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A. KUBELKA ET AL
METHOD AND APPARATUS FOR QUILTING AND INTERLACING
OF TEXTILE MATERIALS

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2 Sheets-Sheet 1

Fig. 1.

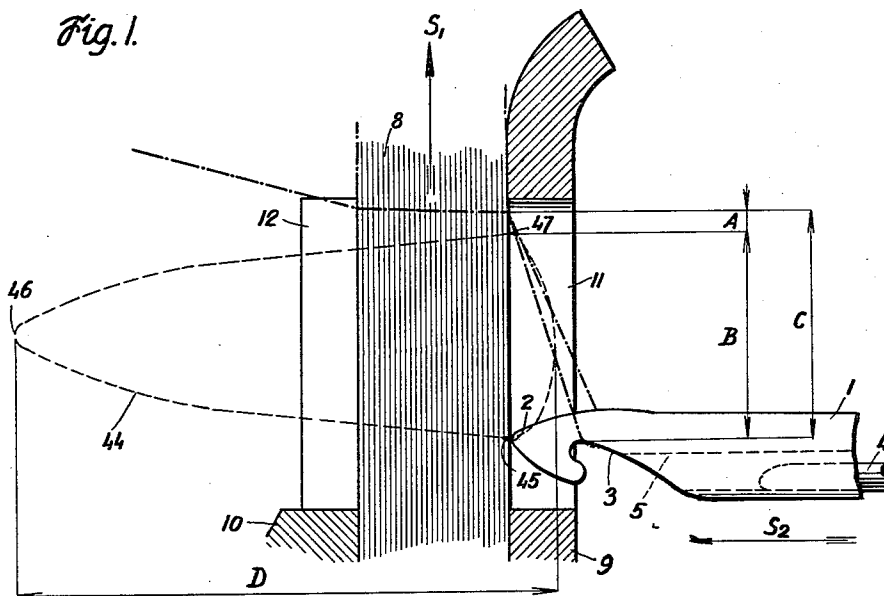
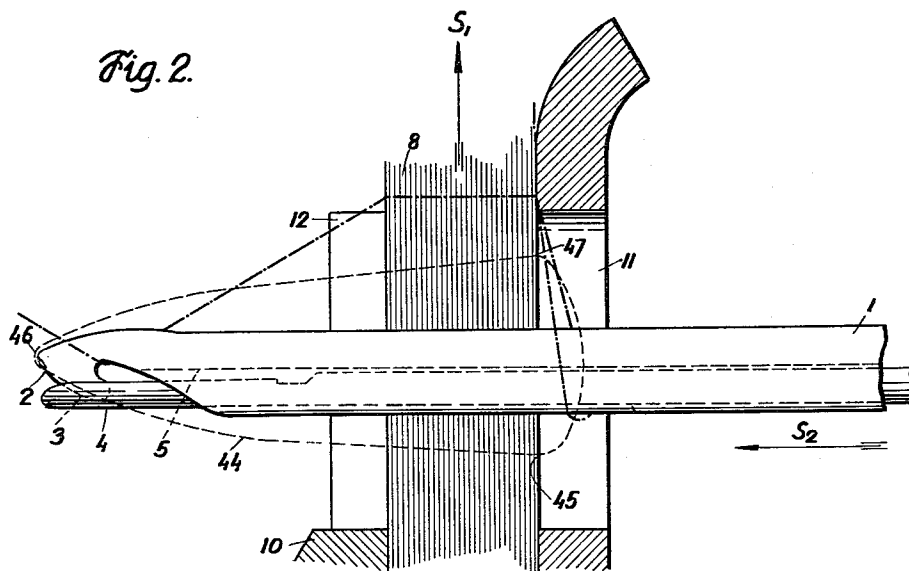


Fig. 2.



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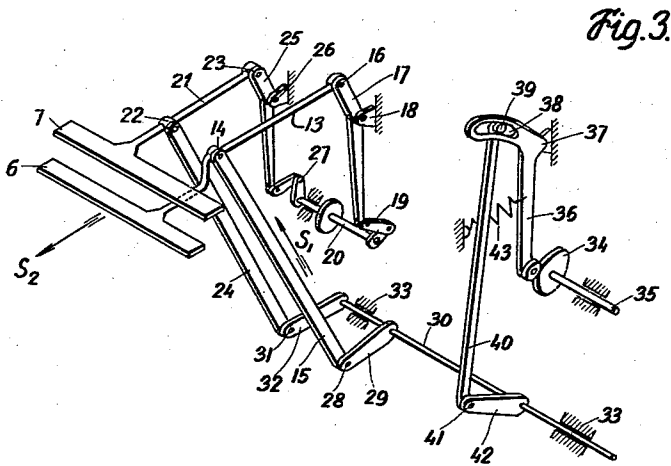
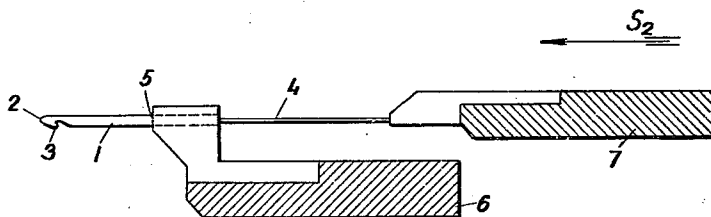


Fig. 4.



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METHOD AND APPARATUS FOR QUILTING AND INTERLACING OF TEXTILE MATERIALS

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The present invention relates to a method and a device for quilting and interknitting of flat textile fabrics and other similar materials, made for instance from synthetic fibres, leather, asbestos etc. The invention also relates to a device for carrying out said method.

Machines are known which serve for quilting and interknitting of flat textile fabrics, in which the quilting itself of such fabrics is effected in two basic processes:

According to the first working process the flat textile fabric is continuously fed to quilting and knitting needles, the needles performing an oscillatory movement on a plane which is not identical with the plane of the flat fabric but usually perpendicular thereto, so that during the piercing operation effected under simultaneous feeding of the fabric the pierced hole is lengthened and the fibres in the flat textile fabric are torn and, at the same time, the needles are subject to an excessive bending stress due to the pull exerted by the treated material.

According to the second working process the treated flat fabric is supplied to the quilting and knitting needles intermittently, while these needles perform the same movement as in the first case, preventing thus—it is true—damage to the treated material and increased stress on the quilting and knitting needles, it being however impossible to exceed a certain working speed of the machine which would achieve a higher performance thereof.

In contrast to conventional sewing machines which for the above mentioned piercing operation employ conventional closed sewing needles, the problem of such quilting and knitting machines is still further aggravated by the fact that it is necessary to use needles having an open hook which, in a certain phase of operation, independently of the needle movement, is closed by an independently controlled latch.

The present invention aims at removing the aforesaid drawbacks of both above described working processes, the essential feature of the invention residing therein that, on the one hand, the material is fed continuously and, on the other hand, the quilting and knitting needles perform during piercing of the treated material a movement parallel to the feeding movement of the material.

Further advantages and features of the present invention will appear from the ensuing disclosure and drawings, wherein

FIG. 1 shows a detail of the quilting and knitting needles prior to the piercing operation, on an enlarged scale,

FIG. 2 a similar view after the finished piercing operation,

FIG. 3 a diagrammatic perspective representation of the working mechanism, and

FIG. 4 an elevational cross sectional view through the needle and latch beds.

The quilting and knitting needle 1 of the machine is provided with a point 2, a hook 3 and a latch 4, the latter being guided in a cavity 5 arranged in the needle 1 (FIG. 1). Said needles 1 are mounted in a needle bed 6, while the latches 4 are mounted in a latch bed 7. The treated flat textile fabric, for instance a fleece 8, is, as it is usual in such machines, continuously advanced in the direction of the arrow S_1 (FIG. 1) between known tables

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9 and 10, the table 9 being provided with apertures 11, while the table 10 is equipped with open combs 12.

Up to the present, the needle beds 6 and the latch beds 7 in such machines have carried out, independently on each other, nothing more than a basic oscillatory movement in one plane, i.e. in the plane of the longitudinal axis of the needle 1, as indicated by the arrow S_2 . To this end the needle bed 6 is mounted at the end of a two-armed lever 13, which is journaled on a pin 14 of a link 15 and also on a pivot 16 of a bell crank lever 17, which is mounted for rocking movement about a pin 18, said pin 18 being rigidly secured in the frame of the machine. The bell crank lever 17 receives constant oscillatory movement about the pin 18 from a crank mechanism 19, which is arranged on a rotating shaft 20.

Said oscillation of the bell crank lever 17 causes the needle to move in the plane of its longitudinal axis. The same movement, but shifted in phase, of the latch bed 7 is effected by means of a two-armed lever 21 which is journaled on the one hand on a pivot 22 and on the other hand on a pivot 23. The pivot 22 is arranged on a link 24 which is rotatable around the pivot 23 of a bell crank lever 25, which latter is adapted for swinging movement around a fixed pin 26 secured to the frame of the machine. The bell crank lever 25 is actuated by a crank mechanism 27, which is likewise mounted on the shaft 20.

To enable the needle bed 6 and the latch bed 7 to perform a movement which conforms with the movement of the fleece 8 during the piercing phase, i.e. a movement substantially perpendicular to the direction of the axis of the needle 1, the link 15 is pivotally mounted on a pivot 28, located on an arm 29 which is rigidly secured to a shaft 30.

Similarly, the link 24 of the latch bed 7 is freely rotatable on pivots 31 of an arm 32, which latter is likewise rigidly fixed to the already mentioned shaft 30. The shaft 30 is mounted for rotation in bearings 33 on the machine frame and receives oscillatory movement from a cam disc 34 fixed on a shaft 35, via a two-armed lever 36, which is arranged for oscillatory movement on a pivot 37 rigidly mounted in the frame of the machine. The two-armed lever 36 is provided with a cam slot 38 at its other end, in which cam slot a rotary pin 39 is adjustably mounted in a known way. Said pin 39 is located at the end of a link 40, which is connected by means of a pivot 41 to an arm 42, which is secured to the shaft 30. The two-armed lever 36 is pressed against the cam 34 by a spring 43 bearing against the frame of the machine.

The described device operates as follows: The aforesaid needle beds 6 and thus also the needles 1, as well as the latch beds 7 and therefore also the latches 4 perform the usual piercing movement in the direction of the arrow S_2 according to FIGS. 3 and 4, as well as the return movement by the action of the two-armed lever 13, the bell crank lever 17 and the crank mechanism 19, or by the action of the two-armed lever 21, the bell crank lever 25 and the crank mechanism 27.

In contrast to conventional arrangements, both beds 6 and 7 and thus also the needles 1 and latches 4 carry out in the piercing phase a movement parallel to the direction of movement of the supplied fleece i.e. in the direction S_1 , which is substantially perpendicular to the direction S_2 . Said movement is accomplished by the oscillation of the shaft 30, which is produced by the cam disc 34 acting on the shaft 30, through the two-armed lever 36, cam slot 38, pin 39 and link 40.

As a result of the combined movements S_1 and S_2 the needle 1 and the latch 4 or point 2 of the needle carry out a movement according to a curve 44 shown in dotted lines in FIGS. 1 and 2.

Prior to piercing the fleece 8 with the point 2 of needle 1, the latter is in a position shown in FIG. 1, in which the latch 4 lies in the cavity 5 of the needle. The point 2 of the needle 1 begins to penetrate into the fleece 8 and the needle 1 moves on the one hand in the direction S_2 along its axis, and on the other hand in the direction S_1 , together with the supplied fleece, and the resultant of this movement is the path described by the point 2 of the needle 1 from point 45 to point 46 of the curve 44. The position of the needle 1 and of the latch 4 at the time when the piercing operation is terminated, is shown in FIG. 2.

In this phase the latch 4 has by now carried out a relative shifting movement in the direction of the longitudinal axis of the needle 1 to a position in which it closes the hook 3 of the needle 1. Beginning from this position, the needle 1 starts its return movement to its initial position, following at the same time the movement of the fleece 8 in the direction of the arrow S_1 , its point 2 travelling from point 46 to point 47 of the curve 44, in which point the needle 1 with the latch 4 leaves the fleece 8.

On this travel of the point 2 of the needle along the curve 44 from point 45 over point 46 to point 47 a knitting loop is formed in a known way and the loop is passed through the fleece, without the hole pierced in the fleece 8 becoming deformed, as would otherwise happen in a known device due to a non-conform movement of the needle 1. After the point 2 of the needle 1 has left the fleece 8, the point 2 of the needle 1 returns quickly to its basic position along the path from point 47 to point 45.

Before the point 2 of the needle 1 carries out its movements from point 47 to point 45, the fleece 8 is shifted by a distance "A," which, together with the length of the stroke "B" of the needle 1 in the direction of the arrow S_1 determines the total width of the course "C." This length of the stroke "B" of the needle 1 and thereby the width of the course "C" can be adjusted by changing the position of the pin 39 in the cam slot 38. In the direction of the arrow S_2 the needle carries out a path marked "D" in FIG. 1.

For the purpose of achieving a substantially rectilinear movement of the point 2 of the needle 1 and of the latch 4 the length of the links 15 and 24 in relation to the length of the upper arms of the bell crank levers 17 or 25 is chosen such, that the links 15 and 24 are substantially longer than the upper arms of said bell crank levers 17 or 25.

The described method and device is of course not restricted to the use of quilting and knitting needles of the latch-type as other conventional types of needles may be used as well.

What we claim is:

1. A device for quilting and interknitting of flat textile fabrics, consisting of various materials and transported in a feeding direction, comprising a frame, a needle bed and a latch bed mounted in said frame for reciprocal movement, knitting needles provided with needle hooks accommodated in said needle beds, each knitting needle having a latch mounted for reciprocal movement in the needle and fixed to said latch bed for movement relatively to the needles to open and close the needle hooks, a needle-actuating crank mechanism and a latch-actuating crank mechanism journaled in said frame, a first bell crank lever operatively connected to said needle-actuating crank mechanism and a second bell crank lever operatively connected to said latch-actuating mechanism, a first two-armed lever pivotally connected to said first bell crank lever and a second two-armed lever pivotally connected to said second bell crank lever, a first link pivotally connected to said first two-armed lever between its end and a second link pivotally connected to said second two-armed lever between its ends, said first and second two-armed levers being connected to said needle bed and latch bed respectively.

2. A device for quilting and interknitting of flat textile

fabrics, consisting of various materials and transported in a feeding direction, comprising a frame, a needle bed and a latch bed mounted in said frame for reciprocal movement, knitting needles provided with needle hooks accommodated in said needle bed each knitting needle having a latch mounted for reciprocal movement in the needle and fixed to said latch bed for movement relatively to the needles to open and close the needle hooks, a needle-actuating crank mechanism and a latch-actuating crank mechanism journaled in said frame, a first bell crank lever operatively connected to said needle-actuating crank mechanism and a second bell crank lever operatively connected to said latch-actuating mechanism, a first two-armed lever pivotally connected to said first bell crank lever and a second two-armed lever pivotally connected to said second bell crank lever, a first link pivotally connected to said first two-armed lever between its ends and a second link pivotally connected to said second two-armed lever between its ends, said first and second two-armed levers being connected to said needle bed and latch bed respectively, an oscillatory shaft mounted in the frame of the device for oscillatory movement about its axis, a first arm and a second arm fixed to the oscillatory shaft, the first arm being pivotally connected to said first link and the second arm to said second link, a cam disc mounted for rotation in the frame of the device, means for imparting rotary movement to said cam disc, a two-armed transmission lever operatively connected to said cam disc, a transmission link joined with one of its ends to the two-armed transmission lever, a third arm fixed on said oscillatory shaft, the third arm being pivotally connected to the other end of said transmission link whereby said two-armed levers move said needle bed and said latch bed with said needles and latches in a composite motion having a component in the longitudinal direction of said needles and a component in said feeding direction so that the fabric does not move transversely to needles piercing the same.

3. A device for quilting and interknitting of flat textile fabrics, consisting of various materials and transported in a feeding direction, comprising a frame, a needle bed and a latch bed mounted in said frame for reciprocal movement, knitting needles provided with needle hooks accommodated in said needle beds, each knitting needle having a latch mounted for reciprocal movement in the needle and fixed to said latch bed for movement relatively to the needles to open and close the needle hooks, a needle-actuating crank mechanism and a latch-actuating crank mechanism journaled in said frame, a first bell crank lever operatively connected to said needle-actuating crank mechanism and a second bell crank lever operatively connected to said latch-actuating mechanism, a first two-armed lever pivotally connected to said first bell crank lever and a second two-armed lever pivotally connected to said second bell crank lever, a first link pivotally connected to said first two-armed lever between its ends and a second link pivotally connected to said second two-armed lever between its ends, said first and second two-armed levers being connected to said needle bed and latch bed respectively, an oscillatory shaft mounted in the frame of the device for oscillatory movement about its axis, a first arm and a second arm fixed to the oscillatory shaft, the first arm being pivotally connected to said first link and the second arm to said link, a cam disc mounted for rotation in the frame of the device, means for imparting rotary movement to said cam disc, a two-armed transmission lever operatively connected to said cam disc, a transmission link joined with one of its ends to the two-armed transmission lever, a third arm fixed on said oscillatory shaft, the third arm being pivotally connected to the other end of said transmission link whereby said two-armed levers move said needle bed and said latch bed with said needles and latches in a composite motion having a component

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in the longitudinal direction of said needles and a component in said feeding direction so that the fabric does not move transversely to needles piercing the same, a pivot carried at the end of the transmission link adjacent the two-armed transmission lever, a cam slot being provided in the latter lever for cooperation with said pivot for the purpose of adjusting the length of the stroke of the transmission link and thus of said needle bed and latch bed in the direction of withdrawal of the treated material.

4. A device for quilting and interknitting of flat textile fabrics, consisting of various materials and transported in a feeding direction, comprising a frame, a needle bed and a latch bed mounted in said frame for reciprocal movement, knitting needles provided with needle hooks accommodated in said needle beds, each knitting needle having a latch mounted for reciprocal movement in the needle and fixed to said latch bed for movement relatively to the needles to open and close the needle hooks, a needle-actuating crank mechanism and a latch-actuating crank mechanism journaled in said frame, a first bell crank lever operatively connected to said needle-actuating crank mechanism and a second bell crank lever operatively connected to said latch-actuating mechanism, a first two-armed lever pivotally connected to said first bell crank lever and a second two-armed lever pivotally connected to said second bell crank lever, a first link pivotally connected to said first two-armed lever between its end and a second link pivotally connected to said second two-armed lever between its ends, said first and second two-armed levers being connected to said needle bed and latch bed respectively, an oscillatory shaft mounted in the frame of the device for oscillatory movement about its axis, a first arm and a second arm fixed to the oscillatory shaft, the first arm being pivotally connected to said first link and the second arm to said second link, a cam disc mounted for rotation in the frame of the device, means for imparting rotary movement to said cam disc, a two-armed transmission lever operatively connected to said cam disc, a transmission link joined with one of its ends to the two-armed transmission lever, a third arm fixed on said oscillatory shaft, the third arm being pivotally connected to the other end of said transmission link whereby said two-armed levers move said needle bed and said latch bed with said needles and latches in a composite motion having a component in the longitudinal direction of said needles and a component in said feeding direction so that the fabric does not move transversely to needles piercing the same, the lengths of said first and second links in relation to the lengths of the upper arms of said first and second bell crank levers being chosen such that said links are substantially longer than said upper arms of the bell crank levers, for the purpose of achieving a substantially rectilinear movement of the tips of said needles and latches.

5. A method of quilting a fabric, comprising the steps of moving the fabric in a feeding direction at a selected speed; piercing the fabric by a longitudinally moving knitting needle, and moving said needle at said selected speed in said feeding direction while said needle pierces

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said fabric so that said fabric does not move in said feeding direction relative to needles piercing the same.

6. A method of quilting a fabric, comprising the steps of moving the fabric in a feeding direction at a selected speed; piercing the fabric by longitudinally moving knitting needle; moving said needle at said selected speed in said feeding direction while said needle pierces said fabric so that said fabric does not move in said feeding direction relative to needles piercing the same; and moving said needle in a direction opposite to said feeding direction when said needle is located outside of said fabric.

7. A method as set forth in claim 6 wherein the stroke of said needle in longitudinal direction thereof is substantially greater than the stroke of said needle in said feeding direction.

8. A device for quilting a textile fabric moving in a feeding direction at a selected feeding speed; comprising a needle and a needle holder; and operating means connecting to said needle holder for moving said needle in a composite motion having a first component in the longitudinal direction of said needle and transverse to said fabric so that said needle pierces said fabric, and a second component in said feeding direction and at said feeding speed so that said needle moves at the same speed as said fabric in said feeding direction while piercing said fabric.

9. A device for quilting a textile fabric moving in an operating plane in a feeding direction at a selected feeding speed; comprising a needle and a needle holder; first operating means for reciprocating said needle holder in a direction perpendicular to said operating plane and in longitudinal direction of said needle; and second operating means operatively interconnected with said first operating means for simultaneously reciprocating said needle holder with said needle in said feeding direction in a forward stroke at said feeding speed while said needle pierces the fabric, and in a return stroke while said needle is located outside of the fabric.

10. A device as set forth in claim 9 wherein said needle includes a main part having a hooked tip at one end thereof, and being mounted in said needle holder at the other end thereof, and a latch part mounted on said main part for reciprocating movement between a position closing said hooked tip and a position opening said hooked tip; and third operating means connected to said latch part for reciprocating the same between said positions, and being operatively connected to said first operating means to reciprocate said latch part in synchronism with the longitudinal reciprocation of said main part.

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