



(51) International Patent Classification:
A41F 9/00 (2006.01)

(21) International Application Number:
PCT/US2014/057890

(22) International Filing Date:
26 September 2014 (26.09.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/897,930 31 October 2013 (31.10.2013) US

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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,

DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*

(54) Title: CONTINUOUS FOLDED AND CREASED WAISTBAND, COLLAR STAND, AND METHODS AND SYSTEMS FOR MAKING SAME

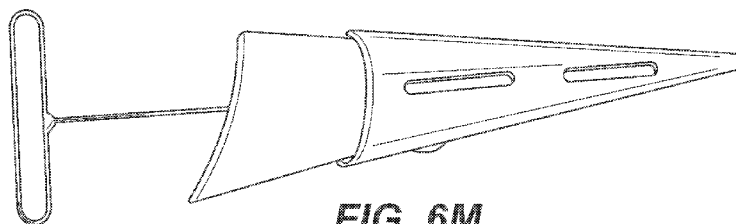


FIG. 6M

(57) Abstract: A continuous stream of elements or parts of garments is formed by providing a continuous first substrate and optionally a continuous fusible substrate; positioning the continuous fusible substrate on the continuous first substrate to form a combination; fusing the combination to form a first fused combination; folding the first fused combination to form a folded fused combination; and then pressing the folded fused combination to form the continuous stream, wherein the continuous stream includes multiple individual elements or parts. The elements or parts may be collar stands or waistbands.



CONTINUOUS FOLDED AND CREASED WAISTBAND, COLLAR STAND, AND METHODS AND SYSTEMS FOR MAKING SAME

BACKGROUND OF THE INVENTION

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FIELD OF THE INVENTION

[0002] This invention relates to garment and garment manufacture, and, more particularly to waistbands and collar stands for garments and methods and devices for their manufacture.

BACKGROUND AND OVERVIEW

[0003] Many garments such as pants, dresses, skirts, and the like include waistbands, and shirt's use collar stands. There are many types of waistbands, including one-piece, waistbands with inners and waistbands with curtains. Traditionally, one-piece waistbands for use on garments were made by first cutting each waistband to the desired length, then folding the waistband across a central axis thereof to create a crease, and then pressing the crease down with a hand iron. The two edges were then each also folded in and pressed, and then, in some cases, the seams were sewn along the two outer edges. Then the one side was used to attach the waistband to the pant or skirt, the other side was tucked in and stitched down when closing the waistband.

[0004] This process was problematic in that often the creases were uneven and resulted in imperfect waistbands that may have frayed out and/or may not have aligned properly with the garment. Additionally, cutting each waistband individually, and then folding and pressing it increased the time taken to make each garment.

[0005] An object of this invention is to create waistbands and collar stands with consistent quality, and without wasting excess fabric, and in such a way that they can be efficiently attached to garments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Various other objects, features and attendant advantages of the present invention will become fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views, and wherein:

[0007] **FIGS. 1A – 1D** are a top views of two substrates in various stages of forming waistbands or collar stands according to embodiments hereof;

[0008] **FIGS. 2A, 2B, and 2C** are side views of the substrates of **FIGS. 1A – 1C**, respectively, according to embodiments hereof;

[0009] **FIGS. 2D-2F** are side views of a substrate according to embodiments hereof;

[0010] **FIGS. 3A-3D** depict systems for manufacture of waistbands or collar stands according to embodiments hereof;

[0011] **FIGS. 4A-4B** are flowcharts of processes for manufacture of waistbands or collar stands according to embodiments hereof;

[0012] **FIG. 5** is a top view of a waistband according to embodiments hereof;

[0013] **FIGS. 6A-6N** depict an exemplary folder for manufacture of waistbands or collar stands according to embodiments hereof; and

[0014] **FIGS. 7A-7C** depict exemplary guides used in the systems of **FIGS. 3A-3B**.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EXEMPLARY EMBODIMENTS

[0015] Waistbands according to embodiments hereof are described with reference to **FIGS. 1A to 1D** and **2A, 2B-1, 2B-2, and 2C**.

[0016] The following description refers to the manufacture of waistbands. It should be appreciated that the same processes and systems may be used for collar stands and other rectangular pieces.

[0017] In the following description a continuous waistband stream may be formed which may then be stored and then later cut to required lengths as needed. It should be appreciated that **FIGS. 1A to 1D** show a top view of only a portion of a continuous waistband.

A waistband stream is formed from two substrates or materials that are processed as described herein. The first substrate **10** is the outer material of the waistband to be manufactured. The first substrate **10** may be provided as a continuous piece of material (e.g., from a spool) or it may be formed by joining pre-cut waistbands together, end-to-end (thereby to form a continuous piece of material). The latter approach is preferable when color matching of waistbands to garment is desired, as the individual pre-cut waistbands can be cut from the same material as the rest of the garment. This latter approach lends itself to a system in which waistbands are processed in smaller batches (e.g., 10-20 at a time), although it can be used for larger batches. Although the process is described here using two substrates, it should be appreciated that a single substrate – a regular fabric – could be used alone, e.g., as shown in **FIGS. 2D-2F**. The first substrate may comprise rigid fabric, or stretch fabric, or fabric cut on the bias. In some cases the first substrate may comprise: denim, cotton, cotton blends, wool, wool blends, polyester, polyester blends, spandex, spandex blends, polyester viscose, linen and linen blends.

[0018] The fusible substrate **12** is a fusible material that is applied to the inside of the waistband. The term “fusible” is sometimes used herein to refer to the fusible material. It should be appreciated that the words “first” and “second” are used herein to distinguish or identify the materials or substrates, and not to show a serial or numerical limitation.

[0019] Preferably the inner material of second substrate **12** comprises a fusible substrate and is provided, in part, to provide and/or maintain an elastic memory of the form and the shape of the waistband.

[0020] For example, if the waistbands are to be made from denim, then the outer material or first substrate **10** will comprise denim, and the inner material or fusible substrate **12** will be an appropriate material that will fuse to the denim under appropriate fusing conditions (i.e., pressure, speed, and temperature conditions). It should be appreciated that the waistbands manufactured by the processes described herein may use any materials, and invention is not limited by any examples given. It should further be appreciated that those of ordinary skill in the art of garment manufacturing will know and understand, upon reading this description, which materials can be used together and what the fusing requirements are for various combinations of first and second substrates.

[0021] In order to manufacture a continuous waistband according to embodiments hereof, and as shown, *e.g.*, in **FIG. 1A**, the fusible substrate **12** is positioned on top of the first substrate **10**. As shown in the drawing in **FIG. 1A**, the first substrate **10**, before being folded, has a width *W1*, and the fusible substrate **12** has a width *W2*.

[0022] Various dashed and dotted lines are used in **FIGS. 1A** to **1C** and **2A**, **2B-1**, **2B-2**, and **2C** to aid in this description. It should be appreciated that these lines are merely descriptive aids.

[0023] Thus, as shown in **FIG. 1A**, the fusible substrate **12** is positioned between dashed lines A - A and B - B, preferably centered along the dashed line M-M that denotes a center axis of the first substrate **10**.

[0024] It should be appreciated, however, that the fusible substrate **12** may be positioned off-center with respect to the first substrate **10** for certain waistband designs, and that these designs are contemplated herein.

[0025] For the purposes of this discussion, the distance from the edge of the fusible substrate along line A - A to the edge X - X of first substrate **10** is referred to as *W3*, and distance from the edge of the fusible substrate along the line B - B to the edge Y - Y of first substrate **10** is referred to as *W4*.

[0026] The fusible substrate **12** may be positioned substantially in the center of the first substrate **10** (*i.e.*, substantially along a central axis of the first

substrate **10**), or it may be positioned off center. In other words, the values of $W3$ and $W4$ may be substantially equal (when the fusible **12** is centered along the transverse axis of the first substrate **10**, or they may be unequal (when the fusible **12** is off center), as shown, e.g., in **FIG. 1D**. In some cases the fusible **12** may be positioned so that there is no substrate **10** exposed on one or both sides. For example, the fusible **12** may be positioned on the substrate **10** with only 1/8 inch of the edge on one side.

[0027] Those of ordinary skill in the art of garment manufacturing will know and the dimensions needed for various types and styles of waistbands or collar stands.

[0028] In **FIG. 1A** the dashed lines A-A and B-B denote two fold lines. In the drawings these lines are shown on the edges of the fusible **12**.

[0029] As will be explained below, in forming a continuous waistband according to embodiments hereof, a portion **10-1** of the first substrate **10** is folded over the fold line A-A, and a second portion **10-2** the first substrate **10** is folded over the fold line B-B. The distance between the fold lines A-A and B-B is essentially the width of the fusible **12**. The width of the first portion of the first substrate **10** that will be folded over the fold line A-A is substantially $W3$, and the width of the portion of the second portion of the first substrate **10** that will be folded over the fold line B-B is substantially $W4$.

[0030] As shown in the drawings, the fold line A-A corresponds substantially to an edge A-A of the fusible substrate **12**. It should be appreciated that in less preferred embodiments the fold line A-A may be away from the edge of the fusible substrate **12**. Similarly, while the other fold line is shown to correspond substantially to the edge B-B of the fusible substrate **12**, in some less preferred embodiments the other fold line B-B may be away from the edge of the fusible substrate **12**.

[0031] **FIG. 2A** shows a cross-sectional view of the materials in **FIG. 1A**, with the fusible substrate **12** positioned on top of the first substrate **10**.

[0032] **FIGS. 1B** and **2B** show a continuous waistband being formed according to embodiments hereof, and in which a first portion **10-1** of the first substrate **10** has been folded over fold line A-A, and a second portion **10-2** of the first substrate **10** has been folded over fold line B-B.

[0033] **FIG. 2B** shows an exemplary cross-sectional view of the continuous waistband being formed in **FIG. 1B**. In the exemplary embodiment in **FIG. 2B** the fold line A-A corresponds substantially to a first edge of the fusible substrate **12**, and the fold line B-B corresponds substantially to a second edge of the fusible substrate **12**.

[0034] After the first and second side portions **10-1** and **10-2** of the first substrate **10** have been folded over fold lines A-A and B-B, respectively, a portion **12'** of the fusible substrate **12** may remain uncovered.

[0035] It should be appreciated that the center fold line M'-M' in **FIG. 1B** may not correspond to the center line M-M in **FIG. 1A**, depending on the symmetry of the fold lines A - A and B - B with respect to the line M-M, and the distances **W3** and **W4**.

[0036] **FIG. 1C** shows a continuous waistband formed when the materials shown in **FIG. 1B** are folded substantially over the fold line M'-M', which is preferably a centerline of the combined substrates after the two side portions have been folded over the fold lines A-A and B-B.

[0037] **FIG. 2C** shows a cross-sectional view of the waistband being formed after the folds shown in **FIG. 1C**. It should be appreciated that, as with all of the drawings herein, **FIG. 2C** is not drawn to scale and that relative positions and sizes of the substrates are merely exemplary. It should be appreciated that, in addition to the drawings not being to scale, the folds of actual substrates or materials will not be rectangular, and the rectangular folding is shown in the drawings to aid in this description.

[0038] As shown in **FIG. 2C**, the substrates of **FIGS. 1B** and **FIG. 2B** are folded over a substantially central fold line M'-M' to form a folded waistband having width **W7**. Those of ordinary skill in the art will appreciate and understand, upon reading this description, how to select various fold

widths in order to achieve a waistband having a width $W/7$. As noted above, the thickness and type of each of the substrates will determine the thickness of the folds and how much material needs to be included in each substrate to accommodate the various folds. Similarly, those of ordinary skill in the art will appreciate and understand, upon reading this description, how large each folded portion of the first substrate **10** needs to be in order to sufficiently overlap fusible substrate **12** when the first and second side portions of the first substrate **10** are folded over fold lines A-A and B-B, respectively.

[0039] The fusible substrate **12** may comprise adhesive or the like so that it may be fused with the first substrate **10** under appropriate fusing conditions. In some embodiments the fusible substrate **12** has less adhesive or fiber or fabric yarns along the fold line M'-M' in order to aid with the folding.

[0040] Although the folding of the first substrate **10** and the fusible substrate **12** is shown in three distinct drawings (**FIGS. 1A-1C**, and corresponding **FIGS. 2A-2C**), it should be appreciated that the folds may be achieved simultaneously, e.g., using a folder shown in **FIGS. 6A-6N**).

[0041] **FIG. 3A** depicts an exemplary system **30** for manufacture of continuous waistbands according to embodiments hereof. As shown in the drawing in **FIG. 3A**, fusible substrate **10** and first substrate **12** are fed into a fuser (or fusing press) **32**. Before entry to the fuser **32**, the fusible substrate **12** is positioned on top of the first substrate **10** as shown, e.g., in **FIGS. 1A** and **2A**. A guide mechanism (e.g., as shown in **FIGS. 7A-7C**) may be positioned in front of fusing press **32** in order to position the fusible substrate **12** on the first substrate **10** exactly where needed

[0042] The first substrate **10** and the fusible substrate **12** may be provided on spools or troughs or the like which are positioned to feed appropriate amounts of the substrates **10** and **12** into the fuser **32** substantially tension free. The spools may be positioned such that the fusible substrate **12** is appropriately located on top of the first substrate **10**.

[0043] The fuser **32** fuses the first and second substrates together under conditions (e.g., at temperature, pressure, and speed) appropriate for the

materials being used. Those of ordinary skill in the art will know and understand what settings to use for the fuser **32** based on the materials being used for the first substrate **10** and the fusible substrate **12**. The output of the fuser **32** is a fused combination **14** of the first substrate **10** and the fusible substrate **12**, e.g., as shown in **FIGS. 1A** and **2A**.

[0044] The output **14** of fuser **32** is preferably cooled (e.g., in troughs or by spacing between equipment components) and then provided to one or more folders **34** in order to achieve the folds, e.g., as described above with reference to **FIGS. 1A** to **1C** and **2A**, **2B**, and **2C** (over fold lines A-A, B-B, and M'-M'). The folds may be achieved simultaneously with a single folder that folds the two side portions first and then does the fold over the M' - M' line (e.g., as shown in **FIGS. 6A-6N**). It should be appreciated, however, that the folds may be achieved with two or three distinct folding mechanisms (which collectively form folder(s) **34**). In some cases only one or two folds may be needed, in which case an appropriate folder mechanism will be used.

[0045] The output **16** of folder(s) **34** is the continuous waistband shown in **FIGS. 1C** and **2C**. This output **16** is fed into a second fuser (fusing press) **36** (denoted "Press" in the drawing) pressing / creasing the folded fused materials (first substrate **10** fused with fusible substrate **12**). Press **36** presses the folded substrates to help production of a continuous folded and/or creased waistband. As the press **36** does not need to fuse the substrates, it may operate at a lower temperature than fuser **32**. The waistband **18** produced by press **36** may then be collected, for example, by a spooler **40** onto spools **42** or may be cut to measurement.

[0046] The spooled continuous waistband **18** may then be cut to appropriate length for use on a garment.

[0047] Fuser **32** may be a Reliant M60 (made by Reliant Machinery Ltd., United Kingdom) or the like, and press **36** may be a Reliant M45 or the like.

[0048] It should be appreciated that the output **14** of the fuser **32** may be hot and should therefore preferably be cooled before being fed into folder(s)

34. Cooling bins or the like may be provided in order to cool the fused output **14**.

[0049] The output **16** of folder(s) **34** is a folded, fused substrate to be fed into the press **36**. In order to prevent the output **16** of the folder(s) **34** from unfolding before being pressed, the folder **34** preferably feeds directly into the mouth **38** of the press **36**, with little or no gap between them. In order to achieve this, the folder preferably has an extended output portion (**35** in **FIG. 3A**, **35'** in **FIG. 3B**, and as shown, e.g., in **FIGS. 6A-6N**) that can feed directly (or substantially directly) into the mouth **38** of press **36**. In one example, as shown in **FIGS. 6A-6N**, a portion **34**, **34'** of the folder **34** extends 8-10 inches (which may be referred to herein as a Roup extension). It should be appreciated that a Roup extension may be shorter than 8 inches or longer than 10 inches. In some embodiments one or more standalone folders may be used with a separate flat guide (e.g., 8-10 inches long) in front of it to feed the output of the folder(s) directly into the mouth of the press. The flat guide should control the output of the folder to prevent it from unfolding. The extended output portion **35**, **35'** of the folder(s) **34**, **34'** may be fully or partially integrated into and be part of the folders(s) **34**, **34'** or it may be a separate component.

[0050] **FIG. 4A** is a flowchart of an exemplary process for manufacture of continuous waistbands or collar stands according to embodiments hereof, using, e.g., the system shown in **FIG. 3A**. As shown in **FIG. 4A**, the fusible substrate **12** (fuse material) is overlaid (at **S42**) onto the first substrate **10** (e.g., waistband material). This corresponds, e.g., to the merging of the two substrates **10** and **12** prior to entering the fuser **32** in **FIG. 3A**. The result of the overlay (in **S42**) is the fusible substrate **12** being positioned on top of the first substrate **10**, e.g., as shown in **FIGS. 1A** and **2A**.

[0051] Next, the two substrates **10** and **12** are fused (at **S44**). Using the exemplary system shown in **FIG. 3A**, the fusing (at **S44**) may be done by fuser (fusing press) **32**, e.g., by being fused together under appropriate conditions (e.g., under appropriate pressure, speed, and temperature). The fused

substrates (denoted **14** exiting fuser **32** in **FIG. 3A**) are then cooled (if needed – not shown in the flow chart) and then folded (at **S46**). In the exemplary system of **FIG. 3A**, the folding may be done by folder(s) **34** (e.g. the folder shown in **FIGS. 6A-6N**), and the result of the folding may correspond to the three-way folding described above with reference to **FIGS. 1A to 1C** and **2A to 2C**. In some embodiments the folding may result in a one-fold waistband or a two-fold waistband.

[0052] Next, the folded substrates are pressed/creased (at **S48**). In the exemplary system of **FIG. 3A**, the pressing/creasing (in **S48**) may be done by press **36**, *e.g.*, by being pressed together under appropriate conditions (*e.g.*, under appropriate pressure, speed, and temperature).

[0053] The fused three-way folded, pressed and creased substrates may then be collected and/or spooled (at **S50**).

[0054] In some preferred embodiments, the continuous tri-folded and pressed waistbands are rolled into 10 or 20 waistband lengths which may then be taken to a production floor where they are fitted overhead or under a waistband machine (that pull the bands as needed) as the operator attaches the waistband onto the pants. It should be appreciated that the use of a spool of continuous waistbands means that, in use, only the first waistband needs to be fed into the waistband machine, the rest of the waistband will follow as needed.

[0055] In some cases the waistbands being produced will include curtains or inners. In these case, as shown, *e.g.*, in **FIG. 3B**, in addition to the first substrate **10** and the fusible substrate **12**, the fuser **32'** also takes in a second substrate **60** (for the curtain or inner) and a second fusible substrate **62**. The output of the fuser **32'** is first stream **14'** formed from the first substrate **10** being fused / pressed with the first fusible **12**, and a second stream **64** formed from the second substrate **60** being fused / pressed with the first fusible **62**. These two streams are the allowed to cool, as needed, and then joined (by joiner **33**) to form a combined stream **66** (with the curtain or inner joined to the combined first substrate **10** and fusible substrate **12**. The combined stream **66** is then fed into folder **34'**, folded as required, and then the folded stream **68** is

fed substantially directly into the mouth **38'** of the press **36'**. The output **70** of the press **36'** may then be collected and spooled (by spooler **40'** on spool **42'**).

[0056] It should be understood that the joiner **33** may be a sewing machine or the like and may require human operation.

[0057] **FIG. 4B** is a flowchart of an exemplary process for manufacture of continuous waistbands or collar stands according to embodiments hereof, using, e.g., the system shown in **FIG. 3B**. First (at **S70**) an outer and an inner or curtain are formed. The outer (**14'** in **FIG. 3B**) is formed in the same manner as the combination **14** in **FIG. 3A**. The inner or curtain may be formed in a similar manner (at **S72, S74**). The outer **14'** and inner or curtain **64** are then joined (at **S78**), folded (at **S80**), and pressed/creased (at **S82**). As noted, the folding (at **S80**) may result in one, two, three, or more folds. The combined folded, pressed outer and inner (or outer and curtain) may then be collected (e.g., spooled) (at **S84**).

[0058] Those of ordinary skill in the art will realize and appreciate, upon reading this description, that when a single substrate is used, without a fusible substrate, then the fuser **32** (**FIG. 3A**) may be omitted (as shown, e.g., in **FIG. 3C**). If a single substrate is used for the outer **10** in the embodiment of **FIG. 3B**, then that substrate need not be processed by fuser **32'**, and it may be fed directly into joiner **33** (as shown, e.g., in **FIG. 3D**).

[0059] **FIG. 5** is a top view of a continuous waistband **18** according to embodiments hereof, produced by the system **30** and process(es) described above. The continuous waistband **14** shown in **FIG. 5** may be further processed to include seams, e.g., seam **50**, as seen, e.g., on some jeans.

[0060] The first substrate may be or comprise, without limitation, a material selected from the group comprising: denim, cotton (e.g., 100% cotton or cotton blends), wool (e.g. 100% wool or wool blends), polyester, polyester blends, spandex (elastane), spandex blend, polyester viscose (e.g., polyester and Rayon or some fabric made from regenerated cellulose fiber), linen or linen blends. A cotton blend may be, e.g., a 65/35 cotton polyester blend or a 50/50 cotton polyester blend. A polyester blend may be, e.g., a 98/2 polyester

cotton blend or a 97/3 polyester cotton blend. Those of ordinary skill in the art will realize and appreciate, upon reading this description, that different and or other materials and blends may be used, and the examples of materials listed here are not intended to limit the scope of this invention in any way.

EXAMPLES

Example 1

[0061] In one example, the first substrate **10** is denim and the fusible substrate **12** is a 84 mm fusible substrate, and the fuser **32** is set to 180°C, speed at 5 Meters/Minute and pressure at 5 bars.

Example 2

[0062] In another example, the first substrate **10** is 100% cotton and the fusible substrate **12** is a 80 mm fusible substrate, and the fuser is set to 160°C, at 4 Meters/Minute with the pressure at 4 bars.

Example 3

[0063] In another example, the first substrate **10** is denim and the fusible substrate **12** is a 47 mm fusible substrate, and the fuser **32** is set to 180°C, speed at 5 Meters/Minute and pressure at 5 bars.

Example 4

[0064] In another example, the first substrate **10** is 100% wool and the fusible substrate **12** is a 45 mm fusible substrate, and the fuser **32** is set to 160°C, speed at 4 Meters/Minute and pressure at 4 bars.

[0065] Thus are described continuous folded waistbands and collar stands, and methods and system for making same.

[0066] Although some of the examples and processes shown about use fusible substrate, it should be appreciated that a fusible substrate is not required in all embodiments, and that waistbands and collar stands may be made without a fusible substrate.

[0067] In some embodiments the fabric for the waistband (or collar stand) may be or include spandex (sometimes referred to as “elastane,” e.g., Lycra™ or some such material comprising an elastic polyurethane fiber or fabric) so that it will be able to stretch by itself.

[0068] In some embodiments the fabric used to make the waistband (or collar stand) may be cut on a bias in order to impart a degree of mechanical stretch to the fabric, with or without the use of a fusible.

[0069] The systems and processes described remove the complexities, inaccuracies and waste of manual products.

[0070] While the above example all show three-way folds, some waistband may only require one or two folds, and these may be accommodated by different folders.

[0071] Where a process is described herein, those of ordinary skill in the art will appreciate that the process may operate without any user intervention. In another embodiment, the process includes some human intervention (*e.g.*, a step is performed by or with the assistance of a human).

[0072] As used in this description, the term “portion” means some or all. So, for example, “A portion of X” may include some of “X” or all of “X”. In the context of a conversation, the term “portion” means some or all of the conversation.

[0073] As used herein, including in the claims, the phrase “at least some” means “one or more,” and includes the case of only one. Thus, *e.g.*, the phrase “at least some ABCs” means “one or more ABCs”, and includes the case of only one ABC.

[0074] As used herein, including in the claims, the phrase “using” means “using at least,” and is not exclusive. Thus, *e.g.*, the phrase “using X” means “using at least X.” Unless specifically stated by use of the word “only”, the phrase “using X” does not mean “using only X.”

[0075] In general, as used herein, including in the claims, unless the word “only” is specifically used in a phrase, it should not be read into that phrase.

[0076] As used herein, including in the claims, the phrase “distinct” means “at least partially distinct.” Unless specifically stated, distinct does not mean fully distinct. Thus, *e.g.*, the phrase, “X is distinct from Y” means that “X is at least partially distinct from Y,” and does not mean that “X is fully distinct from Y.” Thus, as used herein, including in the claims, the phrase “X is distinct from Y” means that X differs from Y in at least some way.

[0077] It should be appreciated that the words “first” and “second” in the description and claims are used to distinguish or identify, and not to show a serial or numerical limitation. Similarly, the use of letter or numerical labels (such as “(a)”, “(b)”, and the like) are used to help distinguish and / or identify, and not to show any serial or numerical limitation or ordering.

[0078] While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

WHAT IS CLAIMED:**We claim:**

1. A method for creating a continuous stream of elements of garments, the method comprising:

5 (A) providing a continuous first substrate and a continuous fusible substrate;

(B) positioning said continuous fusible substrate on said continuous first substrate to form a combination;

(C) fusing said combination to form a first fused combination;

3 (D) folding said first fused combination to form a folded fused combination; and

(E) pressing said folded fused combination to form said continuous stream,

5 wherein said continuous stream comprises multiple individual elements of multiple garments.

2. The method of claim 1 wherein said positioning in (B) positions said fusible substrate substantially along a central axis of said first substrate.

3. The method of claims 1 or 2 wherein said fusing in (C) comprises:

pressing said combination under first heated conditions.

4. The method of any preceding claim wherein said pressing in (E) comprises:

pressing said folded fused combination under second heated conditions.

5. The method of any preceding claim wherein said folding in (D) comprises:

(D)(1) forming three folds in said first fused combination.

5 6. The method of claim 5 wherein said three folds comprise:

a first side fold,

a second side fold, and

a center fold.

7. The method of claim 5 wherein said three folds comprise:

a first side fold formed by folding a first portion of said continuous first substrate over at least some of said continuous fusible substrate.

8. The method of claim 7 wherein said three folds also comprise:

5 a second side fold formed by folding a second portion of said continuous first substrate over at least some of said continuous fusible substrate.

9. The method of claim 8 wherein said three folds also comprise:

10 a middle fold formed by folding said first pressed combination after said first side fold and said second side fold have been made.

10. The method of any of the preceding claims wherein said first substrate comprises a first material selected from the group comprising: denim,
5 cotton, cotton blends, wool, wool blends, polyester, polyester blends, spandex, spandex blends, polyester viscose, linen and linen blends.

11. The method of any of the preceding claims wherein said fusible substrate comprises a second material selected from the group comprising: 84 mm fusible substrates, 45 mm fusible substrates, 47 mm fusible substrates, and 80 mm fusible substrates.

5

12. The method of any of the preceding claims further comprising:
(F) spooling portions of said continuous stream.

)

13. The method of claim 12 wherein said portions comprise sufficient continuous waistband stream for at least ten individual waistbands.

14. The method of claim 12 wherein said portions comprise sufficient continuous elements in said stream for at least twenty individual elements.

5

15. The method of any of the preceding claims wherein said folding in (D) folds said first fused combination with a single folder.

)

16. The method of any of the preceding claims wherein said first continuous substrate was formed by joining pre-cut elements together.

17. The method of any preceding claim further comprising:
(G) cutting a single element from said continuous elements.

5

18. The method of any preceding claim wherein the elements of garments are waistbands.

19. A waistband formed by the method of any of the preceding claims.

20. The method of any of claims 1-17 wherein the elements of garments are collar stands.

5 21. A collar stand formed by the method of any of claims 1-17 and 20.

22. Continuous waistband streams formed by the method of any one of claims 1-17.

23. The continuous waistband streams of claim 22 comprising sufficient material for at least ten individual waistbands.

5 24. The continuous waistband streams of claim 22 comprising sufficient material for at least twenty individual waistbands.

25. A spool of continuous waistband streams according to any one of claims 22 to 24.

26. Continuous collar stand streams formed by the method of any one of claims 1-17 and 20.

27. The continuous collar stand streams of claim 26 comprising sufficient material for at least ten individual collar stands.

5 28. The continuous collar stand streams of claim 26 comprising sufficient material for at least twenty individual collar stands.

29. A spool of continuous collar stand streams according to any one of claims 26 to 28.

30. A method for creating a continuous stream of elements of garments, the method comprising:

- (A) folding a continuous substrate to form a folded substrate; and
- (B) pressing said folded substrate to form said continuous stream,

wherein said continuous stream comprises multiple individual elements of multiple garments.

31. The method of claim 30 wherein said folding in (A) comprises:

- (A)(1) forming three folds in said substrate.

32. The method of claim 31 wherein said three folds comprise:

- a first side fold,
- a second side fold, and
- a center fold.

33. The method of any one of claims 31-32 wherein the folds are formed simultaneously.

34. The method of any of claims 31-33 wherein the elements of garments are selected from: waistbands and collar stands.

35. A system constructed and adapted to perform the method of any of claims 1-17, 20, and 30-34.

36. A system for producing a continuous waistband stream, the system comprising:

(a) a first fusing press constructed and adapted to fuse said combination to form a first fused combination from a combination formed by a continuous fusible substrate on a continuous first substrate;

(b) at least one folder positioned to take said first fused combination from said first fusing press and to form a folded fused combination; and

(c) a second fusing press positioned to take said folded fused combination from said at least one folder and to form said continuous waistband,

wherein said continuous waistband stream comprises multiple individual waistbands.

37. The system of claim 36 wherein said at least one folder comprises a three-way folder.

38. The system of claims 36 or 37 wherein said fusible substrate is positioned substantially along a central axis of said first substrate to form said combination input into said first fusing press.

39. The system of any one of claims 36-38 wherein said first fusing press fuses said combination under first heated conditions.

40. The system of any one of claims 36-39 wherein said second fusing press presses said folded fused combination under second heated conditions.

41. The system of any one of claims 36-40 wherein the at least one folder forms three folds in said first pressed combination.

42. The system of claim 41 wherein said three folds comprise:

a first side fold,

a second side fold, and

a center fold.

43. The system of claim 42 wherein said three folds comprise:

a first side fold formed by folding a first portion of said continuous first substrate over at least some of said continuous fusible substrate.

44. The system of claim 43 wherein said three folds also comprise:

a second side fold formed by folding a second portion of said continuous first substrate over at least some of said continuous fusible substrate.

45. The system of claim 44 wherein said three folds also comprise:

a middle fold formed by folding said first pressed combination after said first side fold and said second side fold have been made.

46. The system of any one of claims 41-45 wherein said folds are formed simultaneously.

47. The system of anyone of claims 36 to 46 wherein said first substrate comprises a first material selected from the group comprising: denim, cotton, cotton blends, wool, wool blends, polyester, polyester blends, spandex, spandex blend, polyester viscose, linen, and linen blend.

48. The system of anyone of claims 36 to 47 wherein said fusible substrate comprises a second material selected from the group comprising: 84 mm fusible substrates, 45 mm fusible substrates, 47 mm fusible substrates, and 80 mm fusible substrates.

5

49. A waistband formed by the system of any one of claims 36 to 48.

50. A continuous waistband stream formed by the system of any of claims 36-48.

9

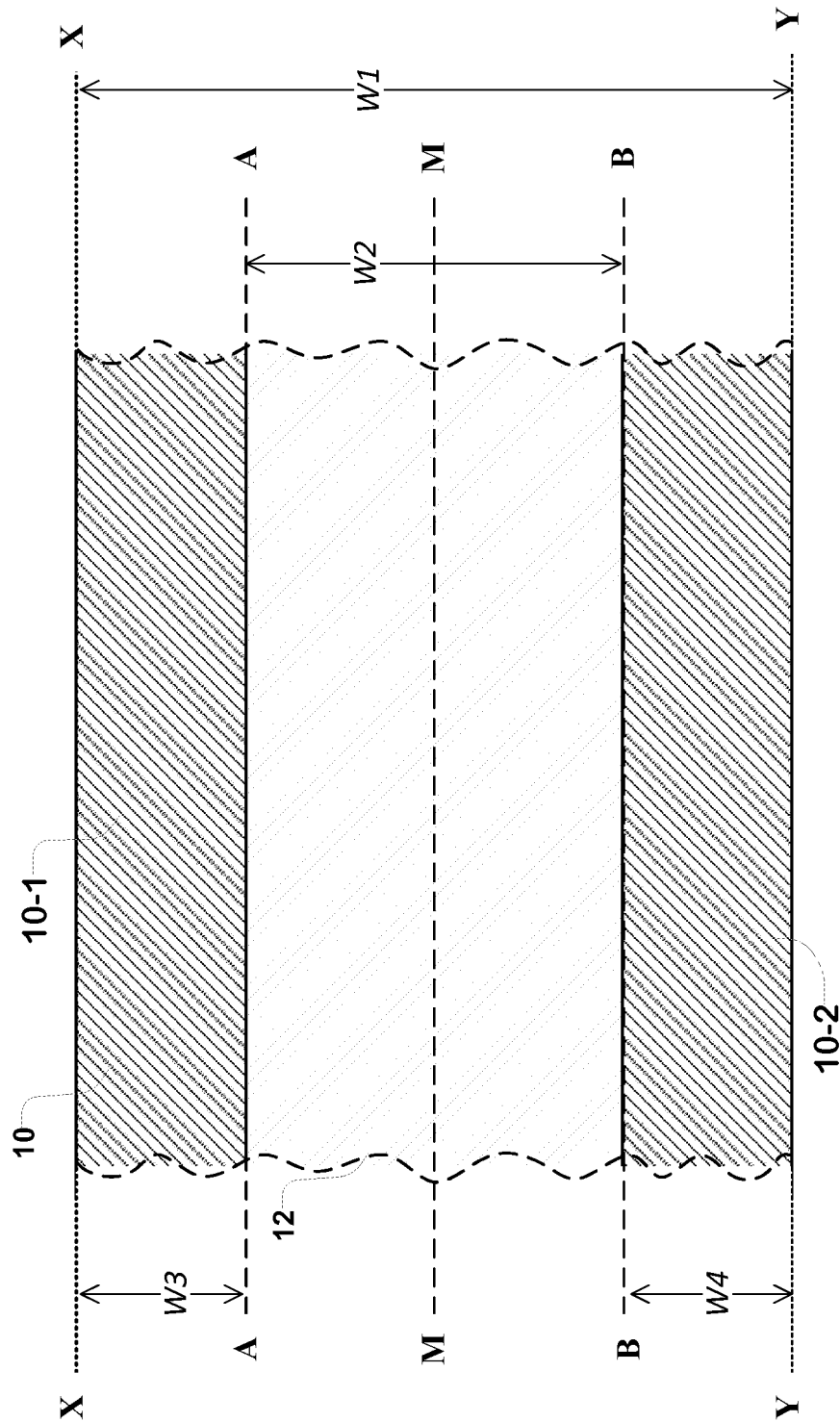


FIG. 1A

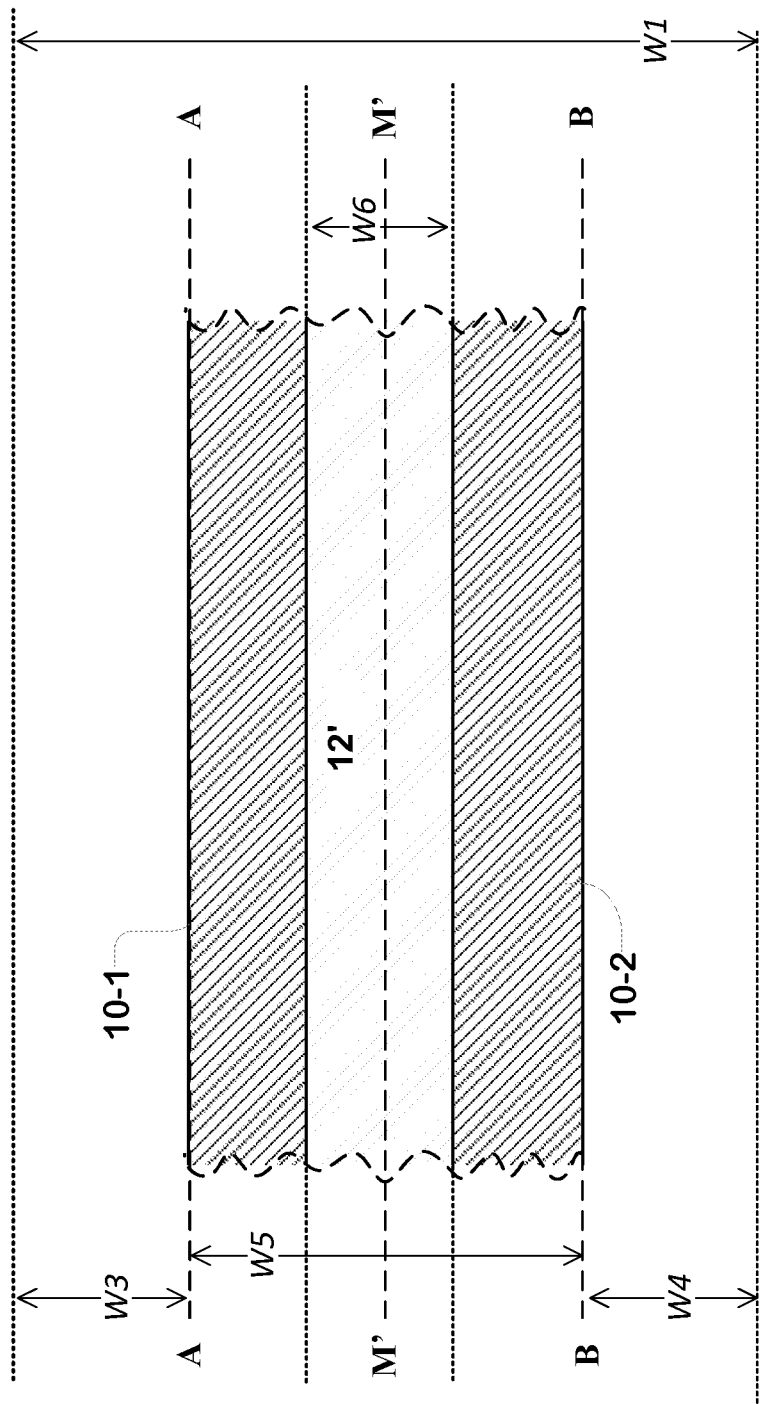


FIG. 1B

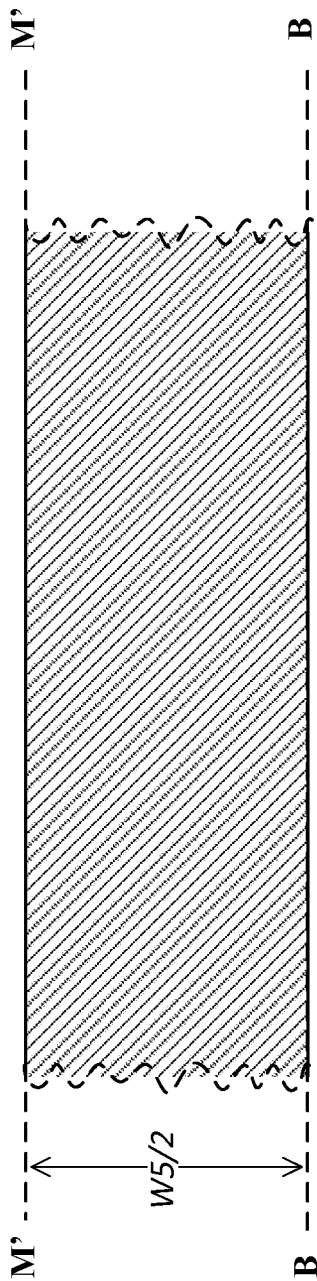


FIG. 1C

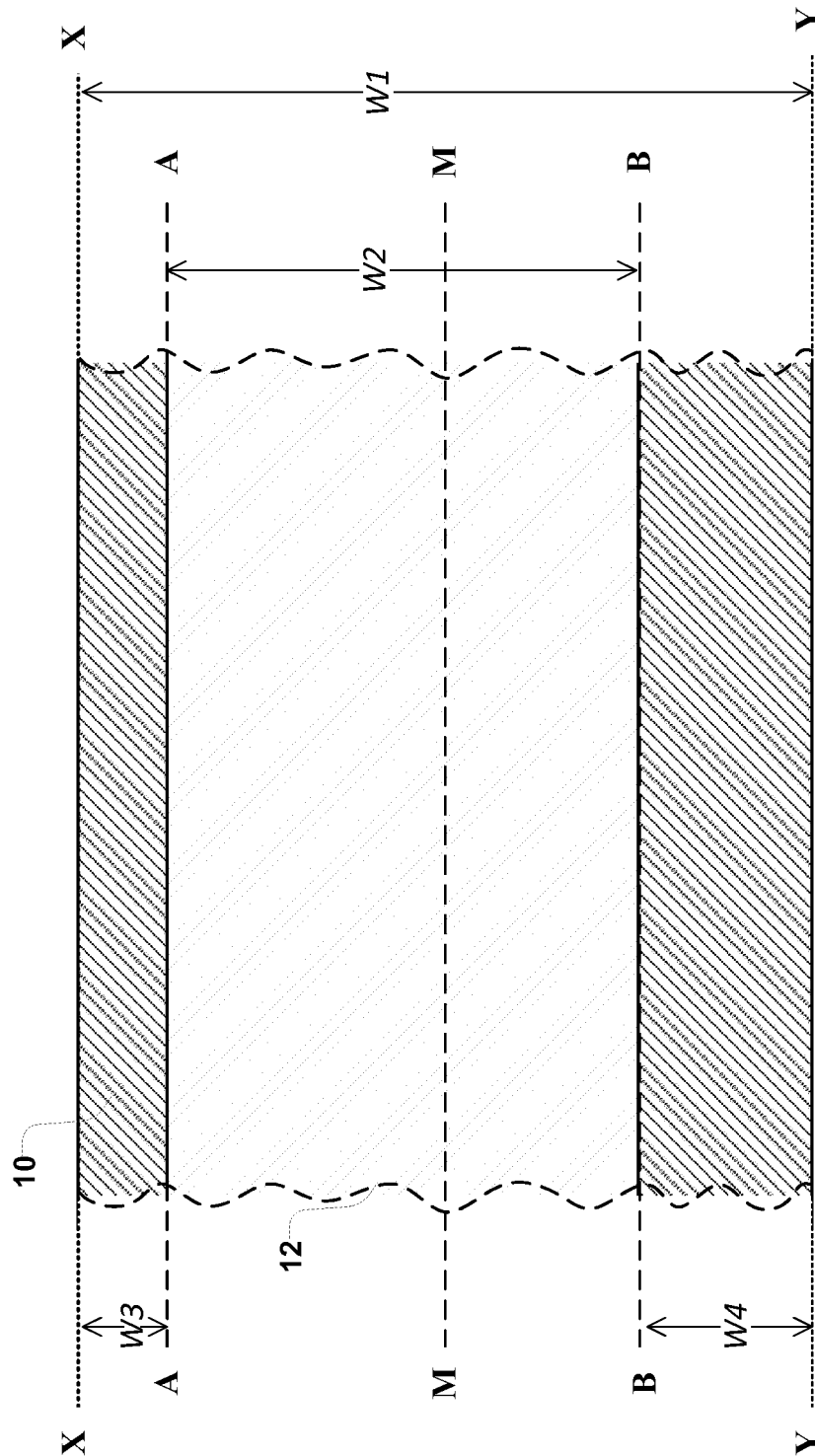


FIG. 1D

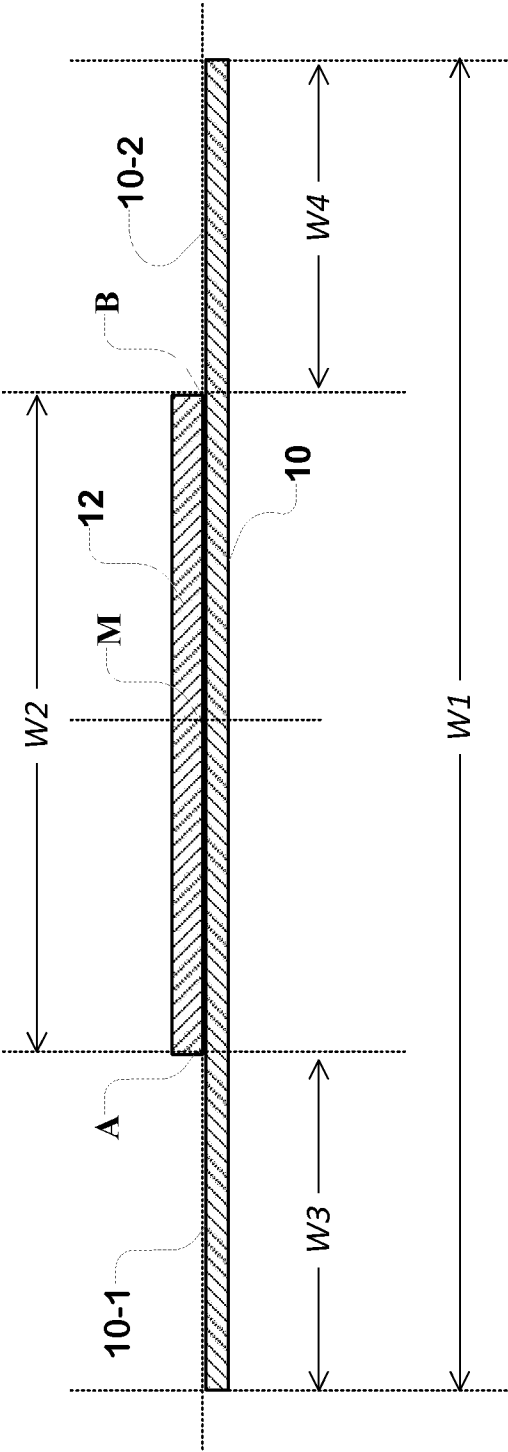


FIG. 2A

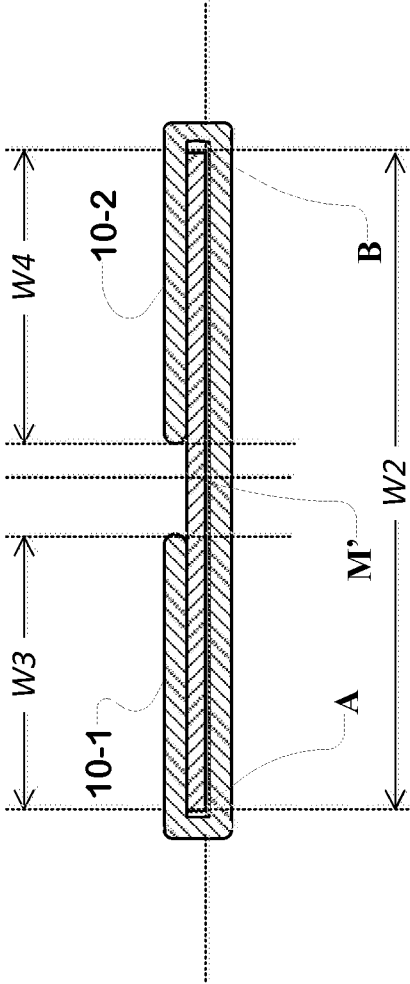


FIG. 2B

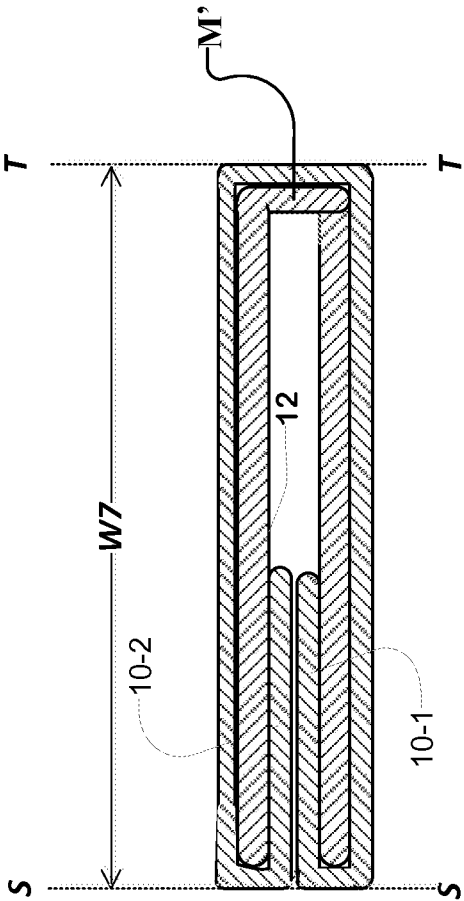


FIG. 2C

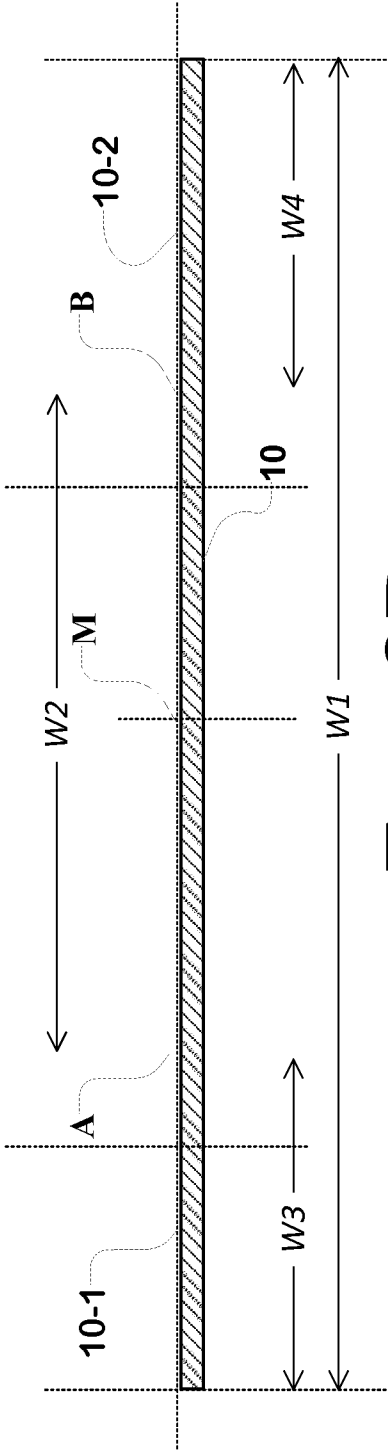


FIG. 2D

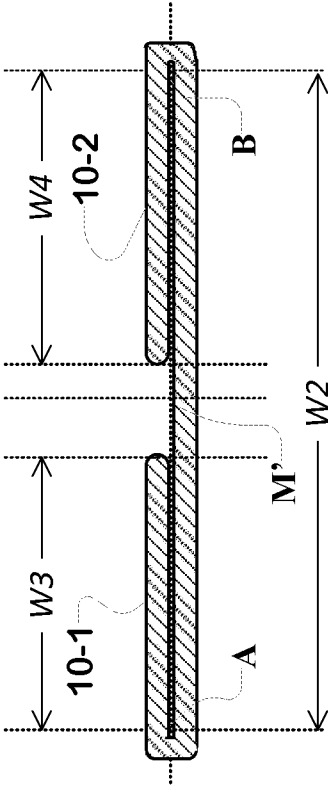


FIG. 2E

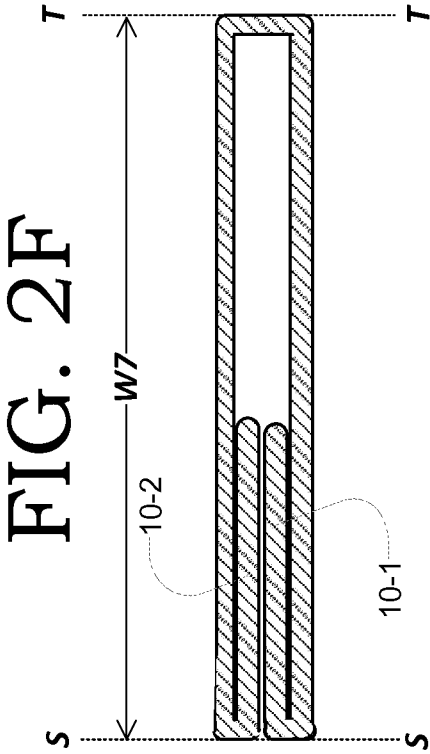


FIG. 2F

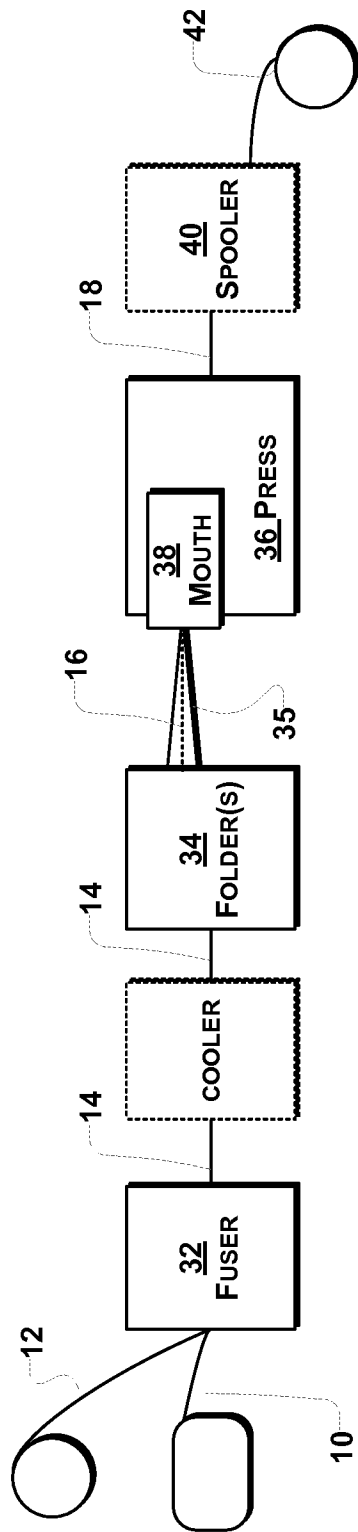


FIG. 3A

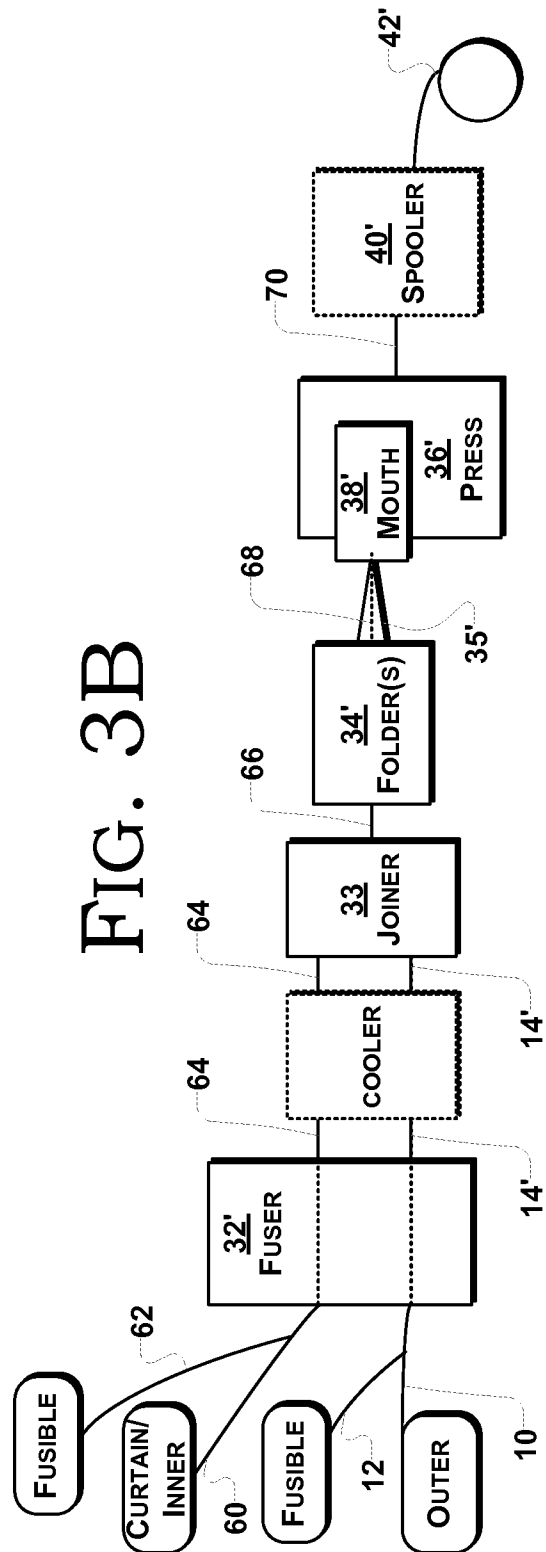
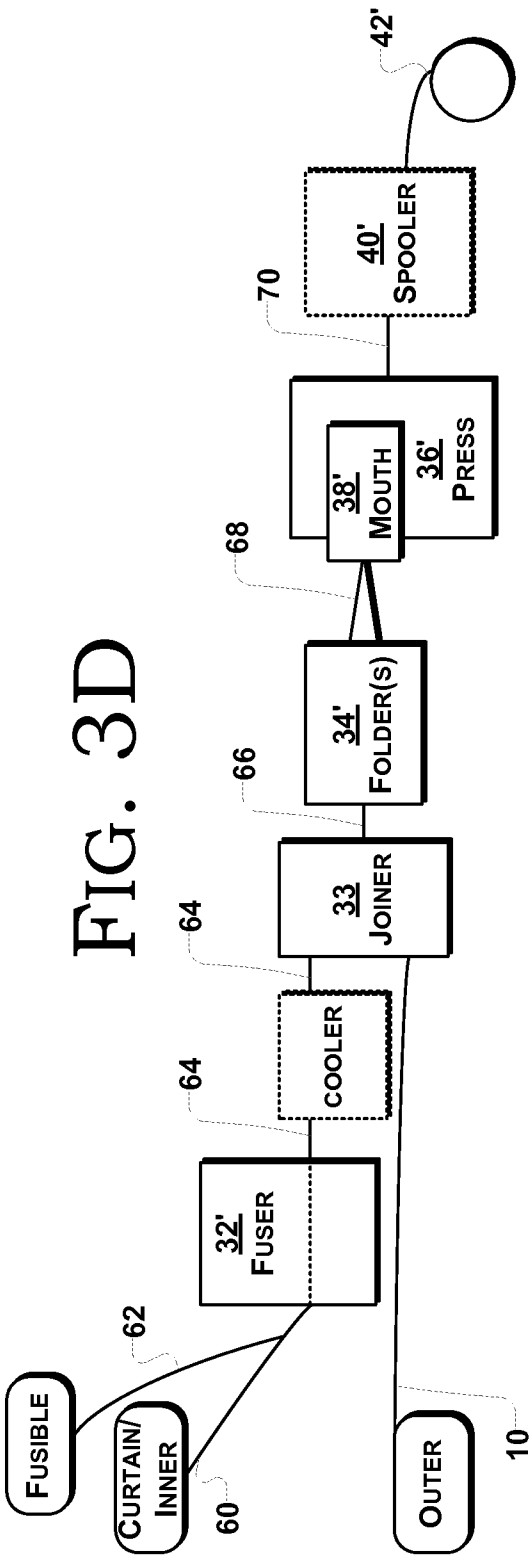
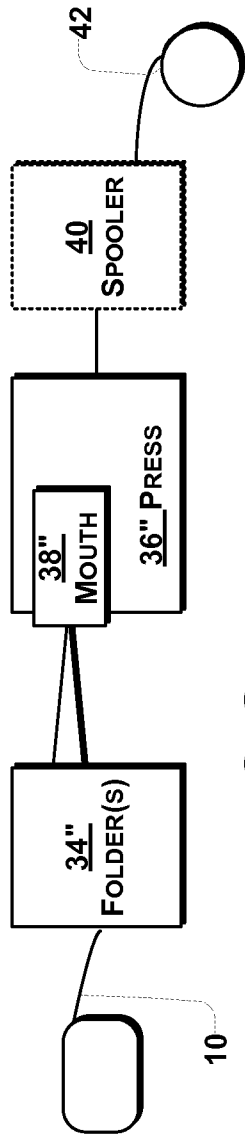


FIG. 3B

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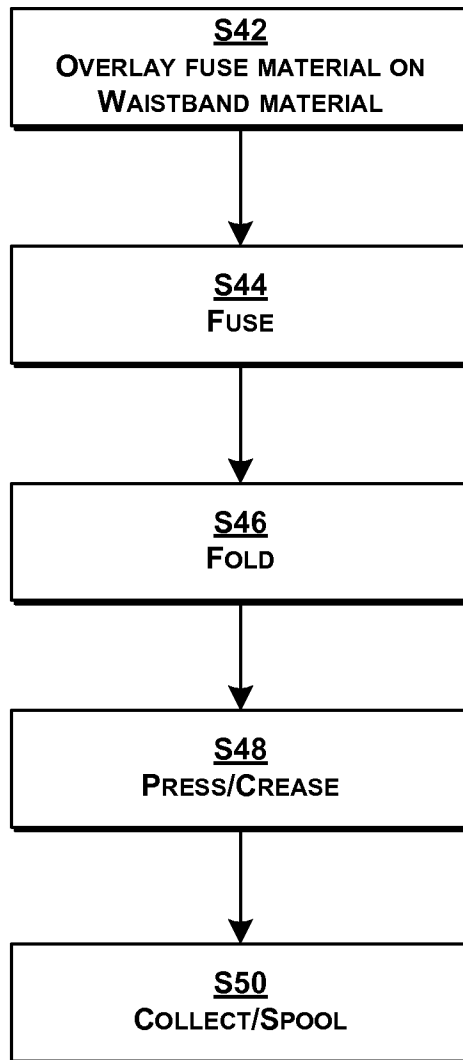


FIG. 4A

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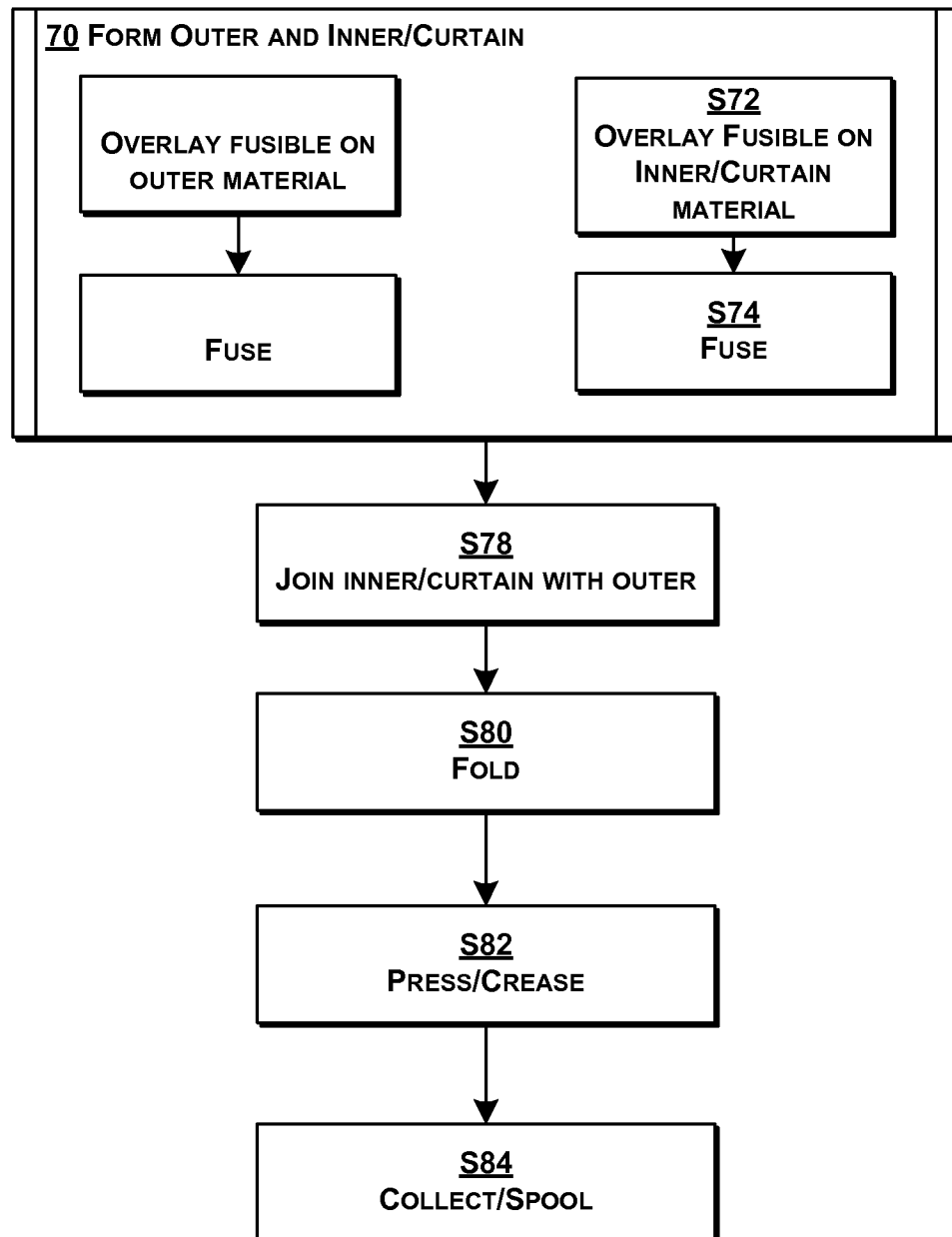


FIG. 4B

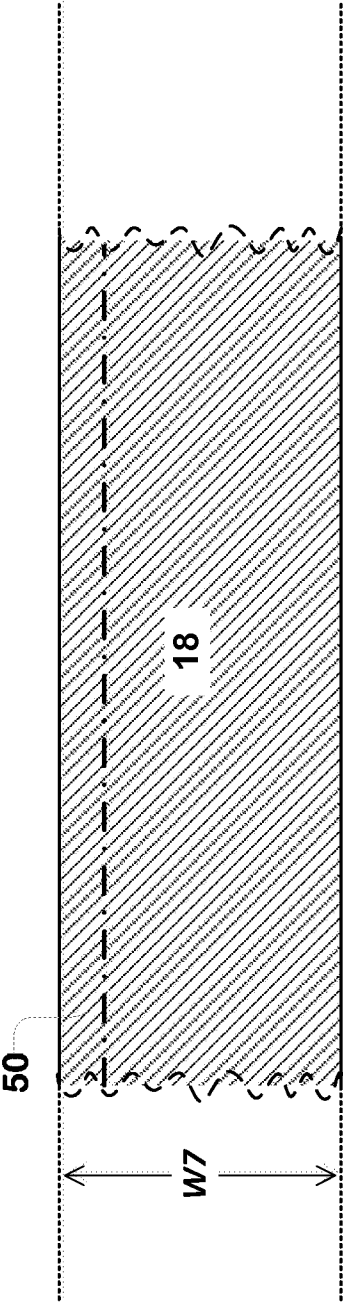


FIG. 5

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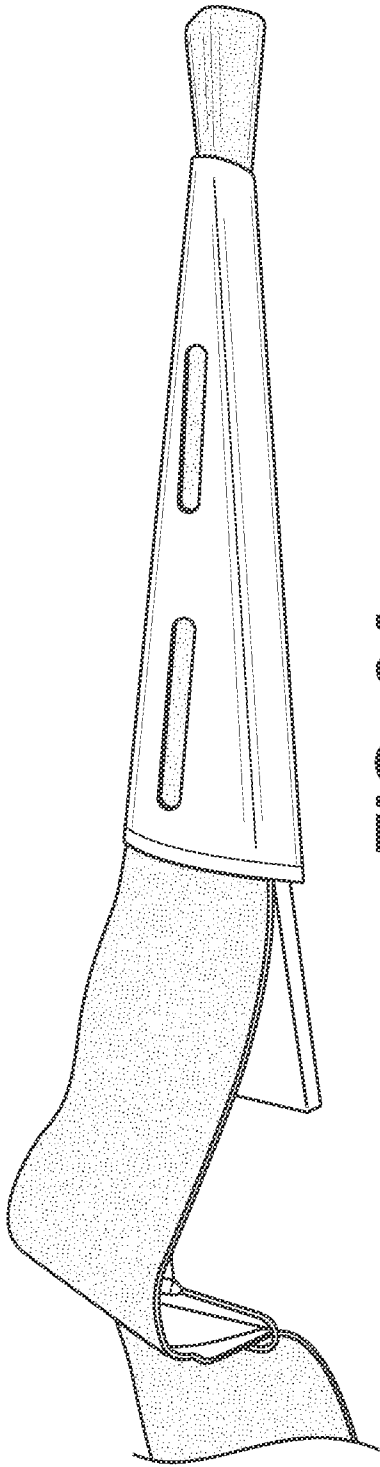


FIG. 6A

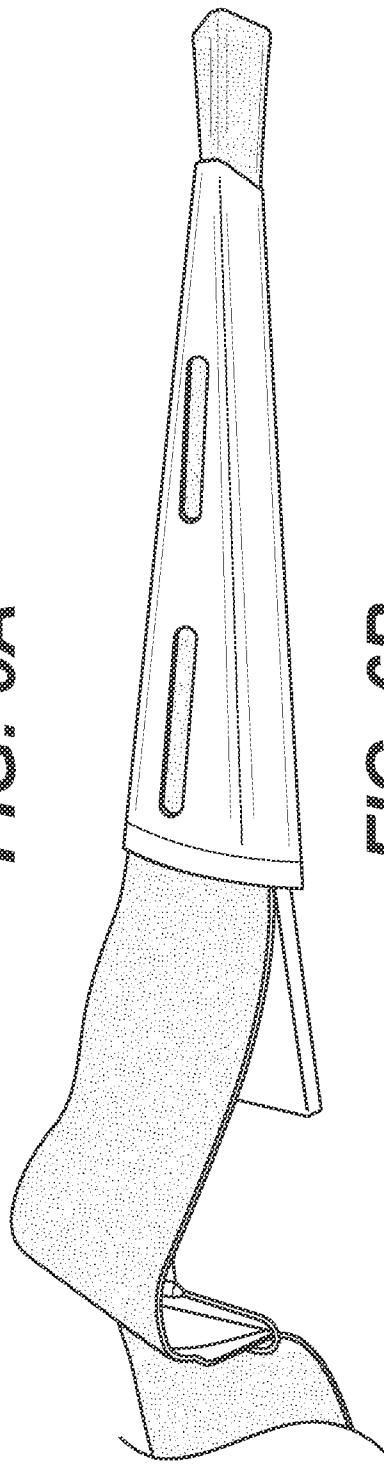


FIG. 6B

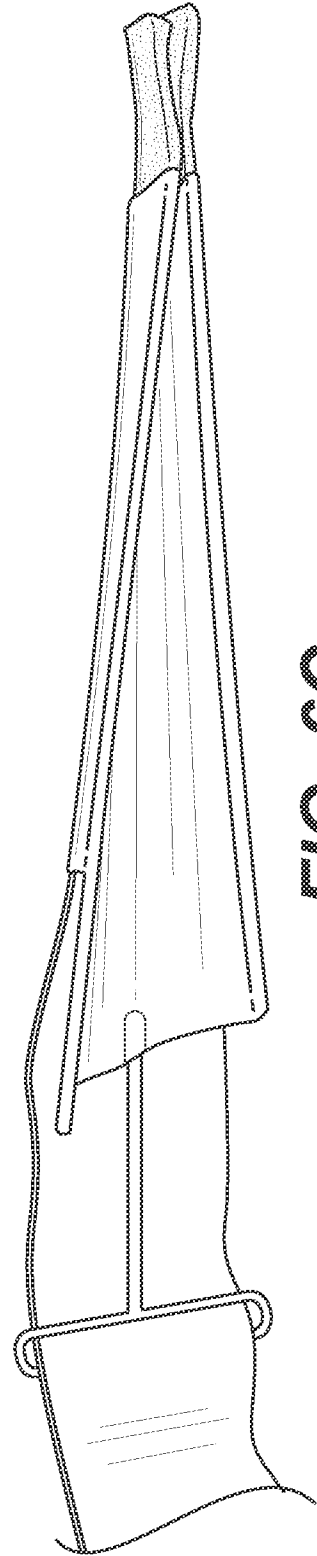
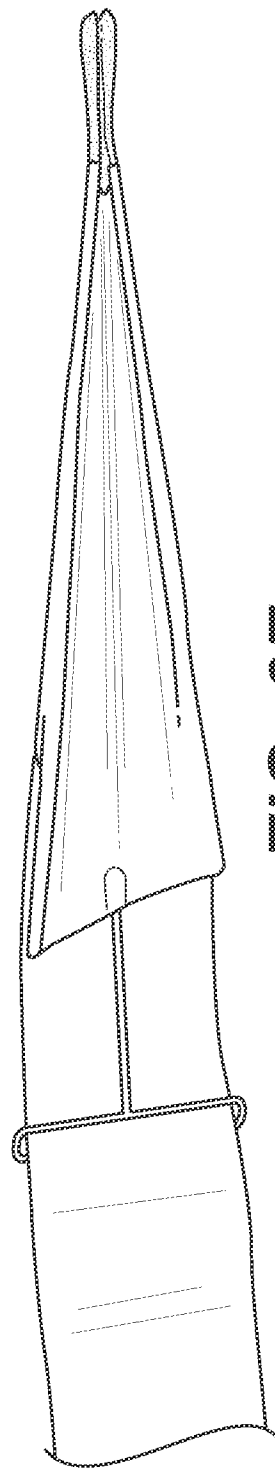
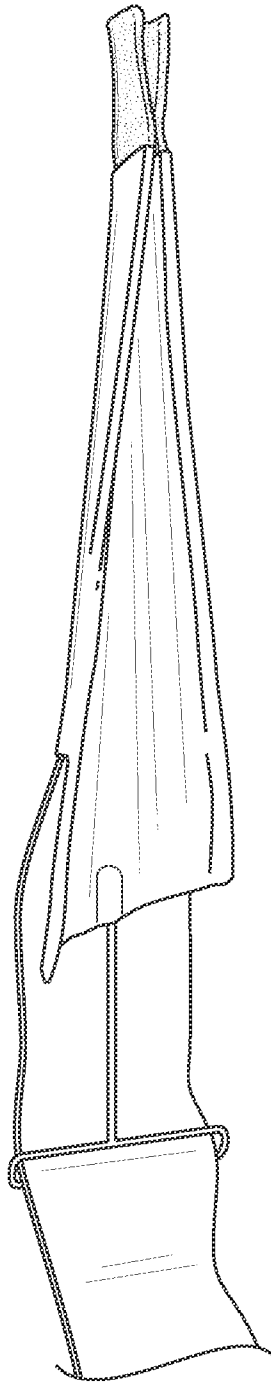
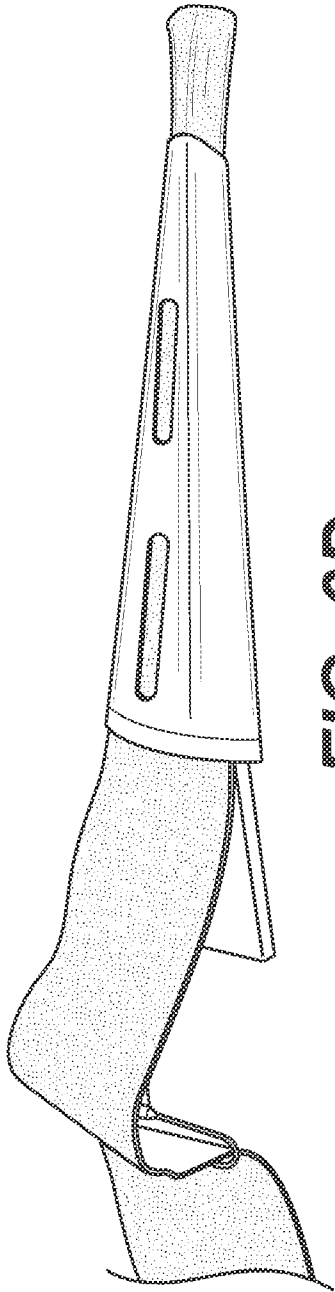


FIG. 6C



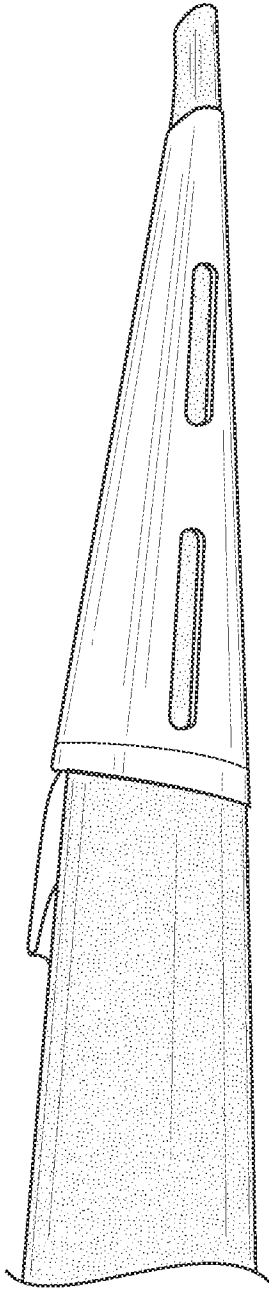


FIG. 6G

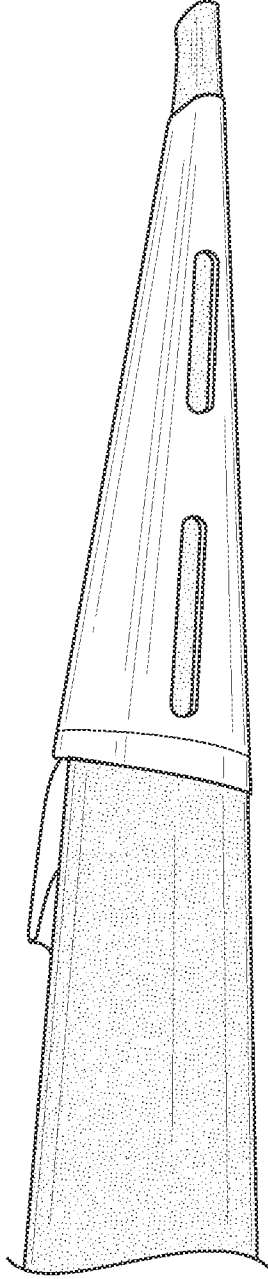


FIG. 6H

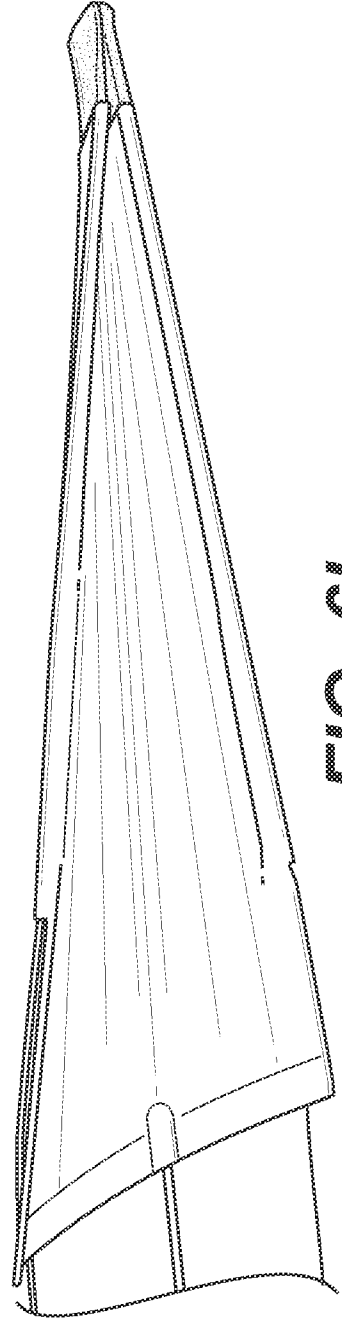


FIG. 6I

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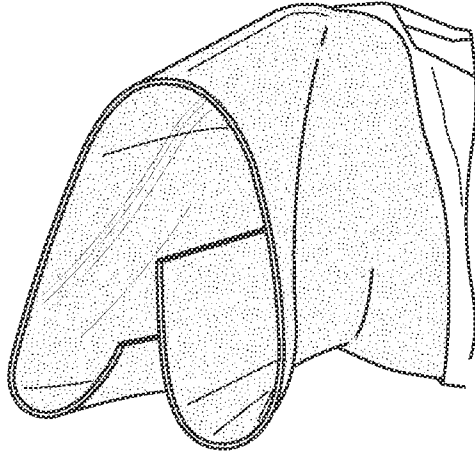


FIG. 6L

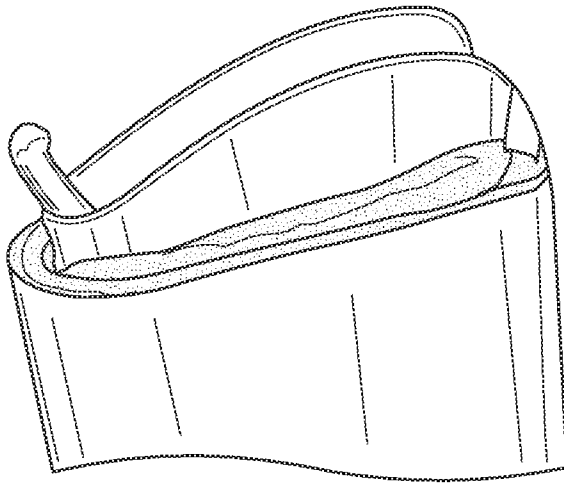


FIG. 6K

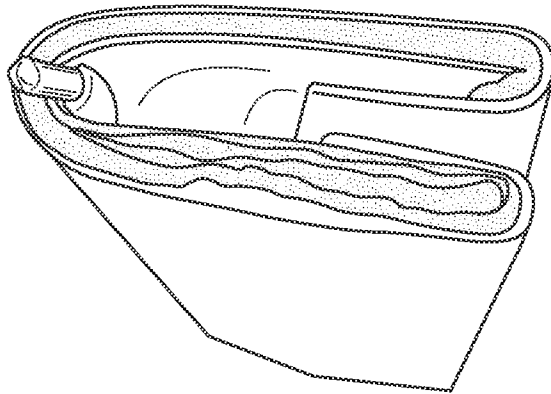


FIG. 6J

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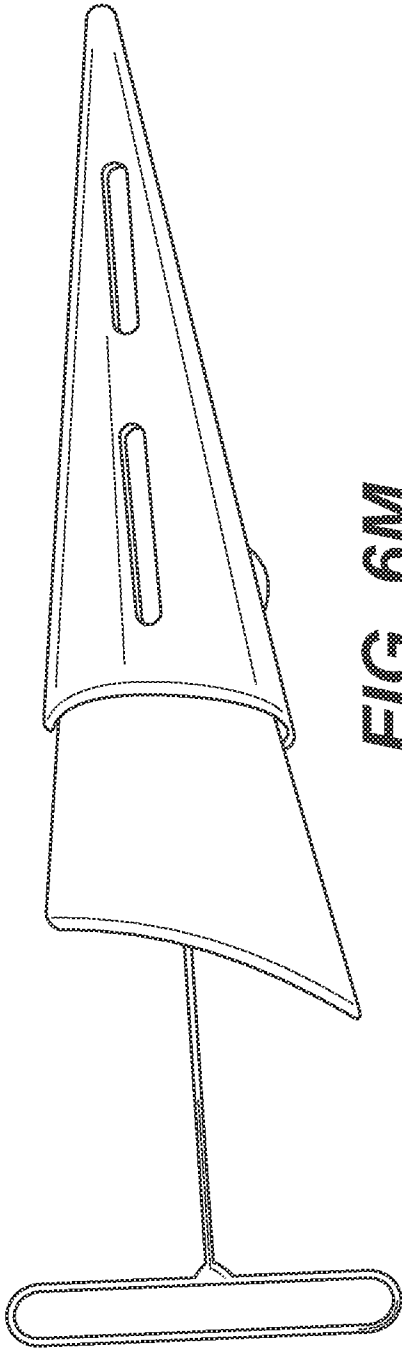


FIG. 6M

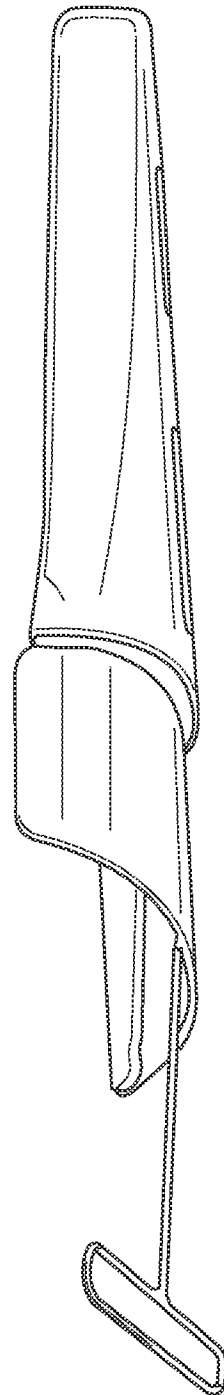


FIG. 6N

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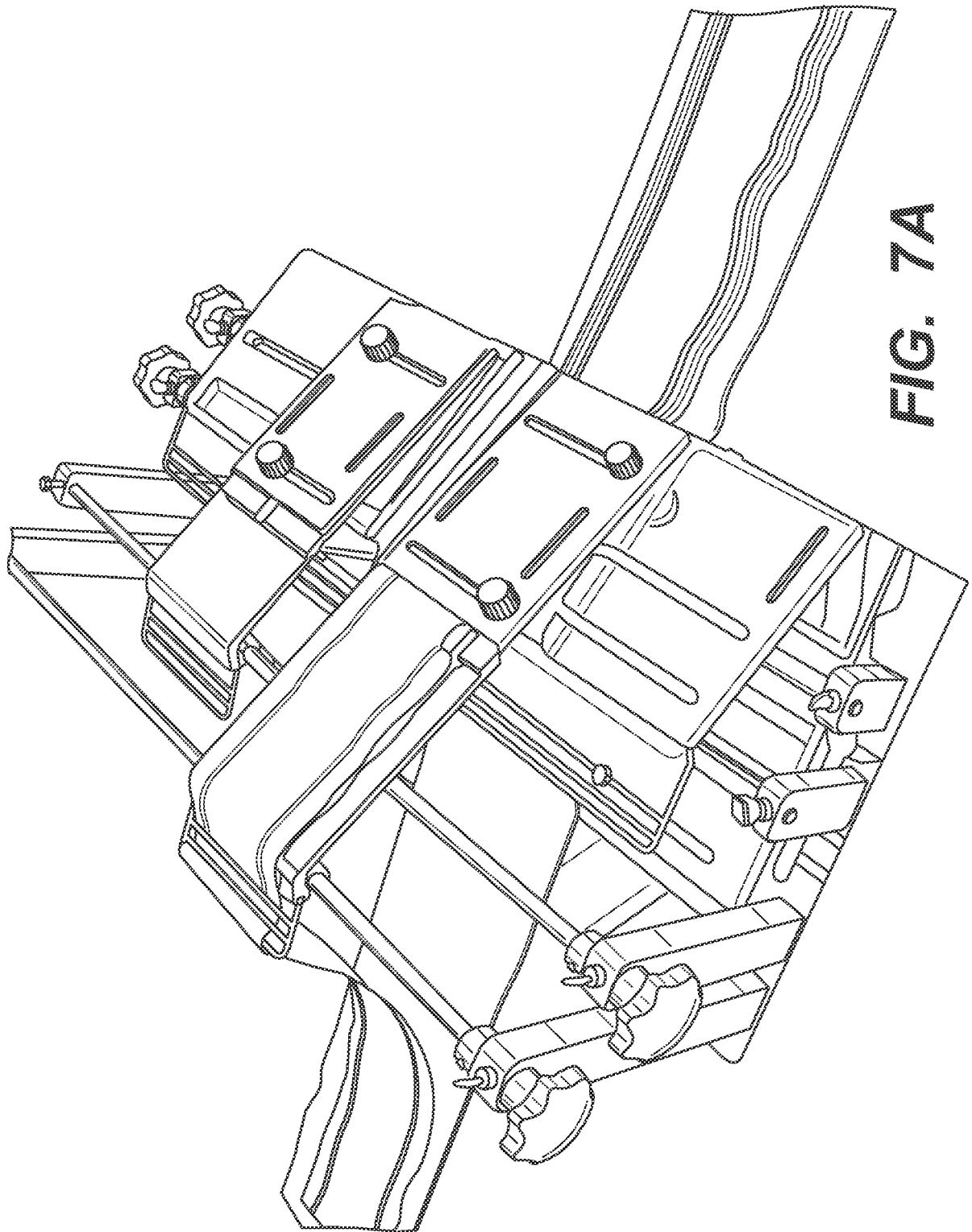


FIG. 7A

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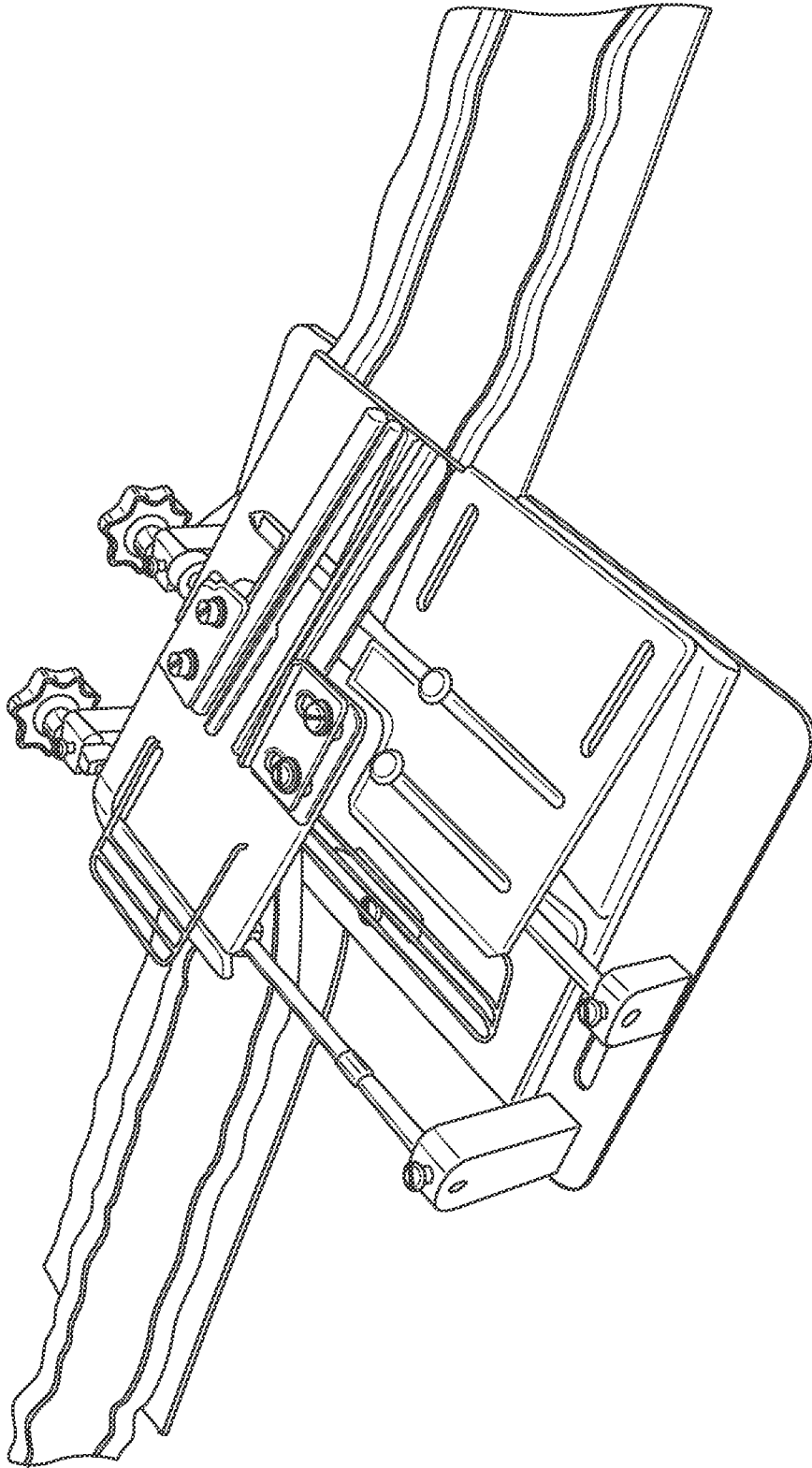


FIG. 7B

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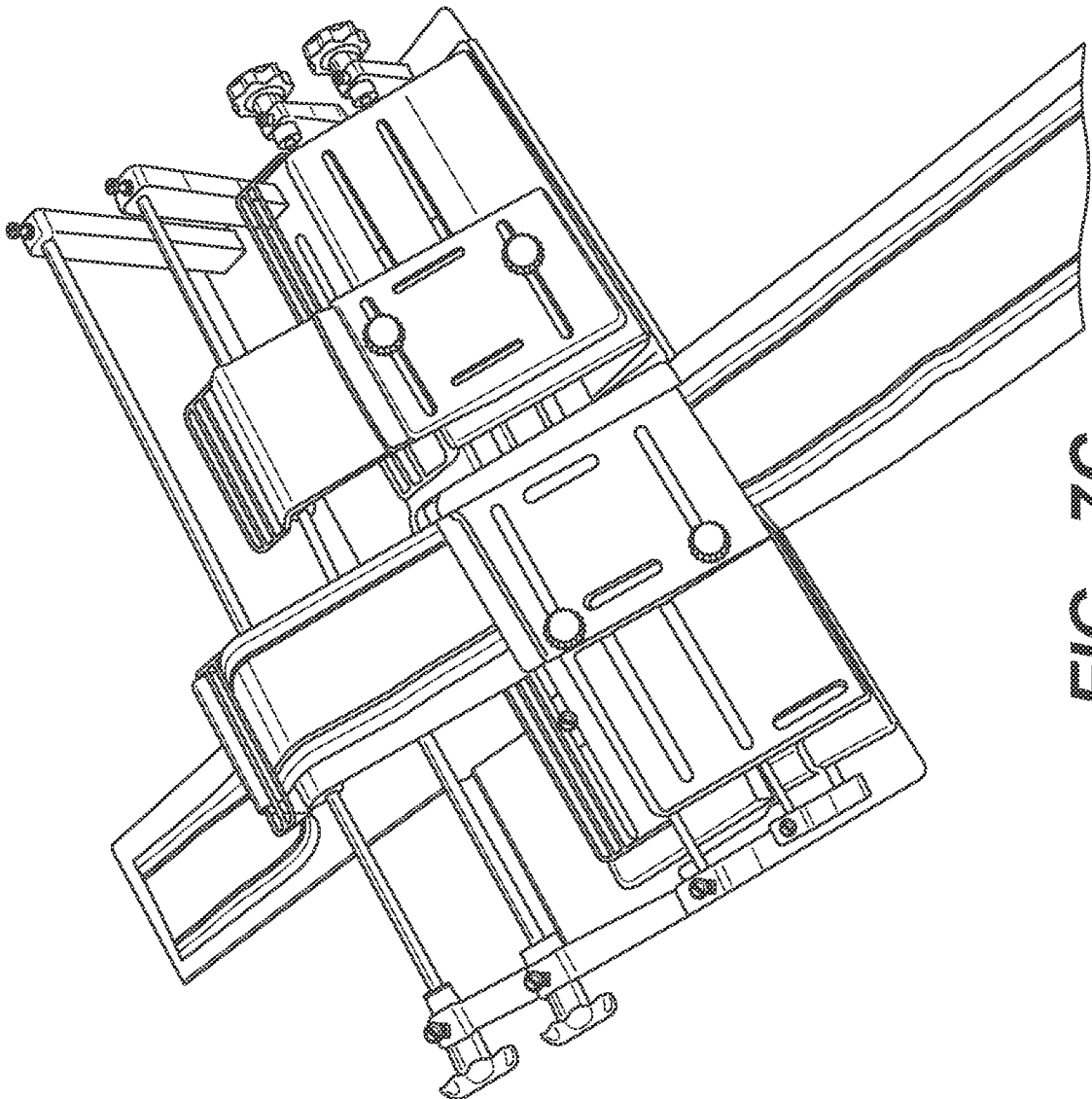


FIG. 7C

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2014/057890

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A41F 9/00 (2014.01)

CPC - A41F 9/00 (2014.12)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - A41F 9/00, 9/02 (2014.01)

CPC - A41F 9/00, 9/02 (2014.12)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC - 2/220, 221 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase, Google Patents, Google Scholar, YouTube

Search terms used: waistband, continuous, production, folding, fusing, pressing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 574 661 A (CENTRALA INDUSTRIEI CONFECTIILOR BUCURESTI) 10 September 1980 (10.09.1980) entire document	1-3, 30-33, 36-38
A	US 3,562,817 A (HUDELSTON) 16 February 1971 (16.02.1971) entire document	1-3, 30-33, 36-38
A	US 2004/0019955 A1 (MORRIS et al) 05 February 2004 (05.02.2004) entire document	1-3, 30-33, 36-38
A	US 5,987,721 A (MORRIS) 23 November 1999 (23.11.1999) entire document	1-3, 30-33, 36-38

☐

Further documents are listed in the continuation of Box C.

☐

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

16 December 2014

Date of mailing of the international search report

02 JAN 2015

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No: 571-273-3201

Authorized officer:

Blaine R. Copenheaver

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2014/057890

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 4-29, 34, 35, 39-50
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.