

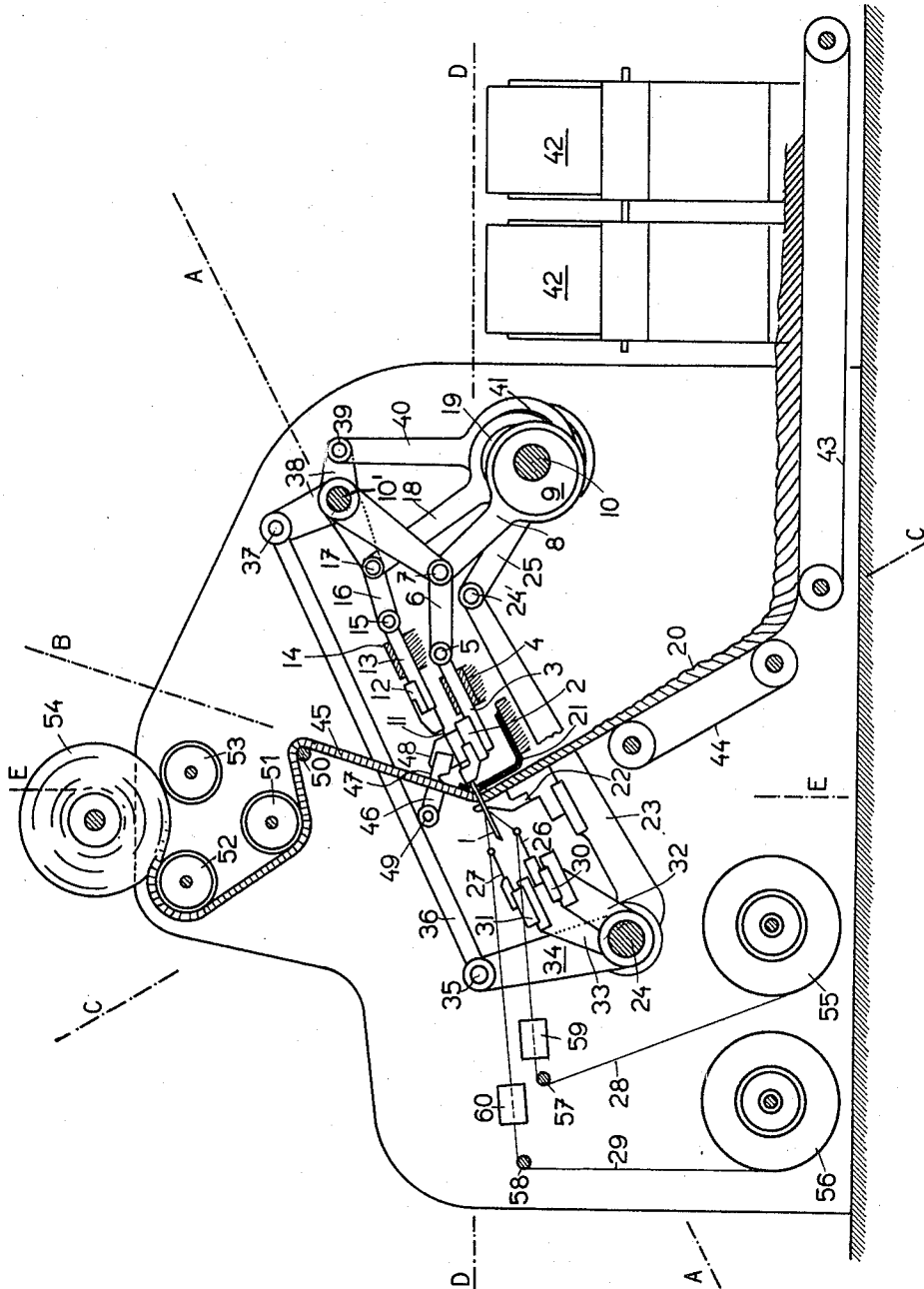
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QUILTING AND KNITTING MACHINE

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QUILTING AND KNITTING MACHINE

Erwin Peschl, Alois Rataj and Antonín Danhel, Brno, and Josef Zmatlík and Jaromír Sedlecký, Prague, Czechoslovakia, assignors to Vyskumny Ústav Bavlnarský, Ustinnad Orlici, Czechoslovakia

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The present application is a continuation application of our copending application Ser. No. 166,577 filed Jan. 16, 1962, and now abandoned.

The present invention relates to a quilting and knitting machine, and more particularly a machine for quilting a fleece or batting by threads knitted into loops.

Known machines of this type employ latch needles arranged in rows and operating either in a vertical plane or in a horizontal plane. The same needle arrangements are used in warp knitting looms.

In machines with vertical quilting and knitting needles operating in a vertical plane and having upwardly directed points, the sheet of the fleece or batting is guided in a horizontal plane, and the warp beams are arranged in the upper part of the machine. Thus, the height of the machine is great, and the needle operating mechanism must be located below the sheet which is quilted by the needles, and consequently access to the mechanism operating the needles, and the exchange of damaged needles or latches is difficult since the sheet has to be entirely removed.

Machines having needles operable in a horizontal plane, require the sheet of material to move in vertical direction and to be wound up on a device including a special frame located high above the needles. In the same manner, the warp beams must be arranged on a special frame requiring additional space. In machines of this type, it is not possible to provide means receiving the quilted sheet for further treatment, such as shaping or depositing on a conveyor.

In both constructions of known quilting machines of this type, latch needles are used. Latch needles used for quilting sheets include a hooked main part, and a latch or tongue slidable in a longitudinal cavity of the main part of the needle between a hook-closing position, and a hook opening position. Since the needles have to pierce the sheet of the fleece or batting, the recesses and cavities of the main parts of the needles are filled with dust and fiber parts, so that the latches cannot freely operate, as required.

In machines in which the fleece is vertically moved, the fleece is suspended and is stretched by its own weight, which has a detrimental influence on the final product.

It is the main object of the present invention to overcome the disadvantages of known quilting machines, and to provide a quilting machine in which all parts are arranged in such a manner that they are easily accessible for control, service and repairs.

Another object of the invention is to provide a quilting machine in which the sheet of fleece or batting is supported and transported in such a manner that it is not stretched, while on the other hand access to the mechanism controlling the needles, thread guides and other movable parts of the machine is not prevented by the sheet of material while the same is being quilted.

Another object of the invention is to operate the needles in an oblique plane, and to feed the sheet material in another oblique plane.

Another object of the invention is to guide the quilted material in a third oblique plane toward the take-up means.

Another object of the invention is to provide the thread supply means including thread guides in the front part of the machine, and to arrange the main drive shaft in the rear part of the machine so that the linkage means controlling the needles are easily accessible.

An important object of the present invention is to arrange the needles in a downwardly pointing oblique position.

With these objects in view, one embodiment of the present invention comprises a set of needles having downwardly directed points and being located in a first oblique plane defining acute angles with vertical and horizontal planes; means for guiding a sheet which is to be quilted past the needles and extending in a second oblique plane intersecting the first oblique plane in the region of the needle points; feeding means for moving the sheet along the guide means and past the needles; and operating means for reciprocating the needles so that the needles pierce the sheet for quilting the same.

In the preferred embodiment of the invention, the second oblique plane defines an angle of less than 60° with a horizontal plane.

The feeding means include an upwardly moving conveyor band located in the second oblique plane below the needles.

Take-up means are located above the needles for winding up the quilted sheet, and include guide elements for guiding the sheet in a third oblique plane defining acute angles with a vertical plane and the first oblique plane. The angle between the first and third oblique planes is preferably less than 75°. Due to this arrangement, it is possible to place the take-up device above the needles so that the operator can remove the finished product without leaving his normal station at which he observes the operation of the needles and thread guides. The main shaft from which the needles, thread guides and thread devices are operated, is located in the rear of the machine and below the needles. An auxiliary shaft which controls additional motions of devices forming part of the machine is also located below the needles, so that the operator has full access to all devices.

For the same reason, the thread supply means including the stop motions by which the machine is stopped upon the breaking of the thread, are also located at the front of the machine below the level of the needles. In this manner, the threading in of broken threads into the thread guides can be easily accomplished. In the preferred embodiment, a cutting device for the edges of the sheets is located above the needles, which has the advantage that cut-off pieces can be easily removed.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of the specific embodiments when read in connection with the accompanying drawing in which the single figure is a schematic vertical sectional view of one embodiment of the invention.

A row of stitch forming needles 1 is mounted on a needle bar 2 which is supported by members 3 guided for sliding movement in supporting means 4 mounted on the machine frame. Supporting means 4 are downwardly inclined so that the needles 1 move in a first oblique plane A which defines an acute angle with a horizontal plane D extending to the region of the needle points, assuming a retracted position of the needles in which they are located on the right side of the sheet of material 20 which is guided past the needles. Guide means including an upper member 21, and a lower member 22 define a guideway for the sheet of material 20, and feeding means in the

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form of a conveyor band 44 guide the sheet 20 toward the guide way so that the sheet 20 moves in a second oblique plane C.

The needles are reciprocated, as will be described hereinafter in greater detail, and move to an advanced position shown in the drawing, in which they pierce the material 20 in order to quilt the same by knitting stitches.

The quilted material is wound up on a take-up reel 54 located above the needles and is transported by rollers 51, 52 and 53, roller 51 being located in a vertical plane E passing through the region of the retracted needle points. A guiding roller or rod 50 determines the direction of the portion of sheet 20 above the needles, and is positioned in such a manner that the quilted sheet portion 45 moves in a third oblique plane B which also extends to the region of the retracted needle points. The oblique plane B defines with a horizontal plane D an angle of substantially 75°, so that the oblique plane A defines acute angles with the horizontal plane D and with the oblique plane B whereby the angle between the oblique plane A and the oblique plane B is less than 75°. The angle between the oblique plane C and the horizontal plane D is preferably about 60° or less.

All angles are considered to be located on the right side of the vertical plane E.

A main drive shaft 10 has a plurality of eccentric means 9 in the form of eccentric discs. Shaft 10 is located in the rear of the machine on the right side of the transported sheet 20, and below the oblique plane A. In the illustrated embodiment, the axis of shaft 10 is also located below the horizontal plane D, and consequently below the needles. Members 3 are connected by a pivot 5 to a link 6 which is connected by a pivot 7 to the arm 8 of a follower whose ring-shaped end portion surrounds an eccentric disc 9 so that the needles 1 are reciprocated between a retracted position located on the right side of sheet 20, and the illustrated advanced position piercing the sheet and extending through openings in the upper and lower guide members 21 and 22.

The needles are provided with latches 11 sliding in recesses of the needles for closing the hook shaped ends of the needles. Latches 11 also move in the oblique plane A and are mounted on a latch bar 12 secured to members 13 guided in guide means 14 and connected by pivot means 15 to links 16. Links 16 are connected by pivot means 17 to the arm 18 of a follower whose ring-shaped end portion surrounds an eccentric disc 19 on shaft 10 so that the latches 11 are reciprocated during rotation of shaft 10 to open and close the hooks of latch needles 1 in a desired sequence.

While the needles 1 move forwardly and downwardly to pierce the sheet, the latches 11 close the hooks of the needles to draw a thread through the sheet 20. In the position shown in the drawing, the latches are retracted, so that the needle hooks are opened to receive a warp thread from the thread guides 26 and 27. The operation of the latch needles is similar to the operation of the latch needles in knitting machines of the type disclosed, for example, in the U.S. Patent 2,428,405 in which, however, the needles and thread guides are used for a different purpose.

The upper guide member 21 is stationary and is used as a knock-over means, while the lower guide member 22 is supported on levers 23 which are mounted for angular turning movement on an auxiliary shaft 24. Levers 23 extend laterally of the transported sheet 20 below the needles 1 and are connected by pivot means 24' to follower means 25 whose ring-shaped end portions surround eccentric discs on shaft 10. When shaft 10 rotates, levers 23 perform an angular movement, and guide member 22 is reciprocated along a circular path which almost coincides with the oblique plane C in the region of the needles.

The auxiliary shaft 24 is located on the left side of the vertical plane E, and below the needles 1.

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The thread guides 26 and 27, which place the warp threads 28, 29 in the hooks of the latch needles 1, are supported on bars 30 and 31 which are mounted for sliding movement parallel to the sheet 20 and in axial direction of shaft 24 in corresponding guide portions which are supported by levers 32 and 33 which are secured to shaft 24. In the illustrated embodiment of the invention, shaft 24 is also located below the extension of the oblique plane A to the front part of the machine.

Shaft 24 has fixed arm means 34 to which link means 36 extending laterally of the sheet portion 45 are articulated by pivot means 35. The other ends of the links 36 are connected by pivot means 37 to bell-crank lever means 38 associated with a suspension rod 10'. Pivot means 39 connect bell-crank lever means 38 to follower means 49 whose ring-shaped end portion surrounds a corresponding eccentric disc 41 on shaft 10. Consequently, during rotation of shaft 10, levers 32 and 33 will perform an angular reciprocating movement which will be transmitted to the thread guides 26 and 27 which also move with members 30 and 31 transversely to the needles 1 so that the warp threads are threaded into the hooks of needles 1. The warp threads 28 and 29 are supplied by warp beams 55 and 56 which are located in the front part of the machine below the level of the needles. The warp threads 28 and 29 are guided over guide rolls 57, 58 so that the upper portion of the warp threads 28 and 29 extends in substantially horizontal direction. Warp stop motions 59 and 60 sense the threads so that the machine may be stopped when a thread break occurs.

A device 42 for shaping and depositing a fleece or batting 20 is arranged above the conveyor 43 which supplies the fleece to the inclined band conveyor 44 whose operative band portion extends in the direction of the oblique plane C and of the guideway between the guide members 21 and 22. Consequently, the sheet 20 is fed in the oblique plane C while being supported on band conveyor 44 whereby a stretching of the sheet due to its own weight is prevented. The sheet 20 extends thus at an angle of 60° or less to the horizontal plane D, while the portion of sheet 20 guided in the guideway between guide members 21 and 22 extends at an angle of substantially 90°, or slightly less than 90° to the needles and to the oblique plane A.

The needles 1 in cooperation with the thread guides 26 and 27 quilt the material 20 with knitting stitches, and the quilted material is guided over the transverse guide element 50 in the oblique plane B so that the portion 45 of the quilted sheet is guided toward the rear of the machine. Rollers 51, 52 and 53 guide the quilted sheet further, and effect the winding-up of the sheet in the form of a roll 54. The angle between the sheet portion 20 and the sheet portion 45 is substantially 135°, or less.

Stationary cutting means 46 are mounted on a holder 49 on the frame of the machine, and cooperate with movable cutting means 47 supported by a holder 48 on the needle bar 2 and reciprocating with same. The cutting means 46, 47 cut off the edges of the sheet portion 45 which were not quilted by the needles 1.

The arrangement of the present invention permits the placing of the let-off warp beams 55 and 56 in the lower part of the machine, while the operation of the needles 1, thread guides 26 and 27, and stop motions 59 and 60 can be observed by the operator, who can re-thread the thread guides when the thread breaks. Due to the inclined position of the quilted sheet portion 45, the wound-up quilted material 54 is also in the reach of the operator who can remove the finished material, when required. The cut-off edge portions of the finished material can be easily removed after they drop into containers in the lower part of the machine.

In this manner, one operator can supervise the operations of one machine so easily that he can simultaneously attend several machines.

The inclined positions of the portions of the sheet material, and of the needles, result in a machine which takes

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up very little floor space, and permits the mounting of the means 42 for supplying the sheet material to the machine in the rear part of the machine adjacent the same, so that again very little floor space is required.

Since the needles 1 point downwardly, and are located below the sheet portion 20 forwardly of the same, dust and small fiber particles which are caught in the hook or cavities of the needles, are automatically ejected by the latches and fall out of the needles so that the needles are self-cleaning, and the operation of the latches cannot be disturbed by dust and fiber particles accumulating in the hook portions and in the cavities of the needles. Part of the weight of the sheet portion 20 is directly supported on the conveyor band means 44, and due to the frictional engagement between the band conveyor 44 and the fed sheet portion 20, a downward sliding of the fed sheet portion is prevented, so that the sheet portion 20 cannot be stretched by its own weight. Since the sheet material forms an upright wall between the front and rear of the machine, all operating parts of the machine are freely accessible either from the front or from the rear of the machine, which is not the case in machines in which the sheet material is transported in a horizontal plane.

It will be understood that each of the elements described above or two or more together, may also find a useful application in other types of quilting machines differing from the types described above.

While the invention has been illustrated and described as embodied in a quilting machine in which the needles reciprocate in an oblique plane and have downwardly directed points for piercing a sheet material fed in another oblique plane, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoints of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A quilting and knitting machine, comprising, in combination, a set of needles including movable latches and having downwardly directed needle points, and being located in a first oblique plane defining angles smaller than 90° with vertical and horizontal planes extending upwardly and rearwardly from the region of said needle points; guide means for guiding a sheet past said needles and extending in a second oblique plane transverse to said first oblique plane and intersecting the same in the region of said needle points, said guide means being adapted to be penetrated by said needles; feeding means for moving the sheet along said guide means and past said needles; and operating means for reciprocating said needles and said latches in said first oblique plane so that said needles pierce the sheet for quilting the same.

2. A machine according to claim 1, and including first and second actuating means located rearwardly and forwardly, respectively, of said second plane for moving said needles and latches on one hand, and said guide means on the other hand; and wherein said operating means include a main shaft located rearwardly of said second plane, first linkage means connecting said main shaft with said first actuating means.

3. A machine according to claim 1 wherein said second oblique plane defines an angle of less than 60° with said horizontal plane, and is located below the same.

4. A machine according to claim 1 wherein said guide means are located below said needles and wherein said second oblique plane defines an angle of substantially 90° with said first oblique plane.

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5. A machine according to claim 1 wherein said operating means include a main shaft located rearwardly of said needles above said second oblique plane, and means connecting said main shaft with said needles and said latches for reciprocating the same.

6. A machine according to claim 5, wherein said guide means include an upper rear guide member and a lower front guide member; including means located forwardly of said second oblique plane for supporting said lower front member for movement substantially in said second oblique plane.

7. A machine according to claim 1 wherein said feeding means include upwardly moving conveyor band means located below said needles in said second oblique plane and adapted to support and transport the sheet toward said guide means.

8. A machine according to claim 1 wherein said feeding means include an upwardly moving conveyor located below said needle points and guide means extending in said second oblique plane and adapted to transport the sheet toward said guide means; wherein said guide means are located below said needle points; and wherein said operating means include a main shaft located rearwardly of said needles above said second oblique plane, and means connecting said main shaft with said needles and latches for reciprocating the same.

9. A machine according to claim 1 and including take-up means located above said horizontal plane for winding up the sheet, and including guide elements for guiding the sheet in a third oblique plane defining acute angles with said first oblique plane; and wherein said feeding means are located below said needle points and guide means and move the sheet upwards along said guide means.

10. A machine according to claim 1, wherein said second oblique plane defines an angle of less than 60° with said horizontal plane; wherein said operating means include a main drive shaft located rearwardly of said needles below said horizontal plane and above said second oblique plane; and including cutting means located in said third oblique plane above said needles for cutting the sheet along the lateral edges thereof.

11. A machine according to claim 1 including thread supply means located forwardly of said needles and of said vertical plane and below the level of said horizontal plane, and including thread guides for supplying threads to said needles; and wherein said guide means include two guide members located on opposite sides of the sheet.

12. A machine according to claim 11, wherein said operating means include a main shaft located rearwardly of said needles above said second oblique plane, and means connecting said main shaft with said needles for reciprocating the same.

13. A machine according to claim 12, wherein said second oblique plane defines an angle of less than 60° with said horizontal plane and is located below the same; wherein said feeding means include upwardly moving conveyor means located below said needles extending in said second oblique plane and adapted to transport the sheet toward said guide means; and including take-up means located above said horizontal plane for winding up the sheet and including guide elements for guiding the sheet in a third oblique plane defining acute angles with said first oblique plane.

14. A machine according to claim 1 wherein said feeding means include upwardly moving first conveyor band means located below said needles extending in said oblique plane and adapted to transport the sheet to said guide means and needles, a horizontal second conveyor band means located at the lower end of said first conveyor band means, and means for supplying the sheet to said horizontal conveyor band means.

15. A machine according to claim 1 wherein said set of needles is arranged in a row; including a needle bar supporting said row of needles; thread supply means

located forwardly of said needles and including thread guides for supplying thread to said needles; wherein said guide means are located below said needles and include an upper member and a lower member having openings traversed by said needles when the same are reciprocated, said upper and lower member defining a guideway for the sheet extending in said second oblique plane; wherein said feeding means include upwardly moving conveyor means for moving the sheet along said guideway, said conveyor means being located below said needles and below said horizontal plane and having a band portion located in said second oblique plane; said second oblique plane defining an angle of less than 60° with said horizontal plane, said lower member being reciprocable in said second oblique plane; take-up means located above said needles and including guide elements for guiding the sheet in a third oblique plane defining acute angles with said vertical plane and said first oblique plane so that the sheet portions above said needles move rearwardly and upwardly; cutting means located in said third oblique plane above said needles and below said take-up means for cutting the sheet along the lateral edges thereof; a main shaft located rearwardly of said vertical plane and said needles above said conveyor band means and below said horizontal plane, said main shaft having an eccentric means; first linkage means including follower means cooperating with said eccentric means and connected to said needle bar and to said latches for reciprocating said needles and latches so that the same pierce the sheet after receiving thread from said thread guides in said advanced position; second linkage means including follower means cooperating with said eccentric means and being connected to said thread guides for operating the same; and third linkage means including follower means cooperating with said eccentric means and being connected with said reciprocable lower member of said guide means for reciprocating the same; said main shaft and said linkage means being parts of said operating means.

16. A machine according to claim 15 and including an auxiliary shaft located forwardly of said vertical plane and of said needles and below the level of said needles; wherein said second linkage means include lever means mounted for turning movement on said auxiliary shaft and supporting said thread guide; and wherein said third linkage means include lever means mounted for turning movement of said auxiliary shaft and supporting said lower member.

17. A machine according to claim 15 wherein said lower member of said guide means is comb-shaped and mounted for reciprocating movement in said second oblique plane; and wherein said third linkage means include a lever connected to said comb-shaped lower member and being turnably mounted on said auxiliary shaft.

18. A machine according to claim 15 and including let-off warp beam located forwardly and below said needles; and wherein said thread supply means include guide rolls located forwardly of said thread guides above

said warp beam for guiding threads to said thread guides, and stop motions adapted to rest on the threads and located between said rolls and said thread guides.

19. A quilting and knitting machine, comprising, in combination:

stitch forming means operable in a first plane disposed at an angle to a vertical plane to make knitting stitches;

feeding means located below said stitch forming means for feeding a sheet material in a second plane in upward direction to said stitch forming means;

take-up means located above said stitch forming means for winding up the sheet material after said stitch forming means have made stitches therethrough so that the sheet material forms an upright wall between the front and rear of the machine;

thread supply means located in front of said stitch forming means on one side of the sheet material; and operating means for actuating said stitch forming means and located rearwardly of said stitch forming means on the other side of the sheet material whereby said stitch forming means, thread supply means, operating means and both sides of the sheet material are accessible from the front or rear of the machine.

20. A machine according to claim 19 wherein said thread supply means include thread guides for inserting thread into said stitch forming means.

21. A machine according to claim 19 including guide means for guiding a sheet material past said stitch forming means in a second plane transverse to said first plane and defining an angle of less than 60° with the horizontal plane, said guide means being adapted to be penetrated by said stitch forming means and including a guide member reciprocable in said second plane; wherein said feeding means include conveyor means for transporting said sheet in said second plane to said guide means and stitch forming means; including a guide element between said stitch forming means and said take-up means for guiding the sheet material in a third plane defining an acute angle with a said first plane; wherein said thread supply means include supply reel means located lower than said stitch forming means, and thread guides for inserting thread into said stitch forming means; and wherein said operating means include a main shaft and connecting means connecting said main shaft with said stitch forming means.

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ROBERT R. MACKEY, *Acting Primary Examiner*.

MERVIN STEIN, R. FELDBAUM, *Assistant Examiners*.