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1 433 661

(54) APPARATUS FOR MANUFACTURING AND STACKING HEMMED FABRIC PIECES

(71) We, CLUETT, PEABODY & Co., INC., a corporation organised under the laws of the State of New York, U.S.A., of 433 River Street, Troy, New York, United States of America, 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 an apparatus for manufacturing and stacking hemmed fabric pieces (especially pockets) with the hems either lined or unlined.

According to the prior art, manufacture and stacking of hemmed fabric pieces (such as pockets) for commercial sale was for the most part a manual operation performed by workers using substantially conventional sewing machines. Quality of the hemmed fabric pieces varied among individual workers and as an essentially hand operation there were inherent limitations in quality. The work was monotonous so there was danger of injury to workers. Labour costs in this operation were high and substantial waste of material was experienced. Further, stacking of the hemmed fabric pieces (lined or unlined) presented difficulty because the hemmed end, being thicker than the other end, caused stacks to build up on the hemmed end thereby tending to cause the stacks to fall over onto the unhemmed ends opposite to the hemmed ends.

With growing popularity of stretch fabrics, knitted fabrics and bias cut woven fabrics, hemming of pockets was usually impractical and at times impossible using apparatus of the prior art.

The prior art with regard to dispensers, for cutting and feeding automatically pieces of liner tape in turn along a path, has been directed to other services. However, U.S. Patent 3,479,911 taught an apparatus for clamping a web of flexible material, cutting the web into increments of length and advancing the web to a work station. U.S. Patent 3,465,624 disclosed a control system for a film cutter. U.S. Patent 3,400,622 showed an apparatus for cutting a strip material into pieces of incremental length and included moving, feeding and shearing functions. In U.S. Patent 2,722,276 strip stock was fed from a roller by means of a self-releasing self-cocking trip-type clutch. U.S. Patents 2,062,643 and 2,783,042 used one-way clutches on a friction roller for feeding paper from a stack to a machine. U.S. Patents 1,127,991 and 1,536,670 related to feeding of paper to printing presses.

The prior art on positioners, for accepting limp fabric pieces inserted manually and for positioning each of the fabric pieces automatically, was relatively remote from the teaching of the present specification. U.S. Patent 3,360,262 taught an apparatus for transporting and aligning limp pieces of material by means of pneumatics. U.S. Patent 3,544,098 employs an edge as a stop means for registering fabric work pieces.

The prior-art folders, for forming a hem, are represented by United States Patents 1,864,503; 3,463,482; 3,481,292 and 3,534,954.

The prior art on stackers, for stacking hemmed fabric pieces into a cartridge vertically and for revolving the cartridge as successive of the hemmed fabric pieces are inserted therein, includes references from various other fields. One reference relating to pockets is U.S. Patent 3,400,841. U.S. Patent 3,115,090 is directed to a packaging machine. Matches are stacked in U.S. Patent 1,880,077 and ingots are stacked in U.S. Patent 2,970,708. U.S. Patent 3,456,423 is directed to stacking of filled envelopes and U.S. Patents 3,450,275 and 3,599,807 relate to stacking of newspapers.

According to the present invention, an apparatus for manufacturing and stacking hemmed fabric pieces (such as pockets),

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lined or unlined, comprises (a) positioner means located along a path of travel through the apparatus for accepting and advancing the fabric pieces, (b) folder means located along said path of travel for forming a hem out of a margin of a fabric piece, (c) sewing means located along said path of travel for sewing the hem along said margin and (d) stacker means located along said path of travel, said stacker means including (e) a cartridge for receiving the hemmed fabric pieces, means for stacking the pieces into said cartridge vertically and means for revolving the cartridge as successive of the hemmed fabric pieces are inserted therein whereby uneven height resulting from the hems is distributed peripherally thereabout.

The positioner means (a) may comprise means for accepting the fabric pieces inserted in turn and for positioning each of the fabric pieces automatically in a desired orientation with respect to the path of travel.

In the case of lined hemmed fabric pieces the apparatus may comprise dispenser means for cutting and feeding automatically a liner tape of constant width in pieces each of a same predetermined length in their lengthwise directions in turn along a path of travel through the apparatus.

The limp fabric pieces, inserted manually by an operator, are positioned automatically by the positioner means, one on each of the liner pieces. A hem is formed from a margin of each of the fabric pieces around its related liner piece and a margin edge is tucked under itself. The hem is sewn automatically along the said margin edge.

The invention will be understood more fully from the following description of an exemplary apparatus for manufacturing and stacking hemmed fabric pieces according to this invention illustrated in the accompanying drawings, wherein

Fig. 1 is a schematic elevation view showing general arrangement of the apparatus.

Fig. 1A is an elevation view in section showing a lined hemmed fabric piece.

Fig. 2 is a plan view of a liner tape dispenser.

Fig. 3 is an elevation view of the liner tape dispenser.

Fig. 4 is an elevation view in section taken along line 4-4 of Fig. 3 and showing a finger.

Fig. 5 is an elevation view in section taken along line 5-5 of Fig. 2 and showing a cutter.

Fig. 6 is an elevation view in section taken along line 6-6 of Fig. 2 and showing a staging member in relation to a positioner endless belt.

Fig. 7 is an elevation view transverse of a path for the pieces and showing a shutter over the positioner endless belt and a stag-

ing member above the positioner endless belt.

Fig. 8 is an elevation view similar to Fig. 7 with both the shutter and the staging member retracted.

Fig. 9 is a plan view of a positioner.

Fig. 10 is a detail elevation view partly broken and showing the shutter with a curled fabric piece thereon.

Fig. 11 is similar to Fig. 10 with the curled fabric piece straightened and brought into contact with a guide abutment.

Fig. 12 is a detail elevation view partly broken showing the fabric piece aligned against the guide abutment.

Fig. 13 is a detail elevation view of an uncurler which directs flow over the fabric piece toward the guide abutment.

Fig. 14 is a detail plan view showing a fabric piece being straightened against the guide abutment by action of the uncurler.

Fig. 15 is a view similar to Fig. 14 with the fabric piece straightened against the guide abutment.

Fig. 16 is a somewhat idealized elevation view partly broken of a folder viewed along the path.

Fig. 17 is a detail elevation view in section taken along line 17-17 of Fig. 16 and showing a fabric piece being bent by a stationary folder member.

Fig. 18 is a partial plan view taken along line 18-18 of Fig. 16.

Fig. 19 is a detail elevation view in section taken along line 19-19 of Fig. 16 and showing a second stationary folder member folding the fabric piece around a folder plate.

Fig. 20 is a partial plan view taken along line 20-20 of Fig. 16 and showing a die of the folder for tucking under a terminal margin flap.

Fig. 21 is an elevation view in section taken along line 21-21 of Fig. 16 and showing action of the die of the folder.

Fig. 22 is an elevation view in section taken along line 22-22 of Fig. 16 and showing further action of the die of the folder.

Fig. 23 is a perspective view showing a lined hemmed fabric after the sewing operation has been completed along the terminal margin flap.

Fig. 24 is an elevation view of a stacker seen transversely of the path.

Fig. 25 is a detail elevation view in section and showing a lined hemmed fabric piece being bent as it enters a stacker cartridge.

Fig. 26 is a detail elevation view in section and showing a plurality of the lined hemmed fabric pieces in relaxed conditions inside the cartridge.

Fig. 27 is a plan view taken along line 27-27 of Fig. 24 and showing a rotatable frame supporting the cartridge with the

cartridge aligned to receive one of the lined hemmed fabric pieces therein.

Fig. 28 is a view similar to Fig. 27 and showing partial rotation of the movable frame.

Fig. 29 is another view similar to Fig. 27 and showing full retraction of a piston to turn the frame.

Fig. 30 is a perspective view showing the cartridge partially filled.

An apparatus for manufacturing and stacking lined hemmed fabric pieces can be seen in Fig. 1 to comprise a dispenser (generally designated 41) for cutting and feeding automatically liner tape 42 of constant width in liner pieces 43 each of a same predetermined length in their lengthwise directions in turn along a path 44. A positioner (generally designated 45) is situated along the path 44 for accepting limp fabric pieces 46 inserted in turn manually and the positioner positioning each of the fabric pieces 46 automatically onto one of the liner pieces 43. From the positioner 45 the fabric pieces 46, each together with an associated liner piece 43, are delivered to a folder (generally designated 47) for forming a lined hem 48 out of a margin 49 of each of the fabric pieces 46 folded around its associated liner piece 43 and having a terminal margin flap 51 tucked under itself ready for sewing. A sewing machine (generally designated 52) is arranged for sewing the lined hem 48 along the terminal margin flap 51. Lined hemmed fabric pieces 53 are delivered thereafter to a stacker (generally designated 54) in which the lined hemmed fabric pieces 53 are loaded vertically upward into a cartridge 55 (see Fig. 30) which is arranged to revolve in increments about a vertical axis 56 so that, as successive of the lined hemmed fabric pieces 53 are inserted therein, uneven height caused by the lined hems 48 is distributed peripherally about the stack.

The dispenser 41 cuts and feeds automatically the liner tape 42 of constant width as the liner pieces 43 each of a like predetermined length lengthwise along the path 44. Tape supply spool 57 is mounted rotatable about a horizontal spool axis 58. A continuous feed of the liner tape 42 is wrapped on the spool 57 and the spool 57 is organized to rotate freely about the axis 58. The liner tape advances one of said predetermined lengths at a time forwardly along the path 44 to a cutting position wherein the front end of a liner tape length is at 59 and its rear end is at 61. A feed platform 62 is organized along the path 44 to support the continuous liner tape 42.

Advancement is achieved by a pusher member which is shown as a roller 63 having a knurled surface for engaging the continuous liner tape 42. A first motion means

is shown as a first piston 64 connected to the roller 63 and a first air cylinder 65 to provide two-way rectilinear movement of the roller 63 forwardly and rearwardly along the path 44. The first motion means is organized to move the roller 63 in response to a first signal from a first sensor 66 which indicates presence of the liner tape 42 in the cutting position. The first motion means moves the roller 63 from an initial forward position against abutment 82 rearwardly to a rearward position shown in Figs. 2 and 3. Slip means are provided in the form of a one-way clutch 67 in roller 63 whereby on moving rearwardly roller 63 rolls over the liner tape 42 but on moving forwardly roller 63 is prevented from rotating so that it engages the liner tape 42 to move it forwardly. When roller 63 reaches its rearward position shown in Figs. 2 and 3 adjustment screw 68 connected thereto triggers switch 60 for automatic return of roller 63 to its forward position. Roller 63 is mounted on a shaft depending between yoke members 69 which engage the first piston 64 in the first air cylinder 65. The length of travel of the roller 63 can be varied by adjustment of the length of screw 68 to set the constant length of liner tape fed to the cutting position on each movement of the roller 63 forwardly on the path 44.

A finger 71 retains the liner tape 42 on rearward movement of the roller 63. A second motion means, shown as a second piston 72 housed in a second air cylinder 73, is connected to the finger 71 for providing two-way movement vertically between an initial retracted position (not shown) wherein the finger 71 is above the feed platform 62 and a holding position shown in Fig. 4 wherein the finger 71 holds the liner tape 42 against the feed platform 62. A positioner endless belt 74 is arranged forward of the finger 71 along the path 44 and is organized to advance the liner tape 42 forwardly. A hold down element 75 is mounted to press the liner piece 43 onto the positioner endless belt 74. A cutter comprises knife 76 and is positioned along the path between the finger 71 and the hold down element 75. A third motion means, shown as a third piston 77 mounted in a third air cylinder 78, is connected to the knife 76 as shown in Fig. 5 via a lever 79 mounted for rotation on a fulcrum member 81, so that the knife 76 is movable between an initial retracted position wherein it is retracted and a cutting position shown in Fig. 5 wherein the knife cuts from the liner tape 42 one of the liner pieces 43.

The dispenser 41 operates from a starting arrangement with the first piston 64 extended to abutment 82, the second piston 72 in its retracted position and the third piston 77 in its retracted position. In this

arrangement a length of the liner tape 42 is already in the cutting position from 59 to 61. To start the operation the first signal is transmitted as has been mentioned from first sensor 66 via a dispenser circuit to the first air cylinder 65 advancing the first piston 64 to move the roller 63 rearwardly. Simultaneously a second signal is transmitted by the dispenser circuit to move the finger 71 to its holding position. The dispenser circuit is arranged then to transmit a third signal to the third air cylinder 78 to move the knife 76 to its cutting position. The dispenser circuit further includes second and third reset means to signal thereafter return of the finger 71 and the knife 76 respectively to their initial positions.

The positioner 45 located along the path 44 accepts the fabric pieces 46 inserted manually thereon and positions each of the fabric pieces 46 automatically onto one of the liner pieces 43. The liner pieces 43 exit the dispenser by means of the positioner endless belt 74. A staging member 83 has a horizontal upper surface with a groove 84 adapted to receive in turn leading edges of the liner pieces 43 to position each of the liner pieces in turn for reception of one of the fabric pieces 46. Fourth motion means, shown as a fourth piston 85 mounted in fourth air cylinder 86, is connected to the staging member 83 for providing two-way movement vertically between an initial receiving position wherein the staging member 83 projects above the positioner, endless belt 74 as shown in Fig. 7 and a withdrawn position wherein the staging member 83 is below the belt as shown in Fig. 8. Additional positioner endless belts 87 are provided and the staging member 83 has lands 88 which project vertically between adjacent of the positioner endless belts 74, 87.

A shutter 89 is positioned above the positioner endless belts 74, 87 and has an upper surface 91 on which the limp fabric pieces 46 are placed manually one by one. Guide abutment 92 is aligned with the path 44 and the fabric pieces 46 are positionable in turn thereagainst for alignment along the path 44. An uncurler, comprising a manifold 93 connected to a suitable supply of a gas (preferably air and not shown), advances the fabric pieces 46 toward the guide abutment 92 to eliminate curls in the limp fabric pieces 46 and to maintain alignment of the fabric pieces 46 with the guide abutment 92. The apertures 94 are shown in Fig. 13 and operation of the uncurler is shown in Figs. 10-12 and 14-15. Fifth motion means, shown as a fifth piston 95 mounted in a fifth air cylinder 96, is coupled by means of a shutter crank 97 to the shutter 89 and provides the shutter 89 with two-way movement horizontally and trans-

versely of the path 44 between an initial position over the positioner endless belts 74, 87 as shown in Fig. 7 and a withdrawn position as shown in Fig. 8 whereby on movement of the shutter 89 to the withdrawn position the fabric piece 46 on the shutter 89 drops onto its associated liner tape piece 43 on the staging member 83. The fourth motion means which are the fourth piston 85 and the fourth air cylinder 86 are then operated on movement of the shutter to its withdrawn position to move the staging member 83 to its withdrawn position so as to seat the fabric pieces 46 in turn each onto one of the liner pieces 43 on the positioner endless belt 74.

Operation of the positioner 45 is controlled by a positioner circuit which includes a fifth sensor means 90 to sense one of the fabric pieces 46 in position along the guide abutment 92 for transmitting the fifth signal to the fifth air cylinder 96 to actuate movement of the shutter 89 to its retracted position shown in Fig. 8 whereby one of the fabric pieces 46 drops onto the staging member 83. The positioner circuit also includes a fourth switch 100 to activate on movement of the shutter 89 to its retracted position to transmit the fourth signal to the fourth air cylinder to actuate movement of the staging member 83 to its retracted position.

The positioner is initiated by action of the worker. The positioner operates with the worker placing one of the fabric pieces 46 on the shutter 89 and pushing it up to and against the guide abutment 92. To uncurl the margin of the fabric piece 46, gas flow is provided through the apertures 94 in the uncurler manifold 93. When the fabric piece 46 approaches the guide abutment 92, but prior to contact therewith, the fifth sensor means 90 transmits a fifth signal to activate the fifth cylinder 96 extending the fifth piston 95 moving the shutter 89 to its withdrawn position as shown in Fig. 8. As the shutter 89 is drawn out of the way, the fabric piece 46 is positioned accurately against abutment 92, is indexed along the path by a fence 100 and falls onto the staging member 83 on top of one of the liner tape pieces 43 which is already there. When the shutter 89 is retracted fully the fourth switch 100 transmits a fourth signal to fourth air cylinder 86 to retract the staging member 83 below the level of the constantly running positioner endless belts 74, 87 permitting the positioner endless belts 74, 87 to carry the fabric piece 46 and the positioner endless belt 74 to carry the liner piece 43 together in desired relationship to each other for delivery to the folder 47.

The staging member and the shutter are returned to their initial positions by means

of two respective reset means (not shown) in the positioner circuit.

The folder 47 forms the lined hem 48 (seen in Fig. 23) out of the margin 49 of the fabric piece 46 folded around the associated liner piece 43 and having a margin edge 51 tucked under itself. The fabric piece 46 and the liner piece 43 are fed together along a straight path with the fabric piece 46 atop the liner piece 43. Margin 49 projects beyond the liner piece 43 transversely of the path 44. The margin 49 has a leading margin end 98 which viewed from the front is here considered to have an initial zero degree rotational orientation (in a plane normal to the path 44). A folder endless belt 99 is organized to engage the fabric piece 46 and with it an associated liner piece 43 for advancing them together in contact with a folder plate 101 along the path 44. The folder plate 101 has folder plate edge 102 aligned along the path 44. When the leading margin end 98 of the fabric piece 46 comes into contact with a first stationary folder member 103, the leading margin end 98 is folded laterally downward past the folder plate edge 102 as shown in Fig. 17. The first stationary folder member 103 rotates the margin 49 about 90° in a plane normal to the path 44) from the initial orientation of the leading margin end. A second stationary folder member 104 engages the leading margin end 98 and folds the margin 49 under the folder plate 101 approximately an additional 90° rotation (in a plane normal to the path 44) from the initial orientation of the leading margin end as shown in Fig. 19.

The margin 49 terminates transversely in margin edge 51. A die 105 is arranged along the path 44 forward of the stationary folder members 103, 104 and is organized for folding the advancing margin edge 51 toward the folder plate 101 and backward to the initial orientation of the leading margin end. The die 105 comprises mainly a first die plate 106 and a second die plate 107 both running substantially along the path 44. The first die plate 106 is straight and continuous. The second die plate 107 is on two elevations and it intersects the plane of the first die plate 106 at designation 108 as well as overlapping the first die plate 106 bottom 109 and top 111 (see Fig. 20) and by virtue of its angular design the second die plate 107 leaves an open space 112 between the two die plates 106, 107 at their middle portion. The margin 49 proceeds along the folder plate 101 in a substantially C-shaped configuration. When the margin edge 51 reaches the die 105, it is riding between a top surface 113 of the second die plate 107 and a bottom surface 114 of the first die plate 106 (see Fig. 21). The angular portion 115 prevents the margin edge 51

from falling away. As the margin edge 51 proceeds it comes to another angular portion 116 and edge 117 forcing the margin flap around the first die plate 106. The margin edge 51 now rides between a lower surface 118 of the second die plate 107 and a top surface 119 of the first die plate 106 causing the margin edge 51 to assume a substantially G-shaped configuration (see Fig. 22). A shaped bar 121 is also included to help maintain the G-shaped configuration until sewing of the line hem 48 takes place along line 122 as shown in Fig. 23.

As the lined hemmed fabric piece leaves the sewing machine 52 it is delivered by means of a stacker endless belt 123 to the stacker 54. Each of the lined hemmed fabric pieces 53 has an enlarged height 124 on one of its ends and it is a principal object of the stacker 54 to distribute the enlarged heights peripherally about a stack 125 so that the stack 125 will not be inclined to fall over. The stacker 54 includes revolvable frame 126 mounted for revolving about a vertical axis 56 and adapted to support a cartridge 55. The cartridge 55 has a cartridge bottom 127 provided with a cartridge bottom opening 128. Stacker endless belt 123 delivers the lined hemmed fabric pieces 53 beneath the revolvable frame 126. Elevator 129 has lands (not shown) which project past the stacker endless belt 123 whereby the elevator 129 penetrates into the cartridge 55 via the cartridge bottom opening 128. Sixth motion means, shown as a sixth piston 131 mounted in a sixth air cylinder 132, is connected to the elevator 129 for providing up and down movement between an initial down position shown in Fig. 24 wherein the elevator 129 is below the stacker endless belt 123 and an up position shown in Fig. 26 wherein the elevator lifts one of the lined hemmed fabric pieces 53 into the cartridge 55 via the cartridge bottom opening 128. Elevator 129 has a horizontal profile smaller than that of the lined hemmed fabric pieces 53. Also the cartridge bottom opening 128 is smaller than the horizontal profile of the lined hemmed fabric pieces 53 so that each of the lined hemmed fabric pieces 53 is deformed as it enters the cartridge 55 and relaxes therein whereby on return of the elevator 129 to its down position the lined hemmed fabric piece sits on the cartridge bottom 127 about the cartridge bottom opening 128.

The revolvable frame 126 is revolved 90° between succeeding insertions of the lined hemmed fabric pieces 53 into the cartridge 55. A seventh motion means, shown as a seventh piston 133 mounted in a seventh air cylinder 134, revolves the revolvable frame 126 about the vertical axis 56. A stacker circuit commences operation with

the elevator 129 in its down position shown in Fig. 24 and includes a sixth sensor to detect approach of one of the lined hemmed fabric pieces 53 on the stacker endless belt 123 to beneath the revolvable frame 126. The stacker circuit transmits a sixth signal on actuation of a sixth sensor 120 to move the elevator to its up position shown in Fig. 26. An air pulse signal is tried to sixth air cylinder 132 to enable it to complete a cycle returning the elevator 129 automatically from its up position to its down position. A seventh switch 140 is provided in the stacker circuit to detect return of the elevator 129 toward its down position. The stacker circuit also has means for transmitting a seventh signal on movement of the seventh switch to revolve the revolvable frame 126.

The revolvable frame 126 depending from a vertical shaft 135 is arranged along the vertical axis 56. A seventh piston 133 is connected to a vertical shaft 135 by means of a revolver crank 136 and a one-way clutch 137 and a stationary frame 138 has a lever arm 139 mounted pivotally thereon about a post 141. The revolver crank 136 has a horizontal extension 142 formed thereon. A spring 143 normally urges the lever arm 139 about the post 141. The revolvable frame 126 has a series of cam followers 144, 145, 146 and 147 mounted thereon. The lever arm 139 is provided with a seat 148 adapted to engage the cam followers one at a time whereby the revolvable frame 126 is oriented when one of the cam followers is positioned in the seat 148 to receive one of the lined hemmed fabric pieces 53. The seventh piston 133 is movable in response to the seventh signal to cause the horizontal extension to disengage one of the cam followers 144 from the seat 148. When the seventh piston 133 moves, the horizontal extension 142 engages the lever arm 139 pivoting the lever arm 139 about the post 141, disengaging the seat 148 from the cam follower 144. The piston 133 is retracted fully (see Fig. 29) and the piston 133 is caused to reverse direction and proceed to its extended position. The one-way clutch 137 engages the shaft 135 for counter clockwise rotation of the shaft 135 when the piston 133 extends the revolver crank 136 about the vertical axis 56. The horizontal extension 142 maintain the seat 148 in a disengaged position and the clutch 137 causes the revolvable frame 126 to rotate counter clockwise about the vertical axis 56. As the piston 133 approaches its fully extended position, the horizontal extension 142 in its sliding engagement with the lever arm 139 and urging of the spring 143 causes the return of the lever arm 139 to its initial position (see Fig. 27) thereby causing the cam follower 145 to come to rest in

contact with the seat 148 locking the revolvable frame 126 in its next position.

WHAT WE CLAIM IS:—

1. Apparatus for manufacturing and stacking hemmed fabric pieces, which apparatus comprises (a) positioner means located along a path of travel through the apparatus for accepting and advancing the fabric pieces, (b) folder means located along said path of travel for forming a hem out of a margin of a fabric piece, (c) sewing means located along said path of travel for sewing the hem along said margin and (d) stacker means located along said path of travel, said stacker means including (e) a cartridge for receiving the hemmed fabric pieces, means for stacking the pieces into said cartridge vertically and means for revolving the cartridge as successive ones of the hemmed fabric pieces are inserted therein whereby uneven height resulting from the hems is distributed peripherally thereabout.
2. Apparatus according to claim 1, wherein the positioner means (a) comprise means for accepting the fabric pieces inserted in turn and for positioning each of the fabric pieces in a desired orientation with respect to the path of travel.
3. Apparatus according to claim 1 or 2, wherein the positioner means (a) accepts fabric pieces inserted manually; the folder means (b) forms a hem out of a margin of the fabric piece to provide a terminal margin flap tucked under itself ready for sewing; and the sewing means (c) sews the hem along the said margin flap.
4. Apparatus according to claim 1, 2 or 3, wherein the positioner means comprises:
 - at least one positioner endless belt arranged to advance forwardly along said path of travel;
 - a staging-member adapted to receive a fabric piece and to seat same on the positioner endless belt, said staging member being located along said path of travel and having a horizontal surface;
 - motion means connected to the staging-member for providing two-way movement vertically between an initial receiving position wherein the staging-member projects above the positioner endless belt and a withdrawn wherein the staging-member is below the positioner endless belt;
 - a shutter above the positioner endless belt and having a planar surface on which one of the fabric pieces can be placed manually;
 - a guide abutment aligned with said path of travel whereby the fabric piece is positionable thereagainst;
 - uncurler means for directing gas flow over the fabric piece toward the guide abut-



the elevator 129 in its down position shown in Fig. 24 and includes a sixth sensor to detect approach of one of the lined hemmed fabric pieces 53 on the stacker endless belt 123 to beneath the revolvable frame 126. The stacker circuit transmits a sixth signal on actuation of a sixth sensor 120 to move the elevator to its up position shown in Fig. 26. An air pulse signal is tried to sixth air cylinder 132 to enable it to complete a cycle returning the elevator 129 automatically from its up position to its down position. A seventh switch 140 is provided in the stacker circuit to detect return of the elevator 129 toward its down position. The stacker circuit also has means for transmitting a seventh signal on movement of the seventh switch to revolve the revolvable frame 126.

The revolvable frame 126 depending from a vertical shaft 135 is arranged along the vertical axis 56. A seventh piston 133 is connected to a vertical shaft 135 by means of a revolver crank 136 and a one-way clutch 137 and a stationary frame 138 has a lever arm 139 mounted pivotally thereon about a post 141. The revolver crank 136 has a horizontal extension 142 formed thereon. A spring 143 normally urges the lever arm 139 about the post 141. The revolvable frame 126 has a series of cam followers 144, 145, 146 and 147 mounted thereon. The lever arm 139 is provided with a seat 148 adapted to engage the cam followers one at a time whereby the revolvable frame 126 is oriented when one of the cam followers is positioned in the seat 148 to receive one of the lined hemmed fabric pieces 53. The seventh piston 133 is movable in response to the seventh signal to cause the horizontal extension to disengage one of the cam followers 144 from the seat 148. When the seventh piston 133 moves, the horizontal extension 142 engages the lever arm 139 pivoting the lever arm 139 about the post 141, disengaging the seat 148 from the cam follower 144. The piston 133 is retracted fully (see Fig. 29) and the piston 133 is caused to reverse direction and proceed to its extended position. The one-way clutch 137 engages the shaft 135 for counter clockwise rotation of the shaft 135 when the piston 133 extends the revolver crank 136 about the vertical axis 56. The horizontal extension 142 maintain the seat 148 in a disengaged position and the clutch 137 causes the revolvable frame 126 to rotate counter clockwise about the vertical axis 56. As the piston 133 approaches it fully extended position, the horizontal extension 142 in its sliding engagement with the lever arm 139 and urging of the spring 143 causes the return of the lever arm 139 to its initial position (see Fig. 27) thereby causing the cam follower 145 to come to rest in

contact with the seat 148 locking the revolvable frame 126 in its next position.

WHAT WE CLAIM IS:—

1. Apparatus for manufacturing and stacking hemmed fabric pieces, which apparatus comprises (a) positioner means located along a path of travel through the apparatus for accepting and advancing the fabric pieces, (b) folder means located along said path of travel for forming a hem out of a margin of a fabric piece, (c) sewing means located along said path of travel for sewing the hem along said margin and (d) stacker means located along said path of travel, said stacker means including (e) a cartridge for receiving the hemmed fabric pieces, means for stacking the pieces into said cartridge vertically and means for revolving the cartridge as successive ones of the hemmed fabric pieces are inserted therein whereby uneven height resulting from the hems is distributed peripherally thereabout.

2. Apparatus according to claim 1, wherein the positioner means (a) comprise means for accepting the fabric pieces inserted in turn and for positioning each of the fabric pieces in a desired orientation with respect to the path of travel.

3. Apparatus according to claim 1 or 2, wherein the positioner means (a) accepts fabric pieces inserted manually; the folder means (b) forms a hem out of a margin of the fabric piece to provide a terminal margin flap tucked under itself ready for sewing; and the sewing means (c) sews the hem along the said margin flap.

4. Apparatus according to claim 1, 2 or 3, wherein the positioner means comprises:

at least one positioner endless belt arranged to advance forwardly along said path of travel;

a staging-member adapted to receive a fabric piece and to seat same on the positioner endless belt, said staging member being located along said path of travel and having a horizontal surface;

motion means connected to the staging-member for providing two-way movement vertically between an initial receiving position wherein the staging-member projects above the positioner endless belt and a withdrawn wherein the staging-member is below the positioner endless belt;

a shutter above the positioner endless belt and having a planar surface on which one of the fabric pieces can be placed manually;

a guide abutment aligned with said path of travel whereby the fabric piece is positionable thereagainst;

uncurler means for directing gas flow over the fabric piece toward the guide abut-

ment to eliminate curls in the fabric piece and to maintain alignment of the fabric piece with the guide abutment;

5 shutter motion means connected to the shutter for providing two-way movement horizontally and transversely of said path of travel between an initial position over the belt and a withdrawn position whereby on movement of the shutter to the withdrawn position the fabric piece drops onto the staging member;

10 the staging-member motion means being operative on movement of the shutter to its withdrawn position to seat the fabric piece onto the positioner endless belt;

15 the staging-member motion means being operative to move said staging member from its initial receiving position in response to a staging-member-actuating signal;

20 the shutter motion means being operative to move said shutter from its initial position over the belt in response to a shutter-actuating signal;

25 a positioner circuit including a sensor means to detect positioning of the fabric piece on the shutter and aligned with the guide abutment,

30 the positioner circuit having means for transmitting the shutter-actuating signal on actuation of the said sensor means to move the shutter to its withdrawn position,

35 the positioner circuit including a switch activated on movement of the shutter to its withdrawn position to move the staging-member to its withdrawn position; and

40 the positioner circuit further including two reset means thereafter to return the staging-member and the shutter respectively to their initial positions.

5. Apparatus according to any of claims 1 to 4 wherein the folder means comprises:

45 means for feeding the fabric piece along said path of travel such that the fabric piece has a margin which projects transversely of said path of travel, said margin having a leading margin end which, viewed from the front, is considered to have an initial, zero-degree rotational orientation in a plane normal to said path of travel;

50 a folder endless belt arranged to engage the fabric piece for advancing it in contact with a folder plate along said path of travel, the folder plate having a folder plate edge along said path of travel;

55 at least one stationary folder member along said path of travel for folding the advancing margin around the folder plate edge;

60 a die arranged along said path of travel forward of the folder member and arranged for folding the advancing margin toward the folder plate and backward to the initial orientation of the leading margin end; and

65 means for withdrawing the fabric piece from the folder plate with the hem folded

and with the edge of the margin tucked under itself ready for sewing.

6. Apparatus according to any of claims 1 to 5, wherein the stacker comprises:

70 a revolvable frame mounted for revolving about a vertical axis and adapted to support the cartridge, the cartridge having a cartridge bottom provided with a cartridge bottom opening;

75 delivery means for delivering the pieces in turn beneath the revolvable frame; an elevator;

80 elevator motion means connected to the elevator for providing up and down movement between an initial down position wherein the elevator is below the delivery means and an up position wherein the elevator lifts one of the hemmed fabric pieces into the cartridge via the cartridge bottom opening;

85 the elevator being such that hemmed fabric pieces having a horizontal profile which is greater than the horizontal profile of the elevator will be deformed as they enter the cartridge and will relax therein so that on return of the elevator to its down position the hemmed fabric pieces will sit on the cartridge bottom about the cartridge bottom opening; and

90 frame motion means for revolving the revolvable frame about the axis so that as succeeding ones of the hemmed fabric pieces form a stack the enlarged height is distributed peripherally thereabout.

7. Apparatus according to any of claims 1 to 6, adapted for manufacturing and stacking lined hemmed fabric pieces, which apparatus further comprises: dispenser means for cutting and feeding automatically a liner tape of constant width in pieces 105 each of a same predetermined length in their lengthwise directions in turn along a path of travel through the apparatus; wherein the positioner means is adapted to position each of the fabric pieces onto one of the liner pieces and the folder means is adapted to form a hem out of a margin of the fabric piece folded over its associated liner piece.

8. Apparatus according to claim 7, 115 wherein the dispenser means comprises:

supply means for supplying a continuous feed of the tape;

120 advancer means for advancing the tape one of said length at a time forwardly along said path of travel to a cutting position;

holder means for holding the tape in the cutting position;

125 cutter means for cutting the tape into said predetermined lengths as the tape is held in the cutting position;

a pusher member organized to contact the tape and pusher motion means connected to the pusher member for providing two-way movement of the pusher member 130



forwardly and rearwardly along said path of travel, the pusher motion means being arranged to move the pusher member from an initial forward position rearwardly along said path of travel;

slip means for preventing the pusher member moving the liner tape rearwardly;

the pusher motion means including means thereafter automatically to return the pusher member to its forward position moving the liner tape forwardly along said path of travel;

the pusher motion means being operative from its initial forward position in response to a pusher-actuating signal;

a finger;

a finger motion means connected to the finger for providing two-way movement transversely of the path between an initial retracted position wherein the finger is retracted and a holding position wherein the finger holds the tape against a platform;

the finger motion means being operative from its initial retracted position in response to a finger-actuating signal;

at least one endless belt arranged forward of the finger along said path of travel and arranged to advance the liner tape forwardly;

presser means for pressing the liner tape onto the endless belt;

the cutter means comprising a knife positioned along said path of travel between the finger and the presser means;

a knife motion means connected to the knife for moving the knife transversely of said path of travel between an initial retracted position wherein the knife is retracted and a cutting position wherein the knife cuts from the liner tape one of the liner pieces;

the knife motion means being operative from said initial retracted position in response to a knife-actuating signal, and

a sensor for detecting the liner tape in the cutting position and connected to a dispenser circuit arranged to transmit the

pusher-actuating signal to move the pusher member rearwardly and simultaneously to transmit the finger-actuating signal to move the finger to its holding position, the dispenser circuit being arranged then to transmit the knife-actuating signal to move the knife to its cutting position, the dispenser circuit further including two reset means thereafter to return the finger and the knife respectively to their initial positions.

9. Apparatus according to claim 7 or 8, as appendant to claim 4, wherein the positioner means comprises means for positioning one of the liner pieces on the endless belt; the staging-member is arranged to engage the liner piece delivered thereto by the positioner endless belt; the shutter is arranged to allow the fabric piece to drop onto the liner piece on the staging-member and the staging-member motion means is arranged to seat the fabric piece and the liner piece together onto the positioner endless belt.

10. An apparatus according to claim 7 or 8, as appendant to claim 5, wherein means for feeding the fabric piece along the path of travel is adapted to do so with the fabric piece and liner piece arranged one atop the other; the said margin of the fabric piece projecting beyond the liner piece; and the folder endless belt is adapted to advance the liner piece together with the fabric piece.

11. An apparatus for manufacturing and stacking hemmed, lined or unlined fabric pieces, which apparatus is substantially, as described and as illustrated in the accompanying drawings.

12. Hemmed fabric pieces whenever manufactured and stacked in an apparatus according to any one of claims 1 to 11.

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