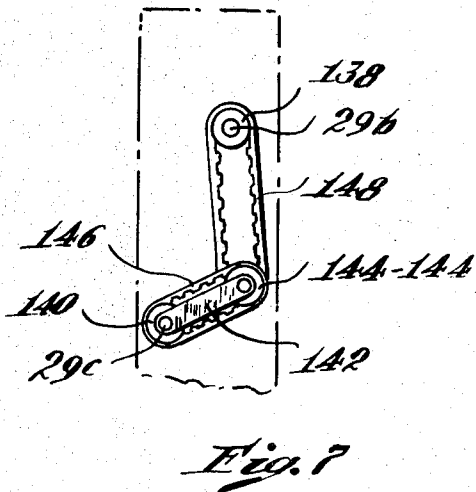
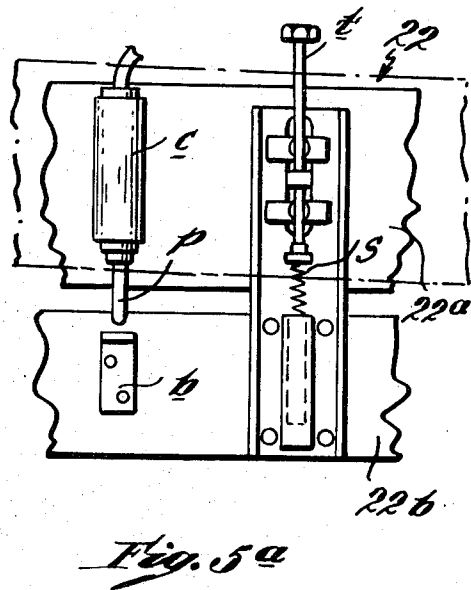
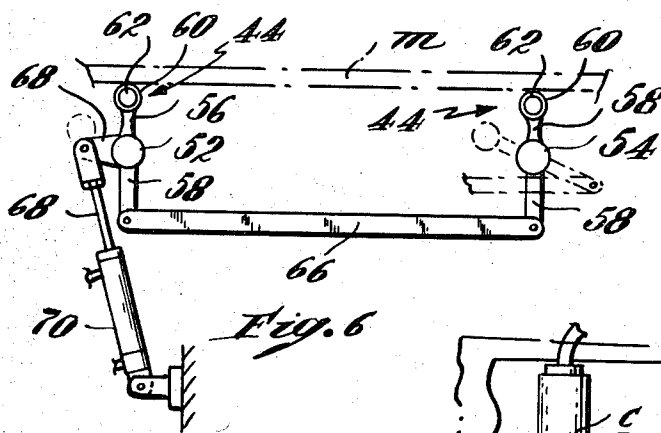
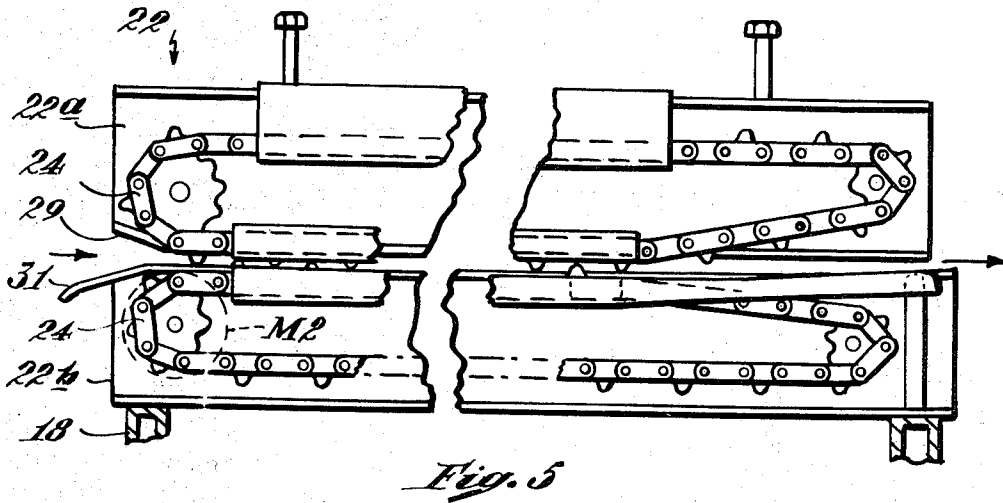


Fig. 4



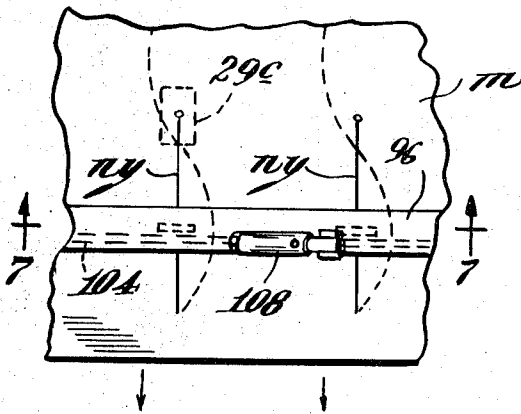


Fig. 8

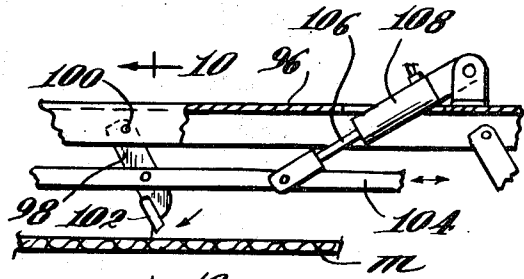


Fig. 9

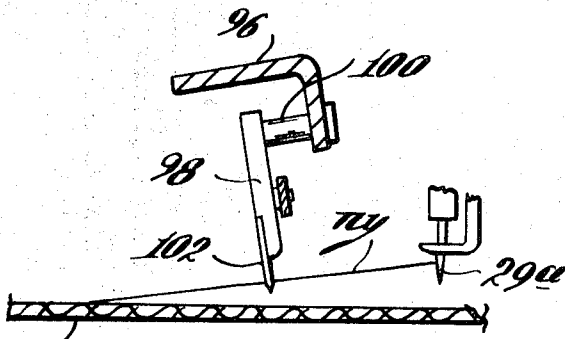


Fig. 10

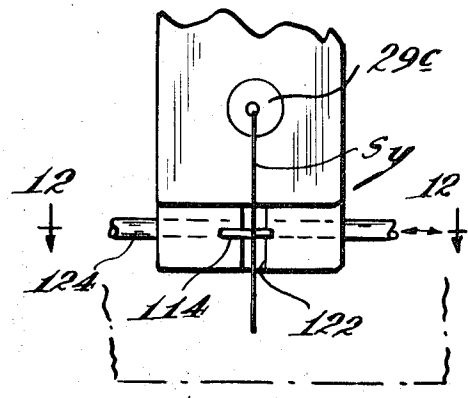


Fig. 11

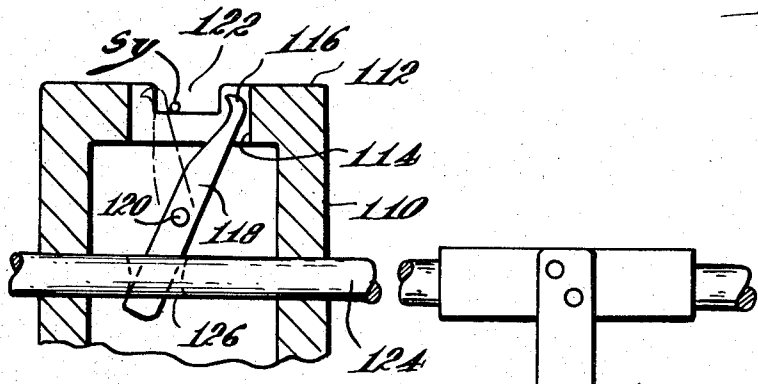
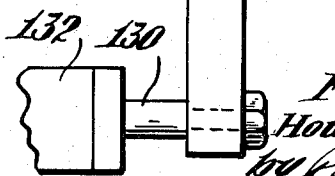


Fig. 12



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QUILTING APPARATUS

BACKGROUND OF THE INVENTION

Quilting machines providing with single and multiple sewing heads and with patterns for guiding the frames which support the material to be quilted relative to the sewing heads have been used for years. Two such machines are disclosed in U.S. Pat. Nos. 3,180,293 and 3,312,184. Our pending application Ser. No. 711,386, filed Mar. 7, 1968 now U.S. Pat. No. 3,500,777 relates more closely to the present invention in that it embodies conveyors for moving the material to be quilted onto and off of the supporting frame for the quilting operation. This invention has for its purpose to improve the operation of the aforesaid machine and the product produced thereon and to reduce the amount of manual labor required and the need for close attention on the part of the operator. More especially the improvements reside in reducing the transverse and longitudinal sag in the material, cutting the needle and bobbin threads automatically as the material leaves the machine and maintaining a constant speed ratio between the needle and the bobbins.

SUMMARY OF THE INVENTION

As herein illustrated, the machine is of the kind in which material to be quilted is supported on a frame for longitudinal and transverse movement relative to sewing instrumentalities of a plurality of transversely disposed sewing heads, means for effecting movement of the frame comprising a pattern and power operable means to cause the frame to follow the pattern and spaced parallel transversely disposed conveyor means on the frame adapted to grip the opposite longitudinal edges of the material to draw it onto the frame for quilting operation and after quilting to move it off the frame. In accordance with this invention, clamping means are provided at opposite ends of the frame adapted to clamp the leading and trailing ends of the material after it has been moved onto the frame, the clamping means comprising vertically spaced upper and lower jaws between which the material is moved onto the frame by conveyor means. The jaws are adapted to be closed on the leading and trailing ends and as an incident to such closing imparting longitudinal tension thereto. Underside supporting means are situated below the plane of the conveyor means which are movable upwardly to support the underside of the material as it is drawn onto the frame by the conveyor means and there is power operable means for effecting operation of conveyor means and power operable means for simultaneously raising the underside supporting means into operative position. To facilitate introducing the leading end of the material to the conveyor means there is provided means for separating the conveyors at their entrance ends and converging aprons for guiding the leading end between the separated conveyor, said means being operable to bring the conveyor into operative engagement with the leading end of the material for parallel introduction therebetween.

Each sewing head embodies needles and needle-operating mechanism and bobbin and bobbin-operating mechanism situated above and below the material. In accordance with another aspect of the invention there is means for moving the needles and needle-operating mechanism vertically with respect to the bobbin and bobbin-operating mechanism at the end of the quilting operation to enable moving the quilted material off the frame and a plurality of thread cutters, one associated with each sewing head for cutting the needle threads and a plurality of thread cutters, one associated with each sewing head for cutting the bobbin threads, said thread cutters being operative to cut the threads as the material is being moved off the frame.

The needles and needle driving mechanism and bobbin driving mechanism are driven by spaced parallel drive shafts and in accordance with another aspect of the invention, these drive shafts are maintained in synchronism so as to maintain a constant speed ratio of the drive shafts with respect to each other by pulleys fixed respectively to said shafts, comprising

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an arm pivotally supported for rotation on the axis of the bobbin shaft and a double pulley mounted on the arm at a radial distance from the center of rotation of the arm such that the driving relation between the pulleys remain constant throughout relative movement of the shafts.

DESCRIPTION OF THE DRAWINGS

The invention will be described in reference to the accompanying drawings:

FIG. 1 is a side elevation of the machine showing the supporting frame for the material which is to be quilted with the frame situated at the left-hand side of the sewing units;

FIG. 2 is a plan view of FIG. 1;

FIG. 3 is a plan view to a very much smaller scale of a material which has been quilted;

FIG. 4 is an elevation taken longitudinally of the supporting frame for the material to be quilted showing partly in section clamping means for the opposite ends of the material and in elevation-supporting means from the underside of the material;

FIG. 5 is an elevation taken on the line 5-5 of FIG. 2 to much larger scale showing the conveyor means;

FIG. 5a is a fragmentary elevation of the rear side of the conveyor-supporting frame as seen in FIG. 5, showing the means for adjustably holding the upper conveyor relative to the lower conveyor and a pneumatically operable cylinder for elevating the upper conveyor relative to the lower conveyor;

FIG. 6 is a fragmentary view taken on the line 6-6 of FIG. 4 showing the means for elevating and lowering the supporting means for the underside of the material;

FIG. 7 is an elevation showing the drive means for synchronizing the drive shafts for the needle bars and bobbins;

FIG. 8 is a fragmentary plan view, showing the threads drawn away from the needles by movement of the quilted material from the machine;

FIG. 9 is a section taken on the line 9-9 of FIG. 8;

FIG. 10 is a section taken on the line 10-10 of FIG. 9;

FIG. 11 is a plan view of a single thread drawn out of a bobbin by movement of the quilted material from the machine; and

FIG. 12 is a fragmentary view showing a single bobbin thread cutter.

The machine shown in this application is basically like that shown in my pending application Ser. No. 711,386, filed Mar. 7, 1968, and like that shown in the aforesaid application has a base frame 10 supported by wheels 12 at its four corners on longitudinally spaced transversely disposed track 14-14 resting on the floor. The base frame 10 supports spaced parallel longitudinally extending tracks 16-16 and a secondary frame 18 having wheels 20 at its four corners, is supported on the tracks 16-16 for longitudinal movement. The secondary frame 18 supports in transversely spaced relation rails 22-22 comprised of upper and lower channels 22a, 22b (FIG. 5) which in turn support longitudinally extending endless conveyors 24-24. The conveyors move the material to be quilted onto the secondary frame 18 for the quilting operation and move it off of the secondary frame 18 following the quilting operation. Vertically disposed spaced parallel posts 26-26 (FIG. 2) support a pair of vertically spaced transversely extending beams 28 and 30 transversely of the frames substantially midway between tracks 14-14 and these support conjunctively a plurality of transversely spaced sewing heads 29. Each sewing head comprises needle bars 29a and means including a drive shaft 29b for driving the same and bobbins 29c and means including a drive shaft 29d for driving the same mounted respectively on the upper and lower beams 28 and 30.

To create a pattern, for example, such as shown in FIG. 3, the frames 10 and 18 are simultaneously moved transversely and longitudinally with respect to the sewing heads by means of a pattern track mounted on the floor between the post 26-26 and a follower mounted on the frame 18 and in engage-

ment with the pattern track. Pattern drives of this kind are old in the art and hence need not be described further herein.

In the aforesaid application the material *m* to be quilted was laid out flat on a supporting table 40, FIG. 1, provided with wheels 42 by means of which it was moved up to the adjacent end of the frame 18 whereupon the leading end of the material was introduced between the endless conveyors 24-24. The conveyor was then started so as to grip the leading end of the material and pull it onto the frame 18.

To facilitate introducing the leading end of the material between the upper and lower conveyors the rails 22a and 22b as shown herein in FIG. 5a and in the aforesaid application are mounted on the frame 18 with the lower rails 22b fixed and the upper rails 22a yieldably supported on the lower rails. The rails 22a are supported by spring *s* and by adjustments of adjustable screws *t*, the compression in the springs *s* may be varied to increase or decrease the pressure between the confronting runs of the conveyors. Supported in this manner the upper rails 22a are movable upwardly relative to the lower rails 22b and thus enable separating the conveyors at the entrance end thereof by raising the upper rails at that end upwardly relative to the lower rails. To accomplish this a pneumatically operable cylinder *c* is mounted on each of the upper rails 22a-22a in a vertical position with its piston rod *p* extending to a position above a bracket *b* fastened to the lower rail. By supplying pressure to the cylinders to extend the rods against the brackets *b* the upper rails 22a-22a may be raised with respect to the lower rails, angularly about their opposite ends as indicated by the dot-dash lines in FIG. 5a. As soon as the material is positioned between the conveyors the cylinders are vented and the rails 22a-22a are returned to their parallel positions with respect to the lower rails 22b-22b. To further facilitate the entrance of the material between the conveyors, converging aprons 29 and 31, FIG. 5, are provided transversely of the upper and lower rails respectively.

In the aforesaid machine the conveyors were supported in a slightly divergent relation in the direction of movement of the material to impart transverse tension to the material, thereby to take up slack or sag. In accordance with this invention, there is provided means for supplementing the action of the conveyors to further reduce the transverse sag as the conveyors draw the material onto the frame preparatory to the end clamping. For this purpose there are provided spaced parallel longitudinally extending underside supporting bars 44-44, adapted to be held with their upper sides substantially at the level of the interengaged runs of the conveyors. The underside supporting bars 44-44 are mounted from the transverse beam 30 and extend rearwardly toward the table 40. Each bar comprises a rigid rod 46 fixed at one end in a boss 48 supported by the beam 30 in a substantially horizontal position below the plane of the interengaged runs of the conveyors. Bushings 52 and 54 are rotatably mounted on each rod 46 and these have radial arms 56 and 58. A tubular part 60 is secured between the pair of arms 56-56 and a link 66 is pivotally connected between the pair of arms 58-58. To provide for extension or retraction of the support, each tubular part is provided with an extension rod 62 which may be drawn forwardly therefrom variable amounts.

A crank arm 68 is fixed to the bushing 52 and this, in turn, is pivotally connected to a piston rod 68 extending from a cylinder 70, mounted on the frame 18. Pressure supplied to the lower end of the cylinder 70 will rotate the bushing 52 in a clockwise direction to raise the bars 44-44 into operative position and pressure supplied to the upper end of the cylinder will rotate the bushing 52 in anticlockwise direction to lower the bars 44-44 out of operative position. In use the supporting bars 44-44 are moved into operative position and at the same time operation of the conveyor means is initiated so as to hold the material without sag while it is being drawn onto the frame 18. Following clamping of the ends of the material after it is drawn onto the frame, the supporting bars are lowered so as not to interfere with the quilting operation.

Clamping means were used in the machine shown in the aforesaid application for clamping the leading the trailing ends of the material. The clamping means were manually moved into clamping position. The present clamping means is automatically moved into clamping position and comprises the improvement over the aforesaid clamping means in that they apply longitudinal tension to the material simultaneously with clamping engagement therewith. This is achieved as herein illustrated by upper and lower clamping jaws 72 and 74, FIG. 4, arranged transversely of the frame 18 for movement into and out of engagement in such fashion as to engage the material at the leading and trailing ends and as an incident to such engagement and clamping to pull these ends in opposite direction in relation to each other to impart longitudinal tension to the material. The upper jaws 72 are pivotally supported at their ends intermediate the ends of the spaced parallel arms 75-75, the arms 75-75 in turn being pivotally mounted at one end is on pivot pins 76-76 fixed to the frame 18. The opposite ends of the arms 75-75 are pivotally connected by pins 78-78 to piston rods 80-80 extending from cylinders 82-82 also mounted on the frame 18. The lower jaws 74 are pivotally mounted at their ends on pivot pins 84-84 fixed to the frame 18. The arms 75-75 have gear sectors 86-86 thereon and the ends of the lower jaws have fixed thereto gear sectors 88-88 which mesh with the gear sectors 86-86 so that oscillation of the arms 75-75 through the intermediary of the meshing gear sectors 86-86 and 88-88 will rock the upper and lower jaws toward any and away from each other. The upper jaws 72-72 have at their lower edges wedge-shaped portions 90 adapted to enter the grooves 92-92 in the lower jaws when the jaws are rocked from their inoperative position shown in dotted lines, FIG. 4, to their operative position as shown in full line to grip and draw the opposite ends of the material away from each other thus imparting longitudinal tension to the material at a time when the supporting bars 44-44 are holding the material in a substantially flat plane.

The jaws 72, 74 are moved into clamping engagement with the ends of the material at the termination of forward movement of the material by means of the conveyor means and following clamping of the ends of the supporting bars 44-44 are lowered to their inoperative position.

The quilting operation is now carried out and at the end of the quilting operation the conveyor means is automatically started to move the quilted material from the machine. To avoid having to stop the machine and manually cut the successive threads, thread cutting means is provided for cutting all of the threads at once, while the material continues to be discharged from the machine, both the needle threads and the bobbin threads. Cutting is achieved by means of independent cutters moved in unison. The needle thread cutters as illustrated in FIGS. 8, 9 and 10, are mounted on a horizontally disposed bar 96 situated forwardly of the sewing heads in direction of movement of the material. The cutters comprise arms 98, pivotally mounted at one end on pivot pins 100 fixed to the bar in spaced parallel relation one for each sewing head. Each arm 98 has at its lower end a cutting blade 102. The arms 98 are moved transversely with respect to the underlying material *m* (FIG. 10) and then needle threads *ny* drawn forwardly from the needles 29a by movement of the quilted material from the machine. A connecting link 104 pivotally connects all of the arms 98 so that they move in unison and the link is in turn pivotally connected to a piston rod 106, extending from a cylinder 108, mounted on the bar 96. The arms 98 are supported high enough above the upper surface of material so that in their depressed positions the cutters will not accidentally touch the surface of the material as the latter passes below them but will intercept the threads above the plane of material as shown in FIG. 10.

The bobbin cutters are mounted in supports 110, (FIG. 12) one for each head located below the plane of the material, the upper surface 112 of which engages the lower side of the material as it is moved off the machine. Each support 110 has transversely of it a slot 114 in which the hook 116 of a cutter

arm 118 pivotally mounted at 120 within the support 110 is adapted to be moved transversely. Each support 110 also contains in its upper surface longitudinally thereof a groove 122 parallel to the thread drawn from the bobbin by movement of the material off the machine for receiving the downwardly inclined length of the thread between the bobbin and the underside of the material. The hook 116 of the cutter by movement transversely of the groove 122 from the full line position to the dotted line position severs the bobbin thread *sy*. To insure a clean cut the slot 114 is made narrow so that the thread is supported at both sides, that is forwardly and rearwardly of the cutter as the cutter intercepts the thread. The bobbin cutters are moved simultaneously by a connecting rod 124 containing spaced openings 126 within which the lower ends of the arm 118 are engaged. The connecting rod 124 is provided with a depending arm 128, the lower end of which is secured to a piston rod 130 extending from a cylinder 132 by means of which it is moved transversely to effect the cutting operation.

In operation the material to be quilted is spread out on the table 42 so that when the table is moved up to the adjacent end of the frame 18 and the leading end of the material guided into position between the conveyor means, operation of the conveyor means will draw the material onto the frame 18. Prior to moving the table up to the rails, the rails 22a-22a are elevated relative to rails 22b-22b to separate the conveyors. During the operation of the conveyor means the jaws are held away from each other; however, the underside supporting bars 44-44 are held up to the underside of the material to support it intermediate the conveyor means, in a substantially flat horizontal position without sag. When the entire length of material to be quilted has been moved onto the frame 18, the gripping jaws are moved into engagement with the leading and trailing ends to clamp and tension it longitudinally, whereupon the underside supporting bars 44-44 are lowered out of position and the quilting operation is initiated. Following quilting the conveyor means are restarted and as the material is being moved off the frame the cutters are actuated without having to stop discharge of the material from the frame simultaneously to cut the needle and bobbin threads.

As shown in FIGS. 1 and 7 a common drive shaft 29b is employed for driving all of the needle bars and a common drive shaft 29c is employed for driving all of the bobbins. The bobbins are mounted in a fixed heightwise position on the lower transverse beam 30 in contrast to the needle bars which are mounted on the upper transverse beam 28 for vertical movement relative to the bobbins to enable raising the needles away from the bobbins to permit the material to be moved therebetween and then lowering the needles into operative position. It is important that the drive shafts 29b and 29c be rotated at a constant speed relative to each other, that is, that the ratio of the rotation of the one to the other be maintained substantially constant.

To achieve this constancy throughout vertical movement of the beam 28 supporting the needle bars relative to the bobbins there are mounted on the adjacent ends of the shafts 29b, 29c pulleys 138 and 140, FIG. 7. The shaft 29c also has pivotally mounted on it an arm 142 and on this arm there is mounted a double pulley 144-144. A belt 146 is entrained about the pulley 140 and one of the pulleys 144 and a belt 148 is entrained about the pulley 138 and the other one of the pulleys 144. The radial disposition of the double pulley 144-144 is such that throughout vertical movement of the shaft 29b relative to the shaft 29c the ratio between the speed of rotation of the pulley 138 to the speed of rotation of the pulley 140 will be maintained constant. The shaft 29b is driven by a motor M, as shown in FIG. 1. The aforesaid means provides for effecting synchronism of the drive shafts for the needle-driving mechanism and the bobbin-driving mechanism, thereby eliminating the need for individual adjustments which are difficult to make and to maintain.

As illustrated therein an electric motor M is provided for driving the shaft of the needle-driving mechanism and the bobbin-driving mechanism, an electric motor M1 for driving

the pattern follower, an electric motor M2 for driving the conveyors, pressure operable motors *c* for separating the conveyors and restoring them to their operative position, pressure-operable motors 82 for effecting closing the jaws, a pressure operated motor 70 for effecting movement of the underside supports into and out of operative positions, a pressure-operable motor 108 for effecting operation of the needle thread cutters, and a pressure-operable motor 132 for effecting operation of the bobbin thread cutters. These motors are controlled in suitable sequence by cams on a common cam shaft not shown or by a programmed tape, and since such means is in common use, a description is not required herein.

We claim:

1. In a quilting machine of the kind in which the material to be quilted is supported on a frame for longitudinal and transverse movement between the sewing instrumentalities of transversely disposed sewing heads, means for effecting movement of the frame and spaced parallel, transversely disposed conveyor means on the frame adapted to grip opposite longitudinal edges of the material, said conveyor means being operable to move the material onto the frame for the quilting operation and after quilting to move the quilted material off the frame; clamping means situated at opposite ends of the frame adapted to clamp the leading and trailing ends after it has been moved onto the frame by the conveyor means, said clamping means comprising vertically spaced upper and lower jaws between which the material is moved onto the frame by the conveyor means, said jaws being adapted to be closed on the leading and trailing ends of the material and operable by closing on said ends to apply longitudinal tension thereto, underside supporting means situated below the plane of the conveyor means, said underside supporting means being movable upwardly, from a position below the conveyor means to engage and support the material intermediate the conveyor means as it is moved by said conveyor means onto the frame, power operable means for effecting operation of the conveyor means and power operable means for simultaneously raising the underside supporting means into operative position.

2. A machine according to claim 1, comprising power operable means for effecting operation of the jaws to clamp the ends of the material and means operable simultaneously with the operation of said last means to effect operation of the power operable means for lowering the underside supporting means to inoperative position.

3. Apparatus according to claim 1, wherein the jaws are supported above and below the plane of the material engaging portions of conveyor means and have parts adapted to be mutually engaged in the plane of the material engaging portions of the conveyor means by rotation of the jaws toward said plane to grip the material and in conjunction to apply longitudinal tension to the material between the pairs of jaws.

4. Apparatus according to claim 1, wherein the jaws are supported above and below the plane of the conveyor means, the upper jaws of each pair being swingable away from each other and the lower jaws of each pair being swingable away from each other and the jaws in each pair being movable by such swinging movement into gripping engagement with the material to apply longitudinal tension thereto.

5. Apparatus according to claim 4, wherein the lower jaws contain transverse grooves and the upper jaws have tapering edges adapted to enter the grooves, as the jaws of each pair of jaws are rotated in gripping engagement with the ends of the material.

6. Apparatus according to claim 3, comprising pairs of transversely spaced arms to which the ends of the upper jaws are pivotally connected, means pivotally supporting said arms at one end, means pivotally supporting the ends of the lower jaws and pairs of meshing gear sectors fixed to said arms and to the ends of the lower jaws, said meshing gear sectors being operable to effect rotation of the jaws of the each pair of jaws toward and from each other and said power operable means being connected to the other ends of said arms for effecting movement of the jaws toward and from each other.

7. Apparatus according to claim 1, wherein the underside supporting means comprise bars pivotally supported in transversely spaced parallel relation on horizontal transversely spaced parallel rods situated below the plane of the interengaged portions of the conveyor means for rotation about the axes of said rods and a link interconnecting the bars, said power operable means being connected to said link and operable to effect movement thereon in a direction to rotate the bars into and out of said plane.

8. Apparatus according to claim 1, wherein the underside supporting means comprise bars, spaced parallel rods located below said bars, bearings on said rods rotatable about the axes thereof, said bars being connected to said bearings and rotatable therewith about the axes of the rods, and a link connected at its ends to the bearings diametrically opposite the bars, said link being operable to cause the bearings to rotate in unison and in the same direction and said power operable means being connected to one of the bearings for effecting rotation thereof.

9. Apparatus according to claim 1, wherein each sewing head embodies needles and needle-operating mechanisms and bobbins and bobbin-operating mechanisms situated above and below the material and there is means for moving the needles and needle-operating mechanism vertically with respect to the bobbins and bobbin-operating mechanism at the end of the quilting operation to enable moving the quilted material off the frame; comprising a plurality of thread cutters, one associated with each sewing head for cutting the needle threads, means supporting the thread cutters forwardly of the needles in direction of movement of material as it is moved off the frame, for pivotal movement transverse to the threads drawn forwardly from the needles by the material, said cutters being situated above the material between the upper surface thereof and the lower ends of the elevated needles.

10. Apparatus according to claim 1, wherein each sewing head embodies needles and needle-operating mechanisms and bobbins and bobbin-operating mechanisms situated above and below the material and there is means for moving the needles and needle-operating mechanism vertically with respect to the bobbins and bobbin-operating mechanism at the end of the quilting operation to enable moving the quilted material off the frame; comprising a plurality of thread cutters, one associated with each sewing head, a horizontal bar, and means pivotally supporting the thread cutters on the bar for pivotal movement, transversely of the direction of movement of the material as it is moved from the frame, from elevated positions to positions such as to intersect the downwardly inclined portions of the threads drawn forwardly by the material from the needles, substantially midway between the ends attached to the material and the ends attached to the needles.

11. Apparatus according to claim 1, wherein each sewing head embodies needles and needle-operating mechanisms and bobbins and bobbin-operating mechanisms situated above and below the material and there is means for moving the needles and needle-operating mechanism vertically with respect to the bobbins and bobbin-operating mechanism at the end of the quilting operation to enable moving the quilted material off the frame; comprising a plurality of thread cutters, one associated with each sewing head for cutting the bobbin threads, means supporting the thread cutters for pivotal movement transversely with respect to the path of movement of the bobbin threads, as the latter are drawn forwardly from the bobbins by the material as it leaves the frame, from positions at one side of the thread paths to positions at the other sides thereof, means for holding the bobbin threads against lateral displacement during cutting and means for effecting operation of all of

the bobbin thread cutters in unison.

12. Apparatus according to claim 1, wherein each sewing head embodies needles and needle-operating mechanisms and bobbins and bobbin-operating mechanisms situated above and below the material and there is means for moving the needles and needle-operating mechanism vertically with respect to the bobbins and bobbin-operating mechanism at the end of the quilting operation to enable moving the quilted material off the frame; comprising spaced parallel drive shafts for driving the needle bars and driving mechanism and bobbins and driving mechanism therefor, means supporting the drive shaft for the bobbins and driving mechanism in a fixed heightwise position, vertically movable bearings supporting the needle bars and driving mechanisms and means for effecting rotation of the drive shafts at a constant ratio relative to each other throughout vertical movement of the needle drive shaft relative to the bobbin drive shaft.

13. Apparatus according to claim 1, comprising spaced parallel drive shafts for driving the needle-driving mechanism and the bobbin-driving mechanism respectively, means supporting the drive shafts for relative movement to enable separating the needles from the bobbins to permit the material to be moved therebetween, pulleys fixed respectively to said shafts, a lever arm pivotally supported for rotation on the axis of the bobbin shaft, a double pulley mounted on said arm at a radial distance therefrom for rotation about the axis of the bobbin shaft as a center and belts entrained about the pulleys on said shafts and the double pulley on said arm, the radial distance of the double pulley from the center of rotation of the arm being such that the driving relation between the pulleys remains constant throughout relative movement of said shafts.

14. Apparatus according to claim 13, comprising means for elevating and lowering the beam supporting the needle bar and driving mechanism therefor.

15. In a quilting machine of the kind in which the material to be quilted is supported on a frame for longitudinal and transverse movement between the sewing instrumentalities of transversely disposed sewing heads, means for effecting movement of the frame and spaced parallel transversely disposed conveyor means on the frame adapted to grip the opposite longitudinal edges of the material, said conveyor means being operable to move the material onto the frame; characterized in that the conveyor means are yieldably supported relative to each other and there is means for separating the conveyor means at the entrance ends thereof, to enable introducing the material therebetween and then restoring them to their unseparated positions.

16. Apparatus according to claim 15, characterized in that the conveyor means comprise upper and lower conveyors mounted on the frame, the lower conveyors being fixed and the upper conveyors being yieldable relative thereto and there are pneumatically operable cylinders operable to raise the upper conveyors relative to the conveyors and then return them to their initial position.

17. Apparatus according to claim 15, wherein there are supports on the frame for the conveyors and said means for separating the conveyors comprise pneumatically operable cylinders fixed to the upper conveyor supports containing piston rods and brackets fixed to the lower conveyor supports positioned to be engaged by extension of said piston rods to effect separation of the conveyors.

18. Apparatus according to claim 16, comprising transversely disposed converging aprons on the upper and lower rails of the frame from guiding the leading end of the material between the conveyors.