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(54) **LINKING MACHINE COMPRISING A GUIDE FOR CORRECTLY POSITIONING A SINGLE COLLAR AND A PIECE OF KNITWEAR WITH RESPECT TO ONE ANOTHER**

(57) Linking machine (100) for linking a piece of knitwear (50) and a collar (51) to one another, which are initially separated, comprising:

- a fixed unit (110) comprising a support frame (120) and a device (16) for feeding the piece of knitwear (50) and/or the collar (51) in a longitudinal direction (Y-Y),
- and a mobile unit (130), comprising:
 - a needle (15) equipped with a related device (140) for operating said needle (15) in a vertical direction (Z-Z), which is perpendicular to the longitudinal direction (Y-Y), to perform the linking,

characterized in that
the linking machine (100) comprises a guide (53) configured to align a collar seam line (7) with a nape seam line (8) of the piece of knitwear (50) and with a neck seam line (10) of the piece of knitwear (50),
said guide (53) comprising a plate (17) having at least one stop (22,23) for the piece of knitwear (50), which is arranged in a direction that is substantially parallel to said longitudinal direction (Y-Y) so as to allow the alignment of the piece of knitwear (50) in parallel with the stop itself (22,23), and a fold (21) on a corner of the plate (17), which is arranged upstream of said at least one stop (22,23) with respect to a feeding direction of the piece of knitwear (50), said fold (21) helping to unroll the nape edge (9) where the collar (51) joins.

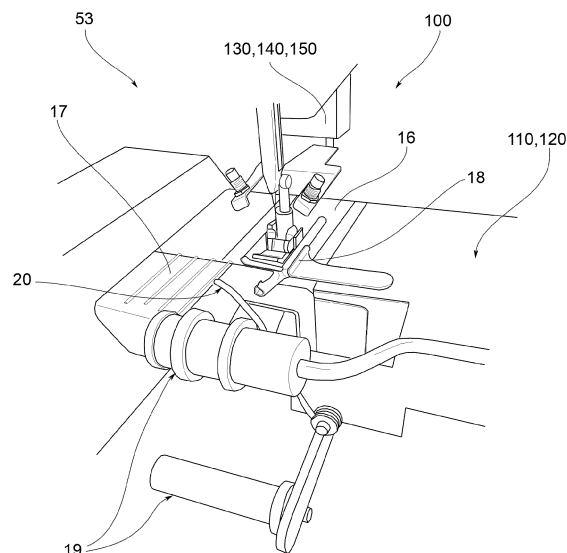


FIG.14

Description

FIELD OF APPLICATION

[0001] The present invention relates to an improved linking machine, comprising a guide for correctly positioning a single collar and a piece of knitwear with respect to one another.

PRIOR ART

[0002] As is known, linking is a processing technique used in the textile industry, which consists of joining together two strips of fabric. For example, said technique is used to join collars, cuffs and sleeves to the rest of the item of clothing in order to be able to thereby compose the finished product. The strips are joined by picking up both ends of the fabric for each piece of knitwear. The connecting thread is "knitted-in" between the end course of the two pieces of fabric, thus forming the continuity of the piece of knitwear. The connection formed in this way is very flat and practically unnoticeable.

[0003] The linking process is a process involving large limitations:

- it is slow and expensive; in this regard, it is estimated to take up more than 70 % of the time taken to produce an item;
- the existing linking machine is not flexible and in fact, in order to change the quality of the fabric, it requires a different setup and therefore a tooling time that limits the productivity thereof;
- the operator in charge of the linking process requires a large amount of experience and knowledge to be able to minimize errors and achieve a certain speed - competence that they acquire after several months of practice,
- one of the main problems encountered by those working in this sector is excessive eyestrain as a result of the modes with which the linking process is carried out; if it continues for a long period of time, this strain can lead to a gradual reduction in the operator's eyesight.

[0004] For these reasons, in addition to having a clear advantage in terms of speed, costs and execution precision, designing a linking apparatus that is capable of autonomously locating where to make the seam stitches also improves the working conditions of whoever is using the machine, thereby rendering the task less arduous and preventing accidents at work.

[0005] Fig. 1 shows a traditional linking apparatus. This is a circular machine in which the operator has to insert the pieces of knitwear present at the end of the two pieces of fabric into the pins. The machine then forms the seam stitches in the region of the pre-positioned pieces of knitwear.

[0006] The prior art also includes examples of auto-

matic or semi-automatic linking machines that aim to solve at least some of the cited problems of the manual machine.

[0007] However, these machines are not exempt from problems that impede or limit the correct function thereof.

[0008] For example, a linking machine that is able to decipher and make the stitches autonomously is known from a patent application by the same applicant.

[0009] In any case, the known solutions manage to optimize/automate the true linking step, that is the sewing between the collar and the piece of knitwear, but not the step of aligning the collar and the piece of knitwear with respect to one another, the step preceding the subsequent sewing step: to date, this alignment step is traditionally carried out manually, and has all the drawbacks described above.

[0010] In order to effectively improve the process of linking a single collar and the piece of knitwear, the machine requires a device that improves, upstream of the sewing step, the step of aligning the pieces of fabric where the collar is intended to be sewn to the item.

PRESENTATION OF THE INVENTION

[0011] There is therefore the need to overcome the drawbacks and limitations described with reference to the prior art; in particular, there is the need to produce a guide that assists the operator with correctly aligning the pieces of fabric with respect to one another, which pieces of fabric then have to be presented to the needle for the relative stitch. This procedure can, in turn, be optimized by presenting the pieces of fabric (piece of knitwear and single collar) to a video camera of the linking machine that can correctly and autonomously view the linking procedure, thereby adapting the seam stitches to the portions of fabric to be joined to one another, i.e. linked, in real time.

[0012] This need to overcome the disadvantages and limitations of the solutions of the prior art is met by a linking machine for linking a piece of knitwear and a collar, which are initially separated, as per claim 1.

DESCRIPTION OF THE DRAWINGS

[0013] Additional features and the advantages of the present invention will become clearer from the description given below of preferred and non-limiting embodiments thereof, in which:

- Fig. 1 shows a view of a traditional manual linking machine;
- Fig. 2a-2b show views of the piece of knitwear to which the single collar is to be joined by linking;
- Fig. 3a-3b show views of the single collar to be joined to the piece of knitwear;
- Fig. 4, 5 and 6 show views of the seam line between the single collar and the piece of knitwear, and a view inside the item of clothing;

- Fig. 7 shows a schematic view of the working region beneath the video camera of a linking machine as per one embodiment of the present invention;
- Fig. 8 shows a view of the back of the piece of knitwear, said nape or rear part the piece of knitwear;
- Fig. 9-10 show a view of the right and left shoulders of the piece of knitwear;
- Fig. 11 shows a view of the front of the piece of knitwear, also called the neck, where the overlock can be found;
- Fig. 12-13 show a view of the piece of knitwear with the single collar already joined (with and without separation cotton);
- Fig. 14 shows a view of the components of the guide;
- Fig. 15 shows a view of a plate of the guide with the stops for the piece of knitwear and a fold for unrolling the nape of the piece of knitwear;
- Fig. 16 shows a view of the guide during the process of linking the single collar, and in particular a view of the unrolling of the nape of the piece of knitwear by making use of the fold on the plate of the guide;
- Fig. 17 shows a component of the guide that acts as the stop for the collar in order to keep it aligned beneath the needle;
- Fig. 18 shows the component of the guide that acts as the rod in order to create visibility for the operator by moving the collar;
- Fig. 19 shows a view for clarifying the function of the rod for the visibility of the guide;
- Fig. 20 shows a view of the course taken by the collar mounted on the guide; and
- Fig. 21 shows a view of the collar and the piece of knitwear mounted on the guide at the starting point where the join of the collar and of the left shoulder of the item of clothing line up.

[0014] The elements or parts of elements that the embodiments described in the following have in common will be indicated by the same reference numerals.

DETAILED DESCRIPTION

[0015] With reference to the above-mentioned figures, reference numeral 100 as a whole indicates an overall schematic view of a linking machine as per the present invention.

[0016] In particular, the present invention relates to a linking machine 100 for linking a piece of knitwear 50 and a collar 51, which are initially separated.

[0017] In general terms, the linking machine 100 comprises a fixed unit 110 having a support frame 120 and a mobile unit 130.

[0018] For the purposes of the present invention, the dimensions, shapes and/or materials of the fixed unit 110 and/or of the mobile unit 130 are irrelevant.

[0019] The fixed unit 110 comprises a device 16 for feeding the piece of knitwear 50 and/or the collar 51 in the longitudinal direction Y-Y.

[0020] According to a possible embodiment, the feeding device 16 comprises a belt drive system 16 that transports the piece of knitwear 50 and the collar 51 near to a small foot 14 that constitutes a support base for the true linking step (that is for the sewing step); preferably, the guide 53 is positioned at the beginning of said belt drive system 16, that is upstream thereof with respect to the feed direction of the piece of knitwear 50 and of the collar 51.

[0021] The linking machine 100 also comprises a needle 15 that is provided with a related device 140 for operating said needle 15 in a vertical direction Z-Z, which is perpendicular to the longitudinal direction Y-Y, in order to carry out the linking process.

[0022] According to one embodiment, the linking machine 100 also comprises a device 150 for positioning a needle 15 in a transverse direction X-X, which is perpendicular to said longitudinal direction Y-Y and is coplanar with the fabric.

[0023] According to a possible embodiment, the linking machine comprises a video camera 160 that can locate a guide thread (not shown) arranged in the region of at least one piece of fabric between the collar 51 and the piece of knitwear 50 to be sewn, said guide thread being inserted inside said fabric so as to locate a plurality of pieces of knitwear to be linked.

[0024] The video camera 160 can be programmed to monitor the exact position of the guide thread in the longitudinal direction Y-Y, and especially in the transverse direction X-X, which is perpendicular to said longitudinal direction Y-Y and vertical direction Z-Z.

[0025] According to a possible embodiment, the video camera 160 is operatively connected to said device 150 for positioning the needle 15 so as to transversally position the needle 15 on the basis of the information received from said video camera 160.

[0026] The linking machine 100 advantageously comprises a guide 53 that is designed to align a collar seam line 7 with a nape seam line 8 of the piece of knitwear 50 and with a neck seam line 10 of the piece of knitwear 50: the aim of this alignment is to facilitate the subsequent linking step carried out by the needle 15.

[0027] In particular, it is necessary to align respective lines of stitches 7, 12 to be linked on the collar 51 with lines of stitches 8, 10 on the piece of knitwear 50.

[0028] According to a possible embodiment in which the linking machine 100 is provided with said video camera 160, the guide 53 is designed such that the line of stitches 7, 12 to be linked of the collar 51 or the collar seam line finishes directly beneath a viewing window 13 of the video camera 160 (Fig. 7), preferably at a fixed spacing from the edge of the piece of knitwear 50 that travels beneath the collar 51.

[0029] According to a possible embodiment, said guide 53 comprises a plate 17 having at least one stop 22, 23 for the piece of knitwear 50, which is arranged in a direction that is substantially parallel to said longitudinal direction Y-Y so as to allow for the alignment of the piece

of knitwear 50 in parallel with the stop itself 22, 23.

[0030] The plate 17 preferably comprises two stops 22, 23, in which a first stop 22 is designed to allow for the alignment of the piece of knitwear 50 in parallel with the stop itself, and a second stop 23 is designed to ensure that an overlock 11 of the piece of knitwear 50 keeps the desired seam line 52.

[0031] According to one embodiment, said plate 17 comprises a fold 21 on a corner of the plate 17, which is arranged upstream of said at least one stop 22, 23 with respect to a feeding direction of the piece of knitwear 50, in which said fold 21 assists with unrolling the edge of the nape 3 where the collar 51 is joined.

[0032] The fold 21 is inclined downwards on the side opposite said at least one stop 22, 23.

[0033] According to one embodiment, said guide 53 comprises a stop 18 for the collar 51, which stop substantially points in said longitudinal direction Y-Y and is provided with a flap 24 for holding the collar 51 flat, which extends in the transverse direction X-X.

[0034] According to one embodiment, the guide 53 comprises at least one adjustable tension roller 19 in order to apply the necessary tension to the collar 51 and to adjust the position of the collar 51.

[0035] Said guide 53 preferably comprises two tension rollers 19, which are parallel to one another and to a transverse direction X-X that is perpendicular to said longitudinal direction Y-Y and vertical direction Z-Z.

[0036] According to another possible embodiment, the guide 53 comprises a releasable rod 20, which is arranged in the form of a cantilever near to said at least one stop 22, 23 so as to keep the collar 51 displaced in order to create visibility of the piece of knitwear 50 for the operator on the stop 22, 23 itself.

[0037] The rod 20 is oriented according to a direction that is substantially perpendicular to said stop 22, 23.

[0038] The function of a linking machine as per the present invention will now be described.

[0039] As mentioned above, the guide 53 represents an accessory that supports a linking machine, in particular, but not exclusively, a linking machine provided with a video camera 150 and a feedback controller for the position of the linking needle in a transverse direction X-X.

[0040] One example of this type of linking machine provided with a video camera with a feedback controller is provided in IT 102018000007417, by the same applicant.

[0041] The guide 53 described above has the object of aligning the seam line 7 of the collar 51 (Fig. 3.0 and Fig. 3.1) with:

[0042] -a seam line 8 that is at a fixed spacing from the nape edge 9 on the nape 3 of the piece of knitwear 50 (Fig. 5)

[0043] -seam line 10 at a fixed spacing from the overlock 11 on the neck 4 of the piece of knitwear 50 (Fig. 6).

[0044] Viewed from the inside of the piece of knitwear 50, the result of joining the collar 51 to the piece of knitwear 50 is the seam line 52 (Fig. 4).

[0045] The pieces of fabric are transported by the belt drive system 16; the guide 53 is positioned at the start of this drive system (Fig. 14).

[0046] The guide 53 can be composed of:

- a plate 17 comprising the stops 22 and 23 for the piece of knitwear 50 and a fold 21 on a corner that helps the operator to unroll the edge of the nape 3 where the collar 51 is joined (Fig. 15);
- a stop 18 for the collar 51, having a flap 24 for keeping the collar 51 flat (Fig. 17);
- one or two adjustable rollers 19 for applying the necessary tension to the collar 51 and for adjusting the position of the collar 51 (Fig. 14);
- a releasable rod 20 (Fig. 18) that keeps the collar 51 displaced in order to create visibility for the operator of the stop 22 and 23 for the piece of knitwear 50 (Fig. 19).

[0047] Driven by the belts 16, the collar 51 travels on a system of tension rollers 19 and stops 18 that allow it to maintain a fixed position without the intervention of the operator (Fig. 20).

[0048] As described, it is important that the line of stitches 7, 12, of the collar 51, to be linked (seam line on the collar Fig. 3) finishes directly beneath the viewing window 13 of the video camera 160 (Fig. 7, if provided) at a fixed spacing from the edge of the piece of knitwear 50 that travels beneath the collar 51 (Fig. 4, 5 and 6).

[0049] First of all, the collar 51 is inserted beneath the little foot 14 and into the guide 53, which is composed of rollers 19 and stops 18 (Fig. 20).

[0050] Secondly, the piece of knitwear 50 is inserted beneath the little foot 14 that is to be positioned beneath the collar 51 (Fig. 21) and in the stop 22 on the plate 17 of the guide 53.

[0051] Contrary to the collar 51, the piece of knitwear 50 is managed and controlled by the operator with the aid of the guide 53.

[0052] Along the circumference where the collar 51 is to be connected, the piece of knitwear 50 comprises very different situations to be managed, which are listed below:

- 1) in the nape 3, the fabric rolls up and requires something to unroll it (Fig. 8);
- 2) there are two seams on the shoulders 1 and 2 that increase the thickness of the fabric and render the edge of the piece of knitwear 50 irregular (Fig. 9-10);
- 3) the overlock 11 is arranged in the front part of the piece of knitwear 50 - said neck 4 (Fig. 11); and
- 4) the edge of the piece of knitwear 50 where the collar 51 is joined is very irregular (Fig. 2).

[0053] For these reasons, the guide 53 supports the operator in managing these different situations.

[0054] Once the piece of knitwear 50 has been inserted into the transport or drive belt 16, beneath the little foot

14 and the collar 51, the join (Fig. 21) of the left shoulder 2 of the piece of knitwear 50 (Fig. 9) is lined up with the join 6 of the ring-like closed collar 51 (Fig. 3).

[0055] The materials (that is the piece of knitwear 50 and the collar 51) are fed until the joins 2 and 6 are beneath the needle 15, and from there the linking procedure begins.

[0056] In the first part, the operator will use a stop 22 on a plate 17 of the guide 53 to keep the piece of knitwear 50 in the correct position (Fig. 16).

[0057] Furthermore, the operator will use the fold 21 on a plate 17 of the guide 53 that makes it possible to unroll the nape 3 of the piece of knitwear 50 (Fig. 16).

[0058] The fold 21 of the plate 17 represents a feature of the guide 53 that is used to unroll the rolled-up fabric (Fig. 16).

[0059] Across the entire nape 3 (Fig. 8), it is necessary that the operator uses the fold 21 of the plate 17 of the guide 53 and the stop 22 on the plate 17 of the guide 53 to unroll the nape 3 of the piece of knitwear 50 and to hold it in the correct position, while the collar 51 does not require several interventions by the rollers 19 and the stop 18 of the guide 53.

[0060] Once arrived at the join 1 of the right shoulder (Fig. 2-10) of the piece of knitwear 50, it is necessary to move the item to a new stop 23 on the plate 17 that makes it possible to manage the situation in a different way to with the piece of knitwear 50 on the front side of said neck 4 (Fig. 2-11), where the edge of the piece of knitwear 50 on the neck 4 is no longer rolled up, as in the nape 3, but where the overlock 11 can be found.

[0061] Therefore, the operator no longer uses the fold 21 to unroll the nape 3, but simply uses the stop 23 on the plate 17 to make sure that the overlock 11 maintains the desired seam line 52.

[0062] The operator therefore continues in this manner, joining the collar 51 to the piece of knitwear 50 along a common seam line 52 having the features described above, until the end.

[0063] As we have seen, the adjustable tension rollers 19 are used to tension the single collar 51 until the development of the collar 51 can be lined up with the circumference of the piece of knitwear 50.

[0064] In the last part of the procedure of linking the single collar 51, it is necessary to release the rod 20 that creates visibility for the operator.

[0065] This operation makes it possible to finish the work without having to move the pieces of fabric of the collar 51 and of the piece of knitwear 50 (Fig. 12-13).

[0066] As can be appreciated from what has been described, the present invention makes it possible to overcome the disadvantages present in the prior art.

[0067] In fact, the present invention provides a linking machine that helps the operator to present the pieces of fabric (piece of knitwear and single collar) to the linking machine so that said machine can correctly and autonomously carry out the linking procedure.

[0068] Preferably, but not necessarily, the linking ma-

chine will also be provided with a video camera so as to be able to further optimize the true step of linking and to speed up the entire linking process.

[0069] Therefore, the present invention provides a guide that, when connected to a system for transporting the pieces of fabric (piece of knitwear and collar), assists the operator with presenting the pieces of fabric to the machine in the correct position: these pieces of fabric can therefore be linked by the machine, preferably provided with a video camera, so as to modify the pitch/seam stitches in real time.

[0070] In order to meet contingent and specific requirements, a person skilled in the art can modify and vary the solutions described above in numerous ways, all of which are, however, covered by the scope of the invention, as defined by the following claims.

Claims

1. Linking machine (100) for linking a knitwear (50) and a collar (51), initially separated, comprising:

- a fixed unit (110) comprising a support frame (120) and a feeding device (16) of the knitwear (50) and/or the collar (51) along a longitudinal direction (Y-Y),
- and a mobile unit (130) comprising:
 - a needle (15) equipped with a device for operating (140) said needle (15) along a vertical direction (Z-Z), perpendicular to the longitudinal direction (Y-Y), to perform the linking,

characterized in that

the linking machine (100) comprises a guide (53) configured to align a collar seam line (7) with a nape seam line (8) of the knitwear (50) and with a neck seam line (10) of the knitwear (50), said guide (53) including a plate (17) with at least one stop (22,23) for the knitwear (50), arranged in a direction substantially parallel to said longitudinal direction (Y-Y), so as to allow the alignment of the knitwear (50) parallel to the stop itself (22,23), and a fold (21) on a corner of the plate (17) and arranged upstream of said at least one stop (22,23) with respect to a feeding direction of the knitwear (50), said fold (21) helping to unroll the nape edge (9) where the collar (51) is joined.

2. Linking machine (100) according to claim 1, wherein the plate (17) includes two stops (22,23) wherein a first stop (22) is conformed to permit the alignment of the knitwear (50) parallel to the stop itself, and a second stop (23) is conformed to ensure that an overlock (11) of the knitwear (50) maintains the desired seam line (52).

3. Linking machine (100) according to claim 1 or 2,

wherein said fold (21) is inclined downwards, on the opposite side to said at least one stop (22,23).

4. Linking machine (100) according to claim 1, 2 or 3, wherein said guide (53) includes a stop (18) for the collar(51), directed substantially along said longitudinal direction (Y-Y), and equipped with a flap (24) to keep the collar (51) flat, extending itself along a transversal direction (X-X), perpendicular to said longitudinal direction (Y-Y) and vertical direction (Z-Z). 5 10
5. Linking machine (100) according to any one of the preceding claims, wherein said guide (53) includes at least one tension roller (19) adjustable to provide the tension required by the collar (51) and to regulate the position of the collar (51). 15
6. Linking machine (100) according to claim 5, wherein said guide (53) includes two tension rollers (19), parallel with each other and with a transversal direction (X-X), perpendicular to said longitudinal direction (Y-Y) and vertical direction (Z-Z). 20
7. Linking machine (100) according to any one of the preceding claims, wherein said guide (53) includes a releasable rod (20), arranged overhanging in the proximity of said at least one stop (22,23) so as to keep the collar (51) shifted to create visibility of the knitwear (50), for the operator, on the stop (22,23) itself. 25 30
8. Linking machine (100) according to claim 7, wherein said rod (20) is directed in a direction substantially perpendicular to said stop (22, 23). 35
9. Linking machine (100) according to any one of the preceding claims, wherein the feeding device (16) includes a belt drive system (16) which conveys the knitwear (50) and the collar (51), and wherein the guide (53) positions at the start of said belt drive system (16). 40
10. Linking machine (100) according to any one of the preceding claims, including a video-camera (160) adapted to identify a guide thread arranged in correspondence of at least one fabric between the collar (51) and the knitwear (50) to be stitched, said guide thread being inserted inside said fabric (50, 51) so as to identify a plurality of knitwears to be linked. 45 50
11. Linking machine (100) according to claim 10, wherein the guide (53) is configured so the line of stitches (12, 7) to be linked of the collar (51) or the seam line of the collar ends up exactly underneath a viewing window (13) of the video-camera (160) at a fixed distance from the edge of the knitwear (50) moving below the collar (51). 55
12. Linking machine (100) according to any one of the preceding claims, including a positioning device (140) of a needle (15) along a transversal direction (X-X), perpendicular to said longitudinal direction (Y-Y) and coplanar with the fabric (50,51).
13. Linking machine (100) according to claim 12 in combination with claim 10 or 11, wherein said positioning device (140) of the needle (15) is operatively connected to the video-camera (160) so as to transversally position the needle (15) according to the information received from the said video-camera (160).

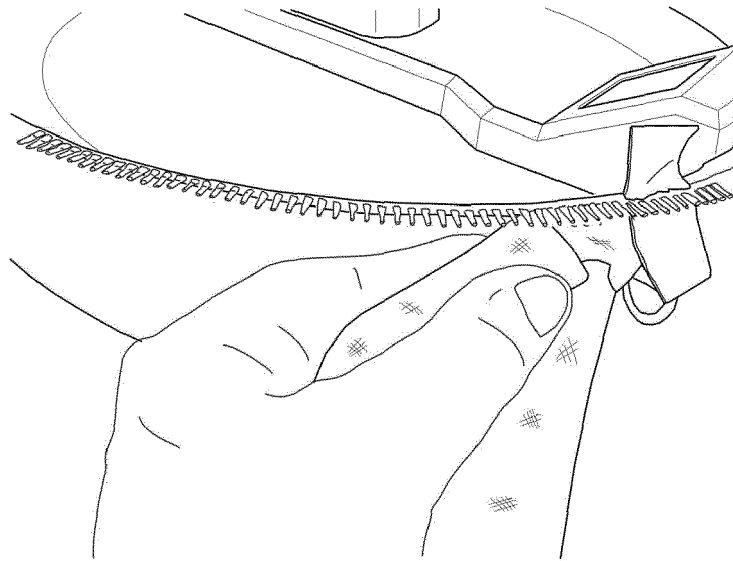


FIG.1 - PRIOR ART

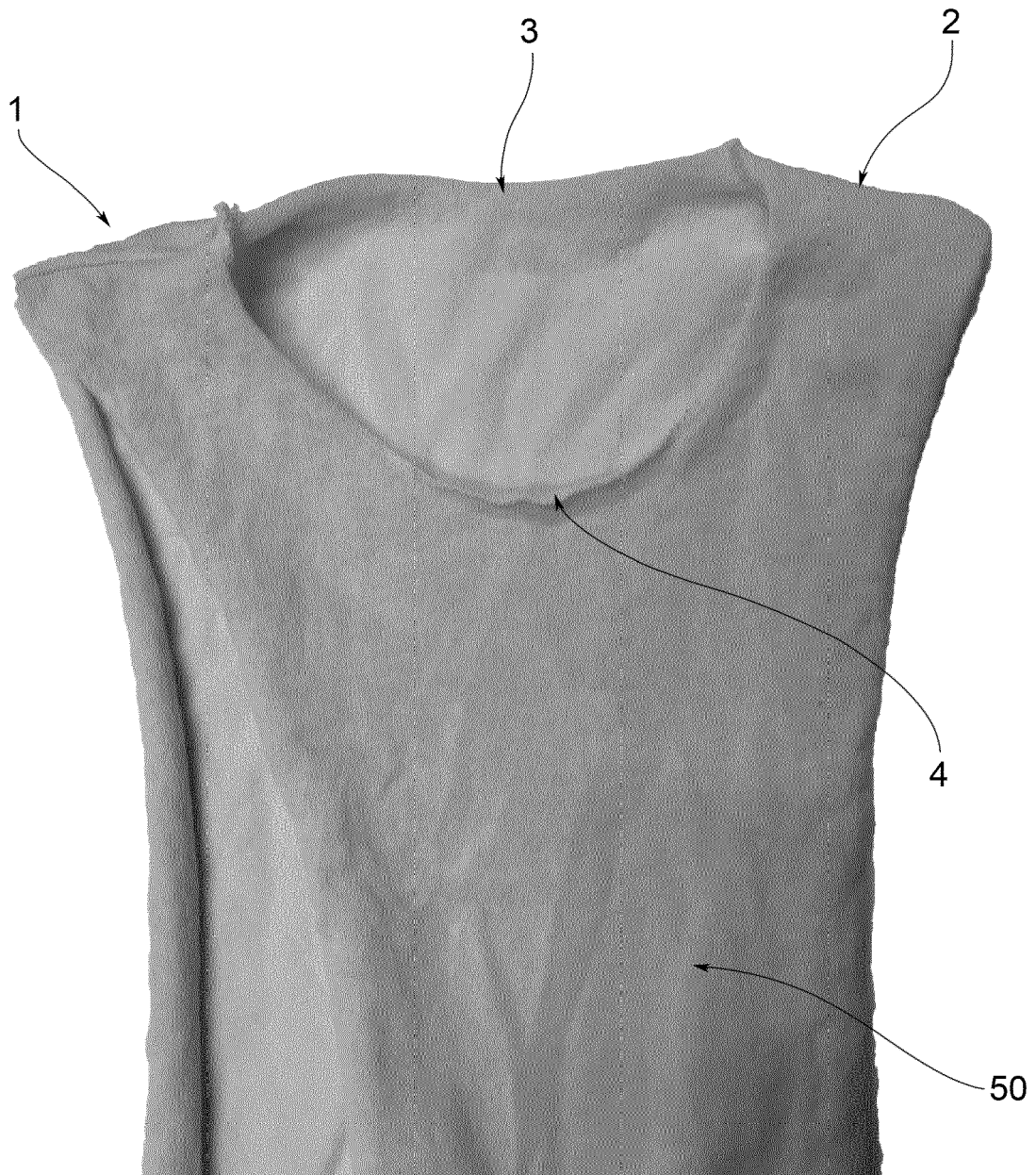


FIG.2a

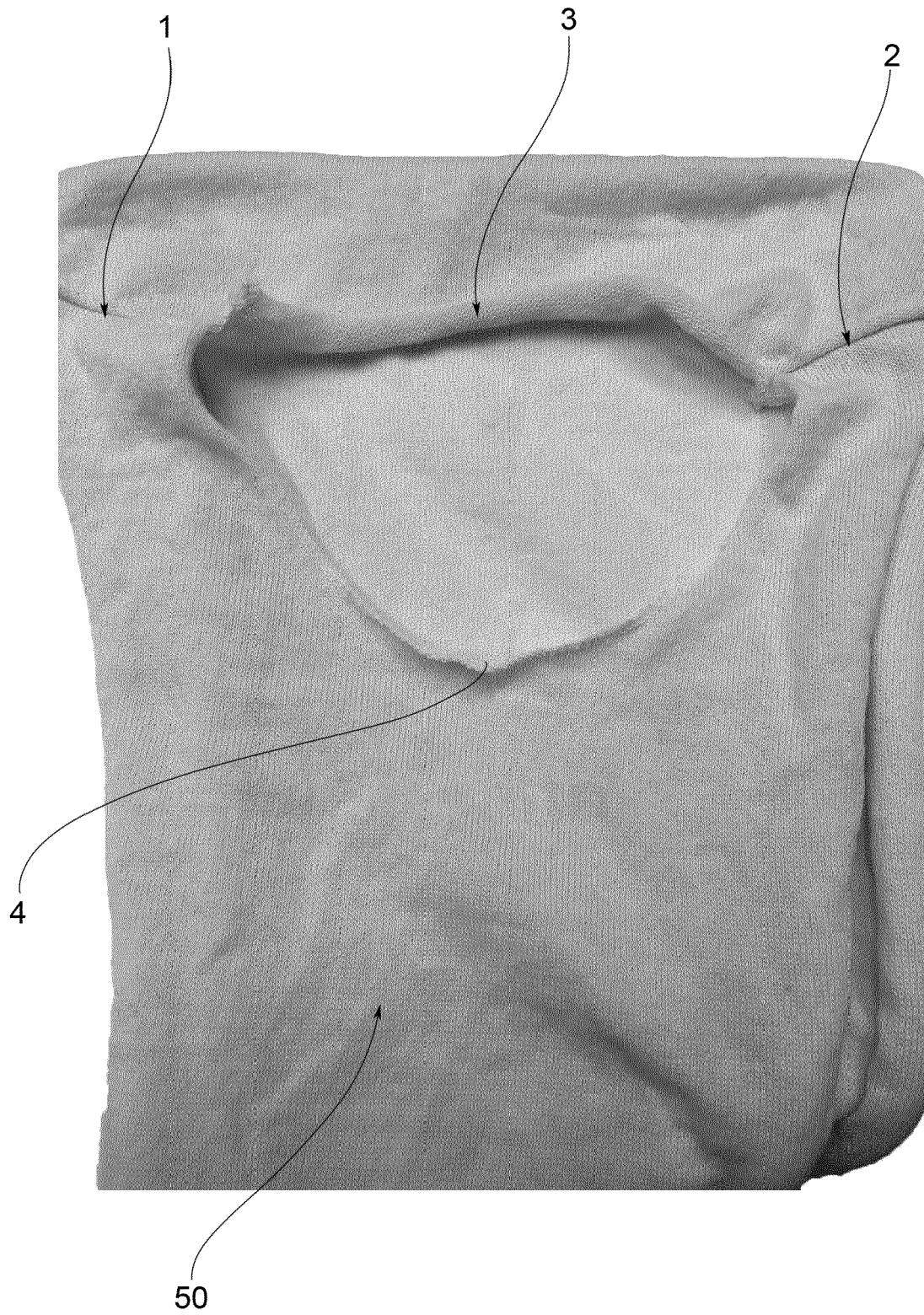


FIG.2b

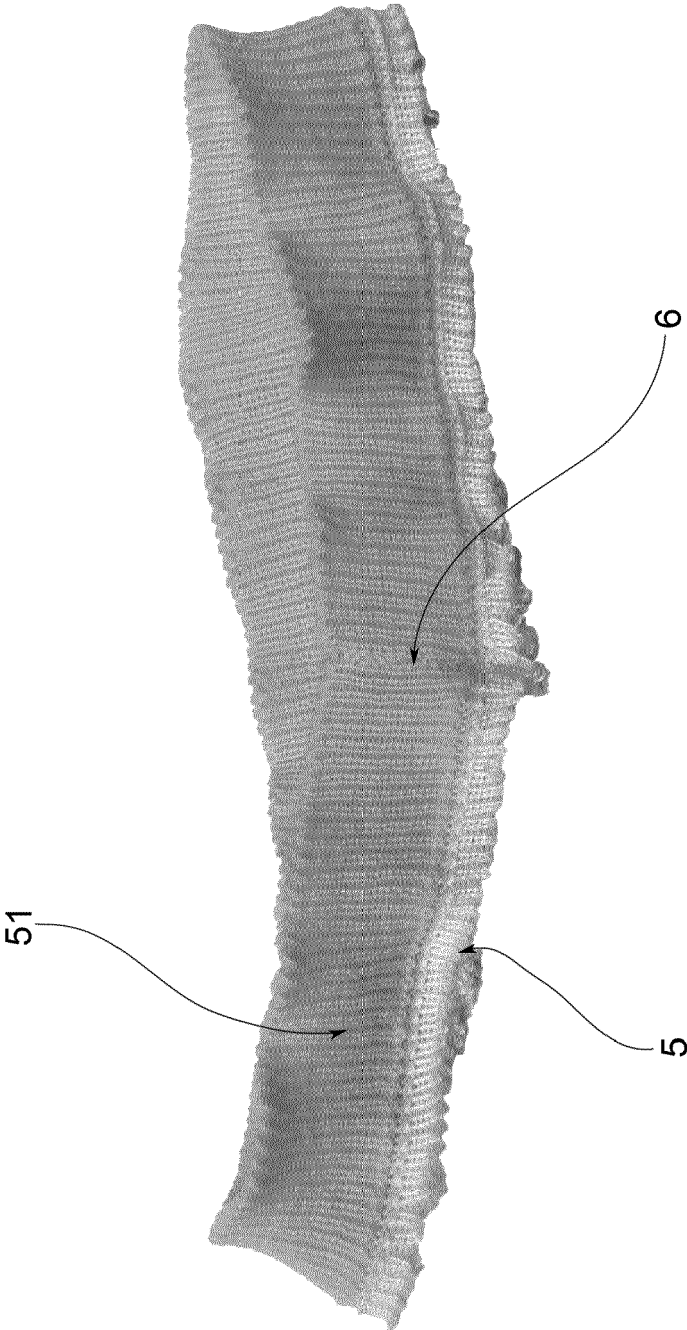


FIG.3a

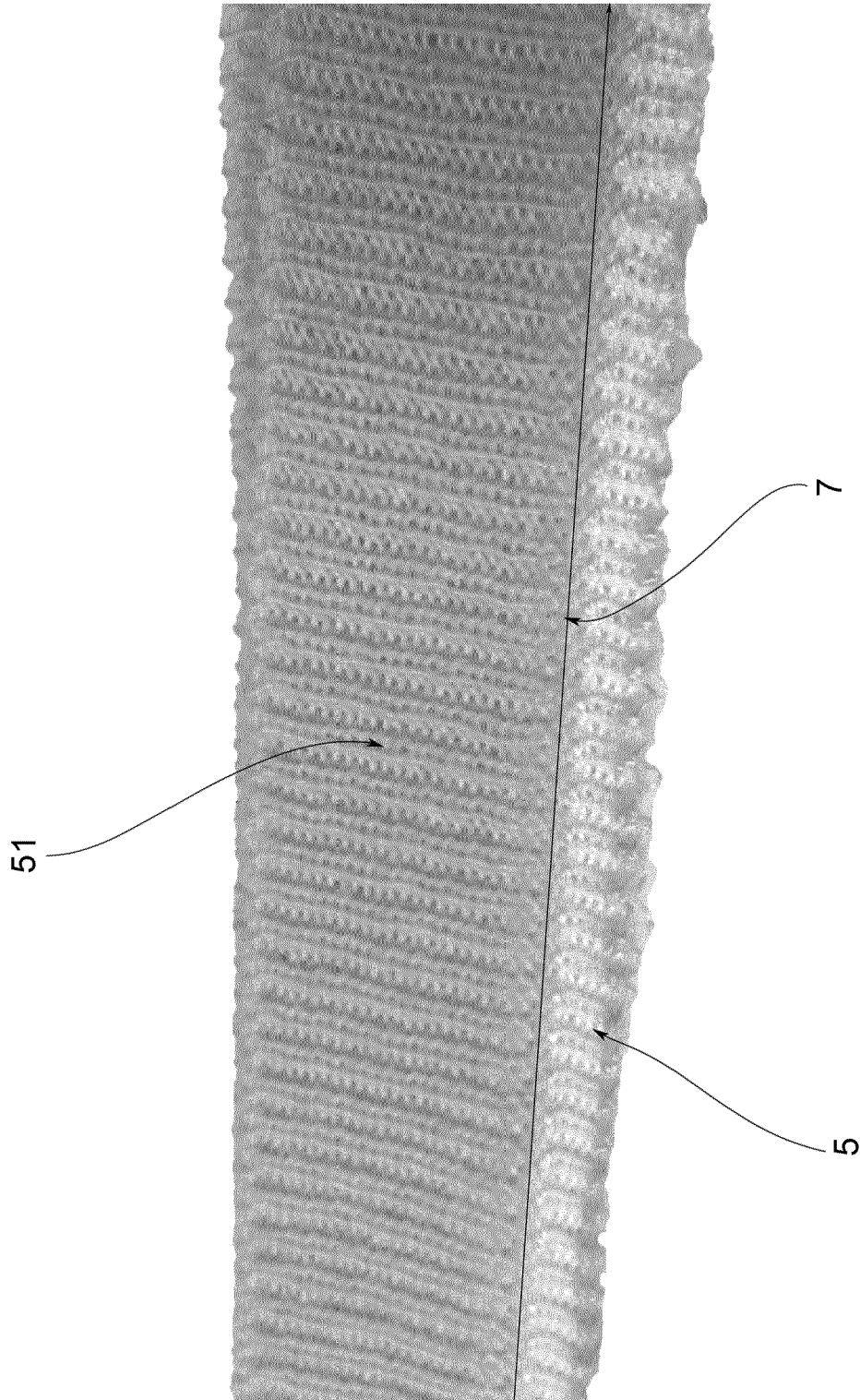


FIG.3b

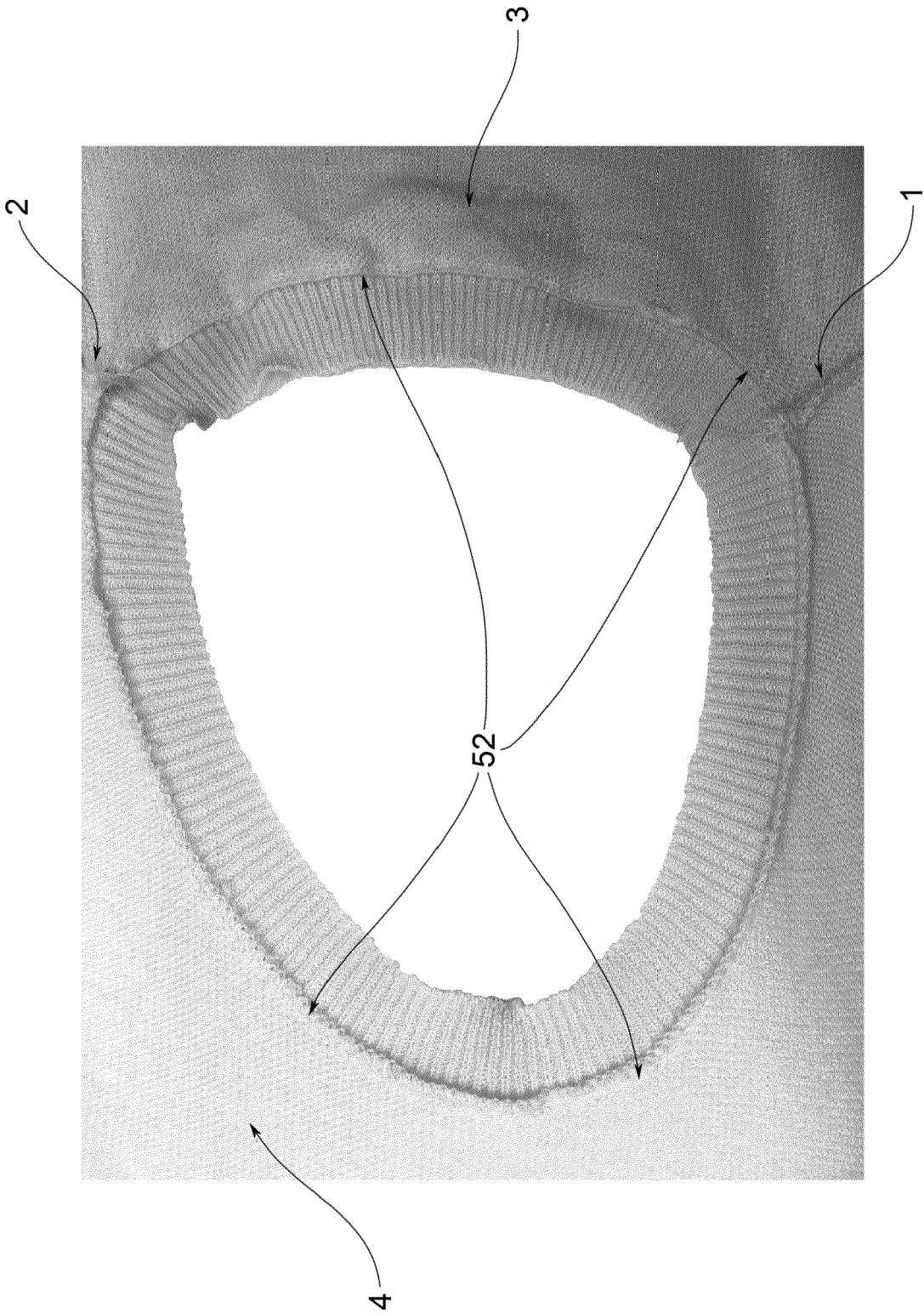


FIG. 4

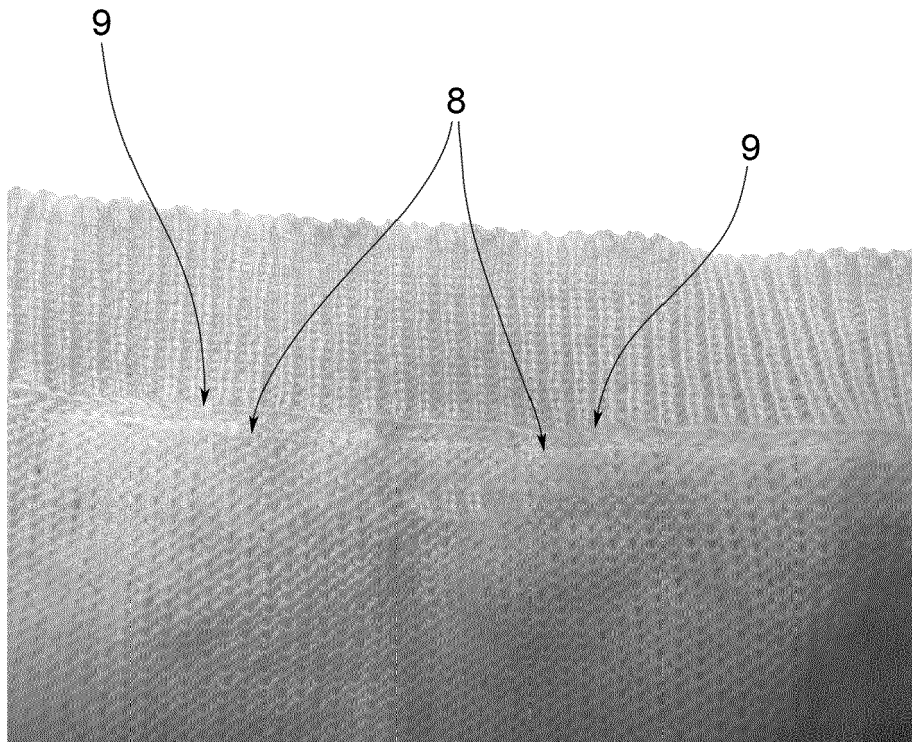


FIG.5

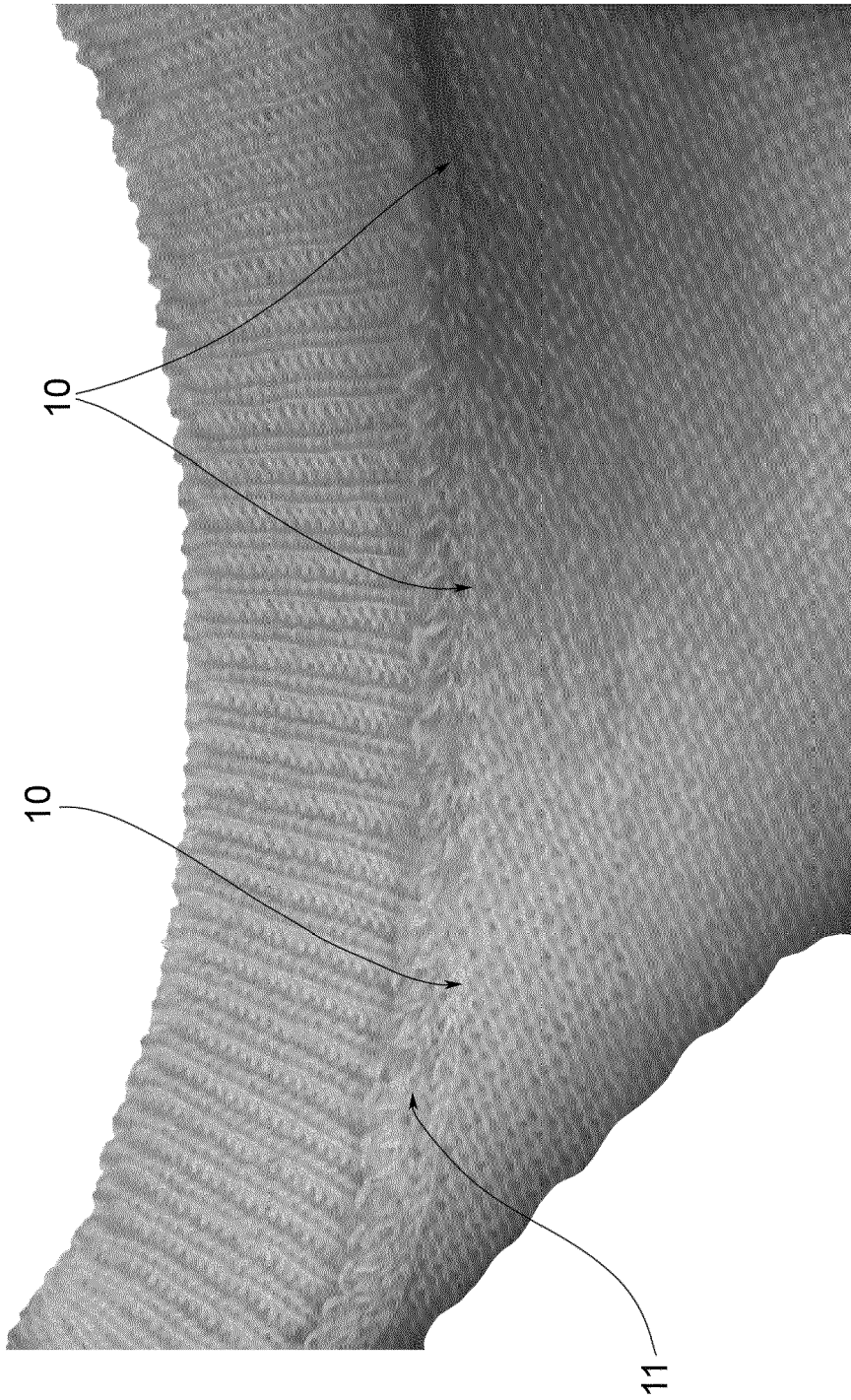


FIG.6

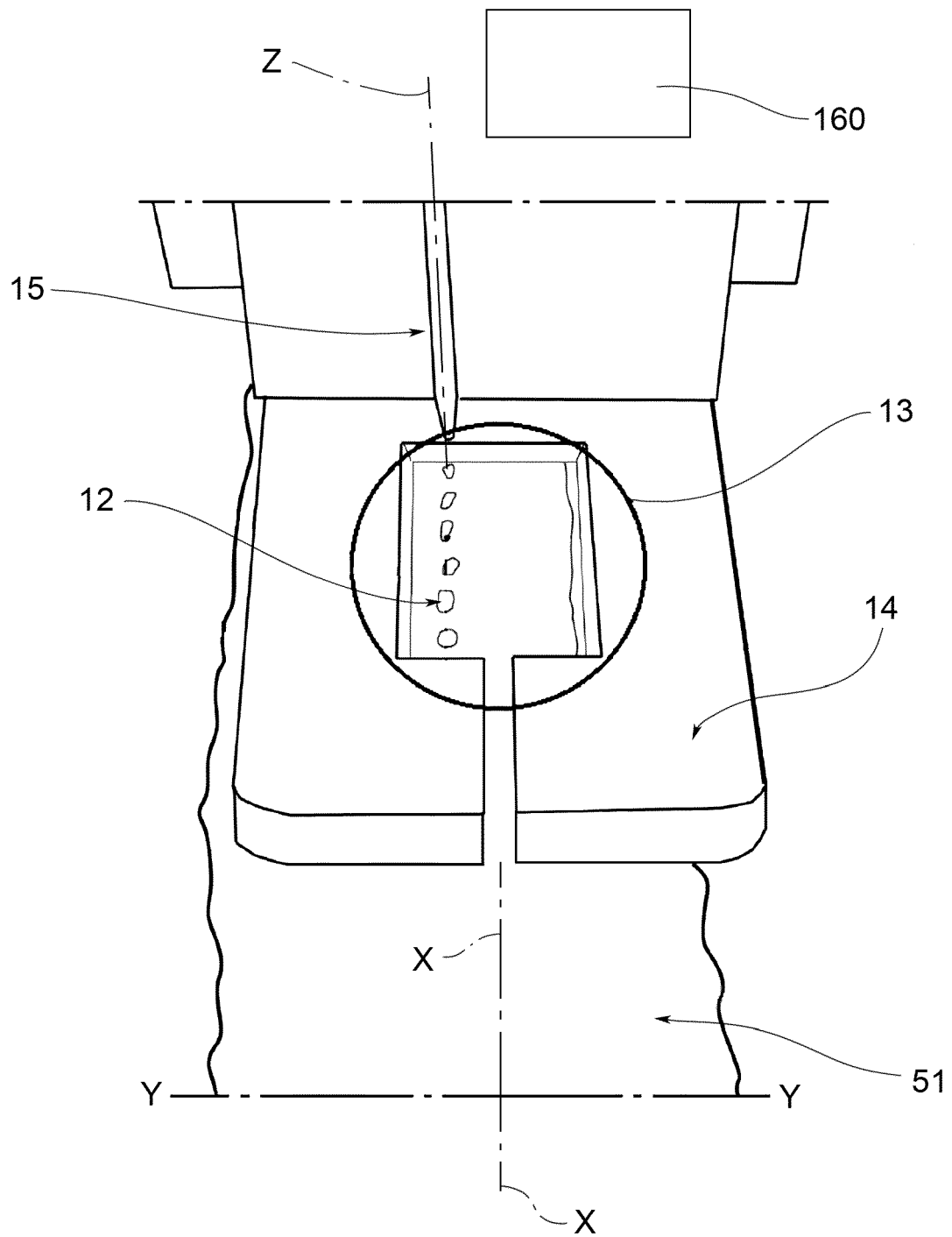


FIG.7

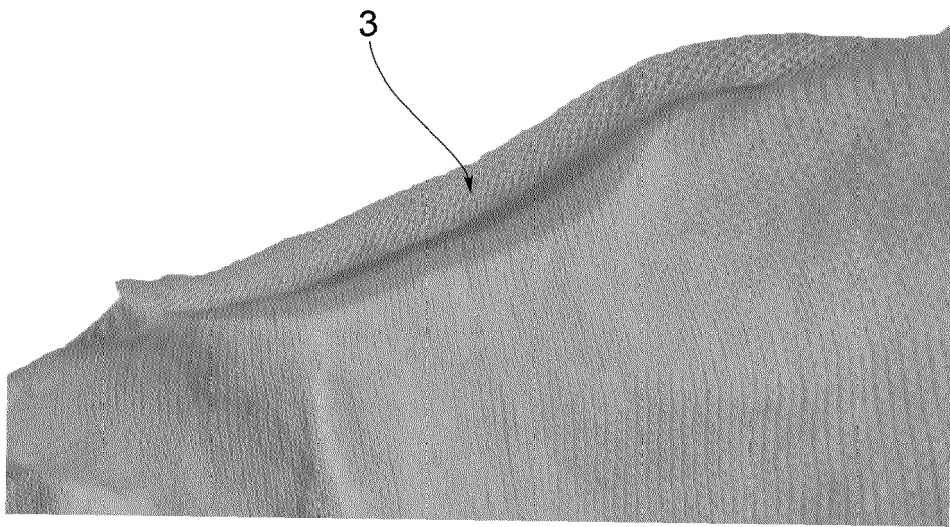


FIG.8

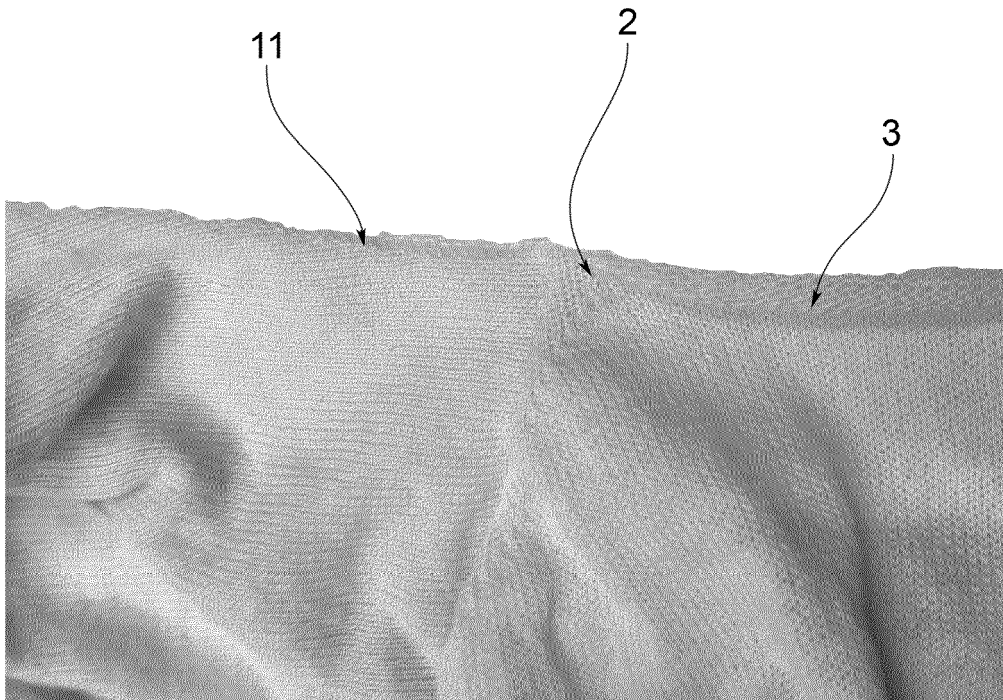


FIG.9

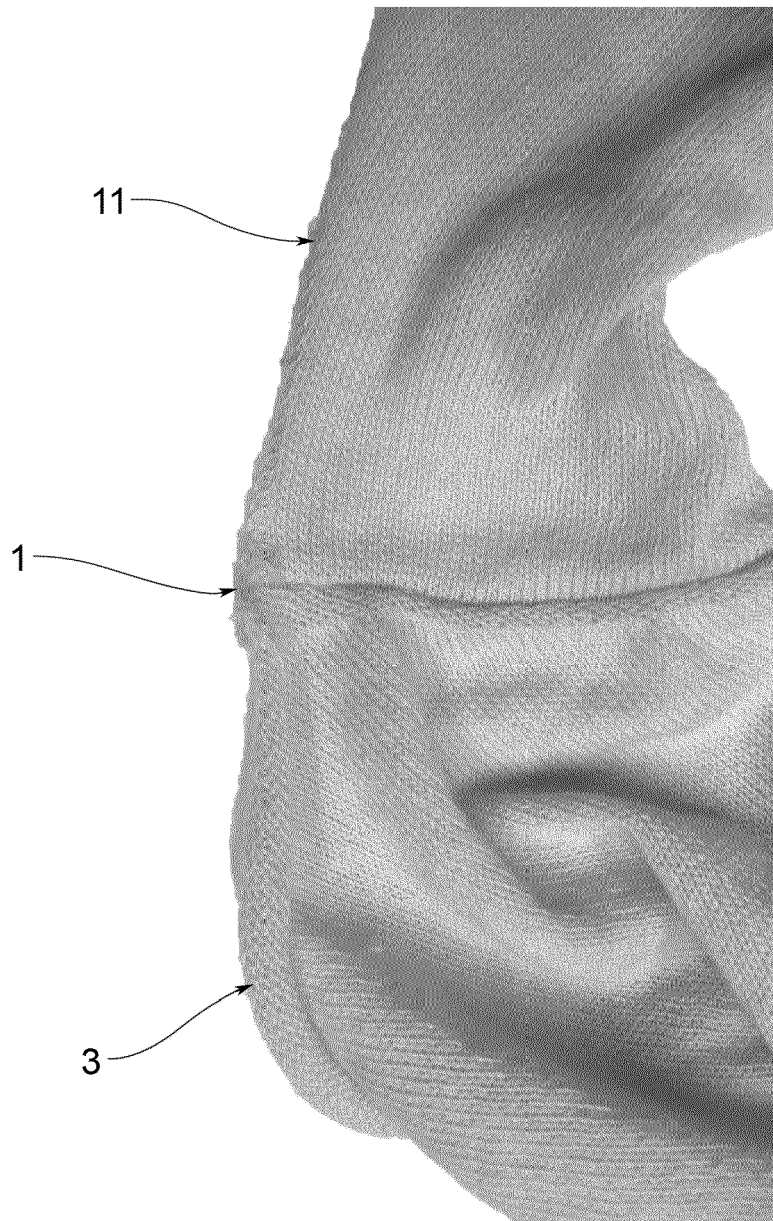


FIG.10

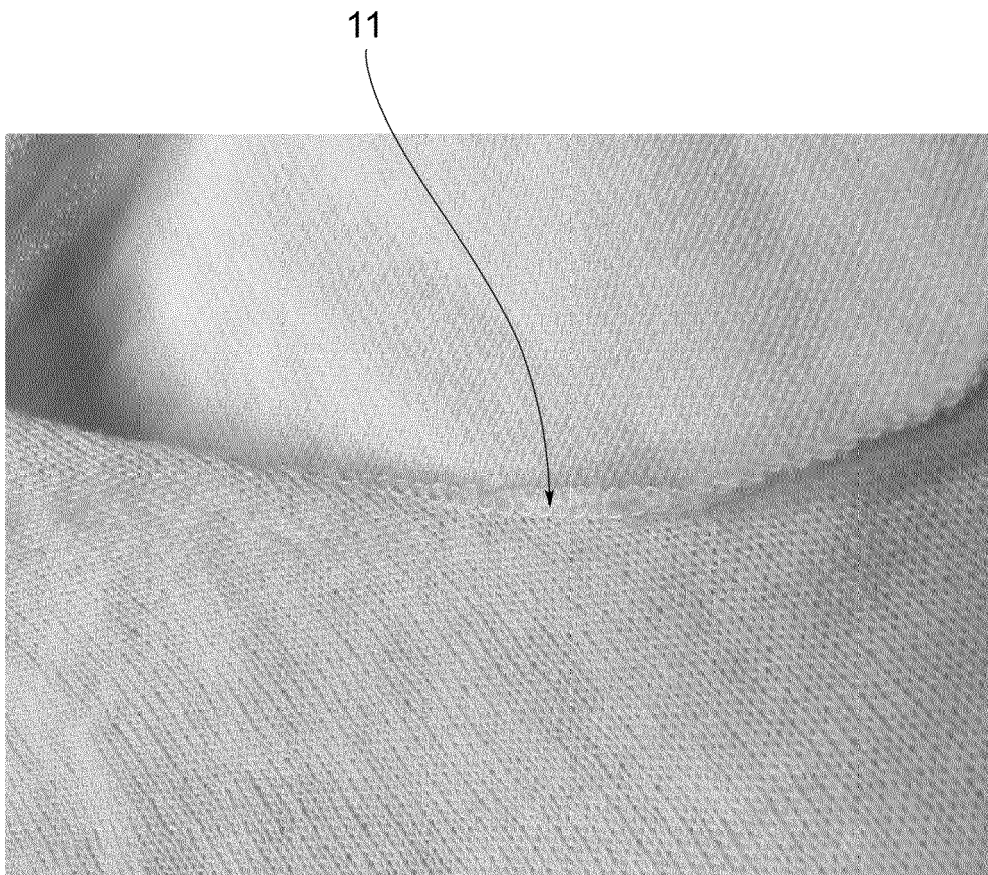


FIG.11



FIG.12



FIG.13

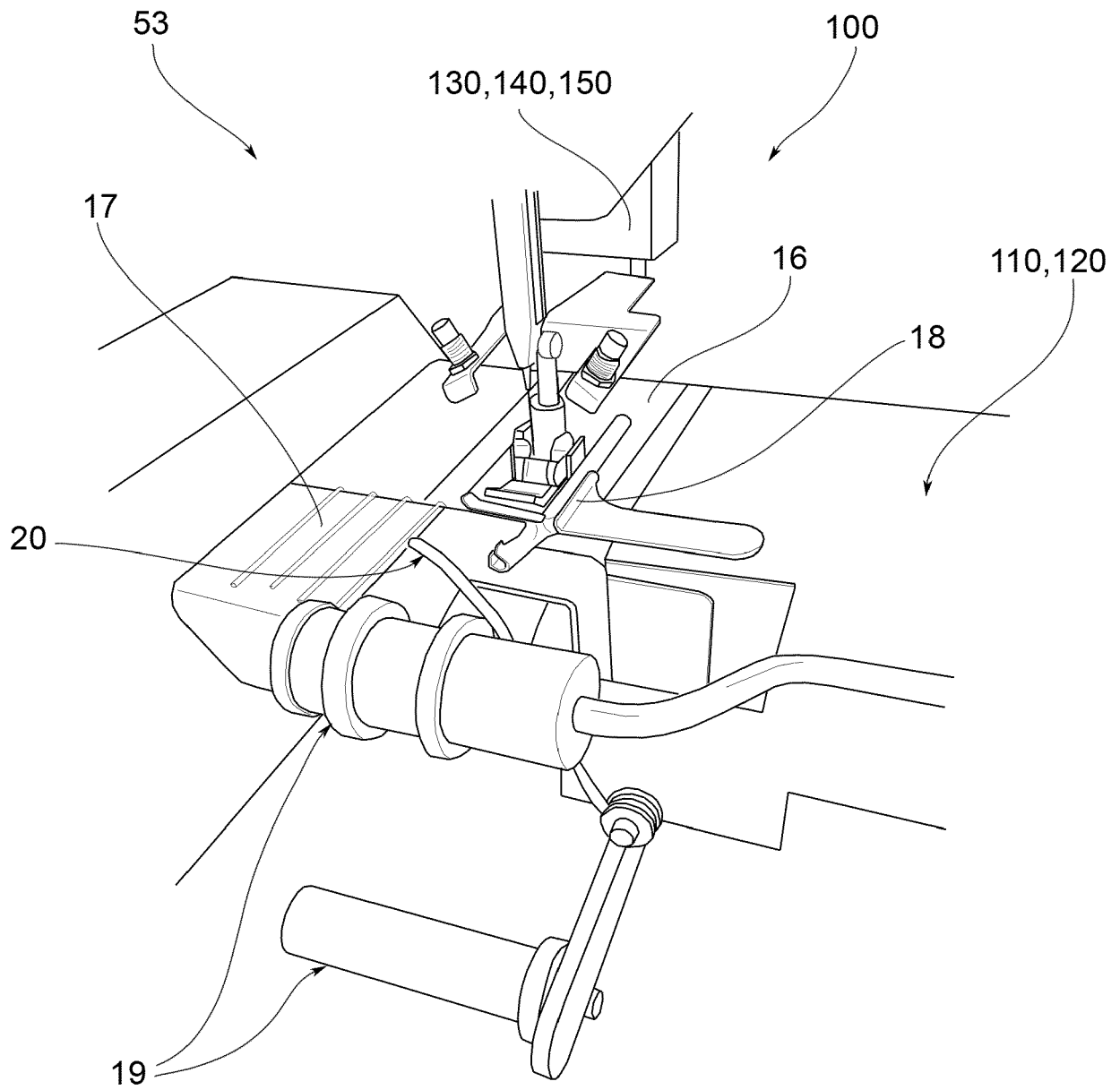


FIG.14

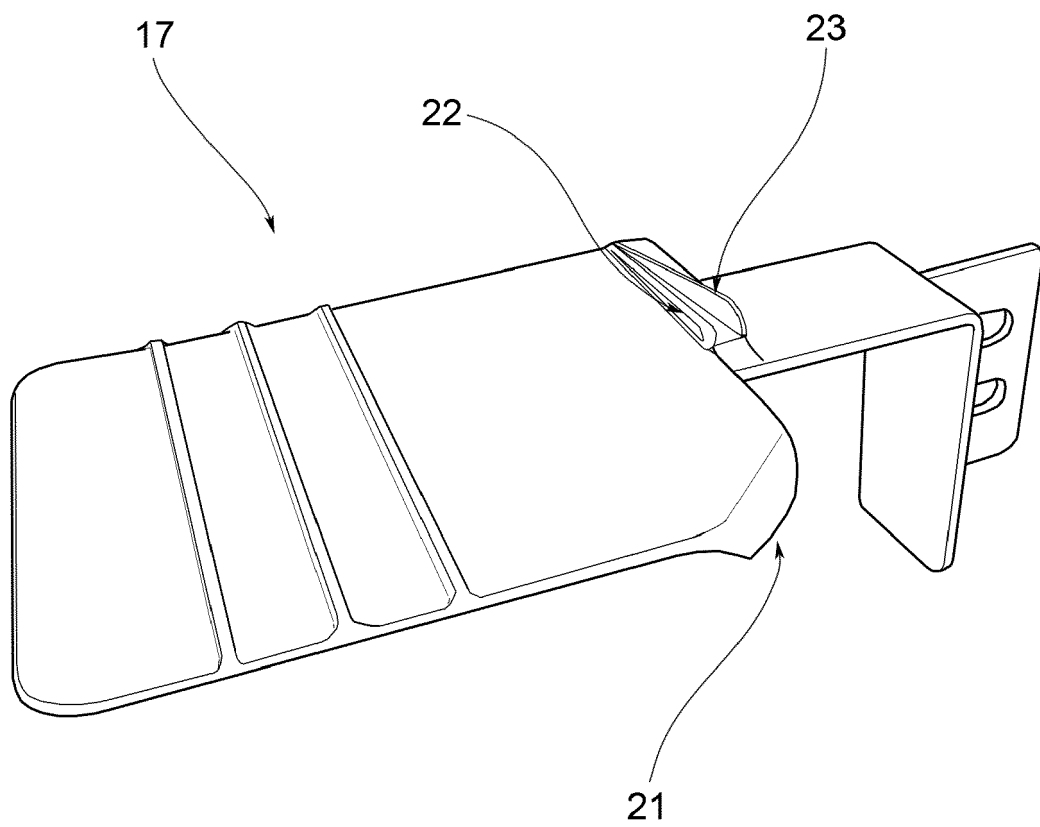


FIG.15

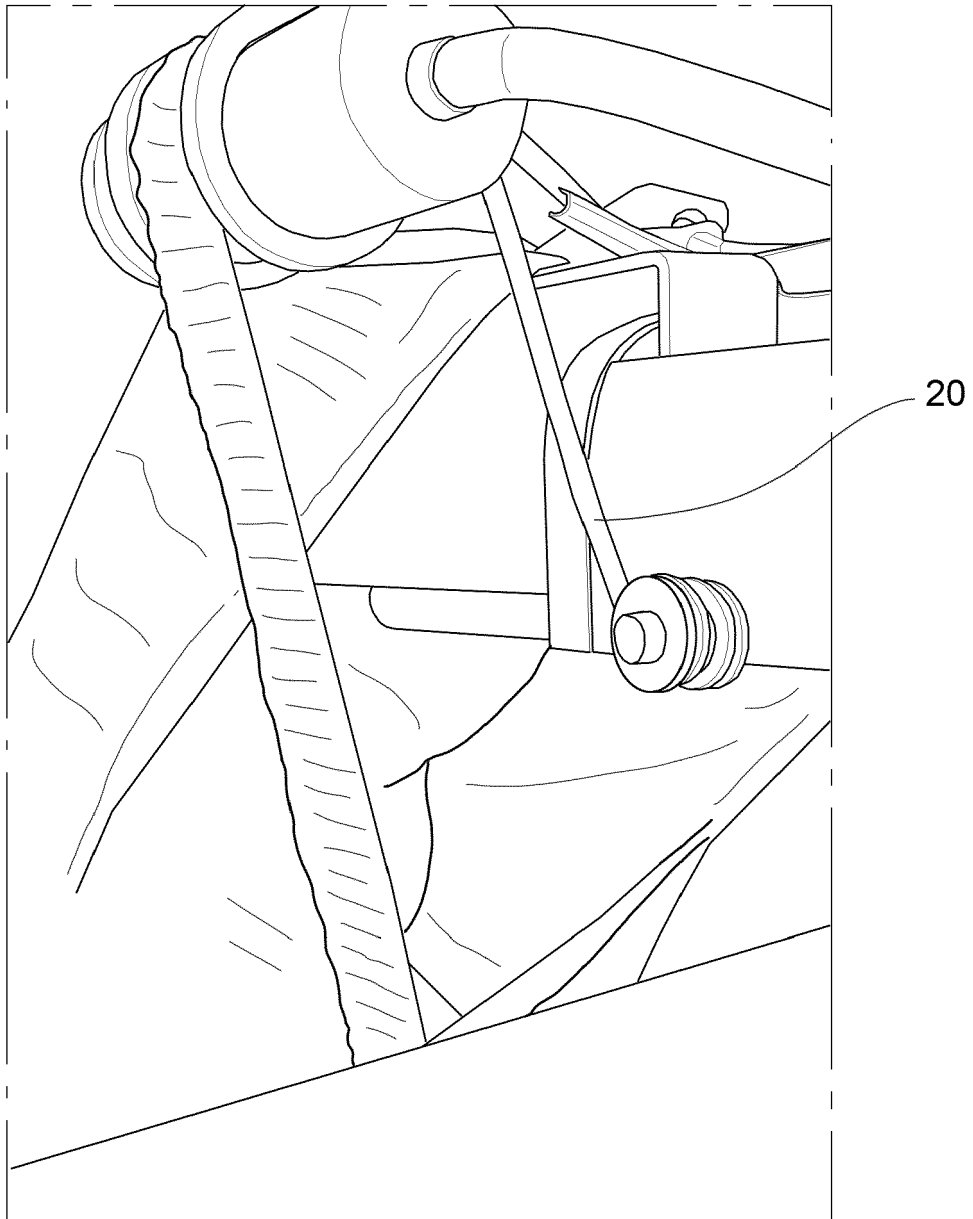


FIG.16

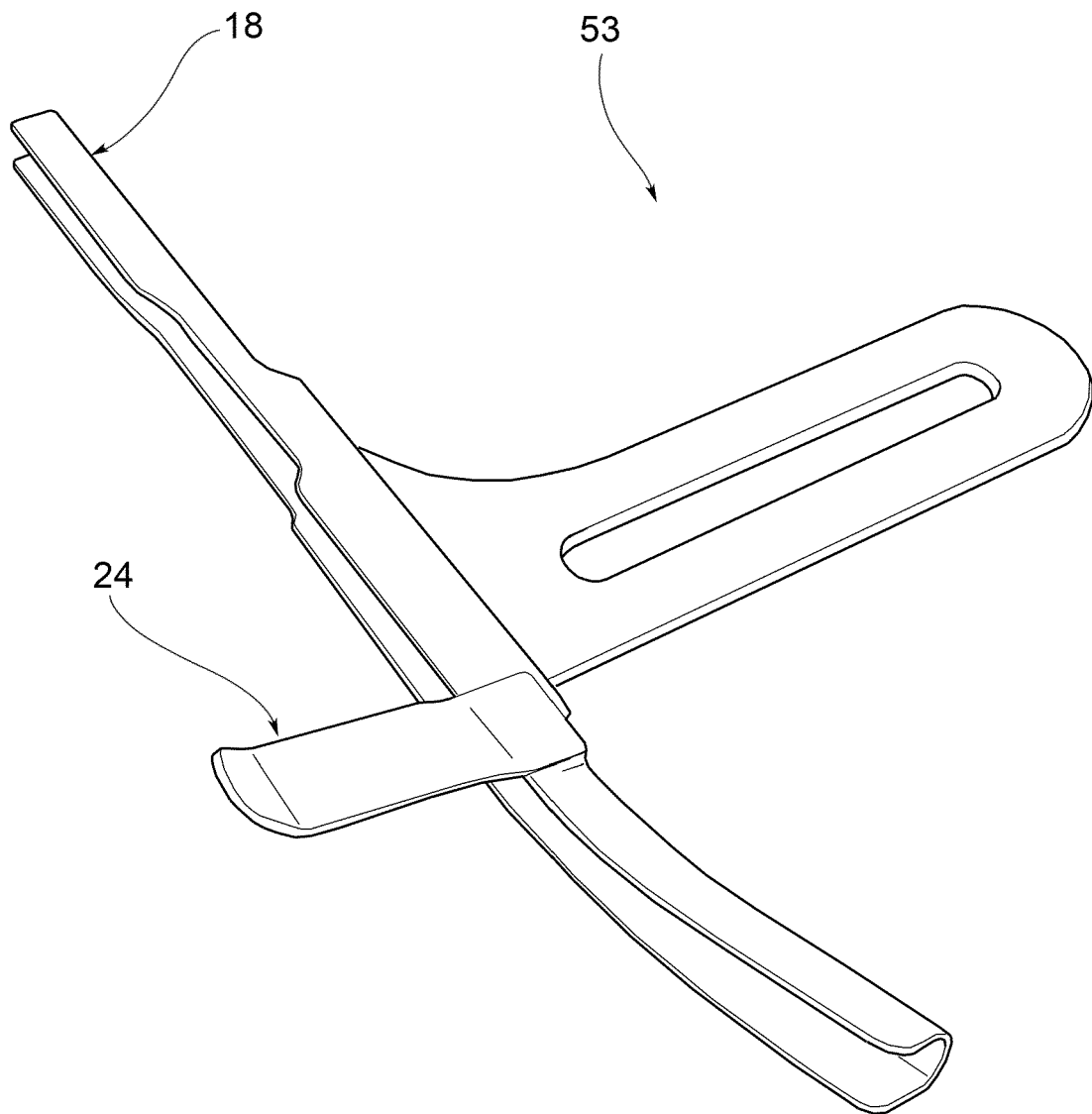


FIG.17

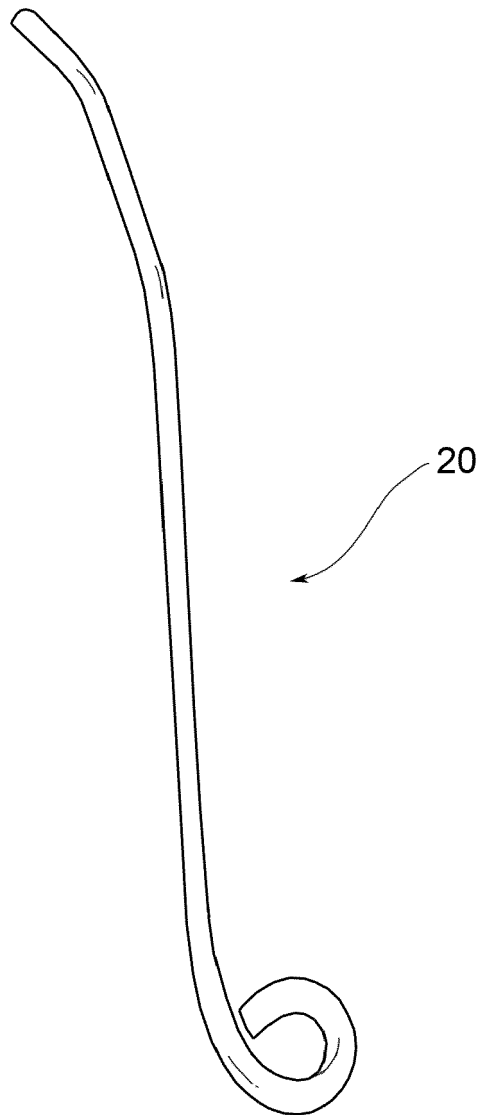


FIG.18

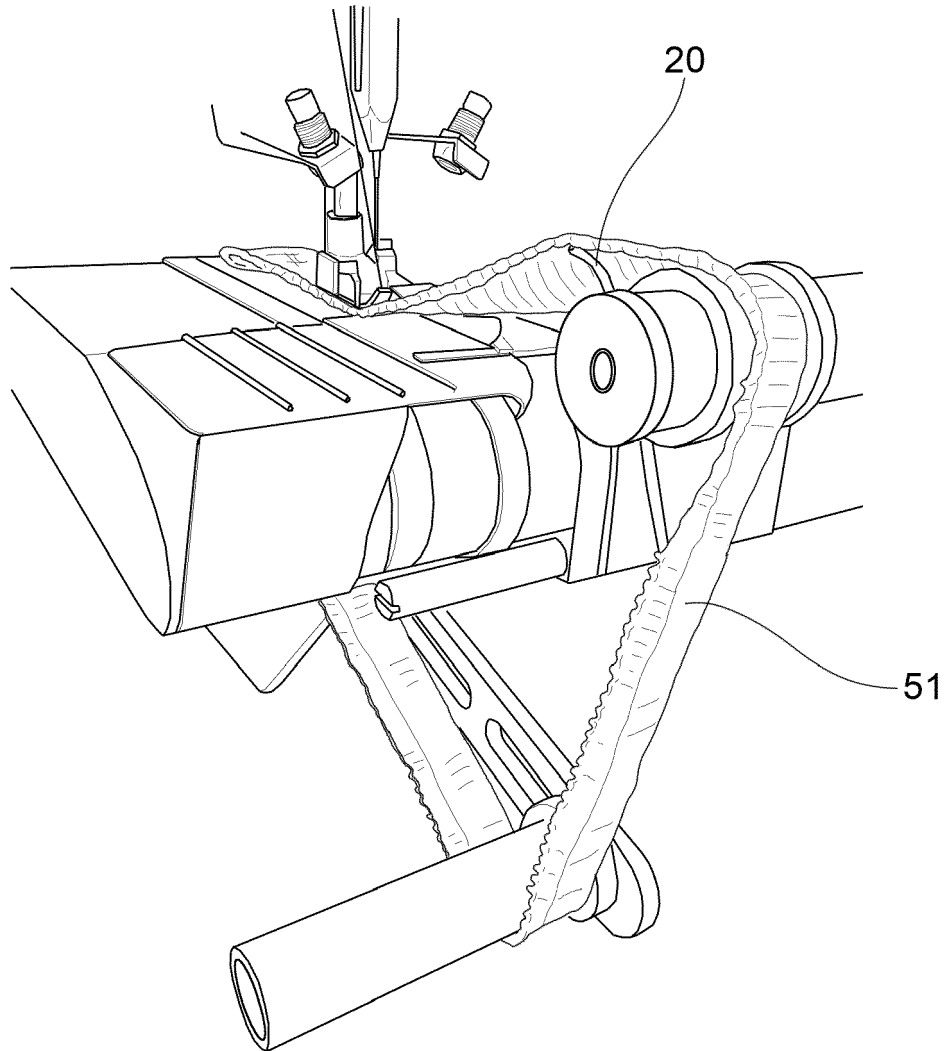


FIG.19

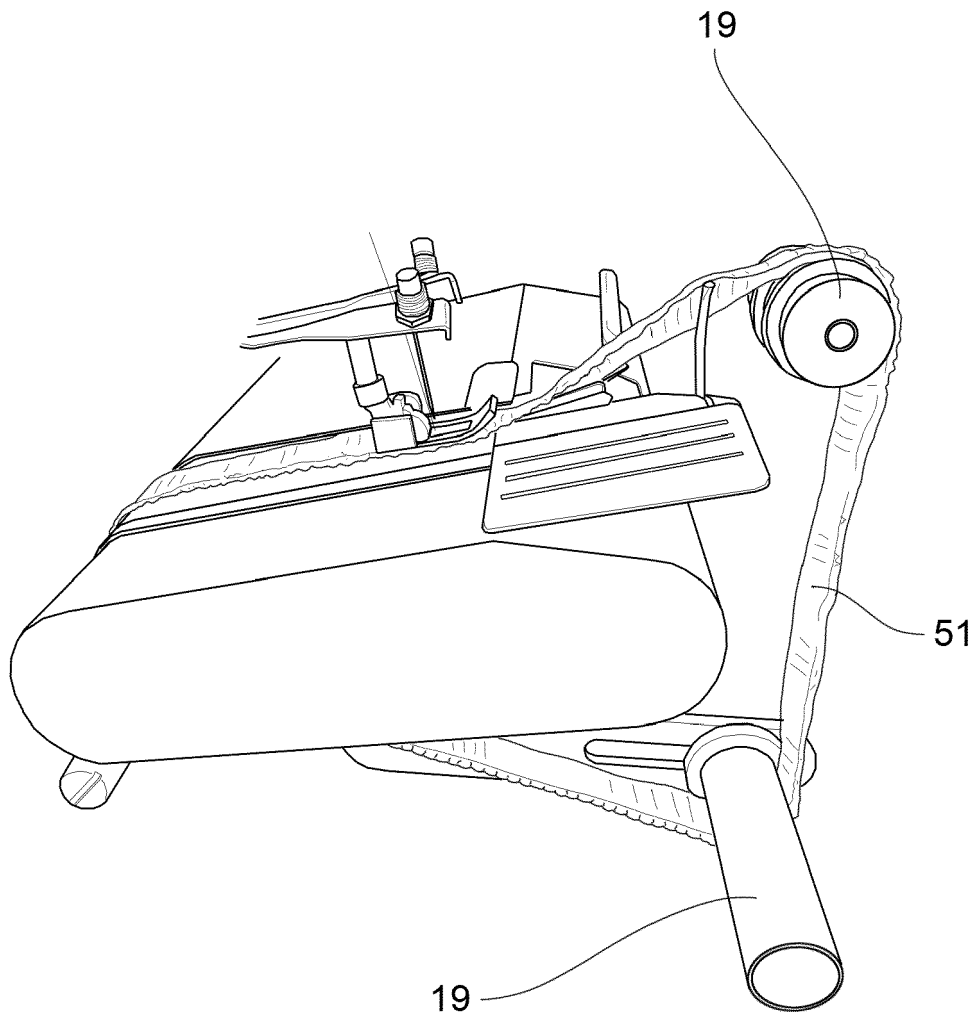


FIG.20

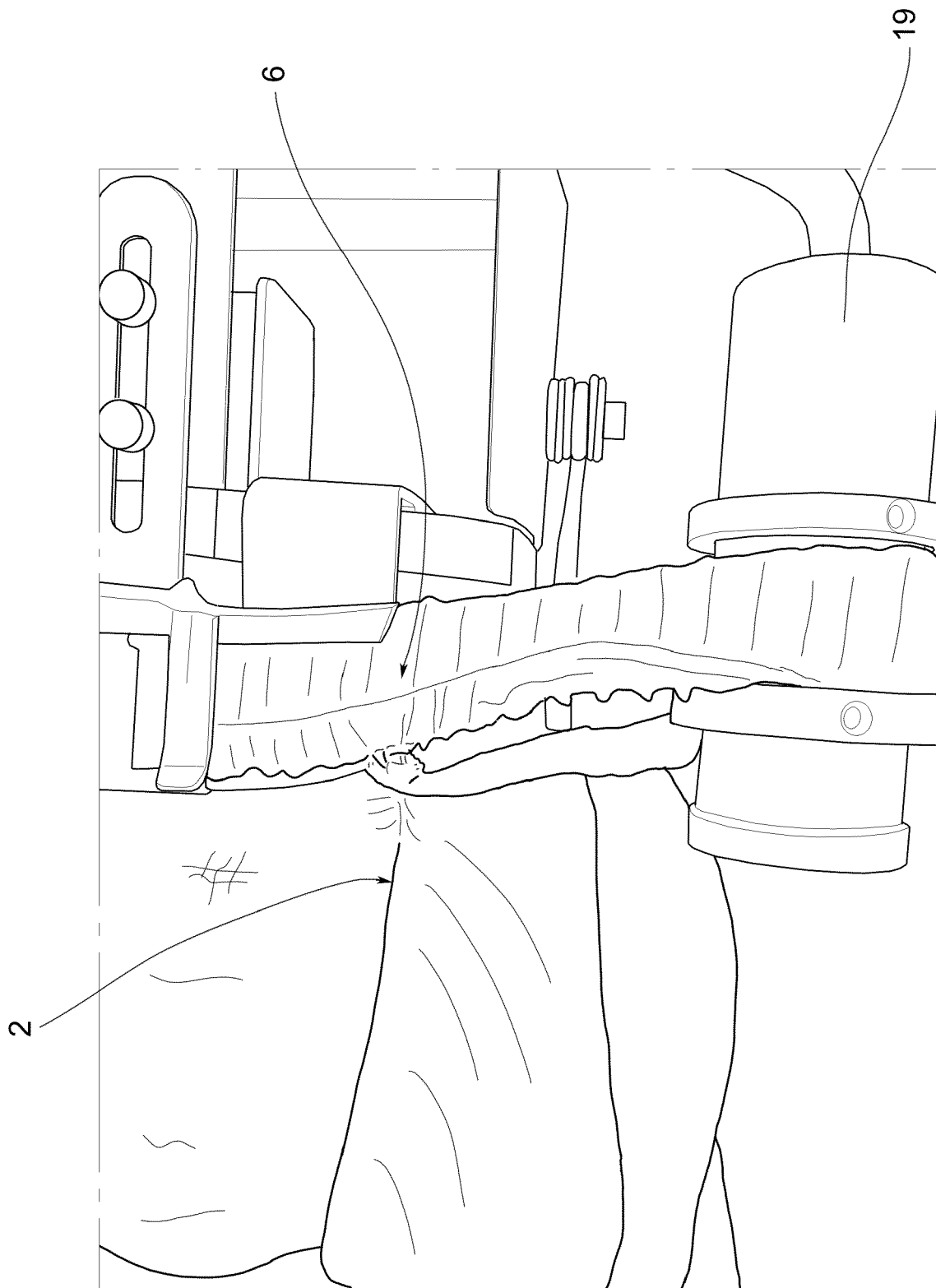


FIG.21



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Munich		9 July 2020	Braun, Stefanie
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EPO FORM 1503 03.82 (P04C01)

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