (Figure 1) about the pivot shaft 18 to lift the abutment plate 25 off the surface of the next pull tab A2. The pull tab A2 is therefore allowed to slide down by gravity along the supply slot 12 until it is engaged by the pin 21 which is now positioned in the supply slot 12.

As the pull tab A2 is thus fed by gravity to the lowermost position in the supply slot 12, the successive pull tabs A following the pull tab A2 are

allowed to fall by gravity to respective lower positions. Therefore, the pull tabs A remain stored as a successive array in the supply slot 12 for immediate delivery out of the chute 11.

- 5 The aforesaid cycle of operation is repeated to feed the pull tabs successively onto the base 13 so that they can successively be applied to the slider bodies S received respectively in the recesses 14.

 The pull tab feeder 10 of the above construction and operation is advantageous for the following reasons:

- The pin 21 on the first swing bar 19 and the abutment plate 25 on the second swing bar 20 are independently swingable alternately between a position
15 to engage the pull tab A1 or A2 and a position to release the pull tab A1 or A2. Therefore, it is relatively easy to adjust timing for positioning each of the recesses 14 immediately below the lower end of the supply slot 12 of the chute 11. The pull tabs A
20 can reliably drop or slide off the chute 11 since the first and second swing bars 19, 20 are alternately actuated by the first and second cams 35, 36.

 Inasmuch as the abutment plate 25 on the second swing bar 36 is held endways against the surface of
25 each of the pull tabs A, the abutment plate 25 can engage and hold the pull tab without fail, irrespective of the position of the hole, the shape, and the

structure of the pull tab A. Where the abutment plate
25 is made of an elastomeric material such as rubber or
soft synthetic resin, the abutment plate 25 can
reliably engage and hold the pull tab A even if the
5 pull tab A is impressed with letters, numerals, and/or
a pattern.

There are no frequent shutdowns of the pull tab
feeder 10 due to operation failures such as jamming,
and hence the availability of the pull tab feeder 10 is
10 high, because the pull tab feeder 10 can feed pull tabs
A to slider bodies S more reliably and stably than
conventional pull tab feeders.

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CLAIMS:-

1. A pull tab feeder for successively feeding pull tabs to a machine for assembling sliders for slide fasteners, comprising:

5 a chute having a supply slot for containing an array of pull tabs longitudinally therein;

a first swing bar angularly movably supported on said chute and having a projection on one end thereof for engaging an end of an endmost pull tab of said array
10 and a first roller on the other end thereof;

a second swing bar angularly movably supported on said chute parallel to said first swing bar and having an abutment piece on an end portion thereof for abutment against a surface of a next pull tab following
15 said endmost pull tab and a second roller on the other end thereof;

a first spring for normally urging said first swing bar to keep said projection in engagement with the end of said endmost pull tab;

20 a second spring for normally urging said second swing bar to keep said abutment piece in abutment against the surface of said next pull tab;

a first cam including a raised portion and movable for engaging said first roller against the
25 resiliency of said first spring;

a second cam including a raised portion and movable for engaging said second roller against the



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resiliency of said second spring; and

said raised portions of said first and second
cams being displaced from each other such that said pin
and said abutment piece will alternately engage and
5 release said endmost and next pull tabs, respectively.

2. A pull tab feeder according to claim 1,
further including a substantially U-shaped bracket
fixed to said chute with opposite legs disposed one on
each side of said chute, and a pivot shaft
10 interconnecting said opposite legs, said first and
second swing bars being angularly movably supported on
said pivot shaft.

3. A pull tab feeder according to claim 2, said
first and second springs comprising tension springs,
15 respectively, acting between said first swing bar and
said bracket and the latter and said second swing bar,
respectively.

4. A pull tab feeder according to any preceding claim, said
abutment piece being made of an elastomeric material.

20 5. A pull tab feeder according to any preceding claim,
said projection and said abutment piece being positionally
adjustably mounted on said first and second swing bars,
respectively.