

PATENT SPECIFICATION

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(54) METHOD OF AND APPARATUS FOR FINISHING SLIDING CLASP FASTENERS

(71) We, YOSHIDA KOGYO KABUSHIKI KAISHA, of No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan; a corporation duly organized under the laws of Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of an apparatus for finishing sliding clasp fasteners and more particularly to such method and apparatus which is designed to apply end stops to and cut interengaged fastener stringers of continuous length into individual product lengths.

In the production of individual lengths of slide fasteners from a continuous length chain thereof, it has been the conventional practice to remove a group of fastener elements at predetermined intervals thereby providing "element-free gaps" on the fastener stringers, apply bottom end stops to endmost elements adjacent one end of each element-free gap, and subsequently cut the fastener stringers at a midpart of the gap to produce desired individual lengths of fastener. Thereafter, the fastener is finished by assembling thereon a slider and a top stop.

Following the recent trend of massive production of ready-made or semi-finished garments such as trousers and similar articles, the garment manufacturers prefer to purchase a continuous length, instead of measured individual lengths, of sliding clasp fastener and cut the stringers to desired product lengths at their end. Then, they assemble the fastener stringers with sliders and end stops in the course of sewing or otherwise attaching the fasteners to garments and the like. This practice is advantageous in that the manufacturers can freely select the cutting lengths of fasteners to suit their particular application and further in that they can dispense with added process of forming "element-free gaps" or attaching top end stops

beforehand depending upon the nature of garments, thus offering a saving in the manufacturing costs.

However, despite the increasing demand for process and apparatus which will carry out the above garment-manufacturers' practice with reasonable efficiency, many difficulties have been experienced in automating the same. The most critical problem has been with the technical steps required to feed the fastener stringers exactly for a desired selected distance and stop the same precisely at a predetermined point of the assembling station in the absence of "element-free gaps" which would serve as a target for detecting or determining the precise position in which the fastener strings are assembled with bottom end stops and cut to measured individual lengths. Another thing is that it has been difficult to feed the ensuing fastener stringers to the assembling station after the preceding stringers have been assembled and separated. Prior to the present invention, no processes or apparatus have been proposed which can overcome the above difficulties and accomplish the fastener finishing operation automatically and efficiently as desired by the garment manufacturers.

It is an object of the invention to provide a novel process and apparatus which will render it possible to manufacture selected lengths of sliding clasp fasteners attached with bottom end stops from a continuous length in an automatic cycle of operation and with a maximum rate of production.

From one aspect the invention consists in a process for the production of measured lengths of sliding clasp fastener units having bottom end stops from a continuous length of interengaged fastener stringers comprised of a pair of opposed stringer tapes carrying along their respective longitudinal edges two rows of continuously meshed fastener elements, which process comprises holding the fastener stringers closely adjacent the longitudinal edges of their stringer tapes along which the rows of fastener elements are

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secured, feeding the fastener stringers intermittently in a horizontal path of movement for a distance corresponding to a selected length of an individual product fastener; discontinuing the feeding of the fastener stringers, applying a bottom end stop to the fastener stringers adjacent a leading end thereof, and cutting the fastener stringers at a point forwardly beyond said bottom end stop.

From another aspect the invention consists in apparatus for the production of measured lengths of sliding clasp fastener units having bottom end stops from a continuous length of interengaged fastener stringers comprised of a pair of opposed stringer tapes carrying along their respective longitudinal edges two rows of continuously meshed fastener elements, which apparatus comprises in combination; a feeding means comprising a drive roller and an idling guide roller arranged in vertically opposed relation for driving frictionally therebetween the fastener stringers intermittently for a predetermined distance in a horizontal direction, said guide roller having opposite circumferential ribs disposed in use astride the two coupled rows of fastener elements and adapted to hold the stringer tapes against the periphery of said guide roller and a continuous circumferential recess defined between said ribs and dimensioned to accommodate said coupled rows of elements; a guiding means located at one end immediately adjacent said feeding means and comprising an elongated panel having opposed parallel guide rails defining therebetween a guide channel dimensioned to conform substantially with the width of said coupled rows of fastener elements; a bottom end stop applying means located immediately adjacent to the other end of said guiding means and comprising a vertically reciprocable punch and a stationary clamping die cooperating therewith for applying bottom end stops to said fastener stringers; and a cutting means located forwardly of said bottom end stop applying means and comprising a vertically reciprocable cutter and a coacting stationary cutter for cutting said fastener stringers assembled with bottom end stops to measured individual lengths.

One method of performing the invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a plan view of a length of sliding clasp fastener stringers attached with bottom end stops of predetermined intervals, the thickened solid line being utilized to indicate the position in which the stringers are cut to individual lengths;

Figure 2 is a longitudinal side elevation of a fastener finishing apparatus according to the invention;

Figure 3 is a cross-sectional view of a

feeding means for feeding the fastener stringers intermittently; and

Figure 4 is a cross-sectional view of a guiding means for guiding the movement of the fastener stringers.

Referring now to the drawings and Figure 1 in particular, there is shown a continuous length of interengaged fastener stringers F which comprises a pair of opposed stringer tapes T, T each carrying along their respective longitudinal edges a row of fastener elements E, the stringer tapes being coupled together through the medium of the fastener elements E which have been meshed with one another. The fastener stringers F are not provided with pre-formed "element-free gaps or spaces" which are utilized as a target for cutting the stringers to measured lengths according to the conventional practice.

A preferred form of apparatus which is employed to carry out a process in accordance with the invention is shown in Figure 2, and this apparatus designated at 10 generally comprises a feeding means 11 for feeding the fastener stringers F intermittently in a horizontal path of movement, a guiding means 12 for guiding the movement of the fastener stringers F, a bottom end stop applying means 13 for applying bottom end stops to the fastener stringers, a cutting means 14 for cutting the fastener stringers into individual measured lengths, and a withdrawal means 15 for withdrawing the cut-off fastener stringers.

The feeding means 11 comprises a pair of rollers 16 and 17 arranged in vertically opposed relation such that the fastener stringers F are engaged between the peripheries of the two rollers and frictionally driven thereby in a horizontal direction toward an assembling and cutting station later described. The lower roller 16 is a drive roller connected to a motor not shown and also to a pulse wheel 18 through a suitable gear arrangement not shown. The amount of each intermittent cycle of rotary movement of the drive roller 16 which determines the length of individual product fasteners to be produced from the stringers F is pre-set by a suitable electronic control device such as a digital counter not shown which is electrically connected to a non-contact switch formed by the pulse wheel 18 and a proximity switch electrically connected therewith 19, the arrangement being that completion of each selected intermittent cycle of revolution of the drive roller 16 is sensed by the non-contact switch whereupon a signal is produced to deenergize a clutch device through relays to stop the roller 16 for a predetermined time interval during which the chain F is assembled with a bottom end stop and cut to a measured length as hereinafter described. Such control mechanism is known and does not constitute any positive part of

the invention; therefore, no further explanation relative thereto will be required.

5 The upper roller 17 is an idling guide roller which is provided around its periphery with a continuous circumferential recess 20 dimensioned to accommodate the two coupled rows of fastener elements E as shown in Fig. 3. The recess 20 is defined by relatively narrow opposite circumferential ribs 21, 21 having abutting faces 21a, 21a disposed astride of the fastener elements E and adapted to hold the stringer T, T close thereat against the periphery of the drive roller 16. This structural feature of the guide roller 17 ensures that the fastener stringers F are fed guidedly straight with a minimum of stresses tending to bias the direction of its movement.

20 The guided movement of the fastener stringers F is further improved by the guiding means 12 better shown in Fig. 4 which comprises an elongated panel 22 having longitudinal side flanges 23, 23 defining therebetween a wide guide channel 25 providing an unrestricted passage for the stringer tapes T, T and opposed parallel guide rails 24, 24 defining therebetween a narrow guide channel 26 dimensioned to conform substantially with the width of the two inter-engaged rows of elements E such that the inner walls 24a, 24a of the respective rails 24, 24 are disposed in sliding engagement with the rear portions Ea of the elements E thereby permitting the fastener stringers F to advance along a straight line of path without swerving sidewise.

35 The guide panel 22 has a width; viz, a distance between the side flanges 23, 23 greater than the width of the fastener stringers F, and the guide rails 24, 24 have their lower ends 24b, 24b disposed short of the surface of the stringers F, with no other parts of the panel 22 coming into the path of the fastener stringers F so that the latter is freely advanced while being guided by the rails 24, 24.

50 Designated at 27 is a supporting bed having a smooth sliding surface 27a on which the fastener stringers F are laid flat and move slidably as it is fed by the feeding means 11.

55 Closely adjacent to the other end of the guiding means 12 or guide panel 22, there is provided an assembling and cutting station including a bottom end-stop applying means 13 comprising a vertically reciprocable punch 28 mounted in the upper frame 30 and normally retracted above the path of the fastener stringers F and a clamping die 29 fixedly mounted in the supporting bed 27. This punch and die arrangement is conventional and applies a bottom end stop P to the fastener stringers F at a predetermined position. The punch 28 for instance may include 65 a means of cutting a continuous length strip

of blank metal into individual pieces of staple-like form or may be arranged simply to receive preformed staple-like stop members from a separate source.

70 Substantially simultaneously as the fastener stringers F are assembled with the end stop P, it is cut by the cutting means 14 included in the said station which is located forwardly of the end stop applying means 13 and which comprises a vertically reciprocable cutter 31 mounted in the upper frame 75 30 and a coaxing stationary cutter 32 provided in the supporting bed 27. This cutter arrangement is also conventional and cuts the fastener stringers F transversely across adjacent to the assembled end stop P as at the thickened solid line in Fig. 1.

80 There is provided a spring-loaded pressure pad 33 accommodated in the supporting bed 27 and normally facing in registry with the path of the fastener stringers F. During the cutting operation, the pressure pad 33 is depressed by the cutter 31 and lowered below the path of the fastener stringers F. With the retraction of the cutter 31, the pressure pad 33 is returned by the action of the spring 34 to a level flush with the path of the stringers F thereby maintaining normal straight posture of the stringers F to permit the same to be taken up without fail by a withdrawing means 15 hereinafter described. 95

100 The withdrawing means 15 is provided for withdrawing the preceding unit of the fastener which has been assembled and cut from the continuous ensuing fastener stringers F, which means comprises a pair of rollers 35 and 36 between which the cut-off fastener is frictionally engaged and thereby withdrawn for collection for example in a suitable basket. The drive roller 35 is preferably connected by a drive belt not shown to the drive roller 16 at the feeding end, so as to synchronize the rotation of these rollers. 105

110 The apparatus described and shown is built relatively compact, requiring a minimum of floor space. In addition, it is to be noted that the feeding means 11 is located immediately adjacent to the inlet of the guiding means 12 so that the fastener stringers F are readily guided without derailing from the straight horizontal path of movement, and that the end stop applying means 13 and cutting means 14 are located immediately adjacent to the outlet of the guiding means 12 so as to allow the respective operations to take place with a maximum accuracy. 115 120

125 Advantageously, the length to which each individual fastener is to be cut from the stringers F can be varied at will simply by regulating the amount of revolution of the feed drive roller 16 with its associated controls.

WHAT WE CLAIM IS:—

1. For the production of measured lengths



the invention; therefore, no further explanation relative thereto will be required.

The upper roller 17 is an idling guide roller which is provided around its periphery with a continuous circumferential recess 20 dimensioned to accommodate the two coupled rows of fastener elements E as shown in Fig. 3. The recess 20 is defined by relatively narrow opposite circumferential ribs 21, 21 having abutting faces 21a, 21a disposed astride of the fastener elements E and adapted to hold the stringer T, T close thereat against the periphery of the drive roller 16. This structural feature of the guide roller 17 ensures that the fastener stringers F are fed guidedly straight with a minimum of stresses tending to bias the direction of its movement.

The guided movement of the fastener stringers F is further improved by the guiding means 12 better shown in Fig. 4 which comprises an elongated panel 22 having longitudinal side flanges 23, 23 defining therebetween a wide guide channel 25 providing an unrestricted passage for the stringer tapes T, T and opposed parallel guide rails 24, 24 defining therebetween a narrow guide channel 26 dimensioned to conform substantially with the width of the two inter-engaged rows of elements E such that the inner walls 24a, 24a of the respective rails 24, 24 are disposed in sliding engagement with the rear portions Ea of the elements E thereby permitting the fastener stringers F to advance along a straight line of path without swerving sidewise.

The guide panel 22 has a width; viz, a distance between the side flanges 23, 23 greater than the width of the fastener stringers F, and the guide rails 24, 24 have their lower ends 24b, 24b disposed short of the surface of the stringers F, with no other parts of the panel 22 coming into the path of the fastener stringers F so that the latter is freely advanced while being guided by the rails 24, 24.

Designated at 27 is a supporting bed having a smooth sliding surface 27a on which the fastener stringers F are laid flat and move slidably as it is fed by the feeding means 11.

Closely adjacent to the other end of the guiding means 12 or guide panel 22, there is provided an assembling and cutting station including a bottom end-stop applying means 13 comprising a vertically reciprocable punch 28 mounted in the upper frame 30 and normally retracted above the path of the fastener stringers F and a clamping die 29 fixedly mounted in the supporting bed 27. This punch and die arrangement is conventional and applies a bottom end stop P to the fastener stringers F at a predetermined position. The punch 28 for instance may include a means of cutting a continuous length strip

of blank metal into individual pieces of staple-like form or may be arranged simply to receive preformed staple-like stop members from a separate source.

Substantially simultaneously as the fastener stringers F are assembled with the end stop P, it is cut by the cutting means 14 included in the said station which is located forwardly of the end stop applying means 13 and which comprises a vertically reciprocable cutter 31 mounted in the upper frame 30 and a coacting stationary cutter 32 provided in the supporting bed 27. This cutter arrangement is also conventional and cuts the fastener stringers F transversely across adjacent to the assembled end stop P as at the thickened solid line in Fig. 1.

There is provided a spring-loaded pressure pad 33 accommodated in the supporting bed 27 and normally facing in registry with the path of the fastener stringers F. During the cutting operation, the pressure pad 33 is depressed by the cutter 31 and lowered below the path of the fastener stringers F. With the retraction of the cutter 31, the pressure pad 33 is returned by the action of the spring 34 to a level flush with the path of the stringers F thereby maintaining normal straight posture of the stringers F to permit the same to be taken up without fail by a withdrawing means 15 hereinafter described.

The withdrawing means 15 is provided for withdrawing the preceding unit of the fastener which has been assembled and cut from the continuous ensuing fastener stringers F, which means comprises a pair of rollers 35 and 36 between which the cut-off fastener is frictionally engaged and thereby withdrawn for collection for example in a suitable basket. The drive roller 35 is preferably connected by a drive belt not shown to the drive roller 16 at the feeding end, so as to synchronize the rotation of these rollers.

The apparatus described and shown is built relatively compact, requiring a minimum of floor space. In addition, it is to be noted that the feeding means 11 is located immediately adjacent to the inlet of the guiding means 12 so that the fastener stringers F are readily guided without derailing from the straight horizontal path of movement, and that the end stop applying means 13 and cutting means 14 are located immediately adjacent to the outlet of the guiding means 12 so as to allow the respective operations to take place with a maximum accuracy.

Advantageously, the length to which each individual fastener is to be cut from the stringers F can be varied at will simply by regulating the amount of revolution of the feed drive roller 16 with its associated controls.

WHAT WE CLAIM IS:—

1. For the production of measured lengths



of sliding clasp fastener units having bottom end stops from a continuous length of inter-engaged fastener stringers comprised of a pair of opposed stringer tapes carrying along their respective longitudinal edges two rows of continuously meshed fastener elements, an improved process which comprises holding the fastener stringers closely adjacent the longitudinal edges of their stringer tapes along which the rows of fastener elements are secured, feeding the fastener stringers intermittently in a horizontal path of movement for a distance corresponding to a selected length of an individual product fastener, discontinuing the feeding of the fastener stringers, applying a bottom end stop to the fastener stringers adjacent a leading end thereof, and cutting the fastener stringers at a point forwardly beyond said bottom end stop.

2. For the production of measured lengths of sliding clasp fastener units having bottom end stops from a continuous length of inter-engaged fastener stringers comprised of a pair of opposed stringer tapes carrying along their respective longitudinal edges two rows of continuously meshed fastener elements, an improved apparatus which comprises in combination;

a feeding means comprising a drive roller and an idling guideroller arranged in vertically opposed relation for driving frictionally therebetween the fastener stringers intermittently for a predetermined distance in a horizontal direction, said guide roller having opposite circumferential ribs disposed in use astride the two coupled rows of fastener elements and adapted to hold the stringer tapes against the periphery of said guide roller and a continuous circumferential recess defined between said ribs and dimensioned to accommodate said coupled rows of elements;

a guiding means located at one end immediately adjacent said feeding means and comprising an elongated panel having

opposed parallel guide rails defining therebetween a guide channel dimensioned to conform substantially with the width of said coupled rows of fastener elements;

a bottom end stop applying means located immediately adjacent to the other end of said guiding means and comprising a vertically reciprocable punch and a stationary clamping die cooperating therewith for applying bottom end stops to said fastener stringers; and

a cutting means located forwardly of said bottom end stop applying means and comprising a vertically reciprocable cutter and a coacting stationary cutter for cutting said fastener stringers assembled with bottom end stops to measured individual lengths.

3. An apparatus as defined in claim 2 which further includes a withdrawing means comprising a pair of rollers arranged in vertically opposed relation for withdrawing therebetween said fastener stringers which have been assembled and cut to a measured individual length.

4. An apparatus as defined in claim 3 wherein one of said rollers is connected in driven relation to said drive roller of said feeding means.

5. An apparatus as defined in claim 2 wherein said drive roller is linked with to a pulse wheel electrically connected to a proximity switch.

6. A process for producing measured lengths of sliding clasp fastener units, substantially as herein described with reference to the accompanying drawings.

7. An apparatus substantially as herein described with reference to the accompanying drawings.

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