April 4, 1967 D. R. CASH 3,312,184

QUILTING MACHINE OF THE ENDLESS GUIDE TRACK TYPE

Filed Feb. 20, 1964 3 Sheets-Sheet 1

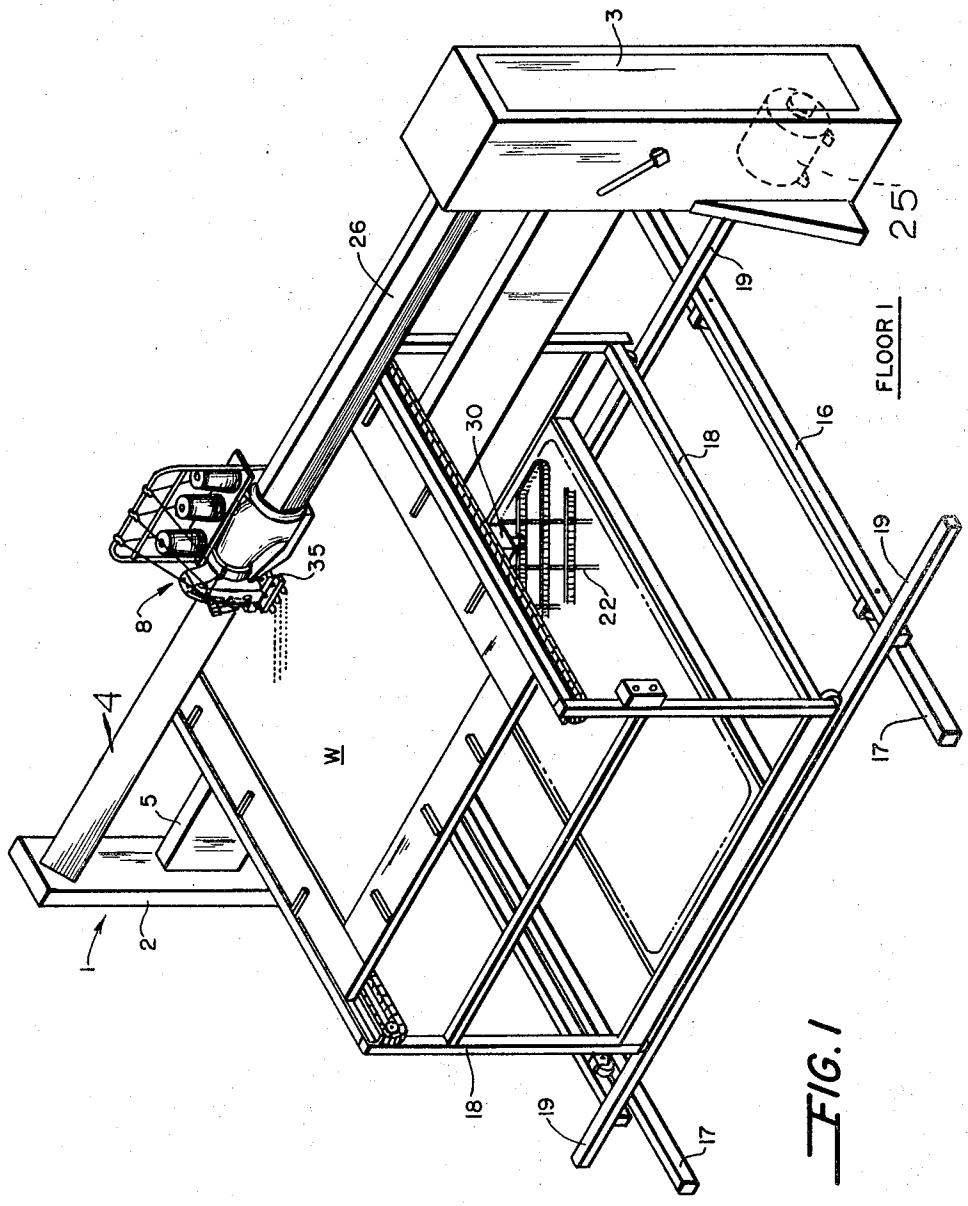


FIG. 1

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QUILTING MACHINE OF THE ENDLESS GUIDE TRACK TYPE

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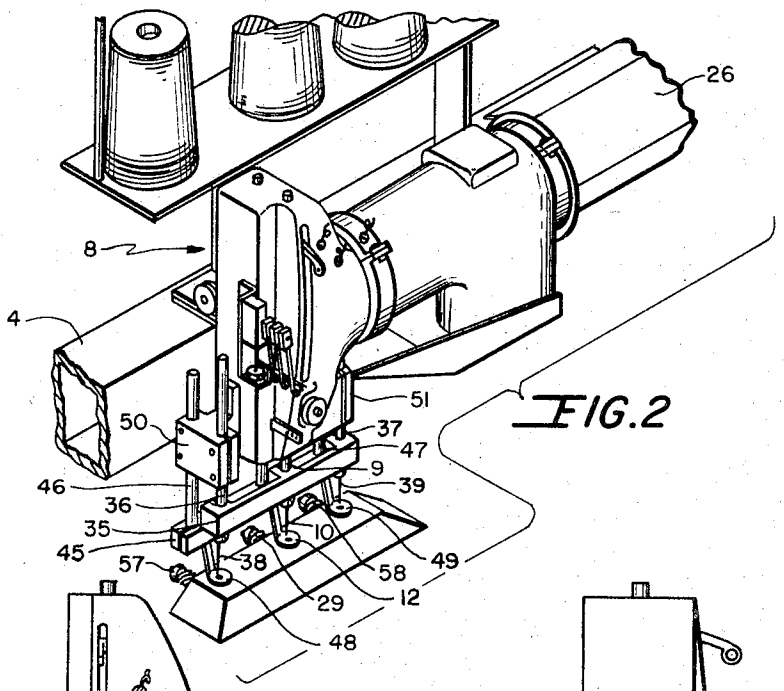
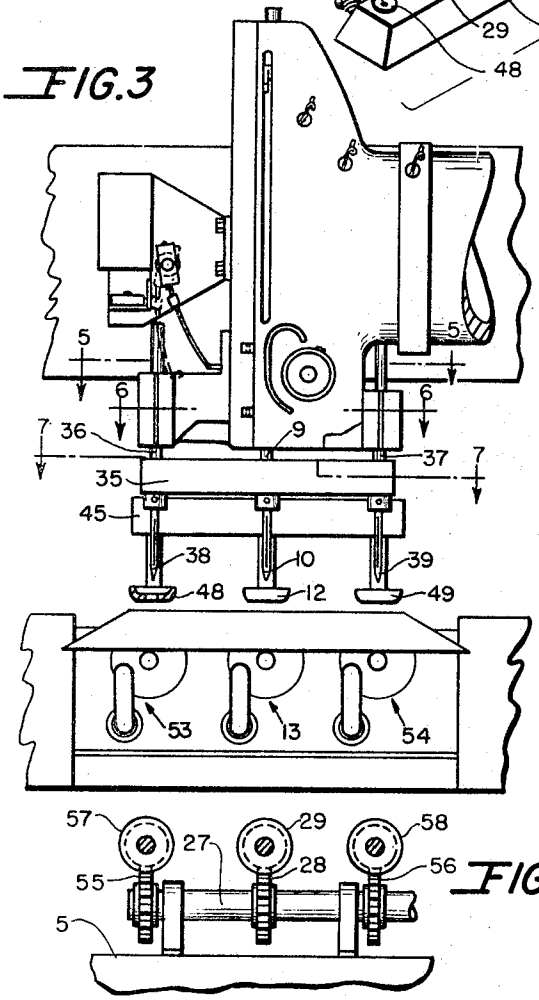


FIG. 2

FIG. 3



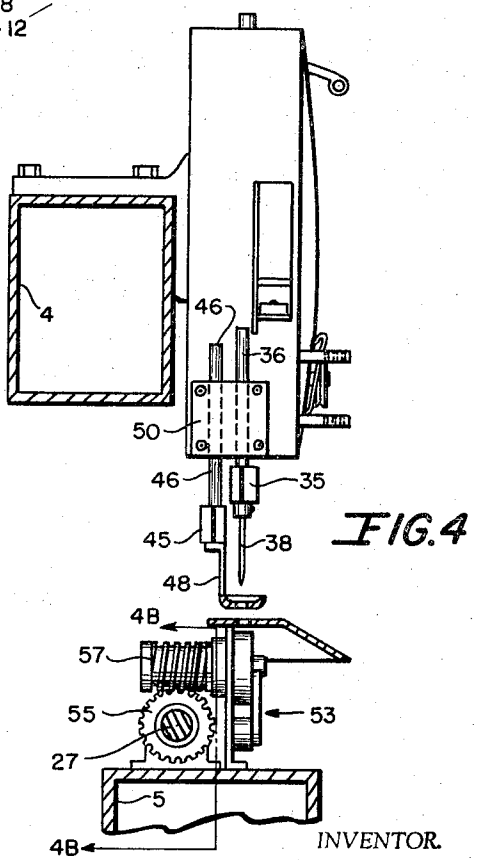


FIG. 4

FIG. 4B

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QUILTING MACHINE OF THE ENDLESS GUIDE TRACK TYPE

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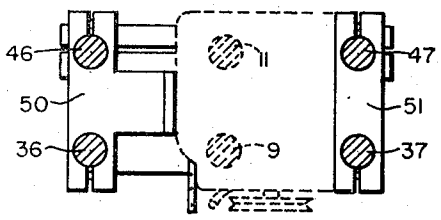


FIG. 5

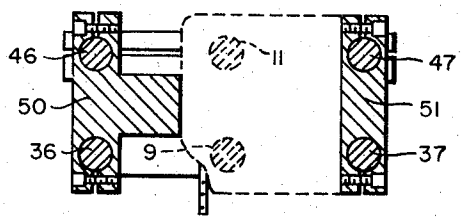


FIG. 6

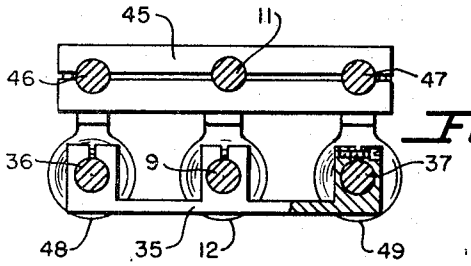


FIG. 7

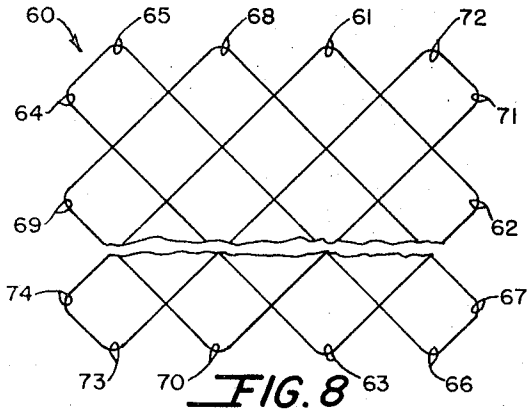


FIG. 8

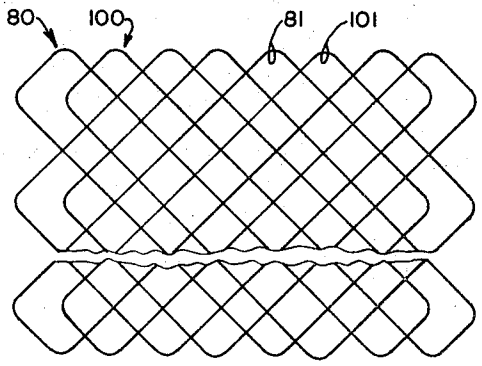


FIG. 9

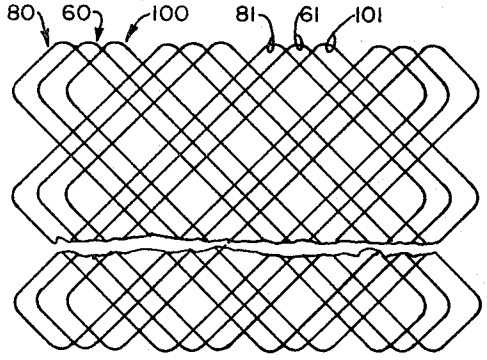


FIG. 10

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3,312,184

QUILTING MACHINE OF THE ENDLESS GUIDE TRACK TYPE

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Filed Feb. 20, 1964, Ser. No. 346,203
5 Claims. (Cl. 112—118)

This invention relates to improvements in quilting machines of the endless guide-track type. In machines of this type, the layers of material, constituting a quilt, are sewn together along an endless path which is contoured to reproduce a given sewing line design.

A conventional quilting machine of the endless guide-track type comprise: (A) a sewing machine having an upper thread-sewing mechanism and a lower thread-locking mechanism; (B) a stationary floor-mounted main frame having (1) a pair of horizontally-spaced vertically-arranged side standards and (2) a pair of vertically-spaced horizontally-arranged cross members extending from one standard to the other, including (a) a base frame for the lower thread-locking mechanism and (b) a head frame for the upper thread-sewing mechanism; (C) movable carriage means mounted on the floor to support a workpiece for operative universal uniplanar movement relative to said sewing machine, said carriage means including (1) a lower carriage mounted on the floor for longitudinal back and forth movement, and (2) an upper carriage mounted on the lower carriage for transverse back and forth movement; (D) an elongate endless guide-track stationarily mounted on the upper carriage and shaped to reproduce a given sewing line design; and (E) drive means for operating the sewing machine and for driving said guide-track so as to move the carriage means along a path reproducing said sewing line design and thereby cause the stationary sewing mechanism to sew that design into the workpiece. The term "operative universal uniplanar movement" is used to designate operative movement in any direction within a horizontal (or equivalent) plane.

The principal object of this invention is to provide a quilting machine of the endless guide-track type, which is capable of sewing two or three reproductions of the same sewing line design into the same quilt at the same time.

Another important object of the invention is to accomplish the principal object through the use of simple and inexpensive means which may be easily prepared for two line and three line operation and which can be used with any of a variety of endless guide-tracks providing different sewing-line designs.

The objectives of my invention are readily accomplished by providing the upper mechanism of the sewing machine with a pair of transversely arranged bars, one constituting a 3-needle bar mounted on the needle-reciprocating mechanism and the other constituting a 3-presser foot bar mounted on the presser foot raising and lowering mechanism and by providing the lower mechanism of the sewing machine with two additional thread-locking mechanisms. With an arrangement of this character, one may use the quilting machine in the conventional way with a single needle or use it in accordance with my invention, with either two or three needles to produce two or three reproductions of the same sewing line design in the same quilt at the same time.

The invention is illustrated in the accompanying drawings wherein:

FIG. 1 is a perspective view of a conventional quilting machine of the endless guide-track type which, in accordance with my invention, is equipped with a multi-needle sewing machine;

FIG. 2 is a perspective view of a sewing machine shown in FIG. 1;

FIG. 3 is a partly broken front elevational view of the sewing end of said sewing machine;

FIG. 4 is a partly broken vertical sectional view taken along line 4—4 of FIG. 3;

FIG. 4B is a vertical sectional view taken along line 4B—4B of FIG. 4;

FIGS. 5–7 are horizontal sectional views respectively taken along lines 5—5, 6—6 and 7—7 of FIG. 3; and

FIGS. 8–10 are plan views showing a single-needle sewing design in FIG. 8, a 2-needle sewing design in FIG. 9 and a 3-needle sewing design in FIG. 10, each of these views being transversely broken to avoid needless repetition.

Conventional structure

The quilting machine shown in FIG. 1 conventionally comprises: (A) a support 1; (B) a sewing machine 8; (C) movable carriage means 16 and 18; (D) an elongate endless guide-track 22; and (E) drive means 25.

The support 1 of element A is provided by the floor on which the quilting machine rests and a stationary floor-mounted main frame having (1) a pair of horizontally-spaced vertically-arranged side standards 2 and 3 and (2) a pair of vertically-spaced horizontally-arranged upper and lower cross frame members 4 and 5 extending from one side standard to the other and secured to both, the upper cross member 4 constituting the head frame 4 and the lower cross member 5 constituting a base frame 5.

The sewing machine 8 of element B has an upper thread-sewing mechanism (i.e. an upper) mounted on the head frame 4 and a main lower thread-locking mechanism, which cannot be seen in FIG. 1, mounted on the base frame 5. As can be seen in FIGS. 2–4, the sewing mechanism main vertically reciprocates a vertically-arranged needle-bar 9, the lower end of which removably carries a main vertical sewing needle 10 and also raises and lowers a main vertically-arranged presser foot-bar 11, the lower end of which carries a main presser foot 12. The main lower thread-locking mechanism 13 is rotated in timed relationship with these vertically-moving parts.

The movable carriage means of element C is mounted on the floor 1 to support a workpiece W for operative universal uniplanar movement. This carriage means includes: (1) a lower carriage 16 mounted on the floor tracks 17 for longitudinal back-and-forth movement; and (2) an upper carriage 18 mounted on lower-carriage tracks 19 for longitudinal back-and-forth movement with the lower carriage, for transverse back-and-forth movement relative to the lower carriage and for universal uniplanar movement relative to the sewing machine.

The elongate endless guide-track 22 of element D is mounted on the upper carriage 18. This track follows a contour which reproduces a given sewing line design. The contour of the track establishes the sewing line design or pattern which the upper carriage 18 will follow in causing the sewing machine to sew that sewing line design into the workpiece W.

The drive means 25 of element E is fixedly mounted on the main frame within side standard 3. It has three drive connections, one of which projects from that side standard 3 through the interior of a sheet metal casing 26 (extending alongside head frame 4) to the sewing head for reciprocating the needle and raising and lowering the presser foot. Its second drive connection projects from side standard 3 to extend along the top side of base frame 5 and ultimately connect with the main lower thread-locking mechanism 13 through a shaft 27 carrying gear 28 which meshes with worm 29 (see FIG. 4) to operate the main lower thread-locking mechanism 13 in timed relationship with the upper sewing mechanism. Its

third drive connection constitutes a pattern drive connection, which leads to and terminates in a pattern follower 30 having driving engagement with the endless guide-track 22 for moving that track and the upper carriage 18 in accordance with the sewing line design. A suitable pattern follower is shown and described in my presently pending application S.N. 185,041, now Patent No. 3,127,858.

Inventive Structure

In accordance with my invention, the upper thread-sewing mechanism is provided with means for supporting and guiding an additional or auxiliary pair of needles and of presser feet while the main lower thread-locking mechanism is provided with two additional auxiliary thread-locking mechanisms.

3-needle support means.—In arranging for the sewing head to reciprocate three needles, I provide the thread-sewing mechanism with an auxiliary multi-needle cross bar 35, mount that auxiliary cross bar 35 on the conventional main needle bar 9 and mount two differential or auxiliary needle bars 36 and 37 on the auxiliary cross bar 35, one at each end thereof. To this end, the auxiliary multi-needle cross bar 35 is provided with three vertical bores, one at its center and one on each end portion. The conventional main needle bar 9 passes through the center bore of the auxiliary multi-needle cross bar 35 which is clamped or otherwise rigidly secured to the main needle bar 9. The auxiliary needle-bars 36 and 37 pass vertically through their respective bores in the auxiliary cross bar 35 and are rigidly mounted on bar 35 by suitable means which may comprise clamping means, set screws or the like. These auxiliary needle-bars 36 and 37 are arranged removably to carry auxiliary sewing needles 38 and 39.

3-presser-foot support means.—In further accordance with my invention, the conventional main vertically-arranged presser-foot bar 11 is arranged to extend through the vertical center bore of an auxiliary horizontally-arranged multi-pressed foot cross bar 45 which is rigidly mounted on the main vertical presser-foot bar 11. The auxiliary multi-presser foot cross bar 45 similarly carries a pair of auxiliary vertically-arranged presser-foot bars 46 and 47, one for each end of the auxiliary cross bar 45, each of the auxiliary vertical bars 46 and 47 passing through vertical bores in opposite end portions of the auxiliary cross bar 45 and being rigidly secured thereto by any suitable means. These auxiliary presser-foot bars 46 and 47 are arranged removably to carry auxiliary presser feet 48 and 49.

Auxiliary guides.—The upper end portion of each auxiliary needle-bar 36 and 37 and of each auxiliary presser-foot bar 46 and 47 is slidably engaged and guided by suitable auxiliary guide blocks 50 and 51. These auxiliary guide blocks are secured to opposite sides of the sewing head and each is provided with a pair of vertical guide ways, one for a given auxiliary needle-bar and the other for the auxiliary presser-foot bar associated with that particular auxiliary needle bar. Thus, the vertical guide ways in auxiliary guide block 50 are respectively aligned with (and arranged to receive) the auxiliary needle bar 36 and auxiliary presser foot bar 46 while the other auxiliary guide block 51 is respectively aligned with (and arranged to receive) the auxiliary needle bar 37 and auxiliary presser foot bar 47.

Auxiliary thread supply and feed means.—Naturally, for each of the auxiliary needles 38 and 39, an auxiliary thread supply will be provided along with conventional means for pulling thread from these sources of supply.

Auxiliary thread-locking mechanisms.—As shown in FIG. 3, a pair of auxiliary thread-locking mechanisms 53 and 54 are provided, one on each side of the thread-locking mechanism 13. These auxiliary thread-locking mechanisms respectively cooperate with auxiliary needles 38 and 39.

Auxiliary drives for thread-locking mechanisms.—To drive the auxiliary thread-locking mechanisms 53 and 54, the cross shaft 27, which carries gear 28 for worm 29 of the central thread-locking mechanism 13, is provided with gears 55 and 56 to drive worms 57 and 58 for auxiliary thread-locking mechanisms 53 and 54 respectively.

Operation

Conventional.—The foregoing quilting machine may be conventionally operated with a single needle 10 to sew any of the customary variety of single sewing line designs such as that shown at 60 in FIG. 8. In this case, we assume that the machine starts at point 61 to sew the line leading to point 62 and that it continues in a like manner to sew the lines leading to successive points 63–74 so that it completes the design upon sewing the line leading from 74 back to its starting point at 61. With a single needle, it can sew all quilts within a wide range of thicknesses.

2-needle operation.—In order to perform this operation under balanced load conditions, the center needle 10 should be removed and the two auxiliary needles 38 and 39 mounted on their respective auxiliary needle bars 36 and 37. Now the machine may be operated in the conventional manner to sew design 80 starting say at point 81. However, in accordance with my invention, it will operate simultaneously to sew design 100 at starting point 101. It will be appreciated that designs 80 and 100 are duplicates of each other and of design 60, all three designs being sewn in accordance with the sewing line design established by the endless guide track 22.

With two needles in use at the same time, the machine performs twice as much work as it performs with one needle when all other conditions are the same; hence, in such case, there will necessarily be a reduction in the maximum quilt thickness which the machine is capable of sewing. I have obtained excellent results with a spacing of 2½" between the center needle and each of the auxiliary needles. Accordingly, in this 2-needle operation, pattern 100 will be offset from pattern 80 by 5".

3-needle operation.—Since a 3-needle operation will be clear from the foregoing, it should suffice to say that, when this quilting machine is operated with three needles to sew duplicate designs 60, 80 and 100 in offset relationship, the resulting end product will appear as in FIG. 10.

Having described my invention, I claim:

1. In a quilting machine of the type, having a guide-track shaped to reproduce a given sewing line design or pattern, wherein a drive means not only drives a sewing machine, having an upper sewing head mounted on a cross head frame to reciprocate a main vertical sewing needle on a main vertical needle bar while raising and lowering a main presser foot on a main vertical presser foot bar and having a main lower-thread-locking mechanism mounted on a cross base frame to co-act with said main vertical sewing needle, but also contemporaneously drives a carriage means along a guide-track path which reproduces said given sewing-line pattern to cause said sewing machine to sew that pattern into a workpiece, an improvement rendering said sewing machine capable of sewing up to at least two additional reproductions of the same sewing line pattern into the same workpiece at the same time, comprising:

(A) auxiliary means for mounting a pair of auxiliary vertical sewing needles on said sewing machine comprising

(1) a 1st auxiliary cross bar,

(2) auxiliary mounting means at the center of said 1st auxiliary cross bar for rigidly mounting that 1st auxiliary cross bar directly on said main vertical needle bar for movement therewith,

(3) a pair of auxiliary vertical needle bars, and

(4) auxiliary mounting means on opposite sides of the center of said 1st auxiliary cross bar for rigidly mounting said pair of auxiliary vertical

needle bars directly on said 1st auxiliary cross bar, one on each side of said main vertical needle bar;

(B) auxiliary means for mounting auxiliary presser feet on said sewing machine comprising

(1) a 2nd auxiliary cross bar,

(2) auxiliary mounting means at the center of said 2nd auxiliary cross bar for rigidly mounting that cross bar directly on said main presser foot bar for movement therewith,

(3) a pair of auxiliary vertical presser-foot bars, each having an auxiliary presser-foot at its lower end, and

(4) auxiliary mounting means on opposite sides of the center of said 2nd auxiliary cross bar for rigidly mounting said pair of auxiliary vertical presser foot bars directly on said 2nd auxiliary cross bar, one on each side of said main vertical presser foot bar; and

(C) means for mounting a pair of auxiliary thread-locking mechanisms on said cross base frame, one on each side of said main lower thread-locking mechanism for simultaneous operation therewith and for co-action with said auxiliary vertical sewing needles.

2. The improvement of claim **1**, wherein:

(A) one of said auxiliary cross bars has a vertical bore through which one of said auxiliary vertical bars passes.

3. The improvement of claim **1**, wherein:

(A) one of said auxiliary cross bars has three vertical bores through which one of said main vertical bars

and both of the corresponding pair of auxiliary bars pass.

4. The improvement of claim **1**, wherein:

(A) one of said auxiliary vertical bars projects upwardly from its auxiliary cross bar; and

(B) said improvement includes

(1) auxiliary guide means connected to and supported by said cross head frame and arranged to receive and guide said upwardly projecting portion of said one auxiliary vertical bar.

5. The improvement of claim **1**, wherein:

(A) said auxiliary vertical needle and presser-foot bars, on one and the same side of said main vertical needle and presser-foot bars, both project upwardly from their respective auxiliary cross bars; and

(B) said improvement includes

(1) auxiliary guide means connected to and supported by said cross head frame and arranged to receive and guide said upwardly projecting portions of said auxiliary vertical needle and presser foot bars.

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