EUROPEAN PATENT SPECIFICATION

MULTI-NEEDLE QUILTING MACHINE AND CORRESPONDING QUILTING METHOD
MEHRNADELSTEPPMASCHINE UND ENTSPRECHENDES STEPPVERFAHREN
MACHINE À PIQUER À AIGUILLES MULTIPLES ET PROCÉDÉ DE PIQUAGE CORRESPONDANT

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

Priority: 14.11.2013 IT MI20131892
30.05.2014 IT MI20141016

Date of publication of application:

Proprietor: Landoni, Alberto
20025 Legnano (IT)

Inventor: Landoni, Alberto
20025 Legnano (IT)

Representative: Petraz, Gilberto Luigi et al
GLP S.r.l.
Viale Europa Unita, 171
33100 Udine (IT)

References cited:
WO-A1-2008/090573
CN-A-101 429 711

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
The present invention concerns a multi-needle quilting machine and a method for quilting textile products or manufactured articles in general, for example consisting of an upper layer, a possible lower layer and an intermediate layer of padding, to make a piece of cloth or a panel of the textile type, and also manufactured articles obtained with said method.

The machine can therefore be the type used to make stitches of the desired type on fabrics, bands, panels for mattresses, quilts or textile products, for example used to make a mattress, quilts, clothing, garments or other similar or comparable manufactured article.

The quilting machine and method allow to make any type of pattern, also very sophisticated such as cording, similar to embroidery and defined by stitches located even at a very close reciprocal distance.

Quilting machines can operate with different types of stitches depending on the equipment provided.

Multi-needle quilting machines are known, comprising one or more rows of needles, also called arrays of needles, which, based on a specific control and command program, make stitches of various forms and characteristics, obtaining the most varied patterns.

The needles of each row are mounted aligned along a determinate longitudinal axis disposed transverse to the normal direction of feed of the materials to be quilted. Normally, each row of needles is mounted on a needle-carrier support bar that develops along said longitudinal axis and that is driven with a vertical alternate motion with respect to the lying plane of the material to be worked, in order to make the stitches according to the desired patterns and forms.

Knownquilting machines generally comprise a support base which the support structures of the one or more rows of needles are installed on or are part of, in a fixed position. The needles can be detachably mounted on the row of needles, and can be made activable or non-activable according to the technology described in EP-B-0.394.601.

The support base is provided with a work plane on which, during use, the materials to be subjected to the typical operations of a quilting machine are moved.

A unit for feeding the materials to be quilted operates upstream with the support base, and comprises one or more bobbins in the case of several materials to be quilted in an associated manner. Downstream a unit is provided to collect the worked material.

During the quilting operations, the material to be quilted is normally moved on the work plane in both a parallel and a transverse direction with respect to the longitudinal positioning development of the needles.
The presence of a plurality of stitching heads, moreover, greatly limits the surface extension of the patterns that can be made, because each head sews a limited size of the fabric. Furthermore, in this solution the material to be sewn is stationary and attached to a support frame that prevents the production of articles made from continuous rolls.

Furthermore, the machine described in US-A-2011/290166 is particularly bulky and has a support base that has shape and sizes suitable to receive a fabric with a predetermined unit of size. This greatly limits the flexibility of the machine, rendering it suitable for quilting articles of sizes limited to the size of the machine.

A solution is also known, described in JP-A-2002.028388, of an embroidery machine that comprises a first support platform and a second support platform adjacent to the first support platform.

A plurality of stitching heads are installed on the first support platform, which are adjacent to each other along a predetermined first longitudinal axis. Similarly, the second support platform is also provided with a plurality of stitching heads adjacent to each other and aligned along a second longitudinal axis, parallel to the first longitudinal axis. Each stitching head is provided with its own independent lower needles and stitching members.

Both the first support platform and the second support platform are installed in a selectively translatable manner, independently of each other, in a direction substantially transverse to that of the first longitudinal axis and the second longitudinal axis.

The presence of independent stitching heads installed on both the first and second platform make the operations to manage the whole machine rather complex, and also limit the surface extension of the patterns obtainable.

One purpose of the present invention is to obtain a multi-needle quilting machine that allows to obtain patterns with great precision and definition.

Another purpose of the present invention is to obtain a multi-needle quilting machine that allows to carry out a plurality of patterns according to rectilinear configurations or with very complex motifs, with desired deviations of the pattern.

It is also a purpose of the present invention to obtain a multi-needle quilting machine that, as well as the innovative and simultaneous production of bands for mattresses, starting from a single compound of fabrics, can be used for quilting panels for mattresses, quilts etc.

Another purpose is to perfect a multi-needle quilting method that allows to obtain a plurality of patterns according to rectilinear configurations or with very varied motifs, with desired deviations of the pattern.

It is also a purpose of the present invention to perfect a quilting method that is efficacious and that allows to considerably increase productivity compared to traditional machines, eliminating downtimes.

It is also a purpose of the present invention to obtain a method that allows to make several finished bands simultaneously, starting from a fabric, or a single composite product.

It is also a purpose of the present invention to obtain products with a whole or partial fabric, or bands with the operating method according to the present invention, and with any type of stitch whatsoever normally made in quilting machines.

The Applicant has devised, tested and embodied the present invention to overcome the shortcomings of the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

The present invention is set forth and characterized in the independent claims, while the dependent claims describe other characteristics of the invention or variants to the main inventive idea.

In accordance with the above purposes, a multi-needle quilting machine according to the present invention comprises at least a base on which at least a stitching unit is disposed, provided with a plurality of upper stitching members, or rows of needles, and a plurality coordinated of lower stitching members suitable to generate on each occasion the desired stitch (chain stitch, lockstitch, satin stitch etc.).

In the at least one stitching unit there may be one or more rows of needles with the coordinated lower stitching members.

By row of needles we mean all the needles that are installed on a common support body, for example a bar, which are disposed substantially aligned along a pre-defined longitudinal axis and which are selectively actuated by the same actuation device.

In every row of needles, the needles are positioned substantially aligned along a longitudinal axis and, in the case of several rows of needles, they are normally even if not necessarily parallel to each other.

Each row of needles can extend substantially for the whole longitudinal extension of the stitching unit, to define the operating amplitude of the machine according to the present invention.
According to one feature of the present invention, at least one platform is provided, disposed on the base and selectively translatable, with respect to the base, in a direction of movement substantially orthogonal to the direction of feed of the material to be quilted.

According to a possible variant, two or more platforms may be provided, for example located adjacent to each other.

During stitching operations, the material is fed only in one direction, which is orthogonal to the longitudinal positioning axis of the needles, which eliminates problems in the fabric and in the stitches such as deformations and distorted patterns.

If there is only one platform, the following combinations can occur:

a) at least a first stitching unit, for example one row of needles, stationary with respect to the base, and at least a second stitching unit, with one or more rows of needles, mobile with the platform;
b) at least a first stitching unit, for example one row of needles, mobile with the platform, and at least a second stitching unit, with one or more rows of needles, stationary with respect to the base;
c) all the stitching units are mobile with the platform;
d) at least one of the stitching units installed on the platform and mobile with respect to it.

However, it is not excluded that, in a possible operating condition, the stitching units can both be kept stationary with respect to the base.

If there are two platforms, located parallel, they can cooperate with one or more stitching units allowing to move the latter selectively and independently of each other.

These operating modes can be obtained by clamping, on each occasion, one or the other stitching unit to the respective platform or with respect to the base. The controlled and managed translation of the platform on which the stitching unit or units are installed, where one and/or the other stitching unit is made solid with the platform, allows to move the stitching units to make the desired stitches, activating or de-activating on each occasion the necessary needles of the respective rows. The quilting machine according to the present invention has great operating flexibility, and can be used for different specific applications such as quilting and also for simultaneously making a plurality of bands for mattresses starting from a single material, and making panels or quilts with very sophisticated patterns and with a wide surface development.

According to the invention, the stitching units stationary with respect to the base will make straight stitches, parallel to the feed of the material.

The stitching units that move in a controlled and desired manner, in coordination with the feed of the material, will make the desired patterns in the desired form and location.

According to the invention, cutting devices, configured for example as a blade, are associated with the needles that, during use, operate near what will become the longitudinal edges of the bands, in order to cut the material.

According to the invention, when working bands, respective needles are positioned near the lateral edges of each band and, in the median position between two nearby needles, a blade.

When two needles descend toward the material in order to make the stitch, the blade also descends and, descending together with the needles, can make a clean, linear cut, leaving a small edge of material at the side of every needle, since the needles that are inserted into the material clamp it and hold the fabric, allowing the blade to make the cut in a clean, precise and linear way.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other characteristics of the present invention will become apparent from the following description of some forms of embodiment, given as a non-restrictive example with reference to the attached drawings wherein:

- figs. 1a, 1b, 1c and 1d are lateral schematic representations of a part of respective quilting machines according to the invention;
- fig. 1e is a plan schematic representation of fig. 1d;
- fig. 2 is a front perspective view of the multi-needle quilting machine according to one form of embodiment concerning fig. 1a;
- fig. 3 is a rear perspective view of the multi-needle quilting machine in fig. 2;
- fig. 4 is an enlarged view of detail K in fig. 3;
- fig. 5 is an enlarged view of a detail of the machine in fig. 2;
- fig. 6 is an enlarged view of a detail of the machine in fig. 2;
- fig. 7 is a schematic representation of two quilted mattress bands obtained with the quilting machine and method according to the present invention.

To facilitate comprehension, the same reference numbers have been used, where possible, to identify identical common elements in the drawings. It is understood that elements and characteristics of one form of embodiment can conveniently be incorporated into other forms of embodiment without further clarifications.

DETAILED DESCRIPTION OF SOME FORMS OF EMBODIMENT

Figs. 1a, 1b, 1c and 1d each represent schematically a quilting machine 10 comprising a base 23, at least a first platform 22, a first stitching unit 80, in this case with only one row 42 of needles 12, and a second...
stitching unit 81, in this case with two rows 13 of needles 12.

In each row 13 or 42, the needles 12 are disposed substantially aligned along a respective longitudinal axis X located substantially orthogonal to a direction of feed A in which the material to be quilted 17 is fed.

In each row 13 or 42, the needles 12 are disposed substantially aligned along a respective longitudinal axis X located substantially orthogonal to a direction of feed A in which the material to be quilted 17 is fed.

The rows 42 and 13 of needles 12, also called hereafter auxiliary upper stitching members 42 and respectively upper stitching members 13, cooperate in use with corresponding auxiliary lower stitching members 43 and respectively lower stitching members 15 in order to make the stitches.

The auxiliary lower stitching members 43 and the lower stitching members 15 can comprise either a shuttle, a rotary crochet, a mobile hook (the latter shown for example in figs. 1a, 1b, 1c and 1d).

According to one possible form of embodiment, the upper stitching members 13 and the lower stitching members 15 of the second stitching unit 80 and the auxiliary upper stitching members 42 and the auxiliary lower stitching members 43 of the second stitching unit 81 extend longitudinally for the entire length of the respective stitching unit 80, 81, defining the operating width of the machine 10.

In possible solutions, see for example figs. 1a, 1b, 1c and 1d, the row 42 of needles 12 cooperates with a cutting device 55, comprising for example a blade 71, to make the cut, for example into bands, of the material 17 that is quilted.

The blade 71, see fig. 7, makes the cut on each occasion along the cutting line 75 while the needles 12 of at least one of the stitching units, in case the first stitching unit 80, make the stitches 74.

It is obvious that, in order to make the stitches 74 straight, the first stitching unit 80 must be stationary with respect to the base 23 while the material 17 is fed only in the direction of feed A, in both one direction and the other, and does not move laterally with respect to the base 23, that is, it does not move in a direction orthogonal to the direction of feed A.

According to the forms of embodiment shown in figs. 1a, 1b, 1d and 1e, the first platform 22 operates on guide members 24 also associated to the base 23, for example of the self-clamping type, and is mobile transversely to the direction of feed A of the material 17, in a desired and controlled manner.

This means that the first platform 22 can be moved or clamped to the base 23 depending on the particular working requirements.

According to the form of embodiment in fig. 1a, the second stitching unit 81 is solid with the first platform 22, whereas the first stitching unit 80 is stationary or kept stationary with respect to the base 23.

According to the form of embodiment in fig. 1b, the second stitching unit 81 is installed on the first platform 22, which slides with respect to the base 23, whereas the first stitching unit 80 is installed on a second platform 31. The second platform 31 is in turn installed on the first platform 22, in sliding manner, in a direction substantially orthogonal to the direction of feed A. Guide members 33 are associated to the first platform 22 and the second platform 31, configured to allow their reciprocal sliding.

According to the form of embodiment in fig. 1b, the guide members 33 are the self-clamping type, that is, they are configured to selectively constrain the reciprocal position of the second platform 31 with the first platform 22, so as to make them solid with each other.

In this way, when the first platform 22 is moved, it draws with it the second platform 31 too.

This operating condition allows for example to quilt panels with a large surface extension both with the first stitching unit 80 and with the second stitching unit 81.

According to one form of embodiment concerning the quilting machine 10 in fig. 1b, the second platform 31 is provided with a clamping device 85, configured to selectively constrain the position of the second platform 31 with respect to the base 23 while still allowing the movement of the first platform 22 with respect to the base 23. In this solution, the guide members 33 interposed between the first platform 22 and the second platform 31 are released, allowing the first platform 22 to slide and leaving the second platform 31 stationary with respect to the base 23.

In this way it is possible to keep the first stitching unit 80 stationary with respect to the base 23, to make the rectilinear stitches and cut the material 17 into bands 76, and to move the second stitching unit 81 in order to make the patterns. This solution allows to make the machine described with reference to fig. 1b functionally identical to the machine described with reference to fig. 1a.

The clamping device 85 can comprise at least one of either a pin, an actuator, a constraint member, a housing seating, or a possible combination of these.

With reference to fig. 1b, the clamping device 85 comprises an abutment element 87 attached to the first stitching unit 80 and an actuator 86 attached to the base 23 and provided with an interference end suitable to cooperate with the abutment element 87 and determine the stable positioning of the first stitching unit 80 with the base 23.

In the form of embodiment in fig. 1b, the first stitching unit 80 comprises its own support frame 82 mounted on the second platform 31, and mobile therewith.

The auxiliary upper stitching members 42 and auxiliary lower stitching members 43 are associated with the support frame 82.

In both forms of embodiment of fig. 1a and fig. 1b, the machine 10 can comprise positioning members 49, or constraint devices 59, for example with sliders and guides, which allow to maintain the correct reciprocal position of the two stitching units 80, 81.

In both cases, the positioning members and the constraint devices can be identical to those that will be described hereafter with regard to the machine in fig. 1a.
The positioning members and respectively the constraint devices are configured to keep the auxiliary upper stitching members 42 and the auxiliary lower stitching members 43 in a solid position with the second platform 31, even though they are themselves connected to the upper 13 and lower 15 stitching members of the second stitching unit 81, to receive motion from the latter.

The support frame 82 of the first stitching unit 80 can also be provided with its own support plane 85 on which the material 17 is rested. The support plane 85 is also provided with through holes 38 to allow the passage during use of the needles 12 and blades 71.

According to a possible variant of the solution shown in fig. 1b, respective movement devices can be associated with the second platform 31, configured to move the second platform 31 sliding on the guide members 33, independently of the first platform 22 in a direction orthogonal to the direction of feed A of the material 17.

According to the variant form shown in figs. 1c, 1d and 1e, both the first platform 22 and the second platform 31 are installed on the base 23, sliding in a direction substantially orthogonal to the direction of feed A, with respective guide members 24 and respectively 33.

Respective movement members 27 and 83 are associated with the first platform 22 and second platform 31, each of which configured to determine an independent movement on the base 23 of the first platform 22 with respect to the second platform 31.

This solution allows to move the first stitching unit 80 independently with respect to the second stitching unit 81 in a direction substantially orthogonal to the direction of feed A of the material 17.

With reference to the form of embodiment in fig. 1c, respective movement members 83 are associated with the second platform 31, configured to move the second platform 31 independently from, and with respect to the first platform 22, transversely to the direction of feed A.

The movement means 83 can comprise a worm screw mechanism 84, able to be selectively actuated by drive members, not shown in the drawings and easily provided by a person of skill.

According to the form of embodiment in fig. 1c, the auxiliary upper stitching members 42 can be connected, as will be described hereafter, to the upper stitching members 13 to receive motion from the latter and to achieve a synchronous stitching action of the upper stitching members 13 and the auxiliary upper stitching members 42.

According to this form of embodiment it can be provided that the upper stitching members 13 and the lower stitching members 15 are actuated by a single drive member, which determines an actuation also of the auxiliary upper stitching members 42 and the auxiliary lower stitching members 43.

According to the form of embodiment in figs. 1d and 1e, the first stitching unit 80 and the second stitching unit 81 are operatively independent of each other and are each provided with their own independent actuation members configured to activate the auxiliary upper stitching members 42 and the auxiliary lower stitching members 43 independently from the upper stitching members 13 and the lower stitching members 15.

In this way two stitching units 80, 81 are obtained, operatively independent of each other and selectively actuated depending on the requirements of the application. This makes the machine 10 extremely versatile and suitable to obtain even very complex patterns.

Also according to the variant in figs. 1d and 1e, the guide members 24 and 33 can be the self-clamping type to determine a selective constraint of the positioning of the first platform 22 and second platform 31 with respect to the base 23.

Furthermore, according to this form of embodiment it may be provided that the movement members 27 of the first platform 22 and the actuation members 83 of the second platform 31 are selectively commandable, for example by a command and control unit, to define predefined movements of the first platform 22 and second platform 31.

Merely by way of example, if it is necessary to make particularly complex patterns on a wide zone of the material 17, for example on mattress panels, a synchronized movement of the first platform 22 and the second platform 31 may be provided.

According to the forms of embodiment shown in figs. 1a, 1b, 1c, 1d and 1e, the following operating situations may occur:

i) the first stitching unit 80 is stationary with respect to the base 23 and the second stitching unit 81 is stationary with respect to the base 23 (figs. 1a, 1b, 1c, 1d and 1e);

ii) the first stitching unit 80 is stationary with respect to the base 23 and the second stitching unit 81 is mobile with respect to the base 23 (figs. 1a, 1b, 1c, 1d and 1e);

iii) the first stitching unit 80 and the second stitching unit 81 are mobile with respect to the base 23 (figs. 1a, 1b, 1c, 1d and 1e);

iv) the first stitching unit 80 is mobile with respect to the base 23 and the second stitching unit 81 is mobile with respect to the base 23, the first stitching unit 80 being mobile independently from the second stitching unit 81 (figs. 1b, 1c, 1d and 1e).

It comes within the logic of the invention to provide that the first platform 22 is associated with movement members 27 (fig. 2) governed for example by a processor, and are configured to move the first platform 22 in the guide members 24 and transversely to the direction of feed A.

According to the form of embodiment shown in the attached drawings, the multi-needle quilting machine also comprises an introduction unit 10a to introduce at
least a material 17 in the direction of feed A, the first stitching unit 80 and the second stitching unit 81, configured to make stitches on the material 17 and an exit unit, or for the collection of the worked material 17 (not shown in the drawings).

[0100] In possible forms of embodiment, see for example figs. 1a, 1b, 1c and 1d, the material 17 can comprise a first layer 18, a second layer 19 and a third layer 20, or layer of padding interposed between the first 18 and second layer 19 to define a so-called "quilted sandwich". However, a different configuration of the material 17 is not excluded, for example a single cloth, or two or more layers.

[0101] According to a possible form of embodiment, the introduction unit 10a and the exit unit for the material 17 are associated in a fixed position on the support base 23, and the first stitching unit 80 and the second stitching unit 81 are interposed between them. The introduction unit 10a can comprise at least a support device 34 configured to support, possibly wound on a bobbin 39, at least one layer that will constitute the material 17 to be obtained. However, it is not excluded that, in other forms of embodiment, the introduction unit 10a can comprise a plurality of support devices 34, each of which is configured to support one of the layers that will constitute the material 17.

[0102] One possible form of embodiment, which can possibly be combined with the form of embodiment described above, provides that the introduction unit 10a is configured to feed simultaneously and to superimpose with respect to each other the layers of material 17 before they are quilted.

[0103] With reference to the form of embodiment shown in fig. 2, the introduction unit 10a comprises two support devices 34 configured to each support a bobbin 39 on which respective layers to be quilted are wound, overlapping each other.

[0104] Each support device 34 can comprise, for example, a rotary shaft 35 to support a respective bobbin 39. Drive members, braking devices, or other devices to control the tension of the material 17 that is created between the introduction unit 10a and the exit unit can be associated with the rotary shaft 35. The activation of these devices can be coordinated with the activation of the exit unit or with possible tensioning devices.

[0105] According to some forms of embodiment of the present invention, for example shown in figs. 1a, 1b and 1c, the second stitching unit 81 comprises upper stitching members 13, lower stitching members 15 and a support plane 16, interposed between the upper stitching members 13 and the lower stitching members 15, and configured to support the material 17 during quilting.

[0106] The upper stitching members 13 and the lower stitching members 15 are located aligned in a determinate longitudinal axis X (fig. 5).

[0107] According to a possible form of embodiment of the present invention, the upper stitching members 13 (figs. 1a, 1b and 1c) comprise at least a first support bar 11, in this case two first support bars 11, parallel to each other, on each of which are mounted, aligned in the longitudinal axis X (fig. 5), stitching needles 12 cooperating with the mating lower stitching members 15 (figs. 1a, 1b and 1c).

[0108] The first support bars 11 are driven by actuation members 14, substantially known and configured to confer alternate motion on the first support bars 11 and allow the stitches to be made.

[0109] The actuation members 14 can comprise at least one of either rotary shafts, articulated mechanisms, connecting rods, crank handles, drive members, command rods, or a possible combination thereof.

[0110] According to some possible forms of embodiment, for example shown in figs. 1a, 1b, 1c, 1d, 4 and 5, the first support bars 11 are associated with movement arms 41 equipped with ascending/descending alternate motion.

[0111] The actuation members 14 can be mounted on a support frame 21 (fig. 2) provided to support and allow the movement of the first support bars 11.

[0112] The lower stitching members 15 (figs. 1a, 1b, 1c and 1d) are installed under the support plane 16 and each of them cooperates during use with a needle 12.

[0113] To this purpose, the support plane 16 can be equipped with through holes 38 (figs. 1a, 1b, 1c and 1d) through which, during use, the needles 12 pass in order to interact with the lower stitching members 15.

[0114] During quilting operations, the material 17 is moved only in the direction of feed A which is transverse, in this case orthogonal, to the longitudinal positioning axis X of the first support bar 11 of the needles 12, whereas the translation of the first platform 22 allows to make quilting patterns according to predefined configurations that can extend over the whole surface development of the material 17.

[0115] The combination of the movement of the first platform 22 in the direction of movement D coordinated with the movement of the material 17 in the direction of feed A allows to position the needles 12 in any spatial position.

[0116] During the movement of the first platform 22, the introduction unit 10a and the exit unit of the composite materials to be quilted 17 are kept substantially stationary.

[0117] According to the forms of embodiment described here, there is no longer any movement in two directions of the material 17 being worked, but only in the direction of feed A. This solution prevents any deformations in the material 17 in a transverse direction with respect to the direction of feed, and hence prevents the possible generation of curling which could compromise the quality of the final product.

[0118] With reference to the form of embodiment shown in figs. 1a, 1b, 1c, 1d and 2, the guide members 24 comprise longitudinal guides 25 attached to the base 23 and sliders 26 attached to the first platform 22 and configured to guide the movement of the latter on the
The movement members 27 can comprise at least one of either a drive member, an hydraulic actuator, an electric actuator, a rack mechanism, a worm screw mechanism, motion transmission members, reducer members or possible combinations thereof.

With reference to the form of embodiment shown in fig. 2, the movement members 27 comprise a worm screw mechanism 28 provided with a worm screw 29 attached to the base 23 and a mother screw 30 attached to the first platform 22 and on which the worm screw 29 screws.

The movement members 27 comprise at least a second support bar 45 configured to support in turn a plurality of needles 12 aligned in an axis parallel to the longitudinal axis X.

According to another possible implementation, the auxiliary upper stitching members 42 are connected to the actuation members 14. In this way, the actuation members 14 are suitable both to actuate the auxiliary upper stitching members 42 and also the actuation members 14. In this way, the actuation members 14 are suitable both to actuate the auxiliary upper stitching members 42 and also the auxiliary lower stitching members 43, and are configured to clamp the movement of the auxiliary upper stitching members 42 and the auxiliary lower stitching members 43 in a direction parallel to the longitudinal axis X.

According to one possible implementation, concerning for example the forms of embodiment in figs. 1a, 4, 5 and 6, the auxiliary upper stitching members 42 comprise guide devices 48 configured to guide the slidding of the second support bar 45 when the first platform 22 is moved in the direction of movement D in order to keep it in a fixed position with respect to the longitudinal axis X.

The positioning members 47 can also comprise abutment elements 51 mounted on at least one of the opposite ends of the second support bar 45 of the auxiliary upper stitching members 42.

The abutment elements 51 can comprise cylindrical bodies 52, for example bearings, mounted idle on the opposite ends of the second support bar 45.

According to a possible form of embodiment, the positioning members 47 also comprise containing elements 53 installed in a fixed position with respect to the base 23.

The containing elements 53 are configured to contact the abutment elements 51 during use and to constrain the movement of the second support bar 45 in the direction parallel to the longitudinal axis X.

The containing elements 53 can comprise a pair of plates, uprights or brackets, mounted at opposite ends on the base 23.

According to some possible forms of embodiment, the activation/de-activation members 54 can comprise electric, pneumatic, hydraulic actuators, or mechanical kinematisms, or similar or comparable members.
According to possible formulations of the invention, the blade 71 of the cutting devices 55 is mounted in a predetermined position along the longitudinal extension of the second support bar 45 of the auxiliary upper stitching members 42 and between at least one pair of needles, which can possibly be distanced from each other by a quarter of an inch. It is clear that in other forms of embodiment several cutting devices 55 can be provided, disposed distanced along the longitudinal development of the second support bar 45.

Each cutting device 55 is configured to cut the material 17 being worked into bands of a predefined width. This solution is particularly advantageous for making bands for mattresses, since with the upper stitching members 13 and lower stitching members 15 and possibly with the auxiliary upper 42 and lower 43 stitching members it is possible to sew the desired patterns on the whole surface of the material 17 and simultaneously obtain also a plurality of bands with a predefined width. This solution allows to reduce waste in making bands for mattresses and avoids having to use several machines for doing the quilting and cutting.

Indeed, this solution allows to cut the bands for mattresses to size, quilted with or without cording, sewn for example at 3 mm from the selvages, and ready to be assembled on the mattresses.

One example of bands for mattresses is shown in fig. 7, where it is possible to identify first stitches 73 made with the upper 13 and lower 15 stitching members, second, rectilinear stitches 74 made with the auxiliary upper 42 and lower 43 stitching members, the cutting line 75 made by the cutting devices 55 and the selvages 77 of the bands 76 for mattresses that are obtained.

With this configuration, the downtimes in making bands for mattresses are drastically reduced.

Furthermore, by suitably positioning the cutting devices 55 on the second support bar 45, it is possible to make, with the auxiliary upper stitching members 42, substantially rectilinear stitches in correspondence with the selvages of the bands that are cut.

Possible solutions of the present invention can provide that the cutting devices 55 are associated with activation/de-activation members configured to activate/de-activate the cutting devices 55.

According to the form of embodiment shown in figs. 1a, 1b and 1c, the cutting devices 55 are able to be selectively activated/de-activated by the same activation/de-activation members 54 of the auxiliary upper stitching members 42.

The multi-needle quilting machine 10 according to the present invention comprises units to feed the threads to the upper stitching members 13, the lower stitching members 15, the auxiliary upper stitching members 42 and the auxiliary lower stitching members 43.

According to possible forms of embodiment of the present invention, it can be provided that the upper stitching members 13 and the lower stitching members 15 are fed from respective thread feed units that are mounted on the first platform 22 and move solidly with it.

According to possible alternative forms of em-
bodiment, the auxiliary upper stitching members 42 and the auxiliary lower stitching members 43 are served by respective thread feed units mounted in a fixed position on the base 23.

According to a possible form of embodiment, at least one of either the thread feed unit of the upper stitching members 13 or the lower stitching members 15 are mounted on a structure, or support raddle, that is fixed, attached on the base 23.

For example, with reference to figs. 3 and 4, the lower stitching members 15 are served by a thread feed unit or raddle 63 mounted sliding in a direction parallel to the direction of movement D, on a support structure 64. The support structure 64 is in turn mounted fixed on the base 23. In this way, the fixed support structure 64, which feeds the materials to be quilted, is separated and made autonomous from the first platform 22.

According to some forms of embodiment, for example shown in figs. 3 and 4, the support structure 64 comprises two uprights 65 attached to the base 23 and a longitudinal guide 66 attached to the uprights 65 and located parallel to the longitudinal axis X.

A slider 67 is slidingly mounted on the longitudinal guide 66, and is configured to support a plurality of reels of thread, each of which is provided to feed one of the lower stitching members 15.

The slider 67 is connected by means of wires 68 and return pulleys 69 to a mobile part 70 of the first platform 22, such as for example a frame to protect and contain the actuation means of the lower stitching members 15 and the auxiliary lower stitching members 43.

In particular, the movement of the first platform 22 in the direction of movement D entails a simultaneous movement of the thread feed unit 63, in order to guarantee a correct feed of the threads to the lower stitching members 15.

At least one of either the introduction unit 10a or the exit unit are served by tensioning devices 36 which can be mounted on the base 23, respectively upstream or downstream of the first stitching unit 80 and the second stitching unit 81, and are configured to keep the material 17 being quilted under tension so that the stitches can be made correctly.

By suitably coordinating the activation of the introduction unit 10a and the exit unit, and possibly also the tensioning devices 36 if present, it is possible to suitably coordinate the tension of the material 17 that is quilted.

Since the movement of the material is only longitudinal, and not also transverse, the fabrics and paddings that make it up can be suitably tensioned, preventing curling and creases in the material 17, compared with the movement that the material 17 would make in traditional machines, thus obtaining perfect, not distorted patterns.

It is clear that modifications and/or additions of parts may be made to the multi-needle quilting machine and corresponding quilting method as described hereto-fore, without departing from the field and scope of the present invention.

According to a possible form of embodiment, at least one of either the thread feed unit of the upper stitching members 13 or the lower stitching members 15 are mounted on a structure, or support raddle, that is fixed, attached on the base 23.

For example, with reference to figs. 3 and 4, the lower stitching members 15 are served by a thread feed unit or raddle 63 mounted sliding in a direction parallel to the direction of movement D, on a support structure 64. The support structure 64 is in turn mounted fixed on the base 23. In this way, the fixed support structure 64, which feeds the materials to be quilted, is separated and made autonomous from the first platform 22.

According to some forms of embodiment, for example shown in figs. 3 and 4, the support structure 64 comprises two uprights 65 attached to the base 23 and a longitudinal guide 66 attached to the uprights 65 and located parallel to the longitudinal axis X.

A slider 67 is slidingly mounted on the longitudinal guide 66, and is configured to support a plurality of reels of thread, each of which is provided to feed one of the lower stitching members 15.

The slider 67 is connected by means of wires 68 and return pulleys 69 to a mobile part 70 of the first platform 22, such as for example a frame to protect and contain the actuation means of the lower stitching members 15 and the auxiliary lower stitching members 43.

In particular, the movement of the first platform 22 in the direction of movement D entails a simultaneous movement of the thread feed unit 63, in order to guarantee a correct feed of the threads to the lower stitching members 15.

At least one of either the introduction unit 10a or the exit unit are served by tensioning devices 36 which can be mounted on the base 23, respectively upstream or downstream of the first stitching unit 80 and the second stitching unit 81, and are configured to keep the material 17 being quilted under tension so that the stitches can be made correctly.

By suitably coordinating the activation of the introduction unit 10a and the exit unit, and possibly also the tensioning devices 36 if present, it is possible to suitably coordinate the tension of the material 17 that is quilted.

Since the movement of the material is only longitudinal, and not also transverse, the fabrics and paddings that make it up can be suitably tensioned, preventing curling and creases in the material 17, compared with the movement that the material 17 would make in traditional machines, thus obtaining perfect, not distorted patterns.

It is clear that modifications and/or additions of parts may be made to the multi-needle quilting machine and corresponding quilting method as described hereto-fore, without departing from the field and scope of the present invention.

According to a possible form of embodiment, at least one of either the thread feed unit of the upper stitching members 13 or the lower stitching members 15 are mounted on a structure, or support raddle, that is fixed, attached on the base 23.

For example, with reference to figs. 3 and 4, the lower stitching members 15 are served by a thread feed unit or raddle 63 mounted sliding in a direction parallel to the direction of movement D, on a support structure 64. The support structure 64 is in turn mounted fixed on the base 23. In this way, the fixed support structure 64, which feeds the materials to be quilted, is separated and made autonomous from the first platform 22.

According to some forms of embodiment, for example shown in figs. 3 and 4, the support structure 64 comprises two uprights 65 attached to the base 23 and a longitudinal guide 66 attached to the uprights 65 and located parallel to the longitudinal axis X.

A slider 67 is slidingly mounted on the longitudinal guide 66, and is configured to support a plurality of reels of thread, each of which is provided to feed one of the lower stitching members 15.

The slider 67 is connected by means of wires 68 and return pulleys 69 to a mobile part 70 of the first platform 22, such as for example a frame to protect and contain the actuation means of the lower stitching members 15 and the auxiliary lower stitching members 43.

In particular, the movement of the first platform 22 in the direction of movement D entails a simultaneous movement of the thread feed unit 63, in order to guarantee a correct feed of the threads to the lower stitching members 15.

At least one of either the introduction unit 10a or the exit unit are served by tensioning devices 36 which can be mounted on the base 23, respectively upstream or downstream of the first stitching unit 80 and the second stitching unit 81, and are configured to keep the material 17 being quilted under tension so that the stitches can be made correctly.

By suitably coordinating the activation of the introduction unit 10a and the exit unit, and possibly also the tensioning devices 36 if present, it is possible to suitably coordinate the tension of the material 17 that is quilted.

Since the movement of the material is only longitudinal, and not also transverse, the fabrics and paddings that make it up can be suitably tensioned, preventing curling and creases in the material 17, compared with the movement that the material 17 would make in traditional machines, thus obtaining perfect, not distorted patterns.

It is clear that modifications and/or additions of parts may be made to the multi-needle quilting machine and corresponding quilting method as described hereto-
sion of the stitching unit, to define the operating amplitude of the machine.

5. Machine as in any claim hereinbefore, characterized in that it comprises a first platform (22) and a second platform (31) disposed adjacent to each other and on which said first stitching unit (80) and said second stitching unit (81) are installed.

6. Machine as in claim 5, characterized in that said first platform (22) is installed on said base (23) and is selectively translatable to the latter, and in that said second platform (31) is installed on the first platform (22) and guide members (33) are interposed between the first platform (22) and the second platform (31).

7. Machine as in claim 6, characterized in that the second stitching unit (81) is installed on the first platform (22) and the first stitching unit (80) is installed on the second platform (31), and in that said guide members (33) are the self-clamping type to selectively constrain the reciprocal position of the second platform (31) with the first platform (22).

8. Machine as in claim 6 or 7, characterized in that said second platform (31) is provided with a clamping device (85) configured to constrain the position of the second platform (31) with respect to the base (23).

9. Machine as in claim 5, characterized in that said first platform (22) and said second platform (31) are each installed on said base (23), respective guide members (24, 33) being associated to said first platform (22) and to said second platform (31) in order to allow their independent movement with respect to said base (23).

10. Machine as in claim 9, characterized in that respective movement members (27, 83) are associated to said first platform (22) and to said second platform (31) in order to translate the first platform (22) and the second platform (31) with respect to the base (23), independently from each other.

11. Machine as in any of the claims from 1 to 9, characterized in that at least one of either said first stitching unit (80) or said second stitching unit (81) is mobile also with respect to said first platform (22) in a direction of movement (D) substantially orthogonal to said direction of feed (A).

12. Machine as in any of the claims hereinbefore, characterized in that said introduction unit (10a) is stationary with respect to said base (23) and is configured to feed said material (17) only in said direction of feed (A).

13. Machine as in any of the claims hereinbefore, characterized in that the first stitching unit (80) and the second stitching unit (81) are each provided with their own activation members, independent from each other.

14. Machine as in any of the claims hereinbefore, characterized in that said first stitching unit (80) is provided with said at least one row (42) of needles (12) and with auxiliary lower stitching members (43), clamping means (40) being associated to said at least one row (42) of needles (12) and to said auxiliary lower stitching members (43) configured to selectively clamp the movement of said row (42) of needles (12) and of said auxiliary lower stitching members (43) in a direction parallel to said longitudinal axis (X).

15. Machine as in any of the claims hereinbefore, characterized in that said at least one row (13) of needles (12) of said second stitching unit (81) comprises at least a first support bar (11) configured to support said needles (12) aligned along said longitudinal axis (X), and actuation members (14) configured to supply at least said row (13) of needles (12) of the second stitching unit (81) with alternate motion.

16. Machine as in claim 15, characterized in that said actuation members (14) are connected to said row (42) of needles (12) of the first stitching unit (80) in order to activate the latter.

17. Method for quilting at least a material (17), which provides to feed said material (17) in a direction of feed (A) by means of an introduction unit (10a) and to make stitches on said material (17) by means of at least one stitching unit (80, 81) mounted on a base (23), wherein said method comprises a first stitching unit (80) and at least a second stitching unit (81) each provided with at least a row (13, 42) of needles (12) with an oblong development along a respective longitudinal axis (X), at least said second stitching unit (81) being installed on a first platform (22), and wherein during the making of said stitches the translation is provided of said first platform (22) with respect to said base (23) in a direction of movement (D) substantially orthogonal to said direction of feed (A), characterized in that at least said first stitching unit (80) is stationary positioned with respect to said base (23), and in that cutting devices (55), associated with said row (42) of needles (12) of the first stitching unit (80), cut said material (17) in a direction parallel to said direction of feed (A), said cutting device (55) being driven by the alternate motion to which said row (42) of needles (12) of the first stitching unit (80) are subjected.

18. Method as in claim 17, characterized in that during
the making of said stitches, said first stitching unit
(80) is kept stationary with respect to said base (23)
and said second stitching unit (81) is moved with
said first platform (22).

19. Method as in claim 17 or 18, characterized in that
during the making of said stitches on said material
(17) said first stitching unit (80) simultaneously
makes other stitches aligned in a direction parallel
to said direction of feed (A).

Patentansprüche

1. Mehr-Nadel-Steppmaschine, welche zumindest ei-
ene Basis (23), eine Einführungsvorrichtung (10a),
welche dazu eingerichtet ist, zumindest ein zu stepp-
endes Material (17) entlang einer Einführungsrich-
tung (A) einzuführen, und mindestens eine Nähvor-
richtung (80, 81) umfasst, um Nähte auf mindestens
 einem Material (17) herzustellen, wobei die Maschi-
ne eine erste Nähvorrichtung (80) und mindestens
 eine zweite Nähvorrichtung (81) umfasst, welche je-
weils mit mindestens einer Reihe (13, 42) von Na-
deln (12) mit einer länglichen Ausprägung entlang
einer jeweiligen longitudinalen Achse (X) versehen
sind, wobei zumindest die zweite Nähvorrichtung
(81) auf mindestens einer Plattform (22, 31) in einer
Bewegungsrichtung (D), welche im Wesentlichen
senkrecht zu der Einführungsrichtung (A) ist, gegen-
über der Basis (23) wahlweise verschiebbar montiert
ist, wobei die Maschine dadurch gekennzeichnet
ist, dass zumindest die ersten Nähvorrichtung dazu
(80) eingerichtet ist, stationär gegenüber der Basis
(23) positioniert zu werden, und dadurch gekenn-
zeichnet ist, dass Schneidvorrichtungen (55) der
Reihe (42) von Nadeln (12) der ersten Nähvorrich-
tung (80) zugeordnet sind und dazu eingerichtet
sind, das Material (17) in einer Richtung zu schnei-
den, welche parallel zu der Einführungsrichtung (A)
ist, wobei die Schneidvorrichtung (55) durch die
tertiierende Bewegung betrieben wird, welcher die
Reihe (42) der Nadeln (12) der ersten Nähvorrich-
tung (80) unterworfen wird.

2. Maschine nach Anspruch 1, welche dadurch ge-
kennzeichnet ist, dass die Schneidvorrichtungen
(55) mindestens eine Schneide (71) umfassen, wel-
che in einer festgelegten Position entlang der lon-
gitudinalen Erstreckung der Reihe (42) von Nadeln
(12) der ersten Nähvorrichtung (80) und zwischen
mindestens einem Paar von Nadeln (12) angebracht
ist.

3. Maschine nach Anspruch 1 oder 2, welche dadurch
gekennzeichnet ist, dass den Schneidvorrichtun-
gen (55) Aktivierungs-/Deaktivierungs-Elemente zu-
geordnet sind, welche dazu eingerichtet sind, die
Schneidvorrichtungen (55) zu aktivieren/deaktivie-
ren.

4. Maschine nach einem der vorhergegangenen An-
sprüche, welche dadurch gekennzeichnet ist,
dass jede Reihe (13, 42) von Nadeln (12) sich im
Wesentlichen entlang der gesamten longitudinalen
Ausdehnung der Nähvorrichtung erstreckt, um die
Arbeitsbreite der Maschine festzulegen.

5. Maschine nach einem der vorhergegangenen An-
sprüche, welche dadurch gekennzeichnet ist,
dass die Maschine eine erste Plattform (22) und eine
zweite Plattform (31) umfasst, welche benachbart
zueinander angeordnet sind und auf welchen die
erste Nähvorrichtung (80) und die zweite Nähvor-
richtung (81) montiert sind.

6. Maschine nach Anspruch 5, welche dadurch ge-
kennzeichnet ist, dass die erste Plattform (22) auf
der Basis (23) montiert ist und wahlweise gegenüber
derer Basis (23) montiert ist, wobei die Maschine
dadurch gekennzeichnet ist, dass der erste Plattform
(22) und die zweite Plattform (31) zwischen der ersten
Plattform (22) und der zweiten Plattform (31) einge-
fügt sind.

7. Maschine nach Anspruch 6, welche dadurch ge-
kennzeichnet ist, dass die zweite Nähvorrichtung
(81) auf der ersten Plattform (22) montiert ist und die
erste Nähvorrichtung (80) auf der zweiten Plattform
(31) montiert ist und dadurch gekennzeichnet ist,
dass die Führungselemente (33) selbst-klemmend
sind, um die relative Position der zweiten Plattform
(31) gegenüber der ersten Plattform (22) wahlweise
einzuschränken.

8. Maschine nach Anspruch 6 oder 7, welche dadurch
gekennzeichnet ist, dass die zweite Plattform (31)
mit einer Klemmvorrichtung (85) versehen ist, wel-
che dazu eingerichtet ist, die Position der zweiten
Plattform (31) gegenüber der Basis (23) einzu-
schränken.

9. Maschine nach Anspruch 5, welche dadurch ge-
kennzeichnet ist, dass die erste Plattform (22) und
die zweite Plattform (31) jeweils auf der Basis (23)
montiert sind, wobei jeweilige Führungselemente
(24, 33) der ersten Plattform (22) und der zweiten
Plattform (31) zugeordnet sind, um deren unabhän-
gige Bewegung gegenüber der Basis (23) zuzu-
sagen.

10. Maschine nach Anspruch 9, welche dadurch ge-
kennzeichnet ist, dass jeweilige Bewegungsele-
mente (27, 83) der ersten Plattform (22) und der
zweiten Plattform (31) zugeordnet sind, um die erste
Plattform (22) und die zweite Plattform (31) gegen-
über der Basis (23) unabhängig voneinander zu bewegen.

11. Maschine nach einem der Ansprüche 1 bis 9, welche **durchgezeichnet ist, dass** mindestens eine der ersten Nähvorrichtung (80) oder der zweiten Nähvorrichtung (81) in einer Bewegungsrichtung (D), welche im Wesentlichen senkrecht zu der Einführungsrichtung (A) ist, beweglich gegenüber der ersten Plattform (22) ist.

12. Maschine nach einem der vorhergegangenen Ansprüche, welche **durchgezeichnet ist, dass** die Einführungsrichtung (10a) stationär gegenüber der Basis (23) ist und dazu eingerichtet ist, das Material (17) nur in der Einführungsrichtung (A) einzuführen.

13. Maschine nach einem der vorhergegangenen Ansprüche, welche **durchgezeichnet ist, dass** die erste Nähvorrichtung (80) und die zweite Nähvorrichtung (81) jeweils mit ihren eigenen, voneinander unabhängigen Aktivierungselementen versehen sind.

14. Maschine nach einem der vorhergegangenen Ansprüche, welche **durchgezeichnet ist, dass** die erste Nähvorrichtung (80) mit der mindestens einen Reihe (42) von Nadeln (12), unterstützen-  
   den unteren Nähvorrichtungen (43) und Klemmelementen (40) versehen ist, welche der mindestens einen Reihe (42) von Nadeln (12) und den unterstützenden unteren Nähvorrichtungen (43) zugeordnet sind, wobei die Klemmelemente (40) dazu eingerichtet sind, wahlweise die Bewegung der Reihe (42) von Nadeln (12) und der unterstützenden unteren Nähvorrichtungen (43) entlang einer Richtung, welche parallel zu der longitudinalen Achse (X) ist, zu klemmen.

15. Maschine nach einem der vorhergegangenen Ansprüche, welche **durchgezeichnet ist, dass** die mindestens eine Reihe (13) von Nadeln (12) der zweiten Nähvorrichtung (81) mindestens eine Halteschiene (11) umfasst, welche dazu eingerichtet ist, die Nadeln (12), welche entlang der longitudinalen Achse (X) ausgerichtet sind, zu halten, und Antriebselemente (14), welche dazu eingerichtet sind, eine alternierende Bewegung für zumindest die Reihe (13) von Nadeln (12) der zweiten Nähvorrichtung (81) bereitzustellen.

16. Maschine nach Anspruch 15, welche **durchgezeichnet ist, dass** die Antriebselemente (14) mit der Reihe (42) von Nadeln (12) der ersten Nähvorrichtung (80) verbunden sind, um diese zu aktivieren.

17. Verfahren zum Steppen von mindestens einem Material (17), wobei das Verfahren vorsieht, das Material (17) in einer Einführungsrichtung (A) mittels einer Einführungsvorrichtung (10a) einzuführen und Näh- 
   te auf dem Material (17) mittels mindestens einer Nähvorrichtung (80, 81) herzustellen, welche auf ei- 
   ner Basis (23) angebracht ist, wobei das Verfahren eine erste Nähvorrichtung (80) und mindestens eine zweite Nähvorrichtung (81) umfasst, welche jeweils mit mindestens einer Reihe (13, 42) von Nadeln (12) mit einer länglichen Ausprägung entlang einer jeweili- 
   gen longitudinalen Achse (X) versehen sind, wobei zumindest die zweite Nähvorrichtung (81) auf einer ersten Plattform (22) montiert ist und wobei während des Herstellens der Nähte die Bewegung der ersten Plattform (22) gegenüber der Basis (23) in einer Be- 
   wegungsrichtung (D), welche im Wesentlichen senk- 
   recht zu der Einführungsrichtung (A) ist, vorgesehen ist, wobei das Verfahren **durchgezeichnet ist, dass** zumindest die erste Nähvorrichtung (80) stationär gegenüber der Basis (23) angebracht ist, und **durchgezeichnet ist, dass** Schneid- 
   vorrichtungen (55), welche der Reihe (42) von Na- 
   deln (12) der ersten Nähvorrichtung (80) zugeordnet sind, das Material (17) in einer Richtung schneiden, welche parallel zu der Einführungsrichtung (A) ist, wobei die Schneidvorrichtung (55) durch die alter- 
   nierende Bewegung betrieben wird, welcher die Rei- 
   he (42) von Nadeln (12) der ersten Nähvorrichtung (80) unterworfen sind.

18. Verfahren nach Anspruch 17, welches **durchgezeichnet ist, dass** während des Herstellens der Nähte die erste Nähvorrichtung (80) stationär gegenüber der Basis (23) gehalten wird und die zweite Nähvorrichtung (81) mit der ersten Plattform (22) bewegt wird.

19. Verfahren nach Anspruch 17 oder 18, welches **durchgezeichnet ist, dass** während des Her- 
   stellens der Nähte auf dem Material (17) die erste Nähvorrichtung (80) gleichzeitig andere Nähte her- 
   stellt, welche entlang einer Richtung ausgerichtet sind, welche parallel zu der Einführungsrichtung (A) ist.

Revendications

1. Machine à piquer à multiples aiguilles comprenant au moins une base (23), une unité d'introduction (10a) configurée pour alimenter au moins un matériau à piquer (17) dans une direction d'alimentation (A) et au moins une unité de couture (80, 81) pour faire des points sur au moins un matériau (17), dans laquelle ladite machine comprend une première unité de couture (80) et au moins une seconde unité de couture (81) munie chacune d'au moins une rangée (13, 42) de des aiguilles (12) avec un développement...
oblong le long d’un axe longitudinal respectif (X), la-
dite au moins une seconde unité de couture (81) étant installée sur au moins une plate-forme (22, 31) pouvant être translatée sélectivement par rapport à ladite base (23), dans une direction de déplacement (D) sensiblement orthogonale à ladite direction d’alimentation (A), caractérisée en ce qu’au moins la-
dite première unité de couture (80) peut être posi-
tionnée de manière stationnaire par rapport à ladite base (23), et en ce que des dispositifs de découpe (55) sont associés à ladite rangée (42) d’aiguilles (12) de la première unité de couture (80) et sont con-
figurés pour découper ledit matériau (17) dans une
direction parallèle à ladite direction d’alimentation (A), ledit dispositif de découpe (55) étant entraîné par le mouvement alternatif auquel est soumise la-
dite rangée (42) d’aiguilles (12) de la première unité de couture (80).

2. Machine selon la revendication 1, caractérisée en ce que lesdits dispositifs de découpe (55) compren-
ment au moins une lame (71) montée dans une posi-
tion déterminée le long de l’extension longitudinale de ladite rangée (42) d’aiguilles (12) de la première unité de couture (80) et entre au moins une paire d’aiguilles (12).

3. Machine selon la revendication 1 ou 2, caractérisée en ce que lesdits dispositifs de découpe (55) sont associés à des éléments d’activation/désactivation configurés pour activer/désactiver lesdits dispositifs de découpe (55).

4. Machine selon l’une quelconque des revendications précédentes, caractérisée en ce que chaque ran-
gée (13, 42) d’aiguilles (12) s’étend sensiblement sur toute l’extension longitudinale de l’unité de cou-
ture, afin de définir l’amplitude de fonctionnement de la machine.

5. Machine selon l’une quelconque des revendications précédentes, caractérisée en ce qu’elle comprend une première plate-forme (22) et une seconde plate-
forme (31) disposées adjacentes l’une à l’autre et sur lesquelles ladite première unité de couture (80) et ladite seconde unité de couture (81) sont instal-
lées.

6. Machine selon la revendication 5, caractérisée en ce que ladite première plate-forme (22) est installée sur ladite base (23) et peut être translatée sélective-
ment vers celle-ci, et en ce que ladite seconde plate-
forme (31) est installée sur la première plate-forme (22) et des éléments de guidage (33) sont interposés entre la première plate-forme (22) et la seconde pla-
te-forme (31).

7. Machine selon la revendication 6, caractérisée en
caractérisée en ce que la seconde unité de couture (81) est installée sur la première plate-forme (22) et la première unité de couture (80) est installée sur la seconde plate-
forme (31), et en ce que lesdits éléments de guidage (33) sont du type auto-serrant pour contraindre sé-
lectivement la position réciproque de la seconde pla-
te-forme (31) avec la première plate-forme (22).

8. Machine selon la revendication 6 ou 7, caractérisée en ce que ladite seconde plate-forme (31) est munie d’un dispositif de serrage (85) configuré pour con-
traindre la position de la seconde plate-forme (31) par rapport à la base (23).

9. Machine selon la revendication 5, caractérisée en ce que ladite première plate-forme (22) et ladite se-
conde plate-forme (31) sont chacune installées sur ladite base (23), des éléments de guidage respectifs (24, 33) étant associés à ladite première plate-forme (22) et à ladite seconde plate-forme (31) pour per-
mettre leur déplacement indépendant par rapport à ladite base (23).

10. Machine selon la revendication 9, caractérisée en ce que des éléments de déplacement respectifs (27, 83) sont associés à ladite première plate-forme (22) et à ladite seconde plate-forme (31) pour translater la première plate-forme (22) et la seconde pla-
forme (31) par rapport à la base (23), indépendamment l’une de l’autre.

11. Machine selon l’une quelconque des revendications 1 à 9, caractérisée en ce qu’au moins l’une parmi ladite première unité de couture (80) ou ladite se-
conde unité de couture (81) est mobile également par rapport à ladite première plate-forme (22) dans une direction de déplacement (D) sensiblement or-
thogonale à ladite direction d’alimentation (A).

12. Machine selon l’une quelconque des revendications précédentes, caractérisée en ce que ladite unité d’introduction (10a) est stationnaire par rapport à la-
dite base (23) et est configurée pour alimenter ledit matériau (17) uniquement dans ladite direction d’ali-
mentation (A).

13. Machine selon l’une quelconque des revendications précédentes, caractérisée en ce que la première unité de couture (80) et la seconde unité de couture (81) sont chacune munies de leurs propres éléments d’activation, indépendants l’un de l’autre.

14. Machine selon l’une quelconque des revendications précédentes, caractérisée en ce que ladite premiè-
re unité de couture (80) est munie d’au moins une rangée (42) d’aiguilles (12) et d’éléments de couture inférieurs auxiliaires (43), des moyens de serrage (40) étant associés à ladite au moins une rangée
(42) d'aiguilles (12) et auxdits éléments de couture inférieurs auxiliaires (43) configurés pour serrer sélectivement le déplacement de ladite rangée (42) d'aiguilles (12) et desdits éléments de couture inférieurs auxiliaires (43) dans une direction parallèle audit axe longitudinal (X).

15. Machine selon l'une quelconque des revendications précédentes, caractérisée en ce que ladite au moins une rangée (13) d'aiguilles (12) de ladite seconde unité de couture (81) comprend au moins une première barre de support (11) configurée pour supporter lesdites aiguilles. (12) alignées le long dudit axe longitudinal (X), et des éléments d'actionnement (14) configurés pour fournir un mouvement en va-et-vient au moins à ladite rangée (13) d'aiguilles (12) de la seconde unité de couture (81).

16. Machine selon la revendication 15, caractérisée en ce que lesdits éléments d'actionnement (14) sont reliés à ladite rangée (42) d'aiguilles (12) de la première unité de couture (80) pour activer celle-ci.

17. Procédé pour piquer au moins un matériau (17), qui consiste à alimenter ledit matériau (17) dans une direction d'alimentation (A) au moyen d'une unité d'introduction (10a) et à faire des points sur ledit matériau (17) au moyen d'au moins une unité de couture (80, 81) montée sur une base (23), dans lequel ledit procédé comprend une première unité de couture (80) et au moins une seconde unité de couture (81) chacune munie d'au moins une rangée (13, 42) d'aiguilles (12) avec un développement oblong le long d'un axe longitudinal respectif (X), ladite seconde au moins une unité de couture (81) étant installée sur une première plate-forme (22), et dans lequel lors de la fabrication desdits points, la translation est appliquée à ladite première plateforme (22) par rapport à ladite base (23) dans une direction de déplacement (D) sensiblement orthogonale à ladite direction d'alimentation (A), caractérisé en ce qu'au moins ladite première unité de couture (80) est positionnée de manière stationnaire par rapport à ladite base (23), et en ce que des dispositifs de découpe (55), associés à ladite rangée (42) d'aiguilles (12) de la première unité de couture (80), découpent ledit matériau (17) dans une direction parallèle à ladite direction d'alimentation (A), ledit dispositif de découpe (55) étant entraîné par le mouvement en va-et-vient auquel est soumise ladite rangée (42) d'aiguilles (12) de la première unité de couture (80).

18. Procédé selon la revendication 17, caractérisé en ce que pendant la fabrication desdits points, ladite première unité de couture (80) est maintenue stationnaire par rapport à ladite base (23) et ladite seconde unité de couture (81) est déplacée avec ladite première plate-forme. (22).
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

- EP 0394601 B [0007]
- US 20110290166 A [0017]
- US 2011290166 A [0022]
- JP 2002028388 A [0023]
- WO 0070137 A [0172]