June 5, 1934. J. P. WEIS ET AL 1,961,950

MULTIPLE NEEDLE ORNAMENTAL STITCH FORMING MECHANISM

Filed Oct. 27, 1930 3 Sheets-Sheet 1

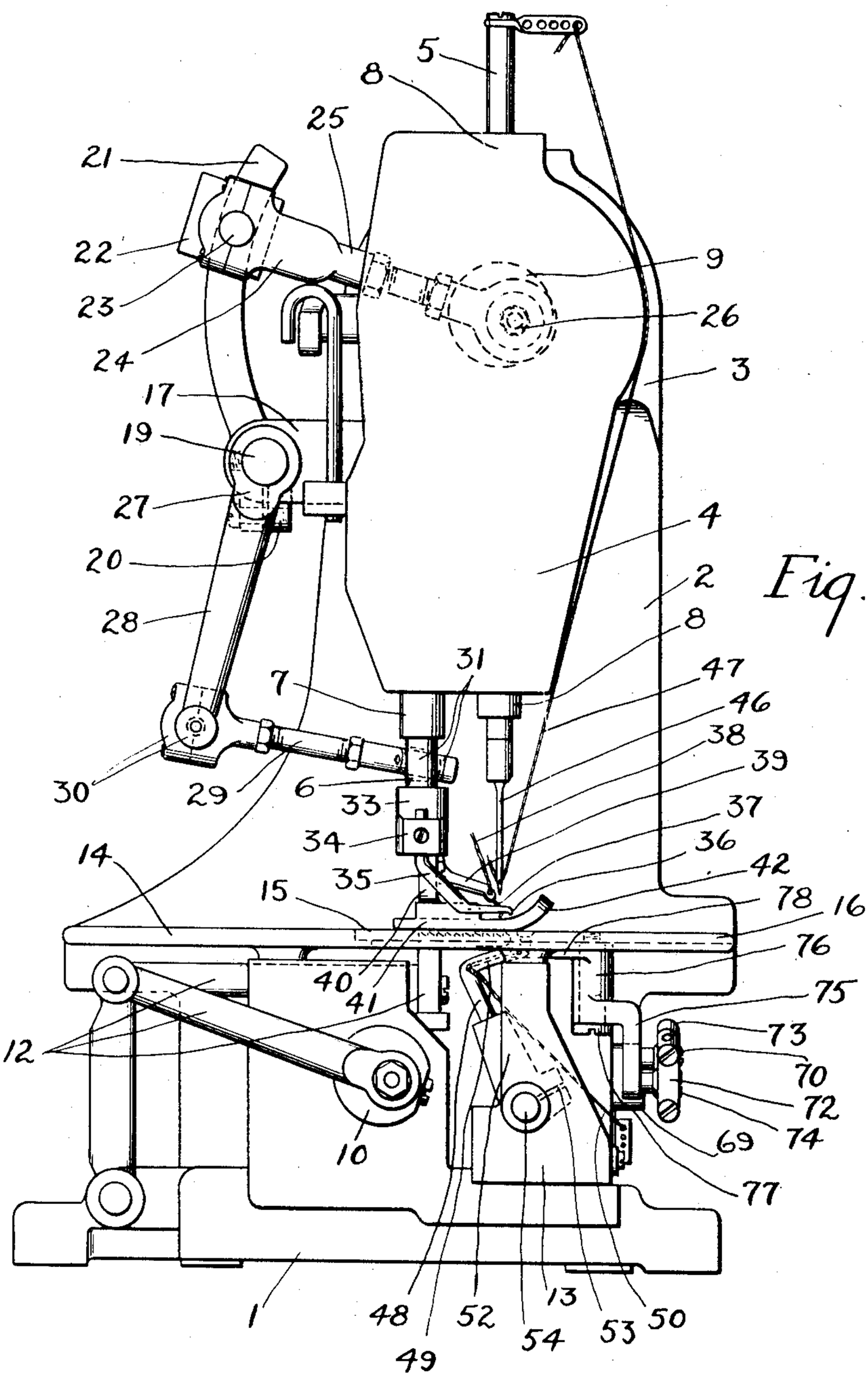

Fig. 1

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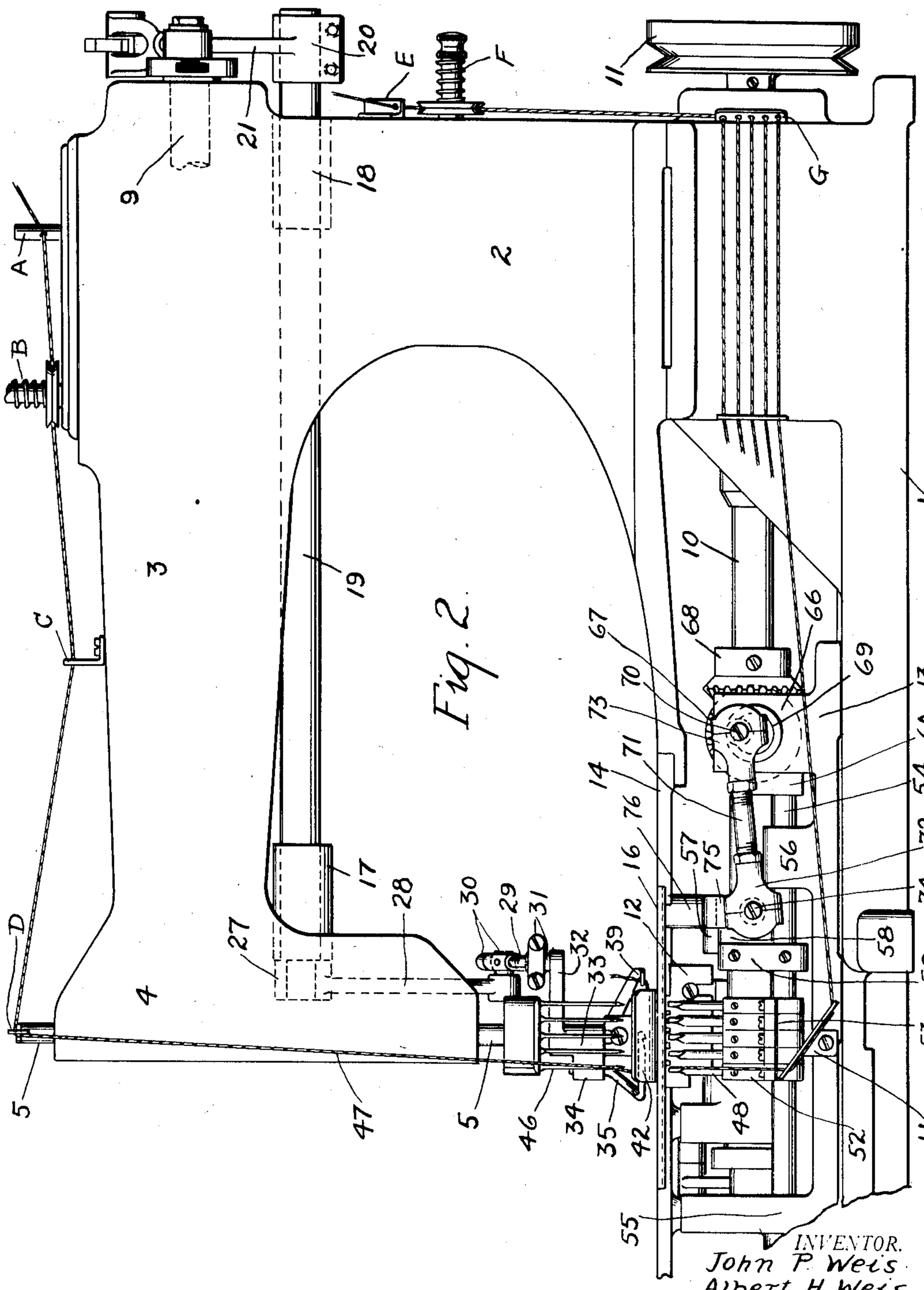

Fig. 2.

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Filed Oct. 27, 1930 3 Sheets-Sheet 3

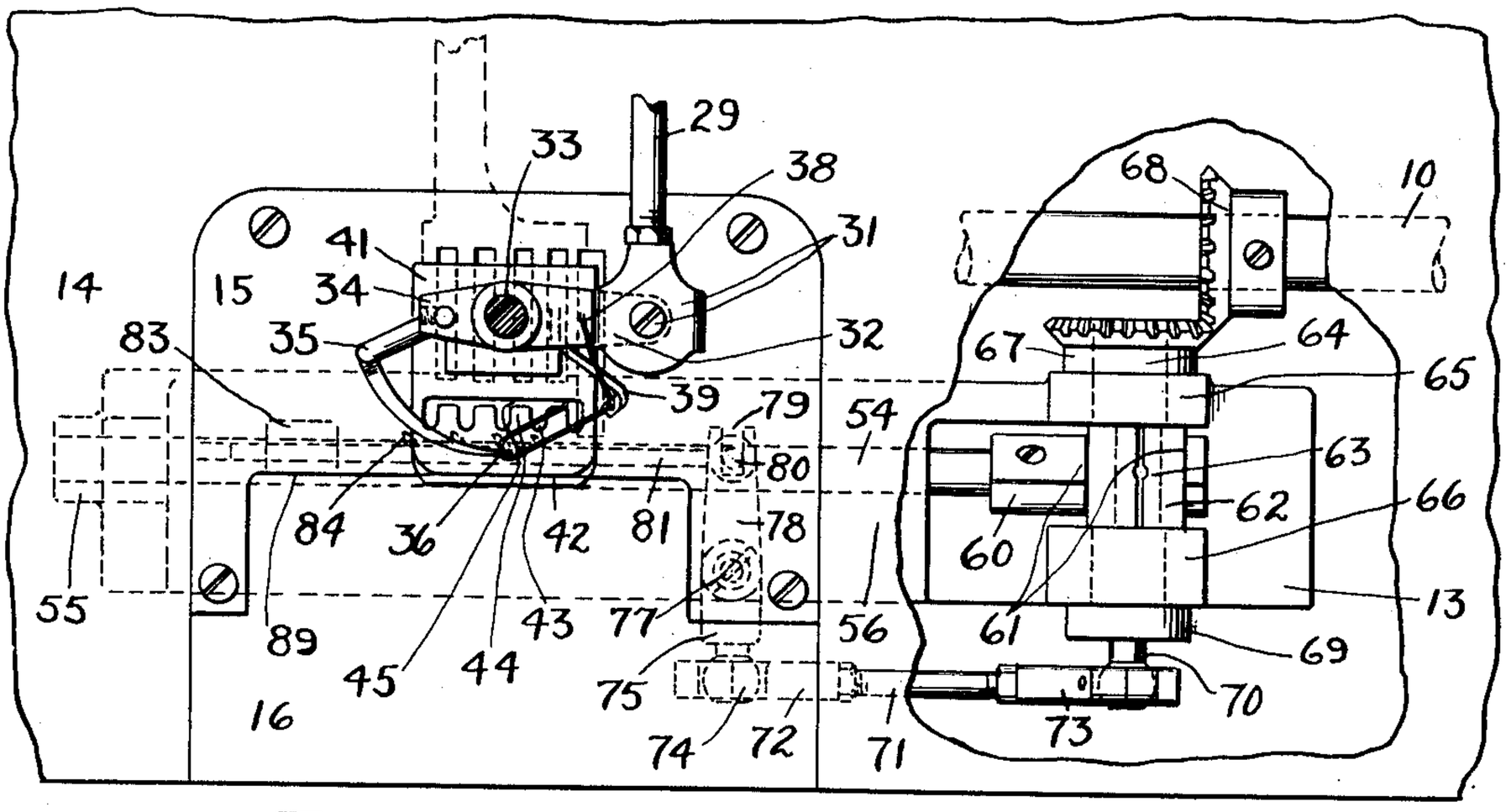

Fig. 3

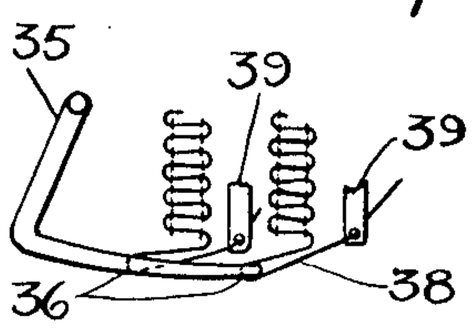

Fig. 7.

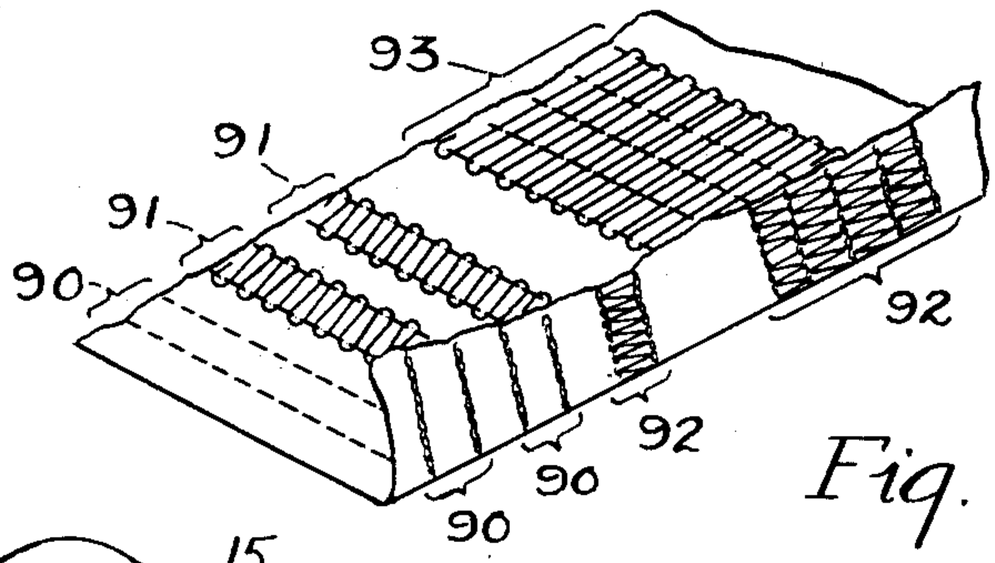

Fig. 5.

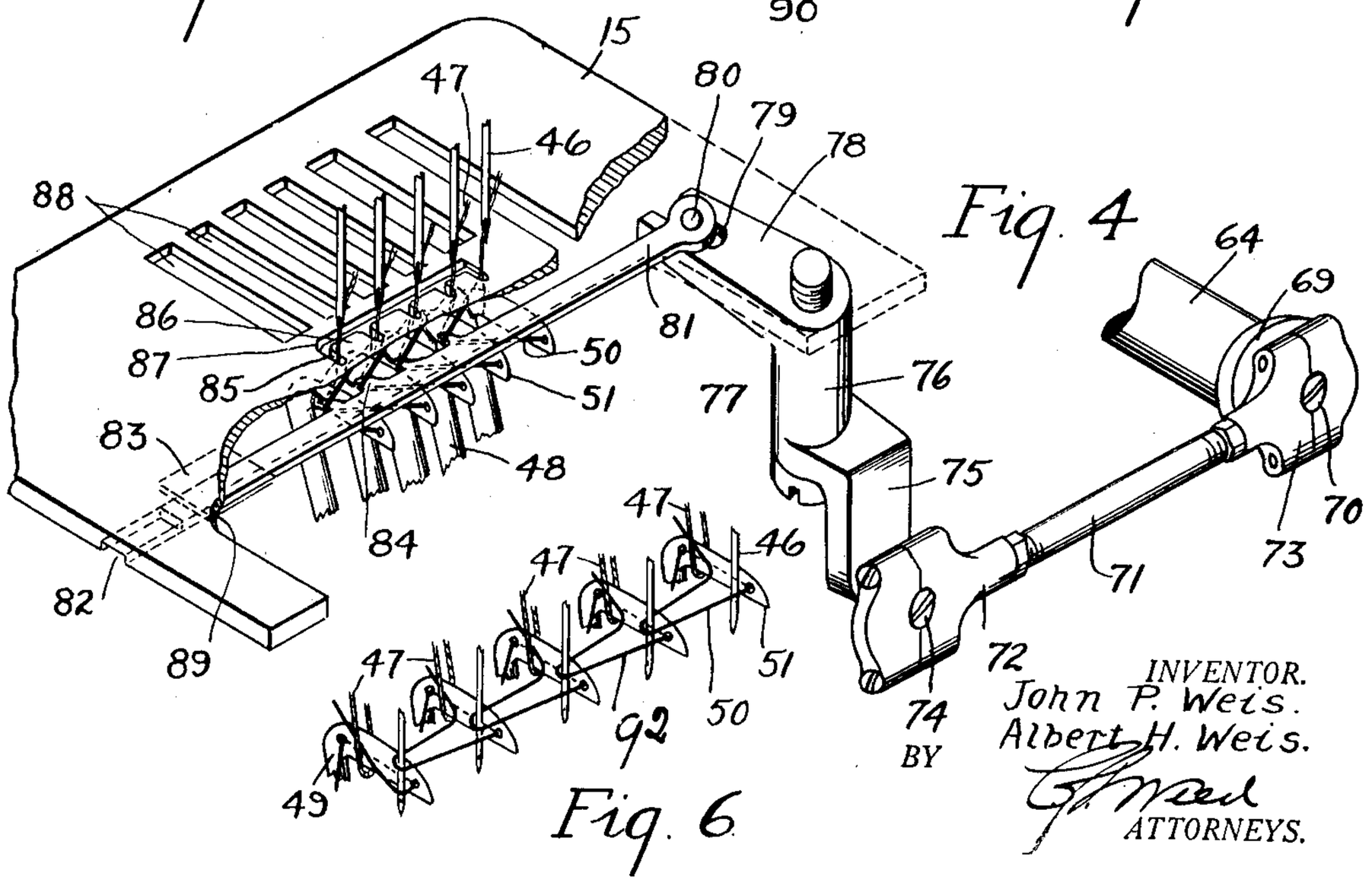

Fig. 4

Fig. 6

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Patented June 5, 1934 1,961,950

UNITED STATES PATENT OFFICE

1,961,950

MULTIPLE NEEDLE ORNAMENTAL STITCH FORMING MECHANISM

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Application October 27, 1930, Serial No. 491,418

22 Claims. (Cl. 112—100)

This invention relates to sewing machines and more particularly to multiple needle sewing machines in which a gang of thread carrying needles and loopers is employed, the object of the invention being to provide a gang needle machine with ornamental stitch forming mechanism for making ornamental covering stitches on the bottom of the work and with complemental stitch forming mechanism for spreading a cross thread beneath the needle threads on the top of the work, both sets of which will be stitched down neatly and uniformly thereby to make a durable, long wearing seam or edging for use on all kinds of materials, especially loose woven or knit fabrics. This improved mechanism is particularly well adapted for making an edging suitable for blankets as well as for stitching other kinds of bed covering and household articles. It is also suitable for use with dresses, millinery and other work where a broad trim imitating a braid or the like is desired, especially where it is required to combine different colors for the purpose of making an ornamental finish.

In the present improvement, a large number of needles and loopers may be used, for instance, from two to sixteen needles, or even a greater number, thereby making an ornamental covering stitch more than three inches wide if desired. In the drawings, however, five needles and five loopers are shown so spaced as to make lines of stitches one and a quarter inches wide, in which eleven threads are used comprising five needle threads, five looper threads and one cross thread.

By means of this improved machine, the many sewing operations that come within the scope of a gang or multiple needle machine, such as edge stitching, seaming, hemming and decorative work of all kinds may be readily and expeditiously done, and in which also several spaced rows of covering and plain stitches can be made simultaneously, useful for edging two opposite edges as well as joining strips of material thereto at the same time since the needle spacing, the number of needles and loopers may be varied to meet various requirements.

In the accompanying drawings forming a part of this specification, Figure 1 is an end view of this improved machine.

Figure 2 is a front view thereof.

Figure 3 is a detail top view partly broken away, illustrating the stitch forming mechanism.

Figure 4 is a perspective, partly sectional view of the needles, loopers and needle loop spreader.

Figure 5 illustrates the different forms of stitches on a piece of work.

Figure 6 illustrates the manner in which the looper threads are carried from one looper to another for making the covering stitches on the bottom of the work by means of the loop spreader shown in Figure 4.

Figure 7 is a detail view showing the cross thread carrier or finger operative on top of the work and provided with a plurality of hooks for making separate rows of cross thread covering stitches.

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

Before explaining in detail the present improvement and mode of operation thereof, we desire 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 drawings, the machine base 1 is provided with a trunk 2 having an overhanging arm 3 terminating in a head 4 in which the needle bar 5 and presser foot bar 6 operate, the presser bar operating in bearings 7 and the needle bar in bearings 8. The needle bar is driven by the usual crank and link from the top rotary shaft 9 and is rotated by three-throw cranks and connecting rods, not shown, connected with a bottom shaft 10 rotated by a belt co-operating with a hand wheel 11 secured to the end of the shaft 10 and driven by a belt.

This lower shaft 10 operates suitable feeding mechanism 12 and looper mechanism 13. A cloth plate 14 covers the looper mechanism and feeding mechanism and supports a throat plate 15 having a slide plate 16 over which the work or material is fed as the stitching proceeds.

The trunk 2 and the head 4 are provided with bearings 17 and 18, see Figure 2, in which is located a rock shaft 19. Clamped to the end of this rock shaft, as at 20, is a curved lever 21, see Figure 1, by means of which this rock shaft 19 is rocked with greater or less movement according to the adjustment of a connector 22 which may be slid up or down on this curved lever 21. This connector has stems 23 fitting freely in bearings 24 carried at the end of a pitman 25 operated by an adjustable crank 26 carried by the end of the top shaft 9. To the other end of the rock shaft 19 is secured a hub 27, see Figures 1 and 2, of an arm 28, whereby movement is given to the cross stitch finger connection 29 having at its ends ball joints 30 and 31, the

latter connecting with an arm 32 of a hub 33 supported for rocking or oscillating movement on the presser bar 6. This hub 33 has a projection 34 in which is secured a cross thread carrying finger 35 having one or more thread engaging hooks 36 each of which passes over a cross thread as at 37, Figure 1, each time the finger moves to its right hand position. Each cross thread, indicated by 38, Figure 1, comes from a suitable supply and tension, not shown, direct to a stationary guide or finger 39 carried by the presser foot, the delivery end of which guide finger is at the right and a trifle in the rear of a right hand needle. It will, of course be understood that these parts may be reversed to carry the cross thread from left to right instead of from right to left, as shown, this change permitting other attachments to be used close to the needle when necessary.

The presser foot 40 has a shank carried by the presser bar 6 and has a bottom 41, toe 42, needle openings 43, see Figure 3, and tongues 44 and also an elongated slot 45 through which the formed stitches pass after sliding off the tongues directly on to the work. These presser feet are made to suit the number of needles and kind of work for which the machine is intended.

The needles 46 carried by the needle bar 5 and supplied with the necessary threads 47 operate in the usual way and coact with suitable thread carrying loopers 48. As these loopers and operating means therefor are well known, only a brief description thereof is necessary.

Each of the loopers 48 comprises a blade 49 having a thread eye and a groove for a looper thread 50 and a loop engaging point 51. As the needle moves upward and throws out its loop, the looper point 51 enters this needle loop, the looper moving forward in a direction opposed to the line of feed of the work and thus carries the looper thread through the needle loop. When the needle descends, it passes through a loop of the looper thread, thus forming at each complete cycle of the machine a two-thread chain stitch. These loopers 48 are secured in holders 52 that are clamped at 53, see Figure 1, to a looper shaft 54 which rocks and slides in bearings 55 and 56, see Figure 2. The rocking movement of the shaft in its bearings is obtained by an eccentric connection 57 operated by the lower shaft 10, and this eccentric connection is connected at 58 to a crank 59 secured to the looper shaft 54. For moving the looper shaft endwise in its bearings 55 and 56, a block 60, see Figure 3, is secured to the right hand end of the looper shaft and this block is provided with a forked portion 61, to receive a split block 62 fitting over a crank 63 of a transverse shaft 64 which rotates in bearings 65 and 66 of a bracket. On one end of this shaft 64 is a bevel gear 67 in mesh with a bevel gear 68 secured to the lower or main driving shaft 10, see Figures 2 and 3, thus giving a rotary movement to the shaft 64, whereby reciprocating or sliding movement of the looper shaft is obtained which, together with the rocking movement of the shaft, results in moving the loopers in elliptical paths around the needles. The opposite end of the shaft 64 is provided with a flange 69, see Figures 3 and 4, having a ball stud 70 for connection with a connecting rod 71, which rod has ball joints 72 and 73 for coupling the ball studs 70 and 74, the latter carried by an arm 75 of a pivotally supported lever 76 which rocks on a stud screw 77 tapped into the throat plate 15, see Figure 4. The other arm 78 of this pivoted lever 76 has a slot 79 in which a pin 80 is located, this pin being carried by a slide 81 which reciprocates in a recess 82 milled in the bottom of the throat plate 15 and is maintained in working position by a plate 83 attached to the bottom of the throat plate. The opposite end of this slide 81 rests on top of the arm 78 and is prevented from getting out of the slot 82 by the plate 83. This slide, see Figure 4, has thread engaging hooks 84, one for each of the four right hand needles. The slide is smoothly finished at the portions where the threads engage the hooks and is operated in timed relation with the needles and loopers and in close relation to the needles and needle slots 85 in the throat plate 15, the side walls of which needle slots 85 are formed by tongues 86 over which the needle and looper stitches are formed and off of which they slide on to the material being stitched, being fed off in the form of chain stitches when no material is being stitched.

An elongated slot 87 communicates with all of the needle slots or holes and tongues to provide stitch clearance. The throat plate 15 is provided with proper feed dog openings 88 and this throat plate is made to suit the number of needles and kind of work the machine is intended for.

Accessibility for threading the loopers, adjusting, oiling, cleaning, etc., is provided by cutting away the throat plate 15 close to the needles as at 89, the slide plate 16 fitting therein for quick removal and replacement, which is very essential in a machine where so many threads are used at one time.

The operation of this improved machine is as follows:

With the needles and loopers operating in the well-known way to make parallel rows of two-thread chain stitches commonly known as U. S. Government stitch, Type 401, indicated at 90, Figure 5, the operation of the cross stitch finger 35 of the cross stitch mechanism lays loops of thread or threads in the paths of the parallel rows of stitches, thus forming a covering ornamental stitch on top of the work, as indicated at 91, Figure 5, and the operation of the looper thread spreader 81 causes this spreader to engage a strand of looper thread extending from the preceding stitch to the forward eye of the looper 49 and carry it over past the next adjoining looper into position for the needle that coacts with that adjoining looper to enter the loop of looper thread formed by the hook 84 of the spreader 81. Thus by providing a hook 84 on the spreader 81 for each needle and looper, except the pair at the extreme left, a wide covering stitch indicated by 92 in Figure 5 is produced and by the addition of other needles and loopers wider covering stitches may be produced. In this figure the top of the material has a series of loops formed by the cross thread finger 35 while the looper threads on the bottom of the material are indicated by 92.

The hooks 84 are preferably made detachable from the spreader bar 81 so that, if desired, different spacing of the bottom covering stitches may be produced. For instance, in a five needle machine, there could be three rows of covering stitches such as 92 and two rows of stitches such as 90 produced simultaneously. In other words, the spreading or carrying over of the looper threads does not in any way affect the straightaway stitching of the parallel rows of stitches, and therefore, the looper thread spreader 81 may be

introduced at will without disturbing or otherwise affecting the stitching.

The threads for the needles come from a suitable supply and pass through a guide A to a tension B, thence to a guide C, thence to the needle bar eyelet D and then directly to the needles, see Figure 2, while the looper threads pass from the supply through guide E to tension F, thence to guide G, thence to guide H and then directly to the eyes in the heels of the loopers, see Figure 2.

In Figure 6, the manner in which the looper threads are drawn over by the spreader 81 is shown. Each looper thread loop 92 is drawn from one looper over the next adjoining looper at the left and in position to permit the needle 46 to enter the loop. As these loops are carried over the tops of the loopers and close to the under side of the throat plate, there being just enough space for the thread to pass freely, there is, in consequence, no surplus thread drawn from the supply, only what is required for the stitches. The loops of the needle thread 47 through which the loopers carry their thread loops 92 forming the bottom covering stitches will function in the regular way when the loop spreader 81 and its hooks 84 are not present, as is clearly illustrated by the left hand looper and needle shown in Figure 6, there being no hook 84 on the loop spreader 81 to cooperate with that looper, so that the looper thread in that instance is only carried away from the looper sufficiently to permit the needle to enter between it and the looper. The figure illustrates how the looper thread loops of each of the four right hand needles are carried from its co-operating looper over the next adjoining looper and concatenated with the needle threads to form this new covering stitch.

In Figure 7, the thread carrying finger 35 is shown provided with a plurality of hooks 36 cooperating with a plurality of stationary thread fingers 39, whereby several threads may be utilized to form separate rows of top cross stitches.

By shifting the loop spreader 81 every second, third or fourth cycle of the machine, interrupted covering cross-over stitches 92 would be produced, this readily being obtained by providing the flange 69 with gear teeth for driving a companion gear of different diameter and connecting the ball stud 70 to the larger gear of the pair the looper spreader 81 would thus be given the desired movement at intervals. Such a gear arrangement is shown in an application of John P. Weis, filed October 20, 1930, Serial No. 489,830.

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, of all of the modes of its use, we claim:

1. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, the combination of means for forming an ornamental stitch on the bottom of the work comprising means for spreading the looper threads, and means for operating it, said spreading means comprising a slide member having a substantially rectilinear movement whereby it is adapted for use with a wide needle gauge and carrying means for engaging the looper threads.

2. In a multiple needle sewing machine having a presser foot and stitching mechanism comprising a plurality of needles and loopers, the combination of means for forming an ornamental stitch on the bottom of the work comprising means shiftable in a substantially rectilinear path whereby it is adapted for use with a wide needle gauge for spreading the looper threads, means for operating it, means for forming an ornamental stitch on top of the work, and means for operating it, said top ornamental stitching means comprising a thread guide movable with the presser foot and a shiftable finger.

3. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, the combination of means for forming an ornamental stitch on the bottom of the work comprising means for spreading the looper threads, means for operating it, means for forming an ornamental cross stitch on top of the work, and means for operating it, said top ornamental stitching means comprising fixed thread guides, and an oscillating finger, said oscillating finger having a plurality of means for engaging independent cross threads.

4. In a multiple needle sewing machine having a plurality of needles and co-operating loopers, a carrier for the loopers having a rectilinear movement, the combination of means for engaging a plurality of looper threads to carry them all in the same direction into position to have the needles adjacent to adjoining loopers pass therethrough, thereby to lay an ornamental stitch on the bottom of the work, and means for operating said means.

5. In a multiple needle sewing machine having a plurality of needles and co-operating loopers, a carrier for the loopers having a rectilinear movement, the combination of cross stitch means for the top of the work, means for engaging a plurality of looper threads to carry them all in the same direction into position to have the needles adjacent to adjoining loopers pass therethrough, thereby to lay an ornamental stitch on the bottom of the work, and means for operating said means.

6. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers, the combination of means for forming an ornamental stitch on the bottom of the work comprising reciprocating means having a substantially rectilinear movement whereby it is adapted for use with a wide needle gauge and adapted to cooperate with a plurality of looper threads to carry them all in the same direction and a thread from one looper to another to permit the needle cooperating with a companion looper to pass through a loop of the looper thread, and means for operating said reciprocating means.

7. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers, the combination of means for forming an ornamental stitch on the bottom of the work and comprising reciprocating means having a substantially rectilinear movement whereby it is adapted for use with a wide needle gauge and having hooks adapted to co-operate with a plurality of looper threads to carry them all in the same direction and a thread from one looper to another to permit the needle co-operating with a companion looper to pass through a loop of the looper thread, and means for operating said reciprocating means.

8. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers,

the combination of means for forming an ornamental stitch on the bottom of the work and comprising reciprocating means having a substantially rectilinear movement whereby it is adapted for use with a wide needle gauge and having hooks adapted to co-operate with a plurality of looper threads to carry a thread from one looper to another to permit the needle co-operating with a companion looper to pass through a loop of the looper thread, and gear operated means for operating said reciprocating means.

9. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers, the combination of means for forming an ornamental stitch on the bottom of the work and comprising reciprocating means having a substantially rectilinear movement whereby it is adapted for use with a wide needle gauge and having hooks adapted to co-operate with a plurality of looper threads to carry a thread from one looper to another to permit the needle co-operating with a companion looper to pass through a loop of the looper thread, and means for operating said reciprocating means, and comprising gearing, a shaft, a rocking member, and means connecting said shaft and rocking member.

10. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers, a carrier for the loopers having a rectilinear movement, the combination of means for laying a cross stitch on top of the work, and means for laying a looper stitch on the bottom of the work, both in position to be stitched down by the needles and with the thread of one looper passing around the needle of a companion looper.

11. In a multiple needle sewing machine, having a presser foot, a plurality of needles and a plurality of loopers, a carrier for the loopers having a rectilinear movement, the combination of means for laying a cross stitch on top of the work and means for laying a looper stitch on the bottom of the work, both in position to be stitched down by the needles, said top cross stitch mechanism including a thread guide movable with the presser foot and located adjacent to the needles and an oscillating thread guide.

12. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers, the combination of means for laying a cross stitch on top of the work and means for laying a looper stitch on the bottom of the work, both in position to be stitched down by the needles, said top cross stitch mechanism including a stationary thread guide located adjacent to the needles and an oscillating thread guide said oscillating thread guide having a plurality of thread carrying means.

13. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers, the combination of means for laying a cross stitch on top of the work and means for laying a looper stitch on the bottom of the work, both in position to be stitched down by the needles, said looper thread means comprising a sliding member having a substantially rectilinear movement whereby it is adapted for use with a wide needle gauge and having means for engaging the looper threads.

14. In a multiple needle sewing machine having a plurality of needles and a plurality of loopers, the combination of means for laying a cross stitch on top of the work and means for laying a looper stitch on the bottom of the work, both in position to be stitched down by the needles, said top cross stitch mechanism including a stationary thread guide located adjacent to the needles and an oscillating thread guide said oscillating thread guide having a plurality of thread carrying means comprising a reciprocating member having means for engaging the looper threads.

15. In a multiple needle sewing machine having a gang of needles and a gang of co-operating loopers, the combination of cross thread laying mechanism for laying cross threads on the top of the work in position to be stitched down by the stitching mechanism, and means for laying loops of looper threads on the bottom of the work in position to be stitched down by the needles and comprising a shiftable member having a substantially rectilinear movement whereby it is adapted for use with a wide needle gauge and having means for engaging the looper threads and means for operating said shiftable member, said operating means being effective to shift said shiftable member to carry a looper thread from one looper across a companion looper in position for the needle of that companion looper to pass therethrough.

16. In a multiple needle sewing machine having a gang of needles and a gang of co-operating loopers, the combination of cross thread laying mechanism for laying cross threads on the top of the work in position to be stitched down by the stitching mechanism, and means for laying loops of looper threads on the bottom of the work in position to be stitched down by the needles and comprising a shiftable member having means for engaging the looper threads and means for operating said shiftable member, said operating means being effective to shift said shiftable member to carry a looper thread from one looper across a companion looper in position for the needle of that companion looper to pass therethrough, said top cross stitch mechanism comprising a fixed thread guide for each pair of needles and located adjacent to the needles, and a shiftable finger having a thread engaging means for each fixed thread guide.

17. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, the combination of means for forming an ornamental stitch on the bottom of the work comprising means for spreading the looper threads, and means for operating it in a substantially rectilinear path whereby it is adapted for use with a wide needle gauge its direction of movement being at right angles to the direction of the feed, said spreading means having hooks, each co-operating with a single looper thread.

18. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, the combination of means for forming an ornamental stitch on the bottom of the work comprising means for spreading the looper threads all in the same direction for the needles adjacent to adjoining loopers to pass therethrough, and means for operating said spreading means in a substantially rectilinear path whereby it is adapted for use with a wide needle gauge the direction of movement thereof being at right angles to the direction of the feed.

19. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, a carrier for the loopers having a rectilinear movement, the combination of means for forming an ornamental stitch on the

bottom of the work comprising means for spreading the looper threads all in the same direction for the needles adjacent to adjoining loopers to pass therethrough, and means for operating it.

20. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, a carrier for the loopers having a rectilinear movement, the combination of means for forming an ornamental stitch on the bottom of the work comprising means for spreading the looper threads all in the same direction for the needles adjacent to adjoining loopers to pass therethrough, and means for operating it, said spreading means having a hook co-operating with each looper thread.

21. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, a carrier for the loopers having a rectilinear movement, the combination of means for forming an ornamental stitch on the bottom of the work comprising means for spreading the looper threads all in the same direction for the needles adjacent to adjoining loopers to pass therethrough, and means for operating it, said spreading means having hooks.

22. In a multiple needle sewing machine having stitching mechanism comprising a plurality of needles and loopers, a carrier for the loopers having a rectilinear movement, the combination of means for forming an ornamental stitch on the bottom of the work comprising means for spreading the looper threads all in the same direction for the needles adjacent to adjoining loopers to pass therethrough, means for operating it, means for forming an ornamental stitch on top of the work, and means for operating it.

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