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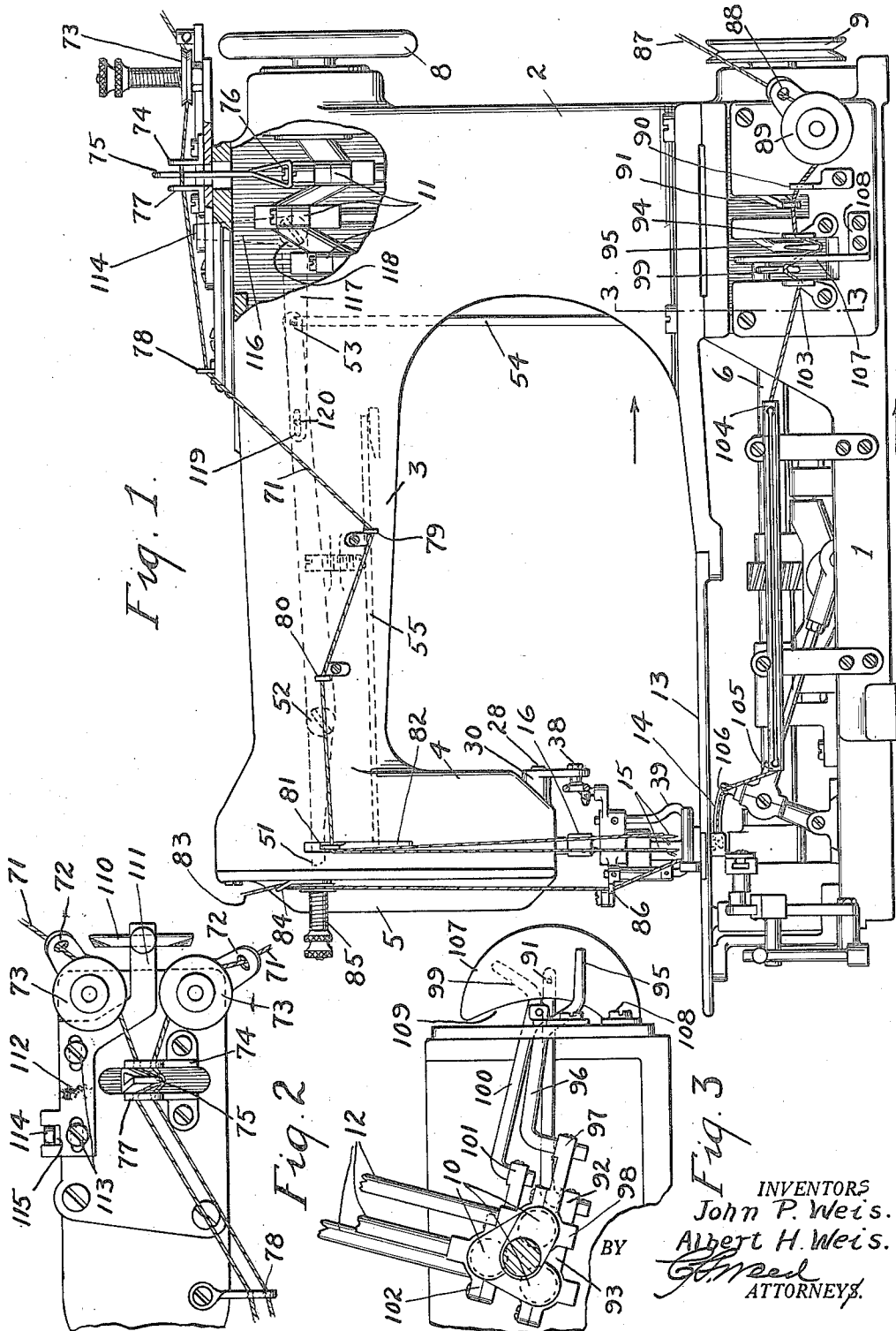
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2,013,019

HIGH SPEED CROSS STITCH MECHANISM

Filed Oct. 12, 1933

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4

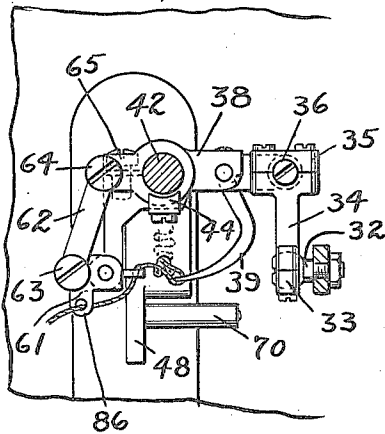


Fig. 5

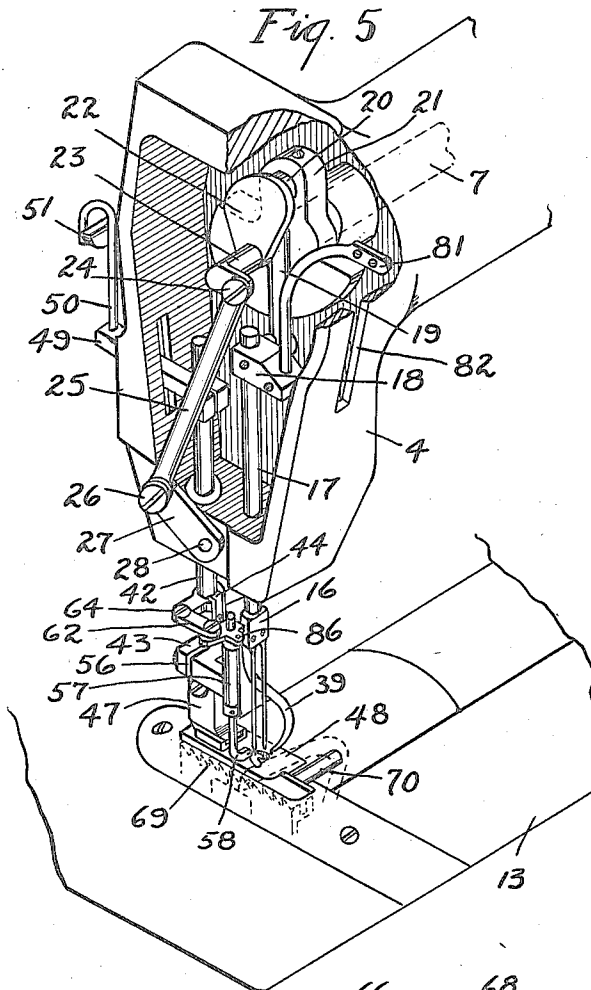


Fig. 6

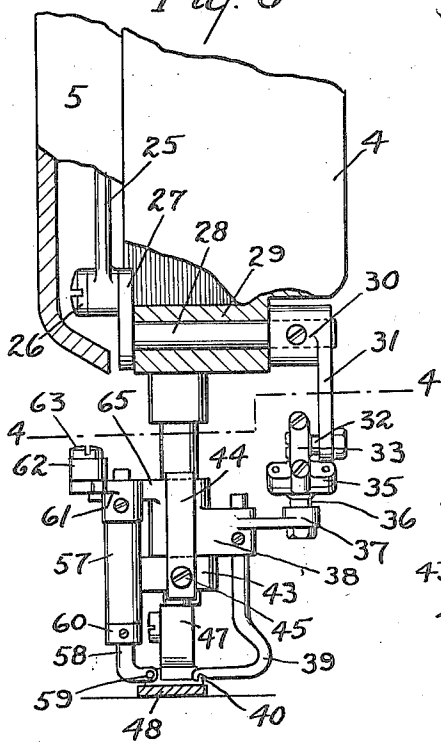


Fig. 7

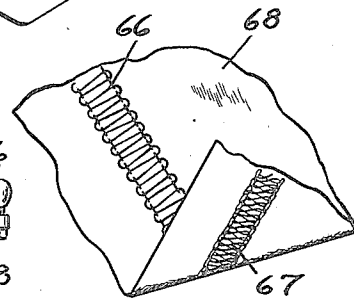
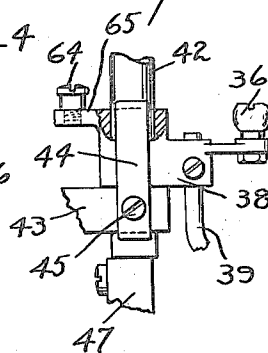


Fig. 8
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UNITED STATES PATENT OFFICE

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HIGH SPEED CROSS STITCH MECHANISM

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29 Claims. (Cl. 112—100)

This invention relates to sewing machines and more particularly to an improved high speed cross stitch laying mechanism therefor, by means of which, ornamental stitching on the top surface of the work is obtained and which improvement is applicable to different kinds of sewing machines such as long and short arm, and also to cylinder sewing machines manufactured by the well-known Metropolitan Sewing Machine Corporation, the present invention being an improvement upon that shown and disclosed in our contemporaneously pending application, Serial Number 489,048, filed October 16th, 1930, and is especially constructed for higher speed and increased production.

The primary object of the invention is the provision of a cross thread laying mechanism in which the movements of the movable thread guide and loop carrying finger are reduced so that the thread carrier has a movement slightly greater than the thickness of the thread carrying finger, and the thread carrying finger has a movement back and forth in front of the needles slightly greater than the width or spacing of the needles so that the loops of thread drawn off by the hook are just sufficient for the needles to step over and stitch the cross thread down on top of the work. These short movements permit the laying of a perfect stitch at high speed without complicated take-up or thread control means, whereas, in the prior construction, the finger for laying the loops in front of the needle had a considerable movement many times greater than the spacing or width of the needle gauge. The shorter movement permits higher speed. The operating parts connecting the thread carrying finger with the driving means for operating the mechanism are of very light construction, all weights having been reduced as much as possible enabling the mechanism to be operated at a speed of 4,000 R. P. M. or more without undue wear and tear.

The prior construction of cylinder machine required long connections from the stitching position, reaching back to the main crank shaft of the machine. In the long arm machine, the rock shaft extending from the stitching mechanism back to the rear end of the machine was employed. In the short arm machine, the connecting rods, oscillating levers, etc., reaching from the stitching mechanism back to the rear end of the machine involved a great deal of weight and a considerable number of joints that were expensive to manufacture and assemble and required constant care such as lubrication and adjustment in

use, all of which has been eliminated in this improved construction.

Therefore, an object of the invention is the provision of improved cross thread laying mechanism, simple in construction and operation, inexpensive to manufacture and assemble accurately, and which will lay the thread or threads close to and directly on the material being stitched and operative with two or more needles of either wide or narrow gauge or spacing.

Since the present improvement is applicable to various kinds of sewing machines, only a brief description of such machines is deemed necessary herein to make clear the construction and operation of the present improvement, since it is applicable to any multiple needle sewing machine.

In the drawings accompanying and forming part of this specification, Fig. 1 is a front view of a top and bottom rotary shaft Metropolitan sewing machine having this improved cross stitch laying mechanism applied thereto.

Fig. 2 is a top view of the tension release for the needle threads and needle loop take-up device.

Fig. 3 is a detail view taken on line 3—3 of Fig. 1, looking in the direction of the arrow, of the bottom crank shaft and the three connecting rods extending therefrom for operating the top shaft, the rods being broken off, each of which has associated therewith a thread take-up finger for acting upon the looper thread or threads.

Fig. 4 is a detail view of the cross thread laying mechanism, presser foot, throat plate and a portion of the cloth plate, taken on line 4—4 of Fig. 6.

Fig. 5 is a perspective view of the head in which the needle and presser bar operate, showing a portion of the top shaft and the operating means for the cross stitch mechanism. The view also shows the stitching elements including presser foot, feed, the bottom looper and also the cloth and throat plates.

Fig. 6 is an enlarged detail partly sectional view of the cross stitch mechanism.

Fig. 7 is a detail partly sectional view thereof showing the presser bar and presser foot shank and the mounting of the cross stitch mechanism on the presser bar, and

Fig. 8 is a view showing the top and bottom of a piece of goods to which the stitch has been applied.

Similar characters of reference indicate corresponding parts in the several views.

Before explaining in detail the present improvement and mode of operation thereof, we de-

sire to have it understood that the invention is not limited to the details of construction and arrangement of parts which are illustrated in the accompanying drawings since the invention is capable of other embodiments, and that the phraseology which we employ is for the purpose of description and not of limitation.

In the machine illustrated, the machine base 1 has its trunk 2 joining the base and carries an overhanging arm 3 terminating in a head 4 to which is attached a face plate 5. A bottom rotary shaft 6 operates in the base and a top rotary shaft 7 operates in the arm 3. These shafts are supported for rotary movement in suitable bearings. The top shaft 7 carries the hand wheel 8. The bottom shaft 6 carries a belt wheel 9 and is provided with the well-known three-throw cranks 10 shown in Fig. 3. The top shaft has the three well-known cranks indicated by 11 in Fig. 1.

Three connecting rods 12 connect the cranks of the bottom and top shafts and transmit rotary motion from one to the other. The bottom shaft 6 operates the looper and feeding mechanism well known in the art and, therefore, a detailed description thereof is unnecessary. These mechanisms are covered and protected by a cloth plate 13 in the usual way. The looper 14 co-acts with the two needles 15 in the formation of the stitches. The looper threads and the needle threads are concatenated with a top cross thread for the production of the stitches. If a third needle is introduced with its thread, the mechanism will then form a different type of stitch.

The top rotary shaft 7 operates the needles 15 which are held in a chuck 16 carried by the needle bar 17. The needle bar has clamped to its upper end a driving member 18 operated by a pitman connection 19 connected to a crank pin 20 carried by the needle bar driving crank 21 secured to the top shaft 7 for rotary movement. The crank pin 20 has a member 22 supporting an extension crank 23 to which is attached by a shoulder screw 24 the pitman connection 25 which operates the cross thread mechanism. Thus, connected with the top rotary shaft is a double crank, one for driving the needle bar and the other for operating the cross thread mechanism.

The bottom end of the pitman is connected by a shoulder screw 26 to a crank arm 27, see Fig. 6. This crank arm is part of a shaft 28 which operates in a bearing 29 at the lower end of the machine head and between the needle and presser foot bars. To the opposite end of this shaft is attached as at 30 a crank arm 31. This arm carries a ball stud 32 that operates in a socket 33 of a connecting rod 34, see Fig. 4. The opposite end of this connecting rod has a socket 35 that connects with a ball stud 36 secured to an arm 37 of the rock member or lever 38 carrying the thread loop finger 39 having a thread engaging hook 40. This finger is adjustably secured to the member 38 and this member or lever 38 has a bearing on the presser bar 42.

A collar 43 is secured to the presser bar just below the member 38 and carries a control piece 44 attached at 45 to the collar 43, the upper end being bent at right angles to hold the member 38 in place on the presser bar during its up and down action. The presser bar carries the usual presser foot shank 47 and presser foot 48. The upper end of the presser bar 42 has clamped to it a guide piece 49, see Fig. 5, carrying a bent,

overhanging wire 50 that co-acts with a presser foot lifting lever 51. This lifting lever is pivoted to the back of the arm 3 as at 52, see Fig. 1, and has its rear end connected at as 53 to a downwardly extending rod 54 reaching down through the table for operation by the usual knee or foot lifting lever that is commonly used for raising the presser feet of sewing machines and by means of which the presser foot may be lifted from the work plate at will by the operator. The presser foot is held against the throat plate by a presser spring 55, see Fig. 1.

The collar 43 is provided with clamping means 56, see Fig. 5, that securely fastens it to the presser bar 42 and has a forwardly extending arm 57 terminating in a vertical cylindrical bearing 57, see Figs. 5 and 6. In this bearing operates an oscillating thread guide 58 having a thread eye 59 at its bottom end in its laterally extending L-shaped portion. A collar 60 is secured to a member at the bottom of the bearing 57 and a crank arm 61 is secured to the top of the oscillating thread guide, giving to it its movement. A link 62 is connected to this crank arm by a shoulder screw 63 and a shoulder screw 64 connects its opposite end to an arm 65 of the lever or member 38.

The operation of the thread carrying finger 39 across the path of the needles directly in front thereof cooperates with the thread eye 59 which operates from front to rear of the needles and, therefore, at right angles to the movement of the finger 39 so as to pick up the strand of thread and carry it to the right as shown in Fig. 4 to form a loop so that the needles will straddle the strand of thread extending from the eye 59 to the thread hook in the manner shown to form the stitches. The movement of the thread guide 58 is just a trifle greater than the thickness of the thread engaging hook 40. The movement of the hook is just sufficient to pass the needles from right to left to position the loop of threads for the right hand needle to enter. These short movements enable the use of a very light construction of parts capable of the highest speeds without vibration, noise or undue wear and permits the use of the mechanism for short stitches without skipping. The cross thread mechanism has a rise and fall movement with the presser foot and will accommodate itself to all thicknesses of goods being stitched. A precise amount of thread is manipulated for the requirement of the stitch. No excess take-up or see-saw action is necessary, as is usual in other machines. By the cross thread mechanism operating from the needle bar crank, the parts are entirely hidden within the head of the machine for convenient lubrication, adjustment and care. All connections are short and as direct as possible reducing the mechanism to its simplest possible form.

The stitch produced by the cross thread finger is indicated at 66 in Fig. 8. The bottom portion of the stitch is indicated at 67 and the fabric at 68. The feed dog 69 acts against the bottom of the stitch 67 and the presser foot 48 acts against the top of the stitch 66 in the feeding of the work through the machine. The presser foot is provided with a roller 70 for conveniently guiding lace, tape or other material.

In this improved mechanism, it will be seen that the needle and cross stitch movement is obtained from a rotary top needle driving shaft and not a rock shaft through the medium of a double crank, one for operating the needle bar and the other

for operating the cross stitch mechanism, thus very much simplifying the connecting means and eliminating many joints and points of wear and operating weight and also shortening the movement of the parts so that there is no interference with high speed of the mechanism. This construction permits one finger of the cross stitch mechanism to pass in front of the needle and the thread carrier 58 to move from front to rear of the needle or at right angles to said finger and as the cross thread stitch mechanism operates around the presser bar in addition to having a rise and fall movement therewith, the construction is very much simplified, the cost of operation decreased and adds greatly to the stand-up-ability of the mechanism under continuous use. Furthermore, an important advantage of operating the needle and cross stitch mechanism from a rotary shaft instead of a rock shaft is that precise timing and relation of movement with respect to the needle operations as well as the feed is obtained since, with a rotary driving shaft it is possible to select any position in the circle of 360 degrees, so that the relative movements of the various parts that must function within very close limits at the high speeds at which these machines operate to handle delicate threads and yarns, is not limited on the rotary shaft drive like it is on the rock shaft or needle lever drive machines and then, too, the connections for operating the cross stitch mechanism are more direct on the rotary shaft machine than they are on the rock shaft or needle lever machine since, on these types of machines, several connections are necessary leading from the cross stitch mechanism back to the means of drive, either leading down to the bottom shaft of the machine or to some auxiliary moving part to select a timing so that the fingers will operate in timed relation with the needles to place the cross thread for forming the stitches as desired.

An improved thread control and tension release mechanism is also shown in this machine but this forms the subject-matter of a separate application.

The threads leading to the needles 15 are indicated by 71. These threads pass through eyelets 72 and around tensions 73. From there they pass to stationary thread guide 74 and past a rotary operating thread take-up finger 75. This finger is attached to one of the crank shaft bearings at 76, see Fig. 1, and because of this, has the same rotary motion as the crank pin of the shaft or the rod operated thereby. This thread finger cannot wind up or in any way tangle the threads and is, in a true sense, a rotary take-up.

At the opposite side of this take-up finger is another eyelet 77, guiding the threads from the take-up finger to the stationary thread eye 78 and from there the threads pass to the thread eyes 79 and 80, then to the thread eyelet 81 carried up and down by the needle bar pitman 19 since it is connected to the driving member 18 which operates the needle bar. This eyelet 81 operates in a slot 82 in the front of the machine head. From this eyelet, the threads are directed to the eyes of the needles.

The object of the thread control is to handle a minimum of thread with the least amount of friction possible and at the same time, control the size of the loops deflected by the needles, regardless of the character of work being stitched. The cross thread is indicated by 83, see Fig. 1, and passes from the eyelet 84 to the tension 85 secured to the face plate 5 and from there to

the crank arm eyelet 86 from where it is guided direct to the thread eye 59 of the finger 58.

The conduct of this thread is direct and with no take-up action whatever. The amount of thread drawn off by the thread hook 40 is precisely that which is required for the formation of each stitch. The looper thread 87 passes through a thread guide 88 and a tension 89 and then to an eyelet 90 and then to the eye of the thread take-up finger 91, which finger is adjustably secured in a socket 92 of the crank pin bearing 93 carried by one of the crank pins 10, see Fig. 3. The thread passes from this finger to a guide 94 and then down under the bent end 95 of the take-up finger 96 adjustably secured in the socket 97 to the crank pin bearing 98 carried by a second crank pin 10.

The thread extends from underneath this finger up over the bent end 99 of the finger 100 which is adjustably held in a socket 101 to the crank pin bearing 102 carried by the third crank pin. These pins are located at 120 degrees with respect to one another and travel in a rotary path around the major axis of the shaft 6. Therefore, the ends of these three take-up fingers are traveling in a circle and act upon the threads with gentle contact for perfect control. From this third finger, the thread passes through the guide 103 and from there to the end of the thread tube 104 and thence emerges from the other end of the tube at 105 and passes direct to the looper as at 106.

This thread control means insures a perfect stitch formation and eliminates the skipping of stitches, tangling and winding up of threads.

To protect the fingers and prevent injury of the operator of this high speed operating machine, a metal guard 107 is secured as at 108 to the face of the machine base and is so formed that its convex side will guard and prevent the fingers from striking any moving object while the concave side 109 provides clearance for free operation of the thread and convenient threading of the parts.

For convenience and ease in removing the work from the stitching position, a tension release or opener is provided for the needle threads 71 as indicated by 110, see Fig. 2. The opener is carried by the arm 111 of a sliding member 112 secured in position by shoulder screws 113 for endwise movement. The end 114 of an up-standing arm 116 of the lever 117 operates in a slotted portion 115 of the slide 112. The lever 117 is pivoted at 118 to the rear wall of the machine frame and has a slotted end 119, see Fig. 1, through which a pin 120 projects. This pin is carried by the foot lifting lever 53.

It is to be understood that, by describing in detail herein any particular form, structure or arrangement, it is not intended to limit the invention beyond the terms of the several claims or the requirements of the prior art.

Having thus explained the nature of our said invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, we claim:

1. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a needle carrying bar, needles carried thereby, means connecting the needle bar and shaft, cross thread laying means comprising a pair of oscillating members, and means connected to the rotary shaft adjacent to the connecting means between the needle bar and shaft for operating said cross

thread laying means over a range only slightly greater than the space between the needles.

2. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by the arm, a needle carrying bar, needles carried thereby, means connecting the needle bar and shaft, cross thread laying means comprising a pair of oscillating members, and means also connected to the rotary shaft adjacent to the connecting means between the needle bar and shaft for operating said cross thread laying means over a range only slightly greater than the space between the needles and located partly in the head of the machine.

3. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried thereby, a needle carrying bar, means connecting the needle bar and shaft, a presser foot bar, cross thread laying means having its axis of movement coinciding with the axis of the presser foot bar and comprising a pair of oscillating members located at opposite sides of said needle bar, and means also connected to the rotary shaft adjacent to the connecting means between the needle bar and shaft for operating said cross thread laying means.

4. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried thereby, a needle carrying bar, means connecting the needle bar and rotary shaft, a presser foot bar, cross thread laying means having its axis of movement coinciding with the axis of the presser foot bar and comprising a pair of oscillating members located at opposite sides of said needle bar, and means also connected to the rotary shaft adjacent to the connecting means between the needle bar and shaft for operating said cross thread laying means and located partly in the head of the machine.

5. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by the arm, a needle bar, a crank connecting the needle bar and rotary shaft, cross thread laying means comprising a pair of oscillating members, and means also connected with the crank for operating the cross thread laying means and located in the head of the machine.

6. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by said arm, a needle bar, a crank connecting the needle bar and rotary shaft, a presser foot bar, cross thread laying means having its axis of movement coinciding with the axis of the presser foot bar and comprising a pair of oscillating members located at opposite sides of said needle bar, and means connected with said crank for operating said cross thread laying means and located in the head of the machine.

7. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by said arm, a needle bar, a crank connecting the needle bar and rotary shaft, a presser foot bar, cross thread laying means having its axis of movement coinciding with the axis of the presser foot bar, and means connected with said crank for operating said cross thread laying means and located in the head of the machine, said cross thread laying means comprising a pair of oscillating members shiftable at right angles to each other and located at opposite sides of the needle bar.

8. In a sewing machine having an overhanging arm terminating in a head, a shaft carried by said arm, a needle bar, a crank connecting the needle bar and shaft, a presser foot bar, cross

thread laying means having its axis of movement coinciding with the axis of the presser foot bar, and means connected with said crank for operating said cross thread laying means and located in the head of the machine, said cross thread laying means comprising a pair of oscillating members located at opposite sides of the needle bar, one carrying an eye and the other a hook and one operating in front of the needle and the other from front to rear thereof.

9. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by the arm, a needle bar, means connecting the needle bar and shaft, a presser foot bar, cross thread laying means having its axis of movement coinciding with the axis of the presser foot bar and comprising a pair of oscillating members located at opposite sides of the needle bar, and means connected therewith and with the means adjacent to the connecting means between the needle bar and shaft for oscillating said members from the rotary shaft and one at right angles to the other.

10. In a sewing machine having a needle bar and needles and means for operating them, the combination of cross thread laying mechanism and means for operating it, said thread laying mechanism comprising an oscillating thread engaging finger and an oscillating thread carrier, said carrier having a short movement slightly greater than the thickness of the finger and over a range only slightly greater than the space between the needles.

11. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by said arm, a needle bar projecting into said head, means located within the head and connecting the needle bar and rotary shaft, a presser foot bar also projecting into said head, cross thread laying means supported by said presser foot bar and having its axis of movement coinciding with the axis of said presser foot bar and comprising a pair of oscillating members located at opposite sides of said needle bar, and means within said head and connected to the rotary shaft adjacent to the connecting means between the needle bar and shaft for operating said cross thread laying means.

12. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by said arm, a needle bar projecting into said head, means located within the head and connecting the needle bar and rotary shaft, a presser foot bar also projecting into said head, cross thread laying means supported by said presser foot bar and having its axis of movement coinciding with the axis of said presser foot bar, and means within said head and connected to the rotary shaft adjacent to the connecting means between the needle bar and shaft for operating said cross thread laying means, said cross thread laying means comprising a pair of oscillating members, one shiftable in front of the needle and the other from front to rear thereof and located at opposite sides of the needle bar.

13. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by said arm, a needle bar projecting into said head, means located within the head and connecting the needle bar and rotary shaft, a presser foot bar also projecting into said head, cross thread laying means supported by said presser foot bar and having its axis of movement coinciding with the axis of said presser foot bar, and means within said head and connected to

the rotary shaft adjacent to the connecting means between the needle bar and shaft for operating said cross thread laying means, said cross thread laying means comprising a pair of oscillating members operating in front of the needle bar, one having a hook and the other an eye and one shiftable at right angles to the other and located at opposite sides of the needle bar.

14. In a sewing machine having an overhanging arm terminating in a head, a shaft carried by said arm and projecting into said head, a needle bar also projecting into said head, means located in the head and connecting the needle bar and shaft, a presser foot bar also projecting into said head, cross thread laying means carried by said presser foot bar and having its axis of movement coinciding with the axis of the presser foot bar and comprising a pair of oscillating thread carrying members, means for operating said oscillating members and comprising a transverse shaft carried by the head between the needle and presser foot bars and connected with the oscillating members, and means connecting said transverse shaft with the shaft adjacent to the connecting means between the needle bar and shaft and having a part thereof located within said head.

15. In a sewing machine having an overhanging arm terminating in a head, a shaft carried by said arm and projecting into the head, a needle bar also projecting into said head, means connecting the needle bar and shaft, a presser foot bar projecting into said head, cross thread laying means carried by said presser foot bar, means for oscillating it and comprising a transverse shaft carried by the head in front of the presser foot bar and connected with the cross thread laying means, and means for operating said transverse shaft and including means located within the head and connected with the shaft adjacent to the means connecting the needle bar and shaft.

16. In a sewing machine having an overhanging arm terminating in a head, a rotary shaft carried by said arm and projecting into the head, a needle bar also projecting into said head, means connecting the needle bar and rotary shaft, a presser foot bar projecting into said head, cross thread laying means carried by said presser foot bar, means for oscillating it and comprising a transverse shaft carried by the head in front of the presser foot bar and connected with the cross thread laying means, and means for operating said transverse shaft and including means located within the head and connected with the shaft adjacent to the means connecting the needle bar and shaft, the connections between the shaft and the needle bar and cross thread laying means comprising double crank mechanism.

17. In a sewing machine having an arm and a needle bar and needles, a rotary shaft in said arm connected with said needle bar, cross thread laying means comprising a pair of oscillating thread carrying fingers located at opposite sides of the needle bar, and means connecting the cross thread laying means with the rotary shaft adjacent to the means connecting the shaft with the needle bar and effective to shift the fingers at right angles to each other, one of them having a range of movement only slightly greater than the space between the needles.

18. In a sewing machine having an arm, a presser foot bar, and needle mechanism, a shaft in said arm connected with said needle mechanism, cross thread laying means comprising a pair of oscillating thread carrying members, and

means connecting the cross thread laying means with the shaft adjacent to the means connecting the shaft with the needle mechanism and including a transverse shaft located between the presser foot and needle bars and connected with the cross thread laying means.

19. In a sewing machine having an arm terminating in a head, a rotary shaft in said arm projecting into said head, a needle bar also projecting into said head, means connecting said needle bar and rotary shaft, a presser foot bar projecting into said head, cross thread laying means comprising a pair of oscillating members shiftable at right angles to each other and means located on said presser foot bar for supporting said oscillating members and having its axis of movement coincident with the axis of the presser foot bar, means connecting one oscillating member with said supporting means of the other oscillating member for operating the former, a transverse shaft carried by said head between said presser foot bar and needle bar, means connecting said transverse shaft with the oscillating means carried by the presser foot bar, and means connecting said transverse shaft with said first shaft adjacent to the connection thereof with the needle bar for operating said transverse shaft.

20. In a sewing machine having an arm terminating in a head, a rotary shaft in said arm projecting into said head, a needle bar also projecting into said head, means connecting said needle bar and rotary shaft, a presser foot bar projecting into said head, cross thread laying means comprising a pair of oscillating members and means located on said presser foot bar for supporting said oscillating members and having its axis of movement coincident with the axis of the presser foot bar, means connecting one oscillating member with said supporting means of the other oscillating member for operating the former, a transverse shaft carried by said head in front of the presser foot bar, means connecting said transverse shaft with the oscillating means carried by the presser foot bar, and means connecting said transverse shaft with said first shaft adjacent to the connection thereof with the needle bar for operating said transverse shaft, one of said oscillating members having a hook and the other a thread eye, the construction being such that the oscillating members have a comparatively short movement, one in front of the needle and the other from front to rear thereof.

21. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a needle carrying bar, cross thread laying means comprising a pair of oscillating members, and a double crank connected with the rotary shaft, one for operating the needle bar and the other for operating the cross thread laying means.

22. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a needle carrying bar, cross thread laying means, a double crank connected with the rotary shaft, one for operating the needle bar and the other for operating the cross thread laying means comprising a pair of fingers located at opposite sides of the needle bar, and means for operating one finger in front of the needle and the other at right angles thereto and from front to rear of the needle.

23. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a needle carrying bar, needles carried thereby, cross thread laying means comprising a pair of fingers located at opposite sides of the needle bar, and means connected with said rotary shaft for operating one

finger in front of the needles with a range of movement only slightly greater than the space between the needles and the other from front to rear thereof and at right angles to the other finger.

24. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a presser foot bar, a needle carrying bar, cross thread laying means, a double crank connected with the rotary shaft, one for operating the needle bar and the other for operating the cross thread laying means, and a transverse shaft located between the presser foot and needle bars and connected with one of said cranks and with the cross thread laying means.

25. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a presser foot bar, a needle carrying bar, cross thread laying means supported on said presser foot bar and having its axis of movement coinciding with the axis of said presser foot bar and comprising a pair of oscillating members located at opposite sides of said needle bar, and a double crank connected with the rotary shaft, one for operating the needle bar and the other for operating the cross thread laying means.

26. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a presser foot bar, a needle carrying bar, needles carried thereby, cross thread laying means supported on said presser foot bar and having its axis coinciding with the axis of said presser foot bar and comprising a pair of fingers located at opposite sides of the needle bar, and means connected with said rotary shaft for operating one finger in front of the needles with a range of movement only slightly greater than the space between the needles and the other finger from front to rear thereof and at right angles to the other finger.

27. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a presser foot bar, a needle carrying bar, cross thread lay-

ing means supported on said presser foot bar and having its axis of movement coinciding with the axis of said presser foot bar, a double crank connected with the rotary shaft, one for operating the needle bar and the other for operating the cross thread laying means, said cross thread laying means comprising a pair of fingers located at opposite sides of the needle bar and operative, one in front of the needle bar and the other at right angles thereto and from front to rear of the needle bar.

28. In a sewing machine having an overhanging arm, a rotary shaft carried thereby, a presser foot bar, a needle carrying bar, needles carried thereby, cross threads laying means supported on said presser foot bar and having its axis of movement coinciding with the axis of said presser foot bar and comprising a pair of fingers, means connected with said rotary shaft for operating one finger in front of the needles with a range of movement only slightly greater than the space between the needles and the other from front to rear thereof and at right angles to the other finger, and means located substantially parallel with the needle bar for supporting said last finger.

29. In a sewing machine having needle mechanism including a plurality of needles and means for operating it, the combination of cross thread laying mechanism and means for operating it, said thread laying mechanism comprising an oscillating thread engaging finger and an oscillating thread carrier, said thread carrier having a short movement slightly greater than the thickness of the finger and said finger having a short movement in front of the needles only slightly greater than the space between the needles.

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