

SPECIFICATION

Machine for Attaching End Stops to a Pair of Coupled Sliding Clasp Fastener Stringers

The present invention relates to a machine for
5 attaching end stops to a pair of coupled sliding
clasp fastener stringers across the chain of
intermeshed rows of coupling elements.

Conventional end stop applying machines
generally comprise a die, a punch vertically
10 movable toward and away from the die, the die
having a stop for locating a pair of coupled sliding
clasp fastener stringers thereon, and end stop
holder disposed between the punch and the die
for supporting an end stop, the end stop holder
15 being movable toward the die as the holder is
openable to release the end stop by downward
movement of the punch, and a chute for supplying
end stops to the end stop holder. The machines
also include a detecting device for stopping the
20 operation of the machine when it is detected that
there is no end stop in a preselected position on
the chute. However, the chute is liable to get
clogged with dust or other obstructions, blocking
the supply of the end stops to the end stop holder,
25 which then becomes unloaded. When the
clogging of the chute takes place at a position
downstream of the end stop detector, the
detector is not actuated and the machine
continues, to operate, whereupon the sliding
30 clasp fastener stringers as they come out of the
machine are devoid of end stops.

According to the invention, there is provided a
machine for attaching end stops to a pair of
coupled sliding clasp fastener stringers,
35 comprising: a frame; a die mounted on said frame
for receiving the fastener stringers thereon; a
punch holder movably mounted on said frame and
supporting a punch movable toward said die for
pressing an end stop into the fastener stringers
40 against said die; drive means mounted on said
frame and movable for a stroke for driving said
punch holder to move said punch toward said die,
said punch holder being connected to said drive
means through a lost motion connection by which
45 said punch and said drive means are movable
towards each other when said punch engages the
end stop at the end of the stroke of said drive
means; and means on said frame for de-
energizing said drive means when said punch is
50 held away from said drive means at the end of the
stroke of said drive means.

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

55 Figure 1 is a side elevational view of an end
stop applying machine constructed in
accordance with the present invention;

Figure 2 is a front elevational view, with parts
in cross section, of the machine;

60 Figure 3 is an enlarged cross-sectional view
taken along line III—III of Figure 1;

Figure 4 is an enlarged cross-sectional view
taken along line IV—IV of Figure 1;

65 Figure 5 is a perspective view corresponding to
Figure 4;

Figure 6 is a schematic front elevational view
showing the position of the working parts in
70 which an end stop is applied to a pair of coupled
sliding clasp fastener stringers;

Figure 7 is a view similar to Figure 6, showing
the parts position in which no end stop is applied
to the fastener stringers; and

Figure 8 is a fragmentary plan view of a pair of
75 coupled sliding clasp fastener stringers having
element-free gaps spaced at internals and an end
stop attached to an end of a chain length of
coupling elements between adjacent two of such
element-free gaps.

80 As shown in Figures 1 and 2, a machine 10 for
attaching end stops to a pair of coupled sliding
clasp fastener stringers comprises a frame 10a
including a base 11 and a housing 12 mounted on
the base 11. A driver lever 13 is pivotally
85 mounted by a pin 14 in the housing 12 and is
connected at its distal end to a link 15 through a
pin 16. The driver lever 13 is pivotable up and
down about the pin 14 by a suitable prime mover
such as an electric motor (not shown), the output
90 shaft of which is operatively connected to the
lever 13 via a crank (not shown).

A vertically reciprocable punch holder 17 is
connected to the link 15 by a pin 18 extending
through the link 15 and is slidably supported in a
95 block 19 mounted on the housing 12. Between
the block 19 and the base 11, there is an opening
or space 20 into which extends a punch 21
mounted on and projecting downwardly from the
punch holder 17 toward the base 11. A die or
100 anvil 22 is disposed on the base 11 and has a die
groove (not illustrated) that is in vertical
registration with the punch 21. A chute 23
extends into the opening 20 toward a position
below the block 19 and carries a row of staple-
105 like end stops 24, which can be moved along by
gravity. In Figure 3, the chute 23 includes a pair of
retainer arms 25, 26 that jointly support the end
stops 24 so as to be fed through and along a
passage 27 in a chute body 28.

110 An end stop holder 29 is supported by the
block 19 and is vertically movable in the opening
20, the holder 29 comprising a holder frame 30
with its upper end portion slidably received in the
block 19. There is a spring 31 disposed in the
115 block 19 and acting on the upper end portion of
the holder frame 30 to normally bias the holder
29 upwardly away from the die 22.

As illustrated in Figures 4 and 5, the holder
frame 30 includes pairs of arms 32, 33 spaced
120 horizontally one from the other in each pair,
between which there are disposed a pair of legs
34, 34 having a pair of feet 35, 35, respectively,
with their bottoms recessed at 35a to receive
therein a chain of interengaged rows of coupling
125 elements. The legs 34, 34 are connected to the
holder frame 30 by a pair of pins 36, 36 extending
between the legs 34, 34. The legs 34, 34 are
movable away from each other toward the arms
32, 33, but are normally urged toward each other

by pairs of leaf springs 37,38 secured to the holder frame 30 by bolts 39 and nuts 40. One of the end stops 24 is supplied from the chute 23 (Figure 1) onto the feet 35 of the end stop holder 29 and is pushed downwardly by the punch 21 as the feet 35 become spread apart by the end stop 24 against the force from the leaf springs 37,38 acting on the legs 34,34. The end stop 24 is held against falling frictionally between the feet 35,35 as long as the end stop 24 is positioned between the feet 35,35.

The die 22 of Figures 1 and 2 contains a stop 41 projecting upwardly toward the punch 21 and depressible into the die 22. The stop 41 is also laterally shiftable and is operatively coupled with a switch (not shown) that when turned on, starts operation of the apparatus 10. Figure 8 shows a pair of coupled sliding clasp fastener stringers 42, 43 having a chain 44 of interengaged rows of coupling elements 45, the stringers 42,43 having a plurality of element-free gaps or spaces 46 located at spaced intervals therealong. Between adjacent two of the element-free gaps 46, there is a length 44a of the chain 44 that acts as an individual sliding clasp fastener chain. When the stringers 42,43 are moved over the die 22 in the direction of the arrow 46a in Figure 2, the stop 41 is depressed under one of the chain length 44a until one of the gaps 46 reaches the stop 41. The stop 41 then projects upwardly through the gap 46 and becomes engaged by the end of the next chain length 44a, whereupon the stop 41 is horizontally shifted thereby, actuating the switch associated therewith to operate the apparatus 10. At this time, the movement of the sliding clasp fastener stringers 42,43 is arrested by the stop 41, and the end of the chain length 44a is located just below the punch 21.

In Figure 2, the pin 18 extends loosely through a hole 47 in the punch holder 17, the hole 47 being in the form of a vertically elongate slot or a circular aperture having a larger diameter than that of the pin 18. Thus, the pin 18, and the hole 47 jointly constitute a lost motion connection by which the punch holder 17 is movable toward and away from the driver lever 13. A compression coil spring 48 is disposed in a bore 49 in the punch holder 17 and acts between the link 15 and the bottom of the bore 49 to normally bias the punch 21 away from the driver lever 13 toward the die 22.

The punch holder 17 supports an arm 50 extending laterally therefrom and having on its distal end a pusher 51 in the form of a bolt extending downwardly toward the base 11. A motion amplifying device 52 is mounted on the frame 10a and comprises a lever 53 pivoted at one end to the frame 10a by a pin 54 and suspended at the other end from the housing 12 by means of an extension spring 55. When the punch holder 17 is moved downwardly, the pusher 51 is engageable with the lever 53 at a position somewhere between the ends of the lever 53, preferably at a position near the pin 54 so as to provide an increased degree of motion

amplification. The lever 53 supports on its end remote from the pin 54 a switch actuator bolt 56 that rests on a feeler 57 projecting from a switch box 58 that houses a suitable switch (not illustrated) such as a limit switch or a proximity switch, for example, which is actuatable when the feeler 57 is pushed down. Actuation of the switch in the switch box 58 causes the operation of the apparatus 10 to discontinue.

The apparatus 10 operates as follows:

When the punch holder 17 is lowered by the driver lever 13, the punch 21 engages an end stop 24 supported on the holder 29 and pushes the holder 29 downwardly until the feet 35,35 move into abutment against a chain length 44a placed on the die 22. Continued depression of the punch 21 causes the end stop 24 to move downwardly between the feet 35,35 which are then spread apart by the end stop 24, and presses the end stop 24 into the fastener stringers 42,43 across the chain length 44a against the die 22, whereupon the end stop 24 is clinched by the die groove and is attached in position to the fastener stringers 42,43. At this time, the driver lever 13 is at the end of its stroke, and the punch holder 17 and the driver lever 13 are moved toward each other with the pin 18 pressed against the lower end of the hole 47, whereupon the punch holder 17 is in a position in which the pusher bolt 51 is prevented from engaging the lever 53 (Figure 6). Accordingly, as long as the end stops 24 continue to be supplied from the chute 23 to the end stop holder 29, the punch 21 always engages the end stop 24 and is prevented from going downwardly beyond the position of Figure 6, and the stop applying operation of the apparatus 10 will be repeated automatically.

When the supply of the end stops 24 fails due to the clogging of the chute 23 or the running out of the end stops 24, the punch 21 as it descends engages the empty holder 29 and pushes it downwardly into abutting engagement with the chain length 44a, whereupon the punch 21 is forced downwardly between the feet 35 as it moves the feet 35 apart. The punch 21 is continued to move downwardly into direct contact with the chain length 44a. The driver lever 13 then is at the end of its downward excursion, and the punch holder 17 is held away from the lever 13 with the pin 18 pressed against the upper end of the hole 47 under the force from the spring 48. At this time, the pusher bolt 51 is in a position lower than that which the pusher bolt 51 assumes when the punch 21 is in its lower limit in Figure 6, such lower position being low enough to depress the lever 53. The depression of the lever 53 enables the actuator 56 to descend a distance sufficiently large to lower the feeler 57 reliably, whereby the switch in the switch box 58 is energized to generate a signal which ceases the operation of the apparatus 10. Accordingly, since the apparatus 10 becomes inoperative the instant the punch 21 as it is lowered finds no end stop therebeneath, there will issue out of the apparatus 10 no

successive chain lengths devoid of end stops. Another advantage of the apparatus 10 of this invention is that the punch holder 17 which is spring-biased away from the driver 13 allows the punch 21 to abut resiliently against an end stop or a chain length without the danger of damaging the end stop, the chain length, or the punch itself.

Claims

1. A machine for attaching end stops to a pair of coupled sliding clasp fastener stringers, comprising: a frame; a die mounted on said frame for receiving the fastener stringers thereon; a punch holder movably mounted on said frame and supporting a punch movable toward said die for pressing an end stop into the fastener stringers against said die; drive means mounted on said frame and movable for a stroke for driving said punch holder to move said punch toward said die, said punch holder being connected to said drive means through a lost motion connection by which said punch and said drive means are movable toward each other when said punch engages the end stop at the end of the stroke of said drive means; and means on said frame for deenergizing said drive means when said punch is held away from said drive means at the end of the

stroke of said drive means.

2. A machine according to claim 1, including a link connected to said drive means, said lost motion connection comprising a pin extending through said link, said punch holder having a hole through which said pin loosely extends.

3. A machine according to claim 2, further including spring means normally biasing said punch away from said drive means toward said die.

4. A machine according to claim 3, said punch holder having a bore, said spring means comprising a compression coil spring disposed in said bore and acting between said link and the bottom of said bore.

5. A machine according to claim 1, said punch holder having a pusher fixed thereto, said de-energizing means having a feeler, further including a lever pivotally mounted at one end on said frame, said de-energizing means being actuatable when said feeler is pushed by the other end of said lever, and said lever being pivotally movable upon engagement with said pusher at a position between the ends of said lever.

6. A machine substantially as herein described with reference to and as illustrated in Figures 1 to 7 inclusive of the accompanying drawings.



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