April 13, 1965 J. A. URSCHELER 3,177,834

APPARATUS FOR CHANGING COLOR WORK IN AN EMBROIDERING PROCESS

Filed July 17, 1963 7 Sheets-Sheet 1

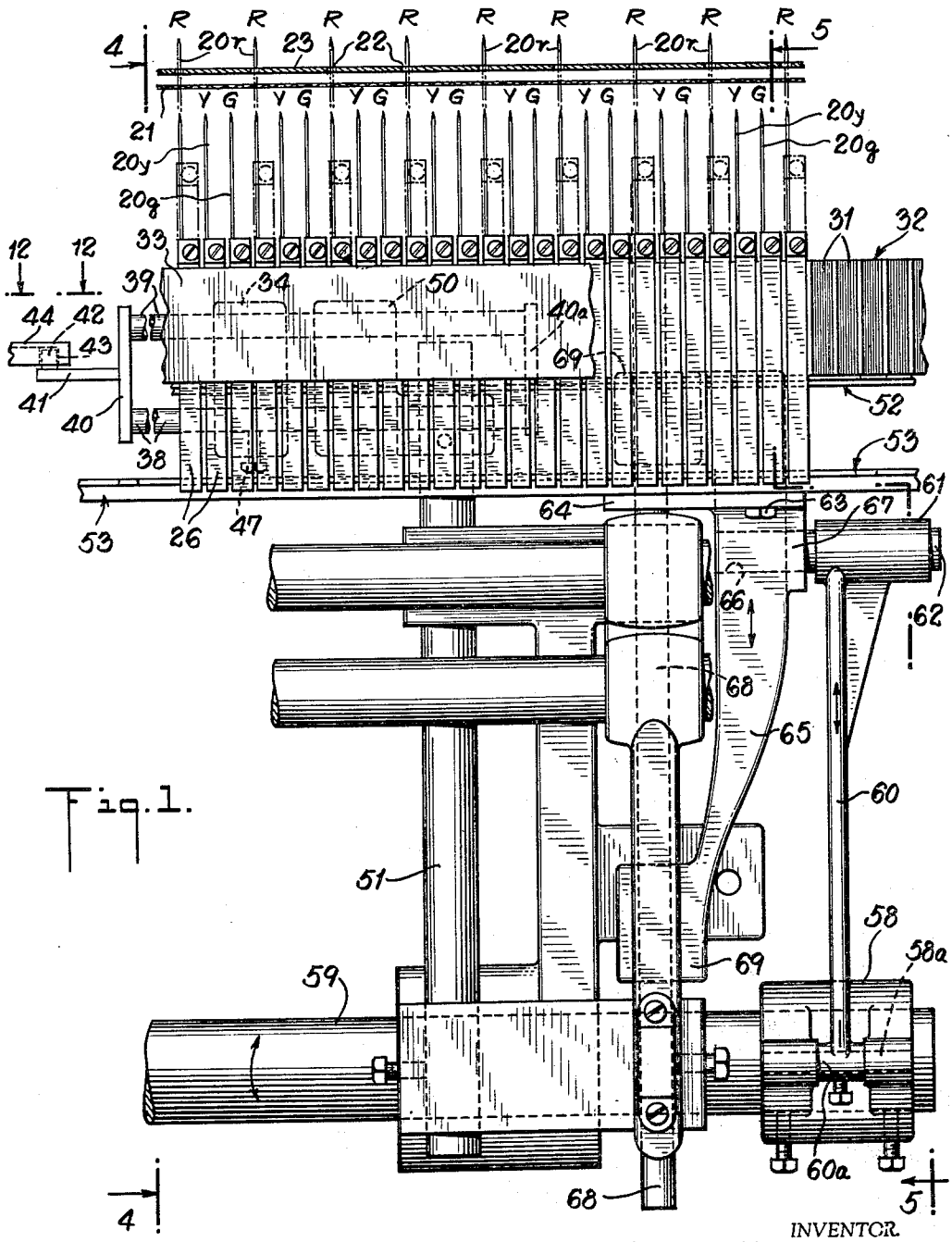

Fig. 1.

INVENTOR.
JACK ANTON URSCHELER
BY E. K. Spruck
ATTORNEY

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Filed July 17, 1963 7 Sheets-Sheet 2

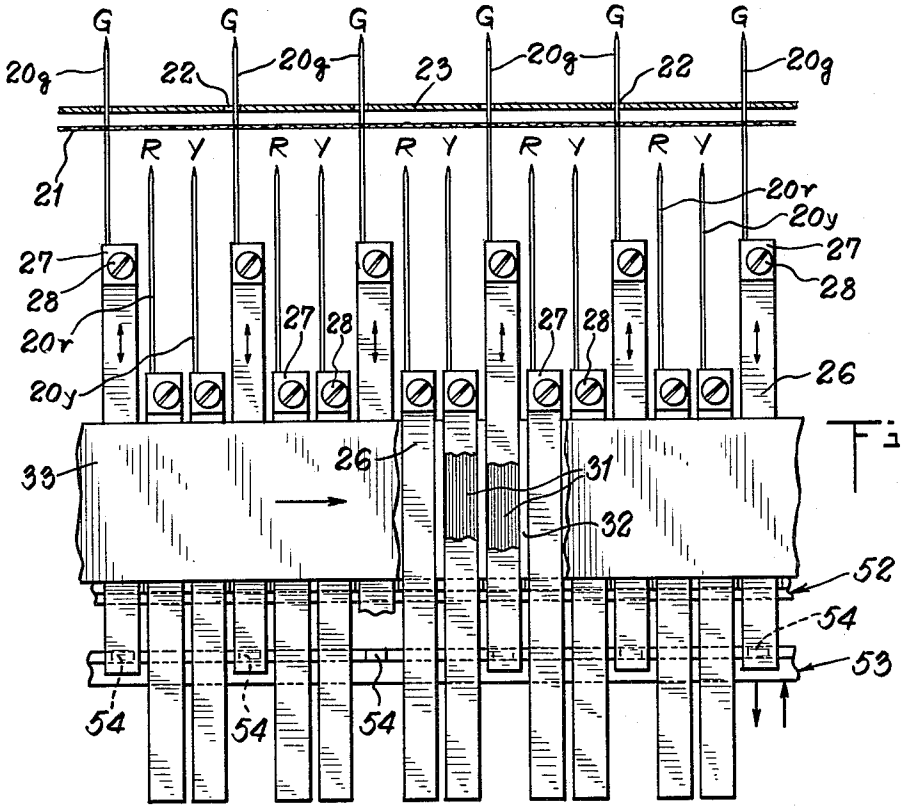


Fig. 2.

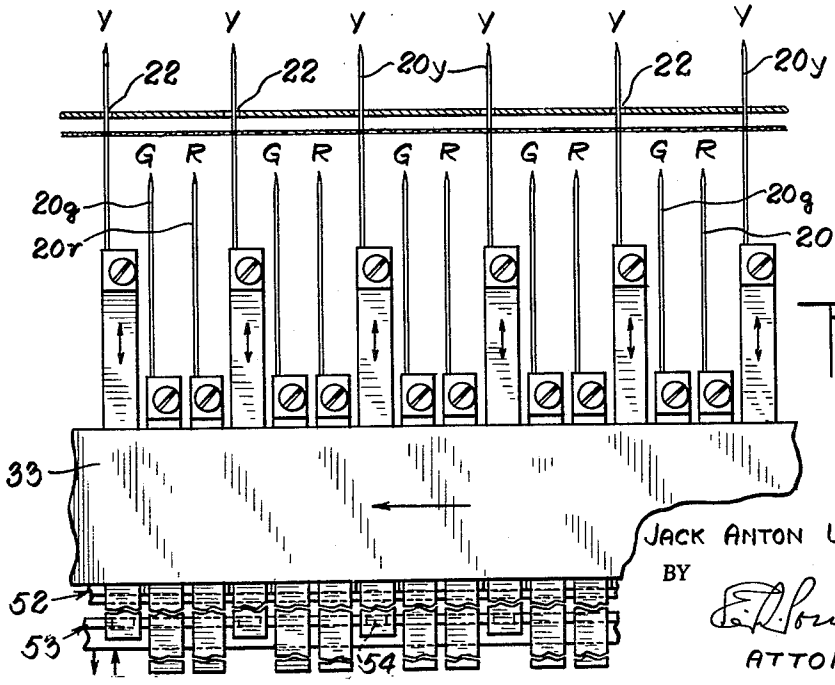


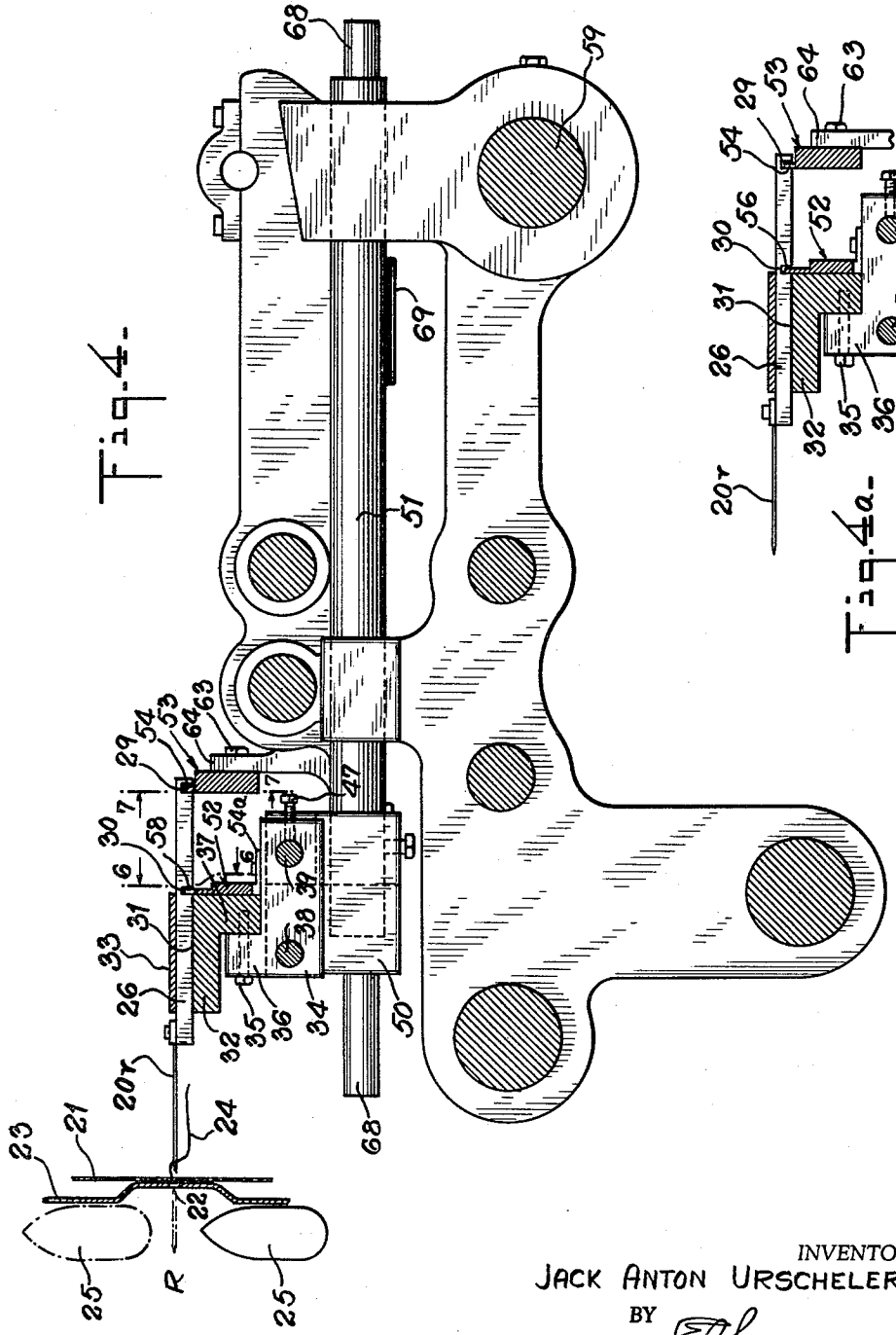
Fig. 3.

INVENTOR.
JACK ANTON URSCHELER
BY
ATTORNEY

April 13, 1965 J. A. URSCHELER 3,177,834

APPARATUS FOR CHANGING COLOR WORK IN AN EMBROIDERING PROCESS

Filed July 17, 1963 7 Sheets-Sheet 3



April 13, 1965 J. A. URSCHELER 3,177,834

APPARATUS FOR CHANGING COLOR WORK IN AN EMBROIDERING PROCESS

Filed July 17, 1963 7 Sheets-Sheet 4

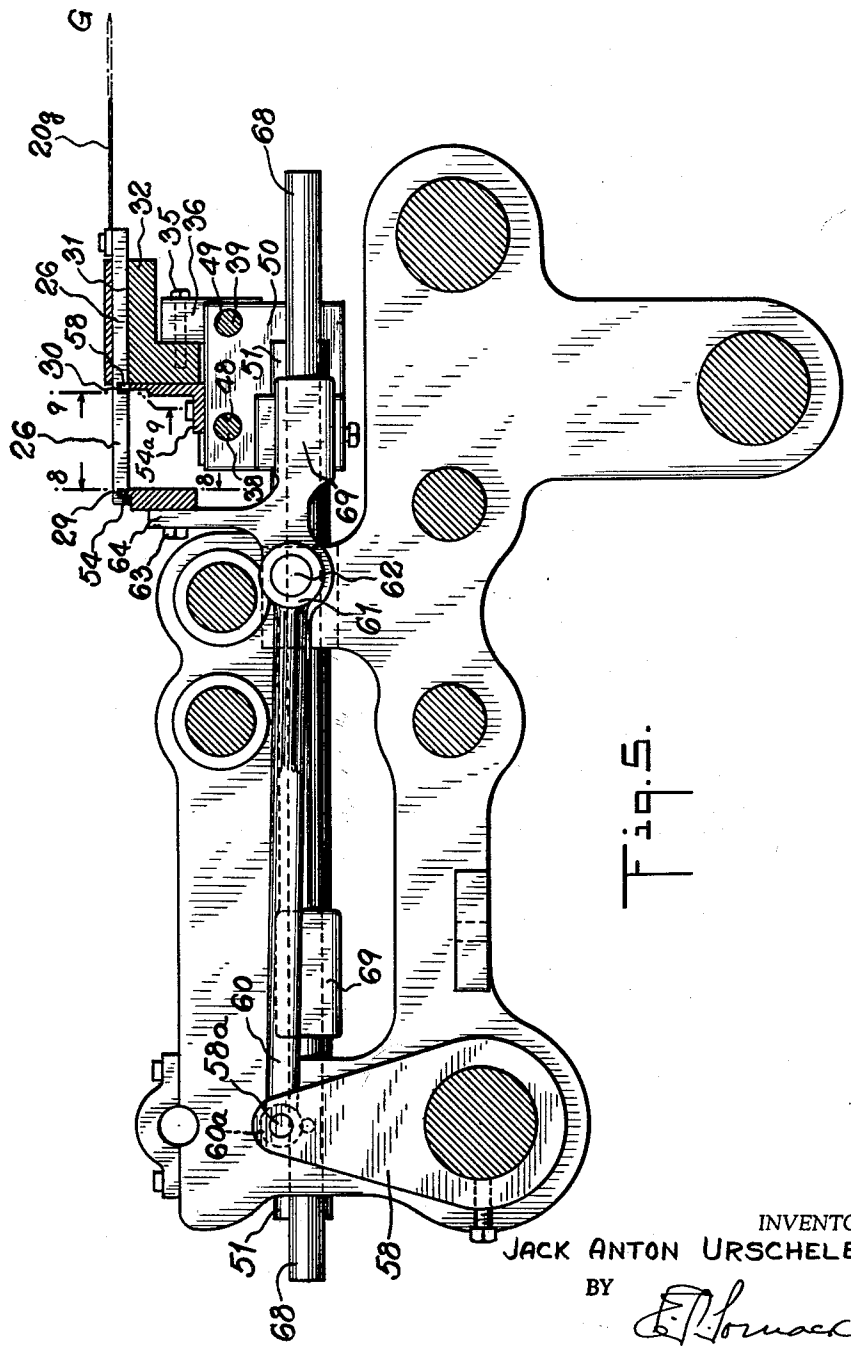


Fig. 5.

INVENTOR.
JACK ANTON URSCHELER
BY
ATTORNEY

April 13, 1965 J. A. URSCHELER 3,177,834

APPARATUS FOR CHANGING COLOR WORK IN AN EMBROIDERING PROCESS

Filed July 17, 1963 7 Sheets-Sheet 5

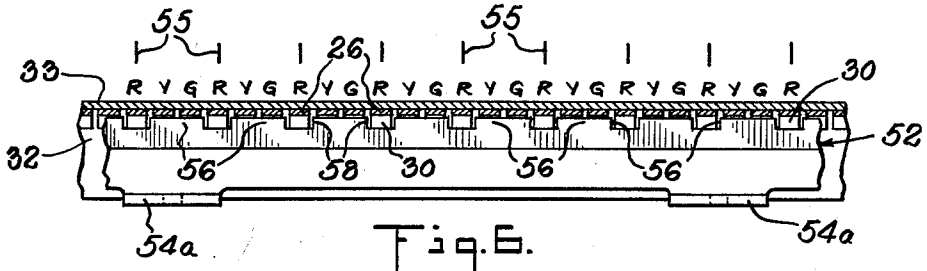


Fig. 6.

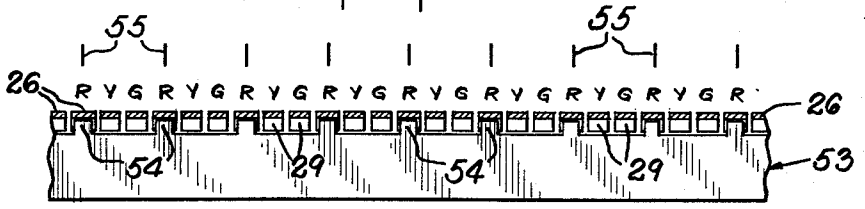


Fig. 7.

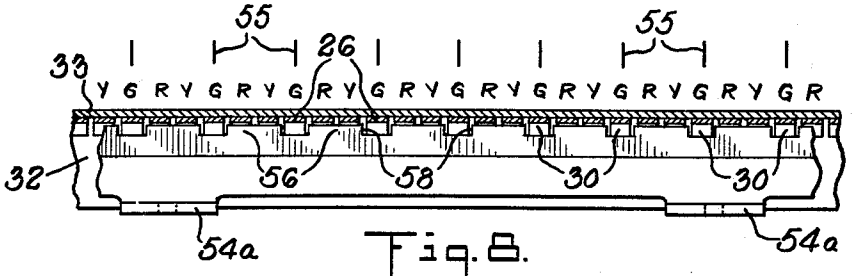


Fig. 8.

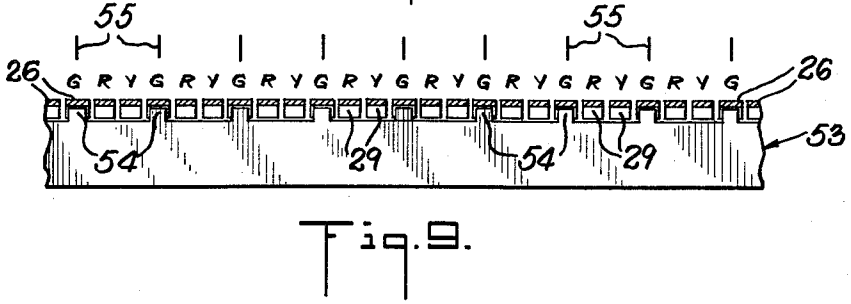


Fig. 9.

INVENTOR.
JACK ANTON URSCHELER
BY
ATTORNEY

April 13, 1965 J. A. URSCHELER 3,177,834

APPARATUS FOR CHANGING COLOR WORK IN AN EMBROIDERING PROCESS

Filed July 17, 1963 7 Sheets-Sheet 6

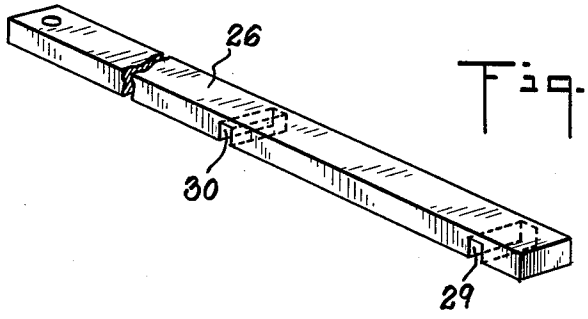
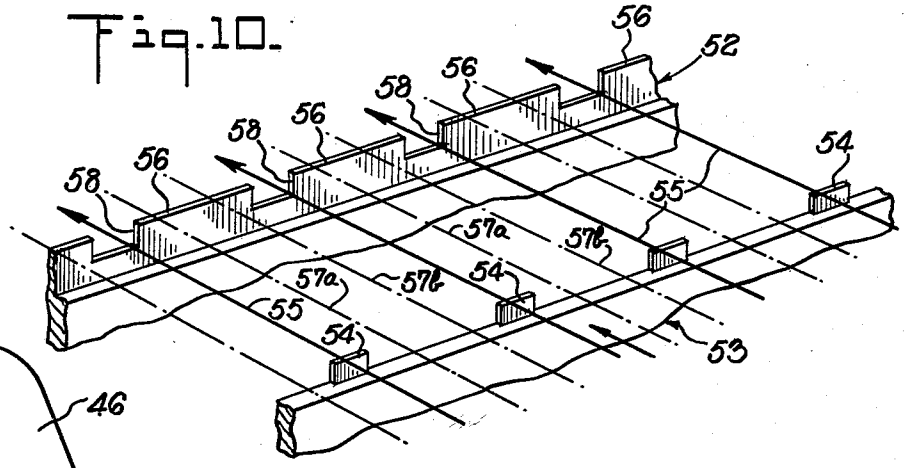


Fig. 11.

Fig. 10.



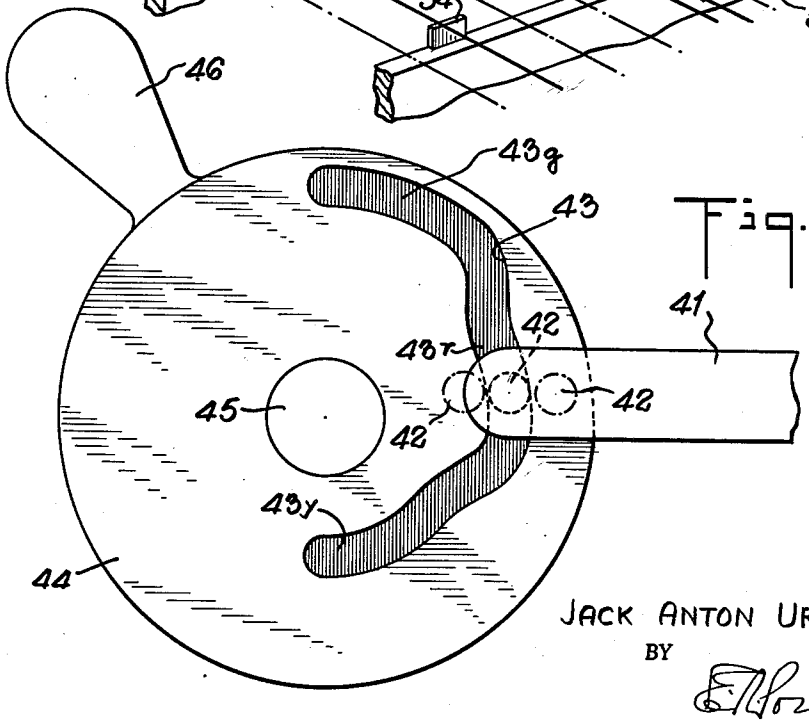


Fig. 12.

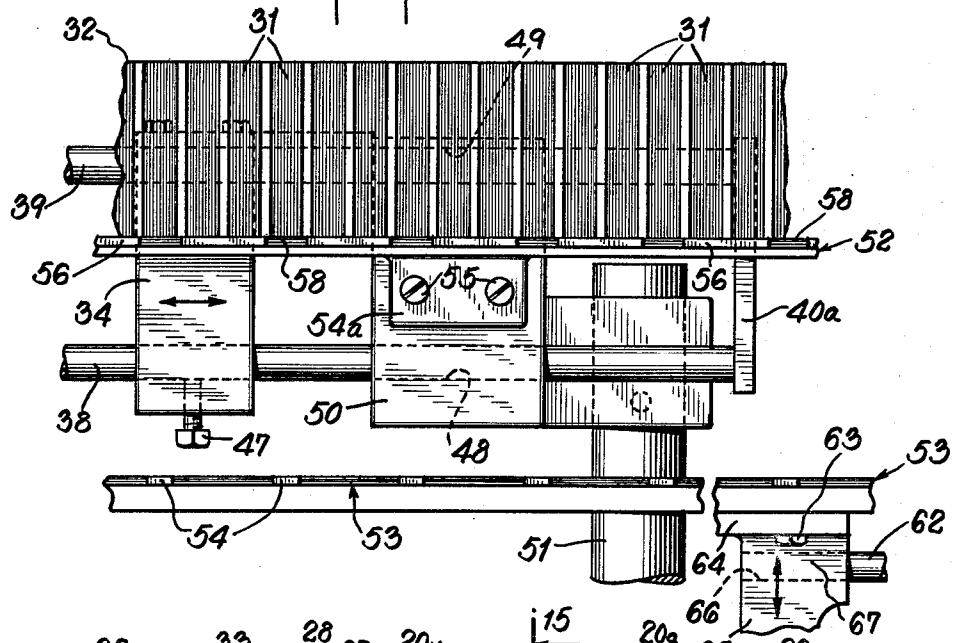
INVENTOR.
JACK ANTON URSCHELER
BY
ATTORNEY

April 13, 1965 J. A. URSCHELER 3,177,834

APPARATUS FOR CHANGING COLOR WORK IN AN EMBROIDERING PROCESS

Filed July 17, 1963 7 Sheets-Sheet 7

Fig. 13.



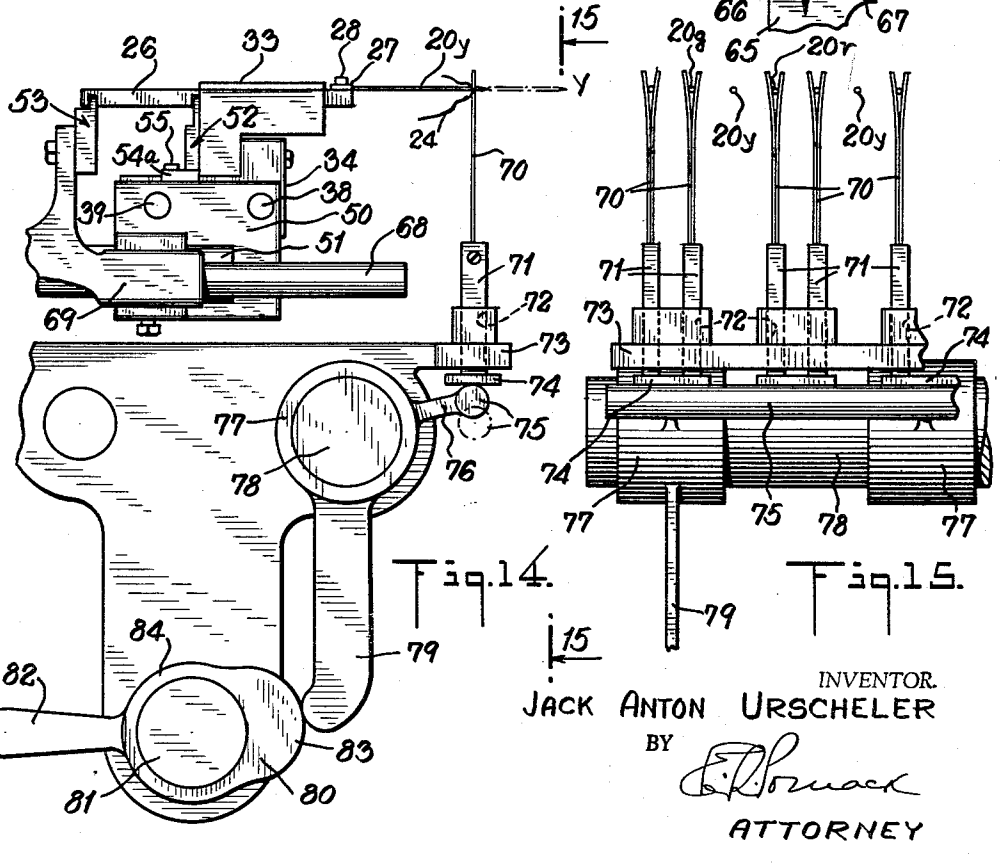


Fig. 14.

Fig. 15.

INVENTOR.
JACK ANTON URSCHELER
BY
ATTORNEY

United States Patent Office 3,177,834 Patented Apr. 13, 1965

3,177,834

APPARATUS FOR CHANGING COLOR WORK IN AN EMBROIDERING PROCESS

Jack Anton Urscheler, Englewood Cliffs, N.J., assignor to I.A.S. Bicor Corp., West New York, N.J., a corporation of New Jersey

Filed July 17, 1963, Ser. No. 295,700
11 Claims. (Cl. 112—83)

This invention relates to embroidery machines, and particularly to thread-supplying needle means for multi-color embroidery.

In conventional embroidery apparatus there is an arrangement of a needle carrying bar which is reciprocatingly moved forwardly and rearwardly, there being a plurality of needles—684 in conventional Schiffli machines—supported by the bar. These needles carry threads which form loops through which correspondingly positioned shuttles move along predetermined operative paths within the framework of the machine—there being threads from bobbins within the shuttles which are engaged by said loops to form lock stitches within the fabric being embroidered. In such conventional apparatus, all the needles contain a selected color of yarn; and when it is desired to change the color—such as is necessary in a multi-colored pattern—the machine must be stopped and the needles re-threaded with a new selected color yarn. This entails not only a loss of time in machine operation, but involves the use of costly labor.

Attempts have been made to provide needles with two or more colored threads, but these have resulted in mechanisms which require complicated apparatus, or doubling or tripling the number of shuttles employed, or which involve complicated setting and adjusting mechanisms.

It is an object of this invention to provide a method of embroidering with two or more differently colored threads through a relatively simple apparatus that is easy to operate, and that can employ the basic structure of an otherwise conventional embroidery machine, such as a Schiffli machine, without increasing the number of shuttles.

This objective is accomplished by the elimination of the conventional needle-carrying bar and by substituting a needle-supporting bed extending along the length of the machine, the bed having a plurality of parallel slots extending in a direction transverse to the longitudinal extent of the machine and slidably accommodating therein a corresponding plurality of novel needle fingers to which are removably connected embroidery needles of conventional construction. Extending lengthwise of said bed are two needle-finger-engaging bars, one being movable forwardly and rearwardly for engaging and actuating a set of coacting needle fingers carrying needles with threads of one color, and the other being a locking bar to hold one or more sets of needle fingers with threads of other colors against movement. The actuating bar has a plurality of upwardly extending projections spaced for engagement with recessed portions on the undersides of the set of operating needles. By means of a suitable cam arrangement said actuating bar is reciprocatingly moved forwardly and rearwardly, thereby actuating the engaged needle fingers to enable the needles carried thereby to perform their operative functions. The locking bar also contains a number of upwardly extending projections proportioned and positioned to engage certain recessed portions on the undersides of the set or sets on non-operational fingers, whereby the needles carried thereby are held in their retracted or inoperative positions.

It is thus apparent that when the actuating bar is operatively moved forwardly, it will move one set of needle fingers and their needles with threads of one color forwardly into their projected operative positions, while the other needle fingers carrying other-colored threads are locked in stationary positions.

When it is desired to change the color, a lever or other actuator at one end of the apparatus is selectively manipulated to one of its several limiting positions to move the entire needle bed a distance equal to that required to bring a previously locked set of needle fingers with differently colored yarn into operative engagement with said actuating bar. Hence, when the latter bar is again actuated, it will cause the set of fingers newly interengaged therewith to be correspondingly operatively actuated, whereby the embroidery process is continued with another color of thread.

The apparatus and method of my invention is thus adapted to attain the objectives above mentioned, in addition to the following additional objectives: effecting a reduction in labor costs, enabling the "change-work" operation to be performed in any repeat with rapidity and relative facility, increasing production, and enabling the pre-setting of needles to accommodate threads of different thicknesses, thereby obviating the laborious and costly effort required in conventional machines to effect such thread change-overs.

Other objects, features and advantages will appear from the drawings and the description hereinafter given.

Referring to the drawings,

FIGURE 1 is a fragmentary plan view of an embodiment of the apparatus of my invention, portions being removed for clarity, the dot-dash lines indicating the projected position of one set of needles.

FIGURE 2 is an enlarged fragmentary plan view of a portion of the apparatus of FIGURE 1, showing the projected position of a second set of needles.

FIGURE 3 is a view like FIGURE 2, showing the projected position of a third set of needles.

FIGURE 4 is a sectional side elevation of the apparatue of FIG. 1 taken substantially along line 4—4, a needle finger being shown in operative engagement with the actuating bar of my invention.

FIGURE 4*a* is a fragmentary view of the upper left hand corner of FIG. 4, but showing the needle finger in operative engagement with the locking bar of my invention.

FIGURE 5 is a side sectional elevation of the apparatus of my invention taken substantially along line 5—5 of FIG. 1.

FIGURE 6 is an enlarged fragmentary section of FIG. 4 taken along line 6—6.

FIGURE 7 is an enlarged fragmentary section of FIG. 4 taken along line 7—7 .

FIGURE 8 is an enlarged fragmentary section of FIG. 5 taken along line 8—8.

FIGURE 9 is an enlarged fragmentary section of FIG. 5 taken along line 9—9.

FIGURE 10 is a fragmentary perspective view of the locking and actuating bars of my invention, shown in their coactive relationship, the view being semi-schematic and indicating by arrows and dot-dash lines the positions of needle fingers with respect to said bars.

FIGURE 11 is a perspective view of one of the needle fingers adapted for operative engagement with the actuating and needle bars of FIGURE 10.

FIGURE 12 is a fragmentary plan view of the cam and link mechanism of said apparatus for operatively shifting the position of the bed of needles, said view being taken substantially in the direction of arrows 12—12 of FIG. 1.

FIGURE 13 is a fragmentary plan view of a portion of the apparatus of my invention illustrated in FIG. 1, the needle fingers and other portions being removed for clarity, the actuating bar being shown in its retracted position.

FIGURE 14 is a fragmentary side elevation of the apparatus, substantially like that shown at the right hand side of FIG. 5, illustrating a modification of the invention embodying a retractable needle holding mechanism, the dot-dash lines showing certain elements in their operatively retracted position.

FIGURE 15 is a fragmentary front elevation of FIGURE 14 looking in the direction of arrows 15—15.

In the form of my invention illustrated, the apparatus is adapted to operatively employ three differently colored threads carried by needles designated by the letters R, G and Y indicating the colors, red, green and yellow, respectively. The needles, generally designated **20**, are of the type employed in embroidery machines, said needles being operatively actuated into projected and retracted positions for performing conventional embrodiery operations. As will be seen from FIG. 4, the needle **20***r*, shown in full lines in its retracted position, is operatively moved forwardly through the fabric **21** and the hole **22** in the plate **23** to its projected position shown in dot-dash lines, and thereafter operatively withdrawn to its said retracted position, a looped portion of the thread **24** having during this operation engaged the thread from the bobbin (not shown) in the shuttle **25** when in its projected (dot-dash) position to form a lock stitch within said fabric **21**, all in known manner.

In the practice of the illustrated embodiment of this invention there are employed three series of needles, needles **20***r* carrying red thread, needles **20***g* carrying green thread and needles **20***y* carrying yellow threads, the needles of each series being separated by two needles, one from each of the other two series—the threads not being shown except in FIG. 4 inasmuch as the thread arrangement is known to those skilled in the art. Among the novel aspects of my invention is the system, to be hereinbelow described, of selectively actuating only the needles of one series, the others being operatively held locked in their retracted positions—the needles of the selected series being brought into operative alignment with the correspondingly positioned holes **22** in the said plate **23**. Fig. 1 shows only the needles **20***r* in operative position with respect to the said holes **22**; FIG. 2 shows only the needles **20***g* in operative position with respect to said holes **22**; and FIG. 3 shows only the needles **20***y* in operative position with respect to said holes **22**.

The method of selective positioning of said respective series of needles is accomplished by a shifting of all the needles simultaneously as a unit, the distance and direction of each shift being effected by the mechanism of the apparatus to be herein described. When the selected series of needles has been brought to its operative position, the next step in the method of this invention is the operative actuation only of the needles in the selected series, so as to enable them to perform their stitching functions with one color or type of thread. This selective actuation is accomplished by a novel combination of elements that project and retract only the selected series of needles while locking all the other needles in place, the needle-actuating components of my apparatus being adapted for coaction with conventional camming mechanisms tied in with an automatic pattern setting or Jacquard card mechanism. After the completion of embroidering with one set of needles, the needle-shifting operations above-mentioned are performed to effect embroidering with the different colors or types of threads carried by the needles of the respective other sets.

Each of the needles **20** is secured to a needle finger **26** by a clamp **27** and screw **28** (see FIGS. 2 and 4), the particular form of needle finger shown being of rectangular cross-section and having on the underside thereof

the transversely extending slotted recesses **29** and **30** (see FIG. 11) to receive therein the respective actuating and locking elements hereinafter referred to. These is a finger **26** for each needle **20**, each finger being slidably disposed in a slot **31** in the slidable bed **32** extending longitudinally of the machine. The said bed **32** thus has as many slots **31** as there are needles, the slots being parallel and extending at right angles to the longitudinal extent of the machine to permit the proper projecting and retracting movements of the needle fingers **26** and their respective needles. Mounted over all of said needle fingers is the hold-down plate **33** suitably secured in place by fasteners not shown.

The said needle bed **32** is fixedly secured to the slide block **34** by the fasteners **35**, said fasteners extending through the vertical wall **36** of the slide block **34** and the adjacent vertical wall **37** of the needle bed **32**, whereby the said bed is effectively held against movement during the reciprocal movement of said needle fingers **26** therein. Extending through and in fixed relation to said slide block **34** are the two rods **38** and **39** joined by the cross-pieces **40** and **40***a* to the former of which is attached the link **41** the outer end of which carries the roller **42** (FIGS. 1 and 12) operatively positioned within the groove **43** of the cam **44**. The said groove consists of three sections, the outermost section **43***g*, the innermost section **43***y* and the intermediate section **43***r*. Said cam is mounted on the shaft **45** and has a handle **46** whereby the cam can be rotated to bring any selected one of said groove sections in engagement with said roller **42**, thereby to move said roller into any one of the three positions indicated in FIG. 12. In this manner the link **41** and the pair of rods **38** and **39** are correspondingly moved—such movements being transmitted to the slide block **34** through the medium of the set screw **47** carried by block **34** and in operative engagement with the rod **38** (see FIGS. 4 and 13). Said rods **38** and **39** slidably extend through the passageways **48** and **49** in the stationary supporting block **50** (see FIGS. 5 and 13) and are accordingly operatively supported thereby, said block **50** being supported by the structural member **51** which, as is known to those skilled in the art, is similar to an analogous structural member in conventional Schiffli embrodiery machines.

The needle-finger locking member of the apparatus is the locking bar **52** (see FIGS. 10, 4, 4*a*, 2) extending longitudinally of the machine directly behind the needle bed **32** and below all the needle fingers **26**. And spaced rearwardly therefrom is the actuating bar **53** parallel to locking bar **52** and of substantially the same length and positioned substantially at the same level as said bar **52**. The said locking bar **52** has the flanged base **54***a* mounted on and secured by fasteners **55** to the said stationary block **50** (FIG. 13); and the said actuating bar **53** is secured by fastener members **63** to the upright wall **64** connected to the reciprocating arm **65** actuated by means to be hereinafter described for imparting operative forward and rearward movements of said actuating bar **53**. The said operative movements of the actuating bar—in response mechanisms known to those skilled in the art—are transmitted to the set of needle bars that are in operative position, as will more clearly hereinafter appear.

The actuating bar **53** has a plurality of upwardly extending projections **54** spaced so as to be in underlying registry with the needle fingers of the operatively selected set. Thus (see FIG. 10), assuming the arrows **55** represent the positions of the needle fingers of the set of needles **20***r*, the said projections **54**, being spaced in registry with said arrows **55**, are positioned for operative underlying relation to the needle fingers of said set. In the particular embodiment of my invention illustrated, there is one projection **54** for every three needles, these being in line with the operative pathways of all the needles indicated by said arrows **55**.

The locking bar **52** has a plurality of upwardly extending projections **56**, these being proportioned and positioned to underlie the non-operative needle fingers. In

other words, each projection 56 is in underlying registry with the two needle fingers positoned between the two adjacent fingers of the operatively positioned fingers. By referring to FIG. 10 it will be seen that the projections 56 are in underlying relation to the dot-dash lines 57*a* and 57*b* between the arrows 55. The arrangement is hence such that the projections 54 are in registry with the notches 58 between the respective projections 56.

When the needle fingers 26 are operatively in place within the needle-bed slots 31, the notches 30 in the said fingers are in transverse alignment with said projections 56 of the locking bar 52, and the notches 29 in the said fingers are in transverse alignment with said projections 54 of the actuating bar. When the cam 44 (see FIG. 12) is rotated to the position where the groove section 43*r* is in engagement with the roller 42, the link 41 is actuated to shift the rods 38 and 39 and the needle bed 32 to the position where the needles 20*r* are in their operative positions shown in FIGS. 1 and 4. When the cam section 43*g* is brought into engagement with said roller 42, the needle bed 32 is operatively shifted, through said link 41 and the rods 38 and 39, to the position shown in FIG. 2 at which the needles 20*g* are in their operative positions; and similarly, when the cam section 43*y* is brought into engagement with the roller 42, the needle bed 32 is operatively shifted to the position shown in FIG. 3 at which position the needles 20*y* are in their operative positions.

When a selected set of needle fingers has, in the manner aforesaid, been brought to its operative position, each needle finger 26 of said set has the rear notch 29 thereof interengaged with one of the underlying projections 54 of the actuator bar 53; but the notches 30 of said needle fingers are free of the projections 56 of said locking bar 52. Such operative positioning is shown in FIG. 4 for the set of needles 20*r*, in FIG. 5 for the set of needles 20*g*, and in FIG. 14 for the set of needles 20*y*. The needle fingers 26 of the non-selected sets are in their respective non-operative positions, their respective notches 30 being interengaged with the projections 56 of the locking bar 52, their respective notches 29 being out of engagement with the projections 54 of the actuating bar, as illustrated in FIG. 4*a*.

The arrangement is hence such that upon an operative forwardly and rearwardly movement of the actuator bar 53, the interengaged needle fingers are correspondingly actuated forwardly and rearwardly to enable the needles 20 carried by these fingers to perform their stitch-forming operations in the manner described. The non-selected needles are maintained in their non-operative retracted positions by the stationary locking bar 52 interengaged therewith.

To effect a change of color, the cam 44 is manipulated in the manner aforesaid, to bring the newly selected set of needles into operative position and simultaneously to remove the previously operatively positioned needles into an inoperative position. In the performance of this change-over operation, the operative shifting of the needle fingers 26 with respect to said bars 52 and 53 causes the operatively positioned fingers to slide out of their respective interengaged positions with the actuator bar 53 and into interengaged positions with the locking bar 52, and at the same time causes the newly selected set of needle fingers to become disengaged from said locking bar 52 and interengaged with the actuating bar 53—operations that are smoothly accomplished by virtue of the fact that the operative shifting of the needle fingers 26 is in the direction of the transverse through slots 29 and 30 which is the longitudinal extent of the said bars 52 and 53. As will be noted from FIG. 10, a shifting of the fingers to the left will bring those that are at the dot-dash lines 57*a* into operative position, and a shifting to the right will bring the fingers that are at the lines 57*b* into operative position.

The operative reciprocating action of the actuator bar 53 can, within the scope of my invention, be effected by any means known to those skilled in the art, such as by the substantially conventional Schiffli mechanism shown on the drawings and adapted to effect the reciprocating action of the conventional needle-carrying bar. Such mechanism comprises, in the particular construction illustrated, a rocker arm 58 fixedly mounted on the shaft 59 (FIGS. 1 and 5) which is operatively actuated by known cam means (not shown), a link 60 having at the outer end thereof an axially bored hub 60*a* rotably mounted over the pin 58*a* of said rocker arm 58 so as to enable the rocking movement of said arm to cause a reciprocating movement of the link 60. The opposite end of said link has an annular hub 61 rotably mounted over the shaft 62, the latter extending into the bore 66 of the boss 67 of arm 65—the arrangement being such that the operative reciprocating motion of said link 60 is transmitted to said shaft 62, the arm 65 and the wall 64 thereof, and thus to the actuator bar 53. Said reciprocating arm 65 is supported for proper reciprocal movement by the guide rod 68 over which is slidably mounted the terminal hubs 69 of said arm.

In the modification illustrated in FIGS. 14 and 15, selective needle holding means are employed. The forked retractable needle supporters 70 are shown in underlying supporting engagement with the needles in their retracted positions, the upper forked terminals of each supporter being so proportioned as to confine the thread of the needle between said terminals and thereby prevent its displacement away from the needle as a result of the machine's vibrations—thereby also preventing a gradual unthreading of the needle. Each supporter 70 is detachably secured to a vertical bar 71 slidably movable through an apertured portion 72 in the front wall structure 73. At the bottoms of pairs of said bars 71 are the plates 74 supported by the terminals 75 of the arm 76 joined to the annular sleeve 77 rotatably mounted over the shaft 78, said sleeve 77 having the follower arm 79 in operative engagement with the two-position cam 80 fixedly mounted on the shaft 81 to which the handle 82 is attached. By manipulating the handle 82, either the high portion 83 or the low portion 84 of the cam can be brought into engagement with said follower 79, thereby to selectively raise or lower the bars 71 and their respective needle supporters 70 to their operative or inoperative positions. Thus, when it is desired to thread the retracted needles, the said supporters are lowered, in the manner aforesaid, to bring the needles into convenient threading positions.

In the above description, the invention has been disclosed merely by way of example and in preferred manner; but obviously many variations and modifications may be made therein. It is to be understood, therefore, that the invention is not limited to any form or manner of practicing same, except insofar as such limitations are specified in the appended claims.

I claim:

1. In an embroidering apparatus of the class in which there are a plurality of equally spaced parallel pathways for the operative movement of embroidery needles, a plurality of sets of parallel embroidery needles, the needles of each set being spaced to correspond with the spacing of said pathways, a plurality of needle fingers supporting said respective needles, a needle bed having a plurality of parallel slots extending in the direction of said pathways and slidably supporting therein said needle fingers, the needles of one of said sets being disposed in operative position in line with said pathways, means for shifting said bed to a position where the needles of another set are in operative position in line with said pathways, and actuating means for operatively actuating the needle fingers of the operatively positioned needles, whereby they will be caused to perform stitching operations, said actuating means comprising a bar extending transversely with respect to the direction of said pathways and having a plurality of needle-finger engaging portions spaced to

correspond with the spacing of said pathways and positioned in line therewith, said portions being in engagement with the fingers of an operatively positioned set of needles.

2. In an embroidering apparatus of the class in which there are a plurality of equally spaced parallel pathways for the operative movement of embroidery needles, a plurality of sets of parallel embroidery needles, the needles of each set being spaced to correspond with the spacing of said pathways, a plurality of needle fingers supporting said respective needles, a needle bed having a plurality of parallel slots extending in the direction of said pathways and slidably supporting therein said needle fingers, the needles of one of said sets being disposed in operative position in line with said pathways, means for shifting said bed to a position where the needles of another set are in operative position in line with said pathways, and actuating means for operatively actuating the needle fingers of the operatively positioned needles, whereby they will be caused to perform stitching operations, and a locking bar extending transversely with respect to the direction of said pathways and having a plurality of projections disposed between and out of alignment with said pathways, said projections being in releasable locking engagement with the fingers of the needles that are in inoperative positions.

3. In an embroidering apparatus of the class in which there are a plurality of equally spaced parallel pathways for the operative movement of embroidery needles, a plurality of sets of parallel embroidery needles, the needles of each set being spaced to correspond with the spacing of said pathways, a plurality of needle fingers supporting said respective needles, a needle bed having a plurality of parallel slots extending in the direction of said pathways and slidably supporting therein said needle fingers, the needles of one of said sets being disposed in operative position in line with said pathways, means for shifting said bed to a position where the needles of another set are in operative position in line with said pathways, and actuating means for operatively actuating the needle fingers of the operatively positioned needles, whereby they will be caused to perform stitching operations, said actuating means comprising a bar extending transversely with respect to the direction of said pathways and having a plurality of projections spaced to correspond with the spacing of said pathways and positoned in line therewith, said projections being in engagement with the fingers of an operatively positioned set of needles, and a locking bar parallel to said actuating bar and having a plurlity of projections disposed between and out of alignment with said pathways, said latter projections being in releasable locking engagement with the fingers of the needles that are in inoperative positions, said projections on said locking bar forming therebetween a plurality of apertured portions, said apertured portions being in alignment with the correspondingly positioned projections of said actuating bar.

4. In an embroidering apparatus of the class in which there are a plurality of equally spaced parallel pathways for the operative movement of embroidery needles, a plurality of sets of parallel embroidery needles, the needles of each set being spaced to correspond with the spacing of said pathways, a plurality of needle fingers supporting said respective needles, a needle bed having a plurality of parallel slots extending in the direction of said pathways and slidably supporting therein said needle fingers, the needles of one of said sets being disposed in operative position in line with said pathways, means for shifting said bed to a position where the needles of another set are in operative position in line with said pathways, and actuating means for operatively actuating the needle fingers of the operatively positioned needles, whereby they will be caused to perform stitching operations, said fingers each having two transverse notched portions thereon, said actuating means comprising a bar extending transversely with respect to the direction of said pathways and having a plurality of projections spaced to correspond with the spacing of said pathways and positioned in line therewith, each of said projections being in slidable engagement with one of said notched portions of the adjacent operatively positioned needle finger, and a locking bar parallel to said actuating bar and having a plurlity of projections disposed between and out of alignment with said pathways, said latter projections being in slidable engagement with one of the said notched portions of the adjacent inoperatively positioned needle finger.

5. In an embroidering apparatus of the class in which there are a plurality of equally spaced parallel pathways for the operative movement of embroidery needles, a plurality of sets of parallel embroidery needles, the needles of each set being spaced to correspond with the spacing of said pathways, a plurality of needle fingers supporting said respective needles, a needle bed having a plurality of parallel slots extending in the direction of said pathways and slidably supporting therein said needle fingers, the needles of one of said sets being disposed in operative position in line with said pathways, means for shifting said bed to a position where the needles of another set are in operative position in line with said pathways, and actuating means for operatively actuating the needle fingers of the operatively positioned needles, whereby they will be caused to perform stitching operations, said fingers each having two transverse notched portions thereon, one of said notched portions being at the rear of the finger and the other forwardly thereof, said actuating means comprising a bar extending transversely with respect to the direction of said pathways and having a plurality of projections spaced to correspond with the spacing of said pathways and positioned in line therewith, each of said projections being in slidable engagement with said rear notched portion of the adjacent operatively positioned needle finger, and a locking bar parallel to and disposed forwardly of said actuating bar and having a plurality of projections disposed between and out of alignment with said pathways, said latter projections being in slidable engagement with the forwardly one of the notched portions of the adjacent inoperatively positioned needle finger.

6. In an embroidering apparatus of the class in which there are a plurality of equally spaced parallel pathways for the operative movement of embroidery needles, a plurality of sets of parallel embroidery needles, the needles of each set being spaced to correspond with the spacing of said pathways, a plurality of needle fingers supporting said respective needles, a needle bed having a plurality of parallel slots extending in the direction of said pathways and slidably supporting therein said needle fingers, the needles of one of said sets being disposed in operative position in line with said pathways, a slide block attached to said needle bed, a slide rod attached to said block, means to actuate said rod for shifting said slide block and bed to a position where the needles of another set are in operative position in line with said pathways, and actuating means for operatively actuating the needle fingers of the operatively positioned needles, whereby they will be caused to perform stitching operations.

7. In an embroidery apparatus, the combination according to claim 6, said slide-rod actuating means having a cam and a follower connected to said rod, said cam having cam surfaces operatively engageable with said follower for moving it to a plurality of positions corresponding to predetermined selected positions of said bed.

8. In an embroidery apparatus, the combination according to claim 6, a stationary supporting block, a passageway in said latter block, said rod slidably extending through said passageway, and locking means positioned out of alignment with said pathways for holding the

non-operatively positioned needle fingers against movement, said locking means being fixedly attached to said stationary supporting block.

9. In an embroidering apparatus of the class in which there are a plurality of equally spaced parallel pathways for the operative movement of embroidery needles, a plurality of sets of parallel embroidery needles, the needles of each set being spaced to correspond with the spacing of said pathways, a plurality of needle fingers supporting said respective needles, a needle bed having a plurality of parallel slots extending in the direction of said pathways and slidably supporting therein said needle fingers, the needles of one of said sets being disposed in operative position in line with said pathways, means for shifting said bed to a position where the needles of another set are in operative position in line with said pathways, and actuating means for operatively actuating the needle fingers of the operatively positioned needles, whereby they will be caused to perform stitching operations, said fingers each having two transverse notched portions thereon, one of said notched portions being at the rear of the finger and the other forwardly thereof, said actuating means comprising a bar extending transversely with respect to the direction of said pathways and having a plurality of projections spaced to correspond with the spacing of said pathways and positioned in line therewith, each of said projections being in slidable engagement with said rear notched portion of the adjacent operatively positioned needle finger, and a locking bar parallel to and disposed forwardly of said actuating bar and having a plurality of projections disposed between and out of alignment with said pathways, said latter projections being in slidable engagement with the forwardly one of the notched portions of the adjacent inoperatively positioned needle finger, and reciprocating means connected to said actuator bar for reciprocatingly moving it in the direction of said pathways.

10. In an embroidering apparatus of the class described, a plurality of sets of embroidery needles, means for operatively projecting and retracting selected needles whereby they will be caused to perform stitching operations, and retractable needle supporters adapted for underlying engagement with said needles, said supporters being movable between operative supporting positions at which they are in engagement with correspondingly positioned needles and retracted positions at which they are out of engagement with said respective needles.

11. In an embroidering apparatus of the class described, a plurality of sets of embroidery needles, means for operatively projecting and retracting selected needles whereby they will be caused to perform stitching operations, and retractable needle supporters adapted for underlying engagement with said needles, said supporters having forked upper ends adapted to straddle correspondingly positioned needles, vertical bars supporting said needles, and cam means for raising and lowering said bars to bring said supporters to their respective projected and retracted positions.

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JORDAN FRANKLIN, *Primary Examiner.*