(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 278 034 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
22.01.2025 Bulletin 2025/04

(21) Application number: **21794602.9**

(22) Date of filing: **29.10.2021**

(51) International Patent Classification (IPC):
D05B 11/00 *(2006.01)* ***D05B 21/00*** *(2006.01)*
D05B 25/00 *(2006.01)* ***D05B 37/04*** *(2006.01)*
B23K 26/044 *(2014.01)* ***D06H 7/00*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
D05B 37/04; D05B 11/00; D05B 21/00; D05B 25/00; D06H 7/00; D05D 2305/08

(86) International application number:
PCT/EP2021/080201

(87) International publication number:
WO 2022/152424 (21.07.2022 Gazette 2022/29)

(54) METHOD AND APPARATUS FOR THE PRODUCTION OF FABRIC OR LEATHER ARTICLES

VERFAHREN UND VORRICHTUNG ZUR HERSTELLUNG VON GEWEBE- ODER LEDERARTIKELN

PROCÉDÉ ET APPAREIL POUR LA PRODUCTION D'ARTICLES EN TISSU OU EN CUIR

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **12.01.2021 IT 202100000398**

(43) Date of publication of application:
22.11.2023 Bulletin 2023/47

(73) Proprietor: **INDUSTRIES S.P.A.**
20144 Milano (IT)

(72) Inventors:
- **ARSANTO, Roberto**
  10141 TORINO (IT)
- **CHIUDINELLI, Denis**
  25052 PIANCOGNO (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners
Via Meravigli, 16
20123 Milano (IT)

(56) References cited:
DE-A1- 3 801 820
US-A- 3 896 749
US-A1- 2006 179 989

EP 4 278 034 B1

Description

[0001] The present invention relates to a method and an apparatus for the production of fabric or leather articles, particularly articles to be padded, for example with goose down.

[0002] Automatic quilting methods are known in which a continuous padded cloth is made to advance first at a sewing head and then at a cutting head, using a perforated conveyor belt with which, by means of air suction, the cloth is retained without any sliding. A method of this type is described in Patent Application DE3801820A1.

[0003] A drawback of the methods in which the seams are closed lines around which the cut must be then performed is the precision with which the cutting line must be kept spaced from the sewing line provided previously.

[0004] Another drawback is that the semi-finished products obtained at the end of the cutting may be indistinguishable to an operator and, consequently, difficult to catalog without a general slowdown of the production line.

[0005] The use of known sewing and cutting methods may also entail some problems in a production line, particularly in lines in which continuous manual intervention is necessary in order to perform certain steps.

[0006] The aim of the present invention is to provide a method for the production of fabric or leather articles and a corresponding apparatus which are capable of improving the background art in one or more of the aspects mentioned above.

[0007] Within the scope of this aim, an object of the invention is to provide a method for the production of fabric or leather articles and a corresponding apparatus which allow to obtain semi-finished products which are sewn and cut precisely along the seams.

[0008] Another object is to provide a method for the production of fabric or leather articles and a corresponding apparatus which can be used with a plurality of mutually different templates.

[0009] Another object of the invention is to provide a method for the production of fabric or leather articles and a corresponding apparatus for obtaining semi-finished products that can be identified easily and quickly, for a subsequent process such as padding and/or the tailoring of garments.

[0010] Another object is to provide an apparatus for the production of fabric or leather articles which can be also used within a manufacturing line for garments.

[0011] Moreover, an object of the present invention is to overcome the drawbacks of the prior art in a manner that is alternative to any existing solutions.

[0012] Not least object of the invention is to provide a method and an apparatus which are highly reliable, relatively easy to provide and at competitive costs.

[0013] This aim and these and other objects which will become better apparent hereinafter are achieved by a method for the production of fabric or leather articles, particularly articles to be padded, comprising the steps as defined in claim 1, which include:

- feeding at least two mutually superimposed cloths to an embroidery machine;
- stepwise advancing of said superimposed cloths along a substantially rectilinear direction;
- at said embroidery machine, automatic sewing of said at least two cloths along sewing lines according to a template that is stored and contains a pattern of reference sewing lines;

characterized in that the method comprises the steps of:

- during said automatic sewing, applying a plurality of markings in the form of respective additional seams, said markings being distributed two-dimensionally on an exposed face of the superimposed cloths according to a corresponding arrangement of reference markings provided in said stored template;
- after said automatic sewing, feeding to a station for the automatic cutting of the sewn portion of said superimposed cloths;
- optically capturing said sewn portion and determining any displacement of said markings applied to said superimposed cloths with respect to the arrangement of the reference markings stored in said template;
- based on said displacement and on the mutual arrangement of the reference markings and of the pattern of the sewing lines provided in said stored template, determining by interpolation the actual pattern of the sewing lines that is present on said sewn portion of the cloths;
- automatically cutting said sewn portion, said cutting being performed substantially along said sewing lines on the basis of said actual pattern obtained with said interpolation, so as to automatically adapt said cutting to any relaxations and/or wrinkles of the cloths after said sewing step.

[0014] Optionally, the above method may be provided with one or more of the characteristics of the dependent claims.

[0015] The aim and the objects of the invention are also achieved by an apparatus for the production of fabric or leather articles, particularly of padded articles, adapted to perform the above method, as defined in claim 8. Said apparatus comprising:

- a feeder of a plurality of cloths, said feeder being configured to unwind said cloths from respective rolls in an advancement direction and to mutually superimpose them;
- memory means comprising a stored template which contains a pattern of reference sewing lines and a plurality of reference markings arranged, with respect to said pattern, according to a reference ar-

rangement;

- an embroidery machine, comprising at least one sewing head and at least one frame adapted to tension and temporarily retain said superimposed cloths during sewing, said embroidery machine being associated with control means configured to perform, by means of relative movements between said at least one sewing head and said frame, an automatic sewing of said superimposed cloths along sewing lines that correspond to said pattern of the stored template;
- said embroidery machine being adapted to apply two-dimensionally, on said superimposed cloths, a plurality of markings in the form of seams in positions that correspond to said reference arrangement stored in said template;
- downstream of said embroidery machine with respect to said advancement direction, means for the optical capture of the cloths sewn by said embroidery machine and a machine for the automatic cutting of said sewn cloths;
- control means comprising stored instructions for:
    - detecting, by means of said optical capture means, the position of said markings applied on said sewn cloths;
    - determining any displacement of said applied markings with respect to the reference arrangement stored in said template;
    - on the basis of said displacement and of the mutual arrangement of the reference markings and of the pattern of the sewing lines provided in said stored template, determining by interpolation the actual pattern of the sewing lines that is present on said sewn cloths, so as to automatically adapt said cutting to any relaxations and/or wrinkles of the sewn cloths after the release of said sewn cloths by the frame of the embroidery machine;
    - said automatic cutting machine being adapted to perform an automatic cutting of said cloths substantially along said sewing lines on the basis of said actual pattern obtained with said interpolation.

[0016] Optionally, such apparatus may be provided with the characteristics of the dependent claims.

[0017] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the apparatus according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a side view of an apparatus according to the invention;

Figure 2 is a top plan view of the apparatus of Figure 1;

Figure 3 is a partial detail view of the tensioning frame of the cloths in the embroidery machine of the apparatus of Figures 1-2;

Figure 4 is a view of an embodiment of a stored template used in the apparatus of the preceding figures.

[0018] With reference to the cited figures, an apparatus according to the invention, generally designated by the reference numeral 1, comprises a feeder 2 of a plurality of cloths in roll form. The feeder 2 is provided with a plurality of unwinding units 2a, 2b, 2c with horizontal unwinding axes, which are arranged so that the cloths 20a, 20b, 20c can be unwound from the respective rolls 21a, 21b, 21c and be fed, in a mutually superimposed manner and along a substantially rectilinear advancement direction D, to the downstream machines, in order to form a multilayer sheet 20d with a number of layers that corresponds to the number of cloths 20a, 20b, 20c in input.

[0019] The cloths 20a, 20b, 20c can have, optionally but not necessarily, substantially the same width, with respect to the direction perpendicular to the advancement direction D, so that they can be superimposed substantially in register at the outlet of the feeder 2.

[0020] In the illustrated embodiment, the superimposed cloths are three and are formed by two cloths 20a-20b, adapted to form a sack for down in a subsequent filling step, and by a third cloth 20c adapted to form an external layer of a garment padded with down and tailored downstream of the apparatus 1.

[0021] At the feeder 2 it is possible, as an alternative, to provide for the interposition, between at least two cloths during the superimposing step, of previously formed sacks for down, as described for example in Italian Patent Application no. 102016000111981, and according to a predefined placement.

[0022] The materials used for the cloths of the invention are those normally used in the textile and/or upholstery industry, in particular for the production of padded articles such as for example garments padded with goose down.

[0023] In particular, the cloths used can be made of fabric (this term being intended to mean knitted fabric, meshes, non-woven fabric, wadding sheets or polyester sheets for padding, synthetic sheets in general) and/or leather (including imitation leather), but plastic films or sheets of other material, always preferably unwound from a roll, can be added, to be associated with the fabric and/or leather cloths.

[0024] Downstream of the feeder 2, the apparatus 1 comprises an embroidery machine 3 which comprises at least one sewing head and, more preferably, a plurality of sewing heads 31a...31f which are aligned along the advancement direction D, for example six sewing heads (not all shown in the figure for the sake of space). The sewing heads 31a-31f may be mounted on a common longitudinal member 30 which is parallel to the advancement direction D.

[0025] Furthermore, the embroidery machine 3 comprises at least one embroidery frame 32 adapted to tension and temporarily retain the superimposed cloths 20d during sewing, in a per se known manner, and to move according to stored embroidering program.

[0026] Embroidering machines with fixed sewing heads and a cloth embroidery frame that moves according to an embroidering program are per se known, for example, from Patent Application DE19722616.

[0027] In the illustrated embodiment, the embroidery frame 32 comprises longitudinal and transverse jaws 33-34, which can be activated on command during the step for sewing the superimposed cloths 20d fed in input to the embroidery machine 3 in order to retain and tension, along two mutually perpendicular directions, the superimposed cloths 20d.

[0028] The apparatus 1 comprises moreover memory means, for example in the embroidery machine 3 itself, which contain and store at least one template which contains a drawing or pattern of reference sewing lines S1, S2, S3, S4, S5 and a plurality of reference markings M1, M2, M3, M4 distributed, with respect to said pattern, according to a reference arrangement.

[0029] The stored template corresponds to a digital pattern, for example in the form of a vector file, and comprises a plurality of substantially closed reference lines S1, S2, S3, S4, S5 which correspond to actual sewing lines of a specific layout inside a rectangular area A that must be provided by one of the sewing heads 31a-31f. In the example shown, the layout is formed by a plurality of semi-finished products (or items) P1, P2, P3, P4, P5 to be obtained by cutting and to be manufactured subsequently in order to form, for example, a padded coat or jacket.

[0030] The embroidery machine 3 is associated with control means, for example, a computerized numeric control (CNC) of the entire apparatus 1, which are configured to actuate relative movements between the sewing heads 31a-31f and the embroidery frame 32 based on said stored template, in order to obtain an automatic sewing of the superimposed cloths 20d along sewing lines that correspond to the pattern of the stored template and, according to a particular aspect of the invention, additional seams according to the reference arrangement of the markings, so that the markings M1-M4 of the stored pattern are replicated, advantageously in the form of corresponding additional seams, on the superimposed cloths 20d.

[0031] One advantage of the invention is that the markings consist of respective seams, for example in the form of circles, obtained with the same sewing head 31a-31f that reproduces in the form of seams the pattern S1-S5 stored in the template. Therefore, with the sewing step the markings are also simultaneously applied, in the form of additional seams on the superimposed cloths 20d, which markings are arranged, with respect to the sewing lines applied to the cloths 20d, in the same manner as the stored template.

[0032] Since the sewing heads of known embroidery machines allow to apply threads of different colors, it is possible to associate with the markings a thread that is different from those used for the sewing lines S1-S5, for example with a high contrast with respect to the color of the exposed face of the superimposed cloths 20d, in order to facilitate its automatic recognition in the subsequent stations.

[0033] The embroidery machine 3 is adapted to move the frame 32 with respect to the sewing heads 31a-31f and to actuate said sewing heads so as to provide on the superimposed cloths 20d seams that correspond (with a 1:1 ratio or according to a known scale factor) to the reference lines S1-S5 and to the reference arrangement of the markings M1-M4.

[0034] Since the superimposed cloths 20d are kept tensioned by the embroidery frame 32, the work area of each sewing head 31a-31f is a planar rectangular area which corresponds, with a 1:1 ratio or with a known scale factor, to the rectangular area A of the stored template or digital pattern. Thus, each actual sewing line provided by each sewing head 31a-31f corresponds exactly (except for a known scale factor) to the respective stored reference sewing line S1-S5.

[0035] The reference sewing lines S1-S5 are optionally such that they have interruptions along one or more portions O1, 02, 03, 04, 05, so that the sewing head 31a-31f does not perform any sewing of the superimposed cloths 20d at these portions 01-05. In this manner, at the end of the sewing step, at these portions 01-05 corresponding inlets are obtained for access to a respective inner pocket formed between the cloths 20-20b-20c and delimited by seams, through which inlet a padding material (for example, goose down) can be inserted in a filling station (not shown) located downstream of the embroidery machine 3 with respect to the advancement direction D. In the illustrated embodiment, the filling station is located downstream of the entire apparatus 1 with respect to the direction D.

[0036] In order to obtain multiple pockets within a given closed sewing line S1-S5, the reference sewing lines S1-S5 may further comprise one or more chords T1, T2, T3, T4, T5 which join two respective points of a respective closed line S1-S5. Sewing is performed along said chords T1-T5 by the same sewing head 31a-31f that performs the sewing that corresponds to the lines S1-S5. Advantageously, the portions 01-05 without seams and arranged side by side along the closed line are separated by one end of one of said chords T1-T5, so that each one of the pockets to be subsequently filled is delimited by at least one of said chords T1-T5.

[0037] The reference arrangement of the markings M1-M4 in the stored template is two-dimensional (i.e., on the entire X-Y Cartesian plane and not only along one axis) and is such that the reference markings M1-M4 are preferably arranged outside the closed lines S1-S5 of the pattern.

[0038] A plurality of peripheral reference markings M1,

M2 are arranged along the peripheral region of the rectangular area A, for example proximate to all the vertices of the rectangle A, while at least one other reference marking M3-M4 is placed more inside said area A than the peripheral markings M1-M2, more precisely alongside a respective curved portion (such as S1' and S2') of the sewing lines S1-S5 of the pattern and preferably in the direction of a radius of curvature of said curved portion.

[0039] Downstream of the embroidery machine 3, the apparatus 1 can comprise a drawing station 4 for pulling the sewn cloths (which correspond to the superimposed cloths 20d after they have undergone sewing), which allows the unwinding of the individual cloths 20a-20c from the respective upstream rolls 21a-21c, the stepwise advancement of the superimposed cloths 20d along the advancement direction D, and the feeding of the sewn portion of the cloths 20d toward the downstream stations, which are described hereinafter.

[0040] The advancement step of the superimposed cloths 20d between the feeder 2 and the drawing station 4 is substantially equal to the length of the embroidery frame 32 in the direction D, so as to feed to the embroidery machine 3 a portion of superimposed cloths 20d of such a length that the stored template can be replicated simultaneously on multiple adjacent rectangular areas of the superimposed cloths 20d by actuating the sewing heads 31a-31f in parallel. The length of the embroidery frame 32 in the direction D is substantially a multiple of the length of the side of one of said rectangular areas in the advancement direction D.

[0041] Throughout the sewing step, the advancement of the superimposed cloths upstream of the drawing station 4 is stopped.

[0042] Advantageously, the drawing station 4 includes a buffer unit for temporarily accumulating the sewn portion of the superimposed sewn cloths 20d that exits from the embroidery machine 3.

[0043] The buffer unit includes sets of deflector rollers 42-43, which have a horizontal axis and are movable toward/away from each other (for example, in a direction substantially perpendicular to the advancement direction D) and between which the sewn portion of the superimposed cloths 20d (which is also referenced herein as "sewn cloths") is guided in a winding path. One set of deflector rollers 42 may be arranged on a movable support 41 while the other set of deflector rollers 43, for example offset with respect to the deflector rollers 42, may be provided in a fixed position.

[0044] By means of the mutual spacing/approach of the roller sets 42-43, the buffer unit of the drawing station 4 can respectively accumulate more/less amount of sewn cloth produced upstream by the embroidery machine 3 without jamming the downstream processing stations.

[0045] Said downstream stations comprise a machine 53 for the automatic cutting of the sewn cloths which is associated with means 5 for the optical capture of the cloths 20d sewn by the embroidery machine according to the stored template. The optical capture means 5 may comprise one or more video cameras 52 arranged on a mounting frame 51 located above the automatic cutting machine 53, towards which machine the video cameras are directed. In this manner it is possible to capture an entire rectangular area (substantially corresponding to the area A of the stored template) containing all the markings applied on that area by the embroidery machine 3, in particular by the sewing head 31a-31f which performed sewing on that area.

[0046] According to an alternative embodiment, not shown, the optical capture means may be positioned upstream of the cutting machine 53 and downstream of the embroidery machine 3 and/or of the drawing station 4.

[0047] The automatic cutting machine 53 may be provided with a conveyor belt 56 on which a segment of the sewn portion of the superimposed cloths 20d is laid and made to advance intermittently so that the belt 56 is stopped only during the cutting step.

[0048] Above the belt there is a support, for example of the Cartesian type, with a cutting head 54, mounted so that it can move along a beam 55 which is, in turn, movable in a direction perpendicular to the longitudinal direction of the beam 55. The cutting tool may be of any type, for example a laser or a blade.

[0049] The means for controlling the apparatus 1 are programmed so as to move the movable beam 55 of the cutting machine 53 to a position that does not obstruct the step of optical capture by the video cameras 52.

[0050] In the illustrated embodiment, the cutting machine 53 is configured to perform, within a predetermined time T1, the cutting of one layout P1-P5 at a time, along the sewing lines of a portion of the sewn cloths that corresponds to a single rectangular area A of the stored template.

[0051] The preset cutting time T1 is related to a preset embroidering time T2 used by the embroidery machine 3 to fully reproduce the stored template, in parallel on multiple adjacent rectangular areas of the superimposed cloths 20d, by means of respective sewing heads 31a-31f. In this case, T2=n*T1, where "n" is the number of sewing heads of the embroidery machine. The buffer unit of the drawing station 4 is adapted to compensate for this speed difference between the embroidery machine 3 and the automatic cutting machine 53.

[0052] With the disengagement of the embroidery frame 32 at the end of the sewing step, the sewn portions of the superimposed cloths 20d that are fed downstream are no longer tensioned in the two perpendicular directions and they are accordingly subject to relaxations and wrinkles which may deform, or reduce in size, the sewing lines and the arrangement of the sewn markings with respect to the stored template.

[0053] The invention therefore provides that the means for controlling the apparatus 1 comprise and store also instructions for:

- detecting, by means of the optical capture of the

video cameras 52, the position of the markings applied on the sewn portion of the superimposed cloths 20d in output from the embroidery machine 3, i.e. on the sewn cloths;

- determining any displacement, i.e., any different arrangement, of the applied markings with respect to the reference arrangement M1-M4 stored in the template;
- on the basis of said displacement and of the mutual arrangement of the reference markings M1-M4 with respect to the pattern of the sewing lines S1-S5 provided in the stored template, determining by interpolation the actual pattern of the sewing lines that is present on the sewn portion of the cloths 20d at the capture means 5, so as to actuate accordingly the cutting machine 53. It is thus possible to adapt automatically the cutting to any relaxations and/or wrinkles of the sewn portion of the cloths 20d as a consequence of the release of said portion by the embroidery frame 32 of the embroidery machine 3.

[0054] The automatic cutting machine 53 is thus suitable for performing an automatic cutting of the sewn portion of the superimposed cloths 20d, in particular around the sewing lines formed by the embroidery machine 3 and at a substantially constant distance from said lines (for example, less than 1 cm) according to the actual pattern obtained with said interpolation, so as to obtain semi-finished products P1-P5 of the original layouts. These semi-finished products, which as a consequence of the cutting are completely separated from each other, can be subsequently padded with down and/or joined subsequently to form a finished article, for example a garment.

[0055] Downstream of the cutting machine 53 it is possible to provide a labeling station 6 which, with a Cartesian applicator 61, is suitable for applying respective automatically readable labels (for example labels with QR codes or bar codes) on the respective semi-finished products P1-P5 obtained in the automatic cutting step.

[0056] The labeling station 6 also is configured to complete its work within a preset time which is preferably equal to the time T1 of the cutting station 53.

[0057] Downstream of the apparatus 1 it is possible to provide a further table (not shown in the drawings) for receiving a batch of semi-finished products P1-P5, for the associated pick-up and feeding to subsequent processing stations, such as for example stations for filling (with down) and/or stations for manufacturing garments. In the case of manual pick-up of the semi-finished products at said receiving table, it is possible to provide, at said receiving table, a confirmation button connected to the means for controlling the apparatus 1 and to be pressed manually each time an operator has completed the pick-up of all the semi-finished products P1-P5 from the receiving table. If the button is not pressed within a predetermined time which corresponds to T1 (i.e., the working time of the cutting machine 53), the control means stop the apparatus 1.

[0058] The operation and correspondingly the method according to the invention are evident from the structure of the apparatus described above.

[0059] In practice it has been found that the invention achieves the intended aim and objects.

[0060] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to the requirements and the state of the art.

[0061] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A method for the production of fabric or leather articles, particularly articles to be padded, comprising the steps of:

- feeding at least two mutually superimposed cloths (20a-20c) to an embroidery machine (3);
- stepwise advancing of said superimposed cloths (20a-20c, 20d) along a substantially rectilinear direction (D);
- at said embroidery machine (3), automatic sewing of said at least two cloths (20a-20c) along sewing lines according to a template that is stored and contains a pattern of reference sewing lines (S1-S5) arranged inside a rectangular area (A);

characterized in that it comprises the steps of:

- during said automatic sewing, applying a plurality of markings in the form of respective additional seams, said markings being distributed two-dimensionally on an exposed face of the cloths (20d) according to a corresponding arrangement of reference markings (M1-M4) provided in said stored template, said arrangement of reference markings (M1-M4) comprising a plurality of peripheral reference markings (M1, M2), arranged along the peripheral region of the rectangular area (A), and at least one internal reference marking (M3, M4), placed more inside said rectangular area (A);
- after said automatic sewing, feeding the superimposed cloths (20d) to a station (53) for the automatic cutting of the sewn portion of said superimposed cloths (20d);
- optically capturing said sewn portion and determining any displacement of said markings

applied to said cloths (20d) with respect to the arrangement of the reference markings (M1-M4) stored in said template;
- based on said displacement and on the mutual arrangement of the reference markings (M1-M4) and of the pattern of the sewing lines (S1-S5) provided in said stored template, determining by interpolation the actual pattern of the sewing lines that is present on said sewn portion of the cloths (20d);
- automatically cutting said sewn portion, said cutting being performed substantially along said sewing lines on the basis of said actual pattern obtained with said interpolation, so as to automatically adapt said cutting to any relaxations and/or wrinkles of the cloths (20d) after said sewing step.

2. The method according to claim 1, wherein a thread used to obtain each applied marking preferably has a color that is optically distinguishable with respect to the coloring of the region of said face in which the respective marking is applied.

3. The method according to one or more of the preceding claims, wherein said at least one internal reference marking (M3, M4) is arranged laterally adjacent to a respective curved portion (S1', S2') of one of the sewing lines (S1-S5) of said pattern.

4. The method according to one or more of the preceding claims, wherein, in said automatic sewing step, said superimposed cloths are kept tensioned so as to form at least one substantially rectangle-like and planar sewing area (A), which is adapted to match up the sewing lines and the markings applied by said embroidery machine (3) with said stored pattern and with said reference arrangement (M1-M4), respectively;
and wherein the side of said rectangle in the advancement direction (D) of the cloths is substantially equal to, or is a submultiple of, said advancement step.

5. The method according to the preceding claim, wherein said automatic sewing step comprises a step of identically reproducing in parallel, by means of respective sewing heads, said sewing lines (S1-S5) according to said pattern on a plurality of said rectangular areas (A) arranged side by side along said substantially rectilinear direction (D), said advancement step being preferably substantially equal to the number of said rectangular areas multiplied by the length of said side.

6. The method according to one or more of the preceding claims, furthermore comprising: a step of temporarily accumulating said cloths between said sewing step and said cutting step in order to compensate for any differences in speed between these two steps; and an optional step of labeling the semi-finished products after said cutting step.

7. The method according to one or more of the preceding claims, wherein at least one of said sewing lines (S1-S5) of said pattern is a substantially closed line, outside of which said reference markings (M1-M4) are arranged, said sewing being interrupted along one or more portions (O1-05) of said substantially closed line, said portions (01-05) being adapted to define a corresponding inlet for access to a respective pocket formed between the superimposed cloths by means of said sewing step, said method further comprising the optional step of inserting down inside said pocket.

8. An apparatus (1) for the production of fabric or leather articles, particularly of padded articles, adapted to perform the method according to one or more of the preceding claims, said apparatus comprising:

- a feeder (2) of a plurality of cloths (20a-20c), said feeder (2) being configured to unwind said cloths (20a-20c) from respective rolls (21a-21c) in an advancement direction (D) and to mutually superimpose them;
- memory means comprising a stored template which contains a pattern of reference sewing lines (S1-S5) arranged inside a rectangular area (A) and a plurality of reference markings (M1-M4) arranged, with respect to said pattern, according to a reference arrangement, said arrangement of reference markings (M1-M4) comprising a plurality of peripheral reference markings (M1, M2), arranged along the peripheral region of the rectangular area (A), and at least one internal reference marking (M3, M4), placed more inside said rectangular area (A);
- an embroidery machine (3), comprising at least one sewing head (31a-31f) and at least one frame (32) adapted to tension and temporarily retain said superimposed cloths (20d) during sewing, said embroidery machine (3) being associated with control means configured to perform, by means of relative movements between said at least one sewing head (31a-31f) and said frame (32), an automatic sewing of said superimposed cloths (20d) along sewing lines that correspond to said pattern (S1-S5) of the stored template;
- said embroidery machine (3) being adapted to apply, during said automatic sewing, two-dimensionally, on said superimposed cloths (20d), a plurality of markings in the form of seams in positions that correspond to said reference ar-

rangement (M1-M4) stored in said template;
- downstream of said embroidery machine with respect to said advancement direction (D), means (52) for the optical capture of the cloths sewn by said embroidery machine (3) and a machine (53) for the automatic cutting of said sewn cloths;
- control means comprising stored instructions for:

- detecting, by means of said optical capture means (52), the position of said markings applied on said sewn cloths;
- determining any displacement of said applied markings with respect to the reference arrangement (M1-M4) stored in said template;
- on the basis of said displacement and of the mutual arrangement of the reference markings and of the pattern of the sewing lines (S1-S5) provided in said stored template, determining by interpolation the actual pattern of the sewing lines that is present on said sewn cloths, so as to automatically adapt said cutting to any relaxations and/or wrinkles of the sewn cloths after the release of said sewn cloths by the frame (32) of the embroidery machine;

- said automatic cutting machine (53) being adapted to perform an automatic cutting of said cloths substantially along said sewing lines on the basis of said actual pattern obtained with said interpolation.

9. The apparatus according to the preceding claim, wherein said embroidery machine comprises a plurality of said sewing heads (31a-31f), arranged side by side along said advancement direction (D) and adapted to replicate in parallel said sewing lines (S1-S5), according to said stored pattern, on a plurality of rectangular areas (A) arranged side by side along said advancement direction (D);
and wherein said apparatus (1) comprises, downstream of said embroidery machine (3) and upstream of said automatic cutting machine (53), a buffer (4) for the temporary accumulation of the sewn cloths in output from said embroidery machine (3), in order to compensate for any differences in speed between the machines upstream and downstream of said buffer (4).

10. The apparatus according to one or more of claims 8-9, wherein said capture means (52) are arranged at said automatic cutting machine (53), which comprises:

- an advancement belt (56) adapted to receive, laid thereon, said sewn portion of the superimposed cloths (20d) that has exited from the embroidery machine (3);
- a support (54) which can move on command along said belt according to a plurality of axes and is provided with at least one cutting tool, said capture means (52) being preferably mounted in a fixed position above said advancement belt (56) so as to capture the entire rectangular area (A) containing all the markings applied according to said reference arrangement (M1-M4).

Patentansprüche

1. Ein Verfahren zur Herstellung von Textil- oder Lederwaren, insbesondere zu polsternden Waren, das folgende Schritte umfasst:

- das Zuführen mindestens zweier übereinander gelegter Stoffe (20a-20c) zu einer Stickmaschine (3);
- das schrittweise Vorwärtsbewegen der übereinander gelegten Stoffe (20a-20c, 20d) in einer im Wesentlichen geradlinigen Richtung (D);
- an der Stickmaschine (3), das automatische Vernähen der mindestens zwei Stoffe (20a-20c) entlang Nähnlinien entsprechend einer Schablone, die gespeichert ist und ein Muster von Referenz-Nähnlinien (S1-S5) enthält, angeordnet innerhalb eines rechteckigen Bereichs (A);

dadurch gekennzeichnet, dass es folgende Schritte umfasst:

- während des automatischen Nähens, das Aufbringen einer Vielzahl von Markierungen in Form entsprechender zusätzlicher Nähte, wobei die Markierungen zweidimensional auf einer frei liegenden Seite der Stoffe (20d) in einer entsprechenden Anordnung von Referenzmarkierungen (M1-M4) verteilt sind, die in der gespeicherten Schablone bereitgestellt sind; wobei die Anordnung von Referenzmarkierungen (M1-M4) eine Vielzahl peripherer Referenzmarkierungen (M1, M2) umfasst, die entlang dem peripheren Abschnitt des rechteckigen Bereichs (A) angeordnet sind, und mindestens eine interne Referenzmarkierung (M3, M4), stärker innerhalb des rechteckigen Bereichs (A) positioniert;
- nach dem automatischen Nähen, das Zuführen der übereinander gelegten Stoffe (20d) an eine Station (53) zum automatischen Schneiden des genähten Abschnitts der übereinander gelegten Stoffe (20d);
- das optionale Erfassen des genähten Abschnitts und das Ermitteln eventueller Verschiebungen der Markierungen, die auf die Stoffe

(20d) aufgetragen wurden, mit Bezug auf die in der Schablone gespeicherte Anordnung der Referenzmarkierungen (M1-M4) ;
- basierend auf den Verschiebungen und auf der Anordnung der Referenzmarkierungen (M1-M4) und des Musters der Nähllinien (S1-S5), die in der gespeicherten Schablone bereitgestellt sind, im Verhältnis zueinander, das Bestimmen, durch Interpolation, des tatsächlichen Musters der Nähllinien, das auf dem genähten Abschnitt der Stoffe (20d) vorliegt;
- das automatische Schneiden des genähten Abschnitts, wobei das Schneiden im Wesentlichen entlang der Nähllinien auf der Basis des tatsächlichen Musters durchgeführt wird, das durch die Interpolation gewonnen wird, um so den Schneidevorgang nach dem Nähschritt automatisch an eventuelle Entspannungen und/oder Falten der Stoffe (20d) anzupassen.

2. Das Verfahren gemäß Anspruch 1, wobei ein Faden, der verwendet wird, um jede aufgetragene Markierung zu erhalten, vorzugsweise eine Farbe hat, die optisch von der Färbung des Abschnitts der Seite unterscheidbar ist, in dem die jeweilige Markierung aufgetragen ist.

3. Das Verfahren gemäß einem oder mehreren der obigen Ansprüche, wobei die mindestens eine interne Referenzmarkierung (M3, M4) seitlich angrenzend an einen entsprechenden gekrümmten Abschnitt (S1', S2') einer der Nähllinine (S1-S5) des Musters angeordnet ist.

4. Das Verfahren gemäß einem oder mehreren der obigen Ansprüche, wobei in dem automatischen Nähschritt die übereinander gelegten Stoffe gespannt gehalten werden, um mindestens einen im Wesentlichen Rechteck-ähnlichen und planaren Nähbereich (A) zu bilden, der ausgebildet ist, um die Nähllinien und die von der Stickmaschine (3) aufgebrachten Markierungen mit dem gespeicherten Muster beziehungsweise mit der Referenzanordnung (M1-M4) abzugleichen;
und wobei die Seite des Rechtecks in der Vorschubrichtung (D) der Stoffe im Wesentlichen gleich dem oder ein Teiler des Vorschubschritts ist.

5. Das Verfahren gemäß dem obigen Anspruch, wobei der automatische Nähschritt einen Schritt des identischen parallelen Reproduzierens, mit Hilfe entsprechender Nähköpfe, der Nähllinien (S1-S5) entsprechend dem Muster auf einer Vielzahl der rechteckigen Bereiche (A) umfasst, nebeneinander in der im Wesentlichen geradlinigen Richtung (D) angeordnet; wobei der Vorschubschritt vorzugsweise im Wesentlichen gleich der Anzahl der rechteckigen Bereiche, multipliziert mit der Länge der Seite, ist.

6. Das Verfahren gemäß einem oder mehreren der obigen Ansprüche, das weiter Folgendes umfasst: einen Schritt des vorübergehenden Akkumulierens der Stoffe zwischen dem Nähschritt und dem Schneideschritt, um eventuelle Geschwindigkeitsunterschiede zwischen diesen zwei Schritten zu kompensieren; und einen optionalen Schritt des Markierens der Vorerzeugnisse nach dem Schneideschritt.

7. Das Verfahren gemäß einem oder mehreren der obigen Ansprüche, wobei mindestens eine der Nähllinien (S1-S5) des Musters eine im Wesentlichen geschlossene Linie ist, außerhalb derer Referenzmarkierungen (M1-M4) angeordnet sind, wobei das Nähen entlang einem oder mehreren Abschnitten (O1-O5) der im Wesentlichen geschlossenen Linie unterbrochen wird, wobei die Abschnitte (O1-O5) ausgebildet sind, um einen entsprechenden Einlass für den Zugang zu einer entsprechenden Tasche zu bestimmen, die mit Hilfe des Nähschritts zwischen den übereinander gelegten Stoffen gebildet wurde; wobei das Verfahren weiter den optionalen Schritt des Einfüllens von Daunen in die Tasche umfasst.

8. Eine Vorrichtung (1) zur Herstellung von Textil- oder Lederwaren, insbesondere gepolsterten Waren, ausgebildet, um das Verfahren gemäß einem oder mehreren der obigen Ansprüche durchzuführen; wobei die Vorrichtung Folgendes umfasst:

- eine Zuführvorrichtung (2) für eine Vielzahl von Stoffen (20a-20c), wobei die Zuführvorrichtung (2) ausgebildet ist, um die Stoffe (20a-20c) in einer Vorschubrichtung (D) von entsprechenden Rollen (21a-21c) abzuwickeln und übereinander zu legen;
- Speichermittel, die eine gespeicherte Schablone umfassen, welche ein Muster von Referenz-Nähllinien (S1-S5), angeordnet innerhalb eines rechteckigen Bereichs (A), und eine Vielzahl von Referenzmarkierungen (M1-M4) enthält, angeordnet, mit Bezug auf das Muster, in einer Referenzanordnung, wobei die Anordnung von Referenzmarkierungen (M1-M4) eine Vielzahl peripherer Referenzmarkierungen (M1, M2) umfasst, angeordnet entlang dem peripheren Abschnitt des rechteckigen Bereichs (A), und mindestens eine interne Referenzmarkierung (M3, M4), stärker innerhalb des rechteckigen Bereichs (A) positioniert;
- eine Stickmaschine (3), die mindestens einen Nähkopf (31a-31f) und mindestens einen Rahmen (32) umfasst, ausgebildet, um während des Nähens die übereinander gelegten Stoffe (20d) zu spannen und vorübergehend zu halten; wobei die Stickmaschine (3) mit Steuerungsmitteln verknüpft ist, die ausgebildet sind, um mit Hilfe

von Relativbewegungen zwischen dem mindestens einen Nähkopf (31a-31f) und dem Rahmen (32) einen automatischen Nähvorgang der übereinander gelegten Stoffe (20d) entlang Nählinien durchzuführen, die dem Muster (S1-S5) der gespeicherten Schablone entsprechen;
- wobei die Stickmaschine (3) ausgebildet ist, um während des automatischen Nähvorgangs zweidimensional eine Vielzahl von Markierungen in Form von Nähten auf die übereinander gelegten Stoffe (20d) in Positionen aufzubringen, die der in der Schablone gespeicherten Referenzanordnung (M1-M4) entsprechen;
- stromabwärts von der Stickmaschine mit Bezug auf die Vorschubrichtung (D), Mittel (52) zur optischen Erfassung der von der Stickmaschine (3) genähten Stoffe und eine Maschine (53) zum automatischen Schneiden der genähten Stoffe;
- Steuerungsmittel, die gespeicherte Anweisungen umfassen, um:

- mit Hilfe der optischen Erfassungsmittel (52) die Position der Markierungen zu erfassen, die auf die genähten Stoffe aufgetragen wurden;
- eventuelle Verschiebungen der aufgebrachten Markierungen mit Bezug auf die in der Schablone gespeicherte Referenzanordnung (M1-M4) zu bestimmen;
- auf der Grundlage der Verschiebung und der Anordnung der in der gespeicherten Schablone bereitgestellten Referenzmarkierungen und des Musters der Nählinien (S1-S5), das Bestimmen, durch Interpolation, des tatsächlichen Musters der Nählinien, das auf den genähten Stoffen vorliegt, um den Schneidevorgang nach der Lösung der genähten Stoffe von dem Rahmen (32) der Stickmaschine automatisch an eventuelle Entspannungen und/oder Falten anzupassen;
- wobei die automatische Schneidemaschine (53) ausgebildet ist, um im Wesentlichen entlang den Nählinien, auf der Grundlage des durch die Interpolation gewonnenen tatsächlichen Musters, automatisches Schneiden der Stoffe durchzuführen.

9. Die Vorrichtung gemäß dem obigen Anspruch, wobei die Stickmaschine eine Vielzahl der Nähköpfe (31a-31f) umfasst, nebeneinander entlang der Vorschubrichtung (D) angeordnet und ausgebildet, um die Nählinien (S1-S5) entsprechend dem gespeicherten Muster auf einer Vielzahl rechteckiger Bereiche (A), die entlang der Vorschubrichtung (D) nebeneinander angeordnet sind, parallel zu replizieren;
und wobei die Vorrichtung (1) stromabwärts von der Stickmaschine (3) und stromaufwärts von der automatischen Schneidemaschine (53) einen Puffer (4) zur vorübergehenden Akkumulation der genähten Stoffe am Ausgang von der Stickmaschine (3) umfasst, um eventuelle Geschwindigkeitsunterschiede zwischen den Maschinen stromaufwärts und stromabwärts von dem Puffer (4) zu kompensieren.

10. Die Vorrichtung gemäß einem oder mehreren der Ansprüche 8-9, wobei die Erfassungsmittel (52) an der automatischen Schneidemaschine (53) angeordnet sind, die Folgendes umfasst:

- ein Förderband (56), ausgebildet, um, darauf abgelegt, den genähten Abschnitt der übereinander gelegten Stoffe (20d) aufzunehmen, der aus der Stickmaschine (3) ausgetreten ist;
- eine Halterung (54), die sich auf Befehl entlang einer Vielzahl von Achsen entlang dem Band bewegen kann und mit mindestens einem Schneidewerkzeug ausgestattet ist, wobei die Erfassungsmittel (52) vorzugsweise in einer festen Position oberhalb des Förderbands (56) montiert sind, um den gesamten rechteckigen Bereich (A) zu erfassen, der alle Markierungen enthält, die entsprechend der Referenzanordnung (M1-M4) aufgebracht wurden.

Revendications

1. Procédé pour la production d'articles en tissu ou en cuir, en particulier d'articles à rembourrer, comprenant les étapes consistant à :

alimenter une machine à broder (3) avec au moins deux tissus (20a-20c) mutuellement superposés ;
faire avancer par palier lesdits tissus (20a-20c, 20d) superposés le long d'une direction sensiblement rectiligne (D) ;
au niveau de ladite machine à broder (3), coudre automatiquement lesdits au moins deux tissus (20a-20c) le long des lignes de couture selon un modèle qui est mémorisé et contient un dessin de lignes de couture de référence (S1-S5) disposées dans une zone rectangulaire (A) ;
caractérisé en ce qu'il comprend les étapes consistant à :

pendant ladite étape de couture automatique, appliquer une pluralité de marques se présentant sous la forme de coutures supplémentaires respectives, lesdites marques étant réparties de manière bidimensionnelle sur une face exposée des tissus (20d) selon une disposition correspondante des marques de référence (M1-M4) pré-

vues dans ledit modèle mémorisé, ladite disposition de marques de référence (M1-M4) comprenant une pluralité de marques de référence périphériques (M1, M2), disposées le long de la région périphérique de la zone rectangulaire (A), et au moins une marque de référence interne (M3, M4) placée plus à l'intérieur de ladite zone rectangulaire (A) ;
après ladite étape de couture automatique, alimenter les tissus (20d) superposés à une station (53) pour la coupe automatique de la partie cousue desdits tissus (20d) superposés ;
capturer, par voie optique, ladite partie cousue et déterminer un éventuel déplacement desdites marques appliquées sur lesdits tissus (20d) par rapport à la disposition de marques de référence (M1-M4) mémorisées dans ledit modèle ;
sur la base dudit déplacement et de la disposition mutuelle des marques de référence (M1-M4) et du dessin des lignes de couture (S1-S5) prévues dans ledit modèle mémorisé, déterminer, par interpolation, le véritable dessin des lignes de couture qui est présent sur ladite partie cousue des tissus (20d) ;
couper automatiquement ladite partie cousue, ladite coupe étant réalisée sensiblement le long desdites lignes de couture sur la base dudit véritable dessin obtenu avec ladite interpolation, afin d'adapter automatiquement ladite coupe aux relâchements et/ou plis éventuels des tissus (20d) après ladite étape de couture.

2. Procédé selon la revendication 1, dans lequel un fil utilisé pour obtenir chaque marque appliquée a de préférence une couleur qui peut être distinguée, par voie optique, par rapport à la coloration de la région de ladite face dans laquelle la marque respective est appliquée.

3. Procédé selon une ou plusieurs des revendications précédentes, dans lequel ladite au moins une marque de référence (M3, M4) interne est disposée de manière latéralement adjacente à une partie courbée (S1', S2') respective de l'une des lignes de couture (S1-S5) dudit dessin.

4. Procédé selon une ou plusieurs des revendications précédentes, dans lequel, à ladite étape de couture automatique, lesdits tissus superposés sont maintenus tendus afin de former au moins une zone de couture (A) sensiblement rectangulaire et plane, qui est adaptée pour faire correspondre les lignes de couture et les marques appliquées par ladite machine à broder (3) avec ledit dessin mémorisé et à ladite disposition de référence (M1-M4) respectivement ;
et dans lequel le côté dudit rectangle dans la direction d'avancement (D) des tissus est sensiblement égal ou est un sous-multiple de ladite étape d'avancement.

5. Procédé selon la revendication précédente, dans lequel ladite étape de couture automatique comprend une étape consistant à reproduire de manière identique en parallèle, au moyen de têtes de couture respectives, lesdites lignes de couture (S1-S5) selon ledit dessin sur une pluralité desdites zones rectangulaires (A) disposées côte à côte le long de ladite direction sensiblement rectiligne (D), ladite étape d'avancement étant de préférence sensiblement égale au nombre desdites zones rectangulaires multiplié par la longueur dudit côté.

6. Procédé selon une ou plusieurs des revendications précédentes, comprenant en outre : une étape consistant à accumuler temporairement lesdits tissus entre ladite étape de couture et ladite étape de coupe afin de compenser d'éventuelles différences de vitesse entre ces deux étapes ; et une étape facultative d'étiquetage des produits semi-finis après ladite étape de coupe.

7. Procédé selon une ou plusieurs des revendications précédentes, dans lequel au moins l'une desdites lignes de couture (S1-S5) dudit dessin est une ligne sensiblement fermée, à l'extérieur de laquelle sont disposées lesdites marques de référence (M1-M4), ladite couture étant interrompue le long d'une ou de plusieurs parties (01-05) de ladite ligne sensiblement fermée, lesdites parties (01-05) étant adaptées pour définir une entrée correspondante pour l'accès à une poche respective formée entre les tissus superposés au moyen de ladite étape de couture, ledit procédé comprenant en outre l'étape facultative consistant à insérer du duvet à l'intérieur de ladite poche.

8. Appareil (1) pour la production d'articles en tissu ou en cuir, en particulier d'articles rembourrés, adapté pour réaliser le procédé selon une ou plusieurs des revendications précédentes, ledit appareil comprenant :

un dispositif d'alimentation (2) d'une pluralité de tissus (20a-20c), ledit dispositif d'alimentation (2) étant configuré pour dérouler lesdits tissus (20a-20c) de rouleaux (21a-21c) respectifs dans une direction d'avancement (D) et pour les superposer mutuellement ;
des moyens de mémorisation comprenant un modèle mémorisé qui contient un dessin de

lignes de couture de référence (S1-S5) disposées à l'intérieur d'une zone rectangulaire (A) et une pluralité de marques de référence (M1-M4) disposées, par rapport audit dessin, selon une disposition de référence, ladite disposition des marques de référence (M1-M4) comprenant une pluralité de marques de référence périphériques (M1, M2) disposées le long de la région périphérique de la zone rectangulaire (A), et au moins une marque de référence interne (M3, M4), placée plus à l'intérieur de ladite zone rectangulaire (A) ;
une machine à broder (3) comprenant au moins une tête de couture (31a-31f) et au moins un châssis (32) adapté pour tendre et retenir temporairement lesdits tissus (20d) superposés pendant la couture, ladite machine à broder (3) étant associée aux moyens de contrôle configurés pour réaliser, au moyen de mouvements relatifs entre ladite au moins une tête de couture (31a-31f) et ledit châssis (32), une couture automatique desdits tissus (20d) superposés le long des lignes de couture qui correspondent audit dessin (S1-S5) du modèle mémorisé ;
ladite machine à broder (3) étant adaptée pour appliquer, pendant ladite couture automatique, de manière bidimensionnelle, sur lesdits tissus (20d) superposés, une pluralité de marques se présentant sous la forme de coutures dans des positions qui correspondent à ladite disposition de référence (M1-M4) mémorisée dans ledit modèle ;
en aval de ladite machine à broder par rapport à ladite direction d'avancement (D), des moyens (52) pour la capture optique des tissus cousus par ladite machine à broder (3) et une machine (53) pour la coupe automatique desdits tissus cousus ;
des moyens de contrôle comprenant des instructions mémorisées pour :

détecter, au moyen desdits moyens de capture optique (52), la position desdites marques appliquées sur lesdits tissus cousus ;
déterminer un éventuel déplacement desdites marques appliquées par rapport à la disposition de référence (M1-M4) mémorisée dans ledit modèle ;
sur la base dudit déplacement et de la disposition mutuelle des marques de référence et du dessin des lignes de couture (S1-S5) prévues dans ledit modèle mémorisé, déterminer, par interpolation, le véritable dessin des lignes de couture qui est présent sur lesdits tissus cousus, afin d'adapter automatiquement ladite coupe aux relâchements et/ou aux plis éventuels des tissus cousus après la libération desdits tissus cousus par le châssis (32) de la machine à broder ;
ladite machine de coupe automatique (53) étant adaptée pour réaliser une coupe automatique desdits tissus sensiblement le long desdites lignes de couture sur la base dudit véritable dessin obtenu par ladite interpolation.

9. Appareil selon la revendication précédente, dans lequel ladite machine à broder comprend une pluralité desdites têtes de couture (31a-31f), disposées côte à côte le long de ladite direction d'avancement (D) et adaptée pour répliquer en parallèle lesdites lignes de couture (S1-S5), selon ledit dessin mémorisé, sur une pluralité de zones rectangulaires (A) disposées côte à côte le long de ladite direction d'avancement (D) ;
et dans lequel ledit appareil (1) comprend, en aval de ladite machine à broder (3) et en amont de ladite machine de coupe automatique (53), un taquet (4) pour l'accumulation temporaire des tissus cousus en sortie de ladite machine à broder (3), afin de compenser d'éventuelles différences de vitesse entre les machines en amont et en aval dudit taquet (4).

10. Appareil selon une ou plusieurs des revendications 8 à 9, dans lequel lesdits moyens de capture (52) sont disposés au niveau de ladite machine de coupe automatique (53), qui comprend :

une courroie d'avancement (56) adaptée pour recevoir, placée sur cette dernière, ladite partie cousue des tissus (20d) superposés qui est sortie de la machine à broder (3) ;
un support (54) qui peut se déplacer sur commande le long de ladite courroie selon une pluralité d'axes et est prévu avec au moins un outil de coupe, lesdits moyens de capture (52) étant de préférence montés dans une position fixe au-dessus de ladite courroie d'avancement (56) afin de capture toute la zone rectangulaire (A) contenant toutes les marques appliquées selon ladite disposition de référence (M1-M4).

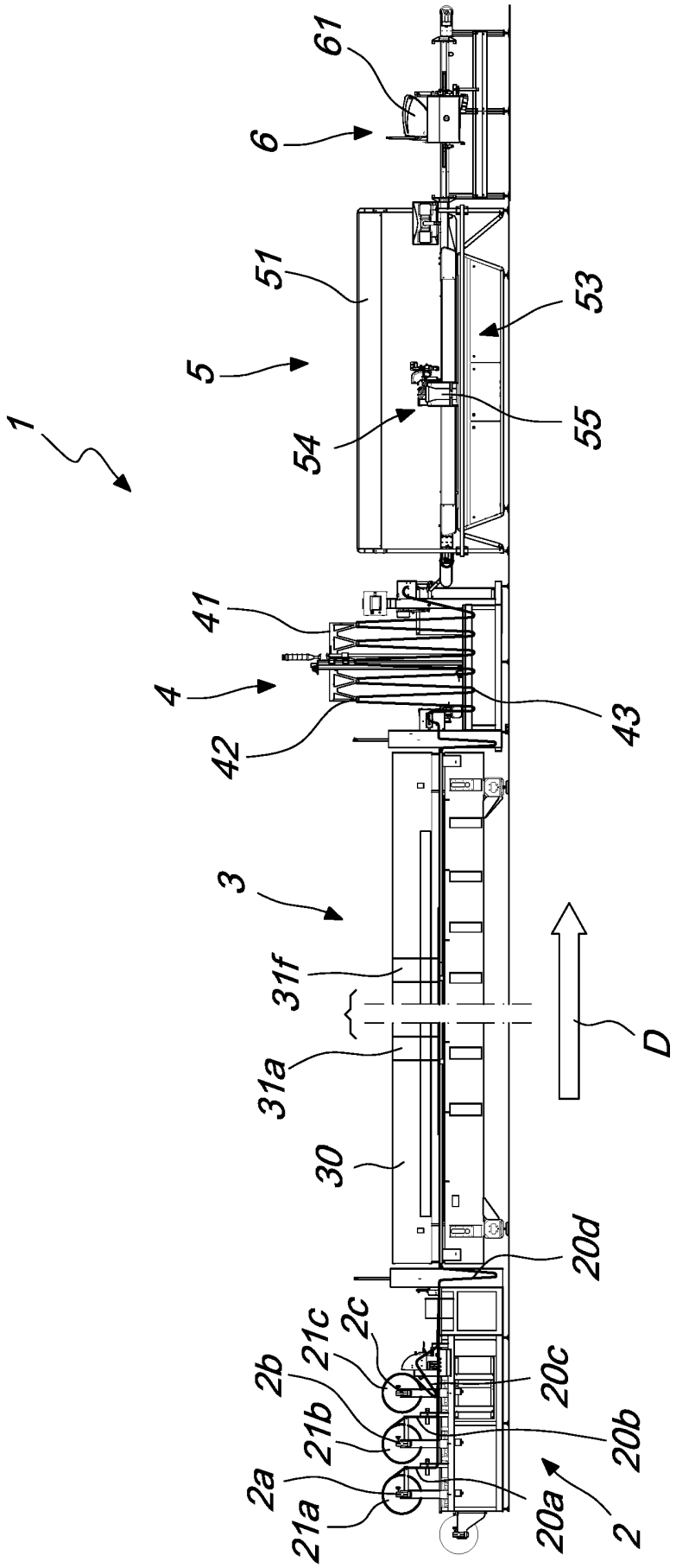
1
2
2a
2b
2c
3
4
5
6
20a
20b
20c
20d
21a
21b
21c
30
31a
31f
41
42
43
51
53
54
55
61
D

Fig. 1

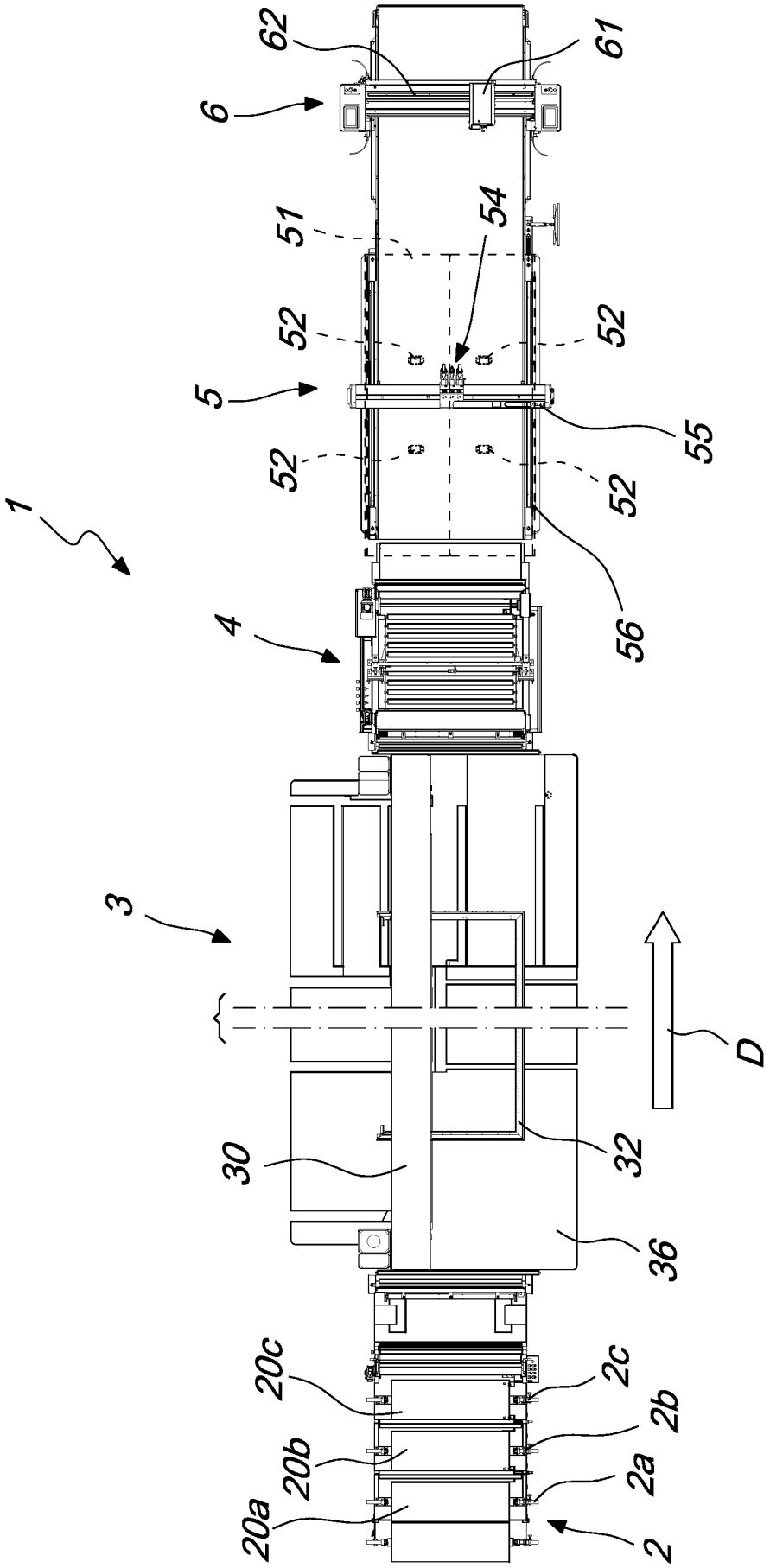

Fig. 2

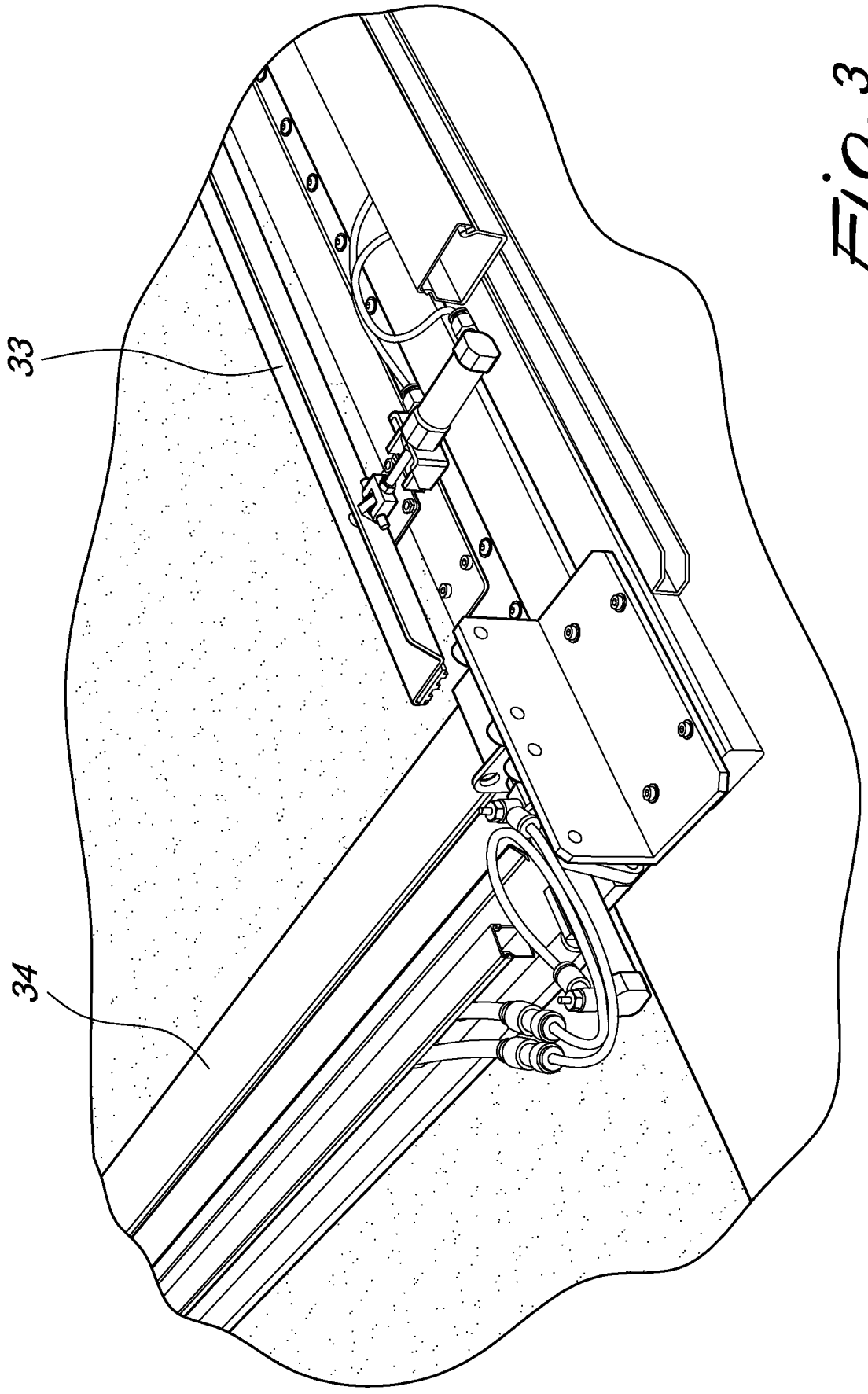

Fig. 3

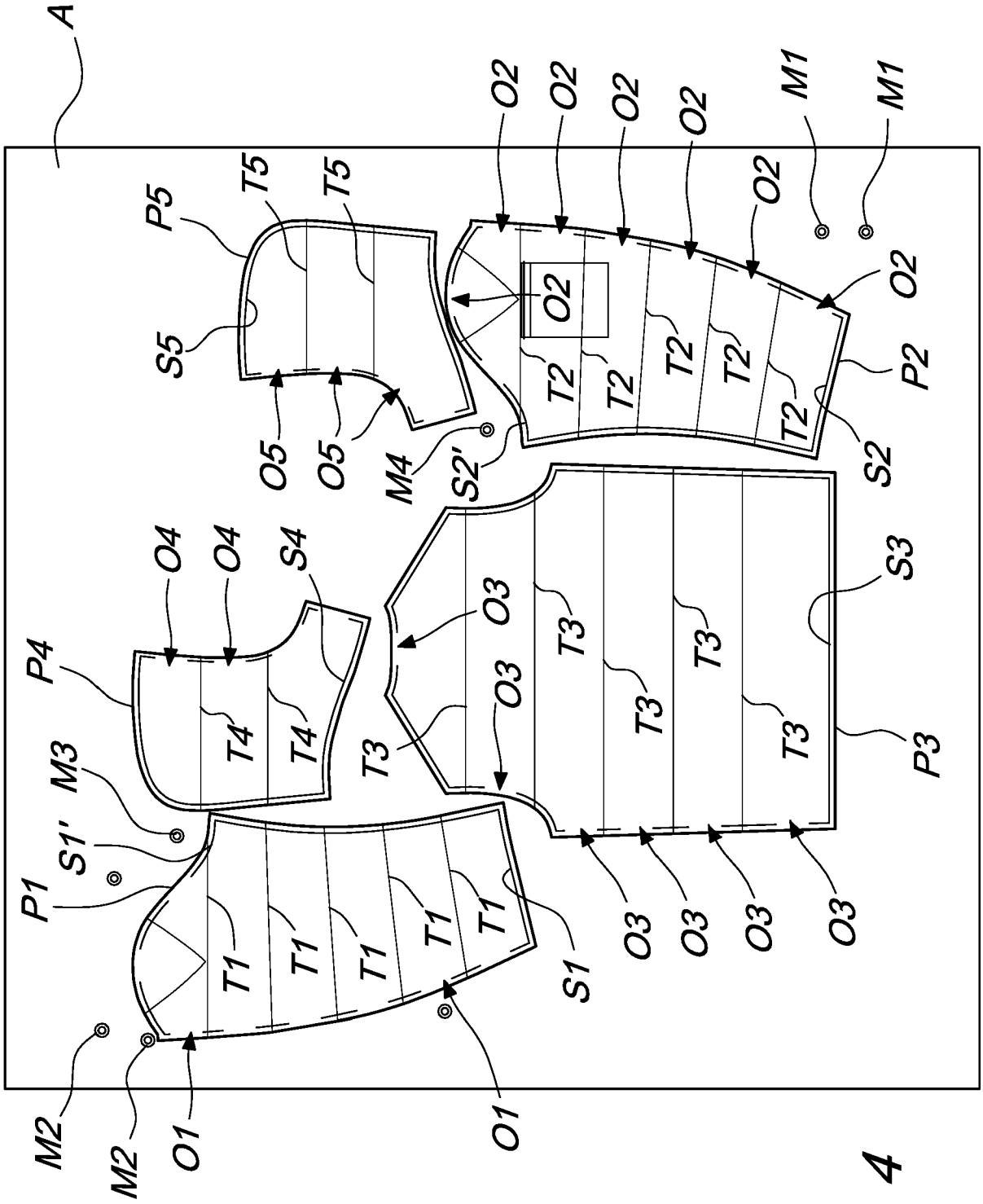
A
O2
O2
O2
O2
M1
M1
O2
P5
T5
T5
O2
O2
S5
T2
T2
T2
T2
T2
P2
O5
O5
M4
S2'
S2
O4
O4
S4
O3
S3
P4
T3
T3
T3
T4
T4
T3
O3
T3
T3
M3
S1'
P1
T1
T1
T1
T1
T1
S1
O3
O3
O3
O3
M2
M2
O1
O1
P3

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 3801820 A1 **[0002]**
- IT 102016000111981 **[0021]**
- DE 19722616 **[0026]**