Dec. 18, 1928. 1,695,680

F. M. CARD

SEWING MACHINE NEEDLE CONTROLLING MECHANISM

Filed Jan. 21, 1927 3 Sheets-Sheet 1

Fig. 1.

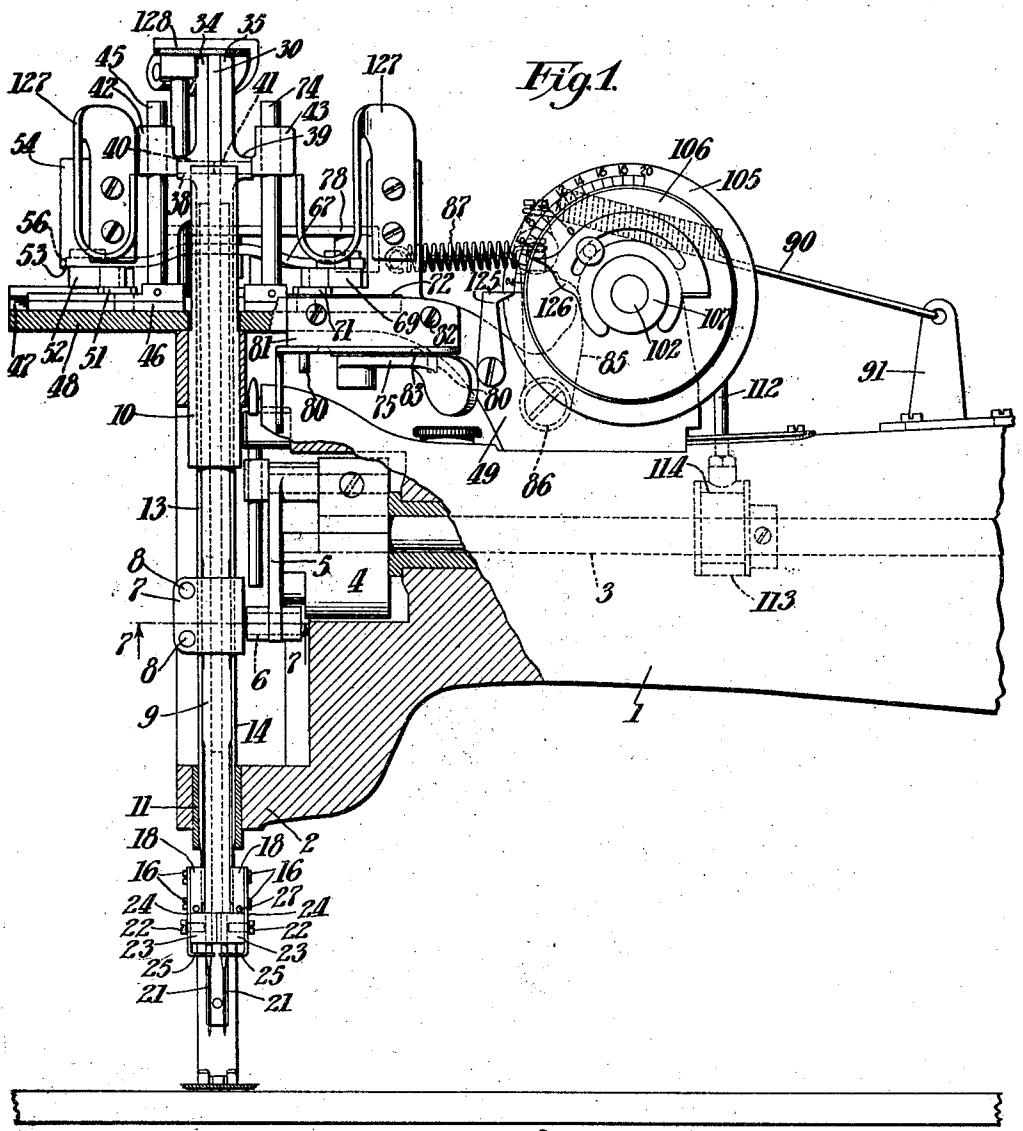
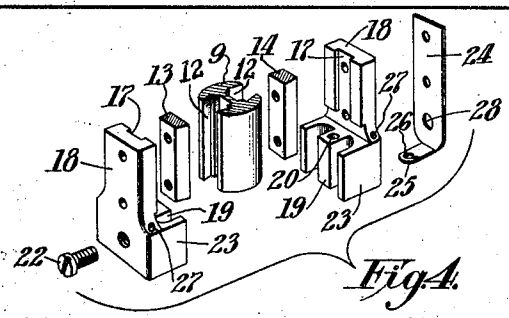


Fig. 4.



Witnesses:
Godfrey Peirce
C. B. Stewart

Inventor
Frederic M. Card

By Henry J. Miller
Attorney

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F. M. CARD

SEWING MACHINE NEEDLE CONTROLLING MECHANISM

Filed Jan. 21, 1927 3 Sheets-Sheet 2

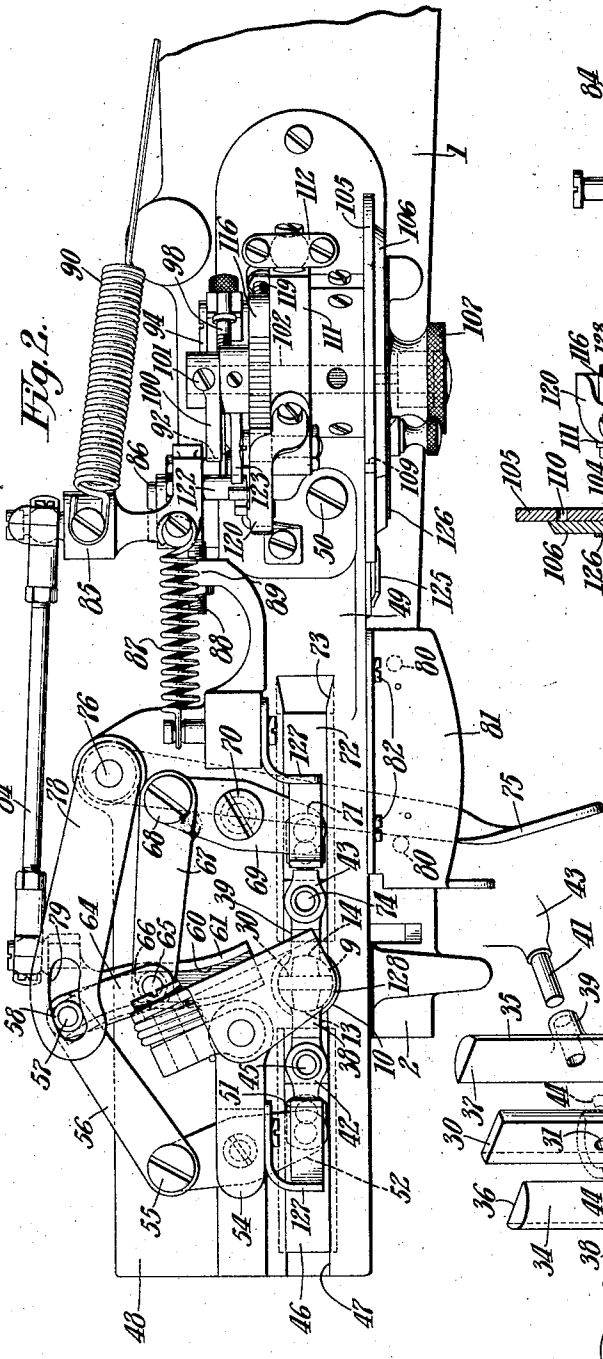


Fig. 2.

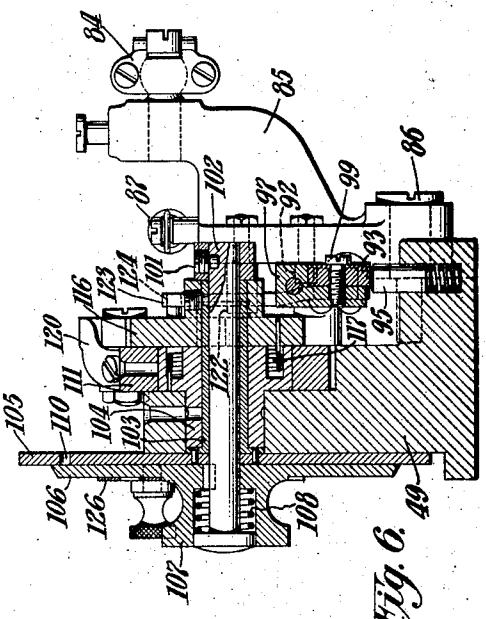


Fig. 6.

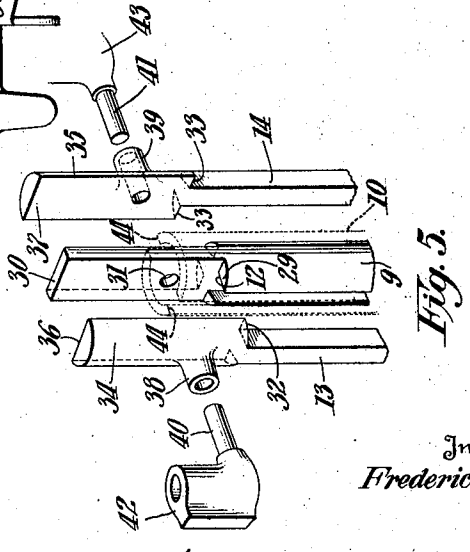


Fig. 5.

Witnesses:
Godfrey Reina,
W. P. Stewart

Inventor
Frederic M. Card

By Henry J. Miller
Attorney

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F. M. CARD

SEWING MACHINE NEEDLE CONTROLLING MECHANISM

Filed Jan. 21, 1927 3 Sheets-Sheet 3

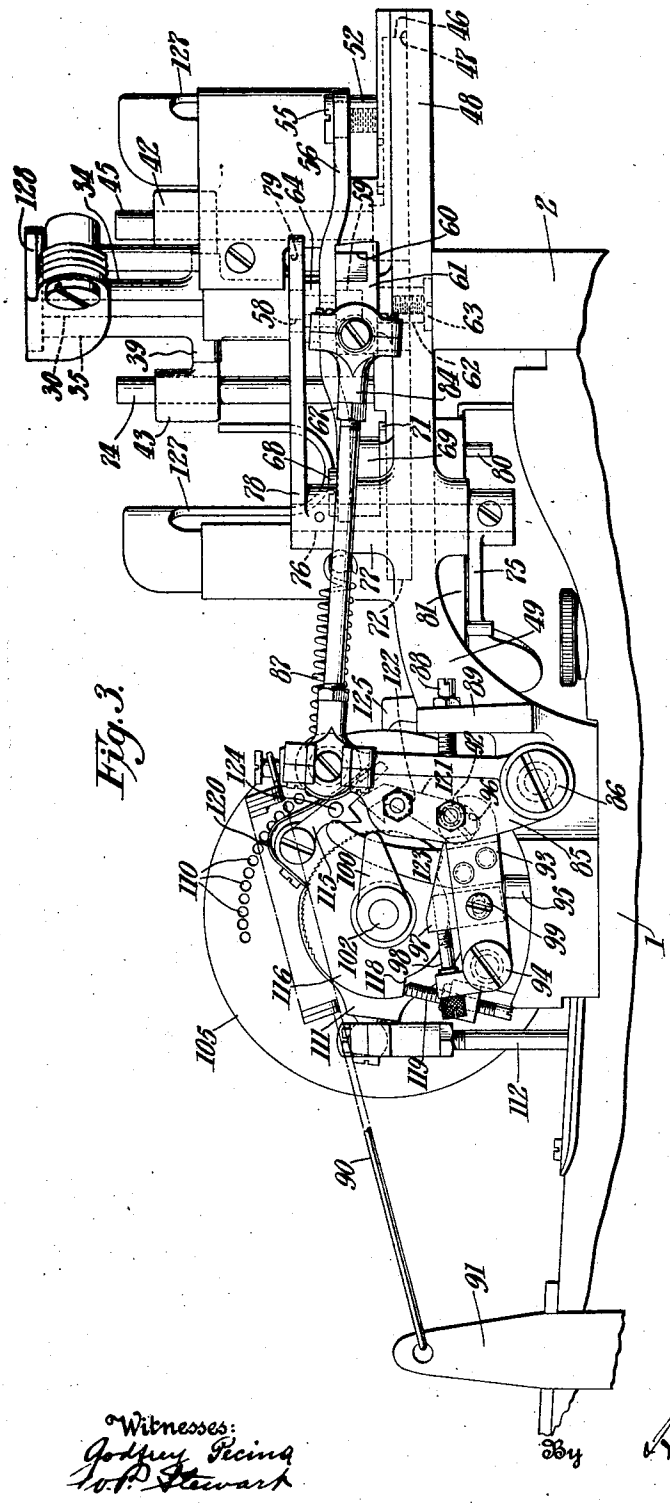


Fig. 3.

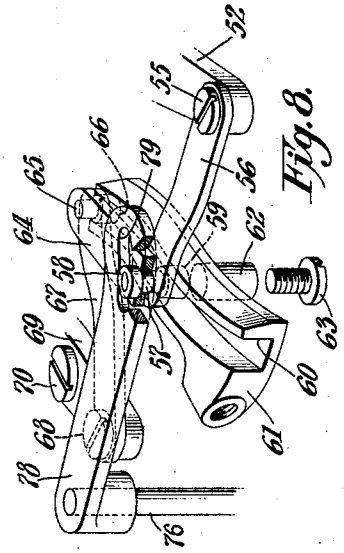


Fig. 8.

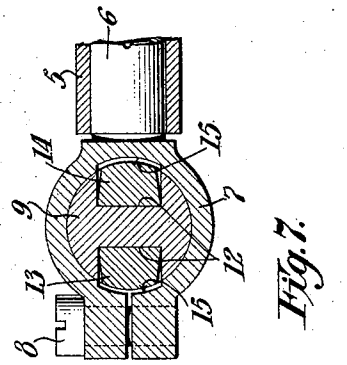


Fig. 7.

Witnesses:
Godfrey Peirce
W. P. Stewart

Inventor
Frederic M. Card

By Henry J. Miller

Attorney

Patented Dec. 18, 1928. 1,695,680

UNITED STATES PATENT OFFICE.

FREDERIC M. CARD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, OF ELIZABETH, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SEWING-MACHINE NEEDLE-CONTROLLING MECHANISM.

Application filed January 21, 1927. Serial No. 162,609.

This invention relates to improvements in two-needle sewing machines and more especially to that class of two-needle machines particularly adapted for stitching angular seams and in which means are provided for at will rendering one of the needles inoperative during a definite period of operation of the other needle. The primary object of the present invention is to increase the efficiency of sewing machines of this character by rendering them more adaptable to produce oppositely directed angular seams and to that end the invention comprehends the provision of improved controlling means for at will throwing either needle of a two-needle machine out of operation and for maintaining the inoperative needle out of action during a predetermined period of operation of the continuously reciprocated needle.

The present needle-bar controlling means is in the nature of an improvement on the controlling mechanism disclosed in my prior patent application Serial No. 35,854, filed June 9, 1925, in which the operation of a manually controlled means for throwing a needle-bar out of action brings into operation a counting device automatically determining the idle period of the disconnected needle-bar with respect to the reciprocations of the other needle-bar. In the present improvement both needle-carrying bars are connected to their reciprocating means by disconnectible coupling elements and a manually shiftable device is interposed in the train of connections with said coupling elements for predetermining which needle-bar is shown out of action under manual control and later automatically reconnected with its reciprocating means by the counting device.

In the accompanying drawings, Fig. 1 is a front elevation, partly in section, of a portion of the overhanging bracket-arm of a two-needle sewing machine embodying the present improvements. Fig. 2 is a top plan view of a portion of the machine bracket-arm and of the parts carried thereby, showing the shifting device in position for manually disconnecting the left-hand needle-bar. Fig. 3 is a rear side elevation of the needle-bar controlling mechanism mounted on the machine bracket-arm. Fig. 4 comprises detached perspective views of the lower ends of the needle-bars and carrier, including the needle-holding clamps. Fig. 5 comprises detached perspective views of the upper ends of the needle-bars and their carrier. Fig. 6 is a substantially central section of the counting device. Fig. 7 is a section substantially on the line 7—7 of Fig. 1. Fig. 8 is a detail perspective view of the shifting device for determining which needle-bar is thrown out of operation.

Referring to the drawings, there is illustrated only so much of the sewing machine as is deemed essential to an understanding of the present invention. The sewing machine includes the usual overhanging bracket-arm 1 terminating at its forward end in the head 2, in which bracket-arm is journaled the rotary main or needle-reciprocating shaft 3. At its forward end, the shaft 3 carries the usual crank-disk 4, connected by means of a link 5 with a stud 6 projecting laterally from a split collar 7 clamped by means of screws, as 8, upon a needle-bar carrier 9. The needle-bar carrier 9 is journaled for endwise reciprocation in suitable bearings provided by an upper elongated bushing 10 and a lower bushing 11 fixed in alined apertures in the head 2. The carrier 9 is formed longitudinally thereof with substantially rectangular grooves 12 in which are slidingly disposed slab-sided needle-bars 13 and 14.

As illustrated more particularly in Fig. 7, the inner or clamping surface of the collar 7 is provided with clearance recesses, as 15, adjacent the rounded outer surfaces of the needle-bars 13 and 14 whereby the needle-bars are free from the clamping action of the collar 7 upon the carrier 9. Fitted to the lower end of each of the needle-bars 13 and 14 and secured by screws, as 16, is the vertically recessed shank-face 17 of a needle-holder 18. Each needle-holder 18 is formed with a lateral lug 19 provided with a vertical aperture 20 for the reception of the shank of a needle 21, secured by a set-screw 22. The lugs 19 are disposed in the grooves 12 of the needle-carrier 9, while positioned at opposite sides of the lug 19 of each needle-holder are flanges 23, the flanges of the two needle-holders being complemental in embracing the carrier 9. Secured by the screws 16 upon each needle-holder is the shank 24 of a thread-guide member 25 projecting laterally from said shank below the needle-holder so as to be disposed directly in advance of the needles. The members 25 are each provided with an open or self-threading aperture 26 to receive the thread directed thereto through

apertures 27 formed in the needle-holders. It will be understood that the needle-holders 18 are not only complemental to each other, but that they differ from each other in being left and right parts merely because of the thread-guiding apertures 27, whereby the cost of manufacture is substantially reduced in the identity of the tool requirements. The thread-guide shanks 24 are each provided with a suitable aperture as 28 (only one of which is shown) to provide clearance for the needle-securing screws 22. As any desired form of loop-taker construction may be employed to cooperate with the needles in the formation of stitches, no particular reference is herein made to this mechanism of the present machine.

By reference more particularly to Fig. 5, it will be observed that the grooved portion of the needle-bar carrier 9 terminates a short distance below the upper end of the carrier, thereby forming shoulders, as 29, and a flattened extension 30 which is provided with a transverse coupling-pin receiving aperture 31. Overlying the shoulders 29 of the carrier 9, in the coupled position of the needle-bars, are shoulders 32 and 33 formed below the upper ends of the needle-bars 13 and 14 by enlarged heads 34 and 35 thereof having flat faces 36 and 37 disposed upon opposite sides of the flattened carrier extension 30. The respective needle-bar heads 34 and 35 are formed with apertured guide-bosses 38 and 39 for coupling-pins 40 and 41 projecting laterally from coupling-blocks 42 and 43. In order to provide clearance for the bosses 38 and 39, the bushing 10 is provided at opposite sides thereof with longitudinal slots, as 44.

The coupling-block 42 is slidingly disposed upon a vertical guide-pin 45 carried by a reciprocatory slide-block 46, said slide-block 46 being mounted in a suitable undercut guideway 47 provided in the forward portion 48 of a counting-device supporting bracket 49. The bracket 49 is secured by a screw 50 upon the bracket-arm 1 of the machine, being apertured to embrace the bushing 10, the bracket carrying the several elements constituting the stitch-counting device.

Both needle-bars may be coupled to and uncoupled from the carrier 9 by reciprocatory movements derived in the one instance from a manually operated lever and in the other from the counting device. To this end, the slide-block 46 is connected by means of a link 51 with one end of a lever 52 pivotally mounted in a milled out slot 53 provided in an upstanding lug 54 of the bracket portion 48. The other end of the lever 52 is connected by means of a pivot-screw 55 with one end of a link 56 of which the opposite end carries a roller-stud 57 provided with an upper roller 58 and a lower roller 59. The lower roller 59 is disposed in a grooved guideway 60 formed in a segment-lever 61 centrally of the length of which depends a vertical fulcrum-pin 62, adapted to enter a suitable aperture in the bracket-portion 48 and secured therein by a screw 63 to permit of horizontal swinging movements of the lever 61.

The upper roller 58 is spaced from the upper surface of the link 56 to provide clearance for connecting the stud 57 with an apertured end of a link 64 of which the opposite end carries on its under side a projecting roller-stud 65 of a roller 66 also disposed in the guideway 60 of the lever 61. The roller-stud 65 affords a connecting medium between the link 64 and another link 67 pivotally secured by means of a screw 68 upon one end of a lever 69 fulcrumed intermediate its ends upon a screw 70 secured upon the bracket 49. The other end of the lever 69 is connected by means of a short link 71 with a slide-block 72 disposed in an undercut guideway 73 provided in the bracket 49. Carried by the slide-block 72 is a vertical guide-pin 74 upon which is slidingly mounted the coupling block 43 for the right hand needle.

The guideway 60 of the segment-lever 61 is curved in opposite directions from the fulcrum pin 62, the rearward curve of the guideway being arcuate to a radius corresponding to the link 56 while the forward curve of the guideway is arcuate to a radius corresponding to the link 67, whereby shifting of the linkage described from the position in Fig. 2 of the drawings to that of Fig. 8, or vice versa, may be effected in a stationary position of the segment-lever 61. In order to shift the roller 59 of the linkage in the guideway of the lever 61, there is provided a manually operable lever 75 secured upon the lower end of a vertical rock-shaft 76 journaled in an apertured boss 77 formed on the bracket 49. Rigidly secured upon the upper end of the rock-shaft 76 is an arm 78 of which the free end is provided with a curved slot 79 entered by the upper roller 58 of the stud 57. The hand-lever 75 projects forwardly beyond the bracket 49 and is horizontally shiftable between limits determined by spaced stop-pins 80 depending from an auxiliary angle-bracket 81 secured by screws, as 82, upon the front side of the bracket 49. In order to insure that the lever 75 retains its left or right hand positions under machine vibration, it is preferred to provide the upper surface of said lever with a nub 83 adapted to yieldingly enter suitable recesses in the under surface of the bracket 81 adjacent the stop-pins 80.

It is to be understood from the foregoing description that the lever 75 is not employed for coupling or uncoupling the needle-bars, but merely to shift the linkage to determine which needle-bar will be uncoupled from its actuating mechanism upon operation of the

manually controlled mechanism described in my prior patent application hereinbefore referred to. The actual coupling or uncoupling action therefore occurs only when the segment-lever 61 is vibrated, it being apparent that the coupling-pin of the left-hand needle only will be shifted upon vibration of the lever 61 in the position of the parts shown in Fig. 2 because in that position the roller-stud 65 coincides with the axis of vibration of the lever 61. Likewise, when the hand-lever 75 is shifted to its extreme right position, only the right-hand needle will be affected by vibratory movements of the lever 61, because in that position, as illustrated in Fig. 8, the stud 57 coincides with the axis of vibration of the lever 61.

In order to swing the lever 61 to effect coupling or uncoupling of the needle-bars, said lever is provided with a ball-joint connection with one end of a pitman 84 of which the opposite end is pivotally connected with the upper end of a vibratory arm 85 fulcrumed upon a stud-screw 86 threaded into the bracket 49. A spring 87 connected at one end with the bracket 49 and at its other end with the arm 85 functions to yieldingly hold said arm in position wherein the needle-bars are coupled with the carrier 9 for reciprocation therewith, the movement of the arm 85 into this position being limited by an adjustable stop-screw 88 threaded into a lug 89 upon the bracket 49. The upper end of the arm 85 is also connected by means of a yielding link 90 with a lever 91 adapted to be suitably actuated from a treadle (not shown) in a direction to swing the arm 85 away from the stop-screw 88, i. e., to uncouple either one of the needle-bars from its carrier 9.

In order to predetermine the number of reciprocations of the active needle-bar while the other or disconnected needle-bar is idle, there is employed a counting device substantially as fully disclosed in my prior patent application Serial No. 35,854. This counting device operates in conjunction with the arm 85 from the inner side of which projects a latch-pin 92 overlying the forward end of a latch-lever 93 in the stop-screw engaging position of said arm 85. The latch-lever 93 is pivotally mounted upon the bracket 49 by means of a screw 94 and the free end thereof is urged upwardly by a spring pressed plunger 95 engaging the under side of the lever 93. The latch-lever 93 is formed at its forward end with a latching notch 96 and rearward of said notch 96, said lever is provided with an inclined block 97 which may be adjusted longitudinally of the lever by manipulation of an adjusting screw 98 and secured in adjusted position by means of a screw 99.

Adapted to engage the upper surface of the wear-block 97 is a tappet 100 secured by means of a screw 101 upon a rock-shaft 102 journaled for oscillation within the bore of a sleeve 103 which itself is capable of rocking movements within a stationary bushing 104 fixed in a suitable aperture formed in the bracket 49. Fixed upon a flanged end of the sleeve 103 is an indicator-disk 105 through an aperture in which extends the headed end of the shaft 102. Splined to the shaft 102 adjacent the indicator-disk 105 is a tappet-adjusting member 106, having a manipulating knob 107 recessed to receive a coil-spring 108, functioning to yieldingly hold the member 106 in contact with the disk 105. The adjusting member 106 carries a pin 109 adapted to enter any one of a plurality of graduated apertures 110 formed in the disk 105, the selected aperture corresponding to the desired initial position of the tappet 100 with respect to the wear-block 97.

Journaled for rocking movements upon the bushing 104 is a rocker-arm 111 having a ball-joint connection with the upper end of a pitman 112 of which the lower end is provided with a strap 113 embracing an eccentric 114 upon the main-shaft 3, whereby the rocker-arm 111 is continuously oscillated during the operation of the machine. Pivotally mounted upon the rocker-arm 111 is a pawl 115 adapted in its operative position to engage the peripheral teeth of a ratchet-wheel 116 suitably fixed upon the sleeve 103. The ratchet-wheel 116 is under the action of a spring 117, housed in a recess in the bushing 104, whereby a shoulder 118 formed on the periphery of the ratchet-wheel is yieldingly held against an adjustable stop-screw 119. While the pawl 115 is yieldingly urged by a spring 120 to operatively engage the teeth of the ratchet-wheel, it is held out of engagement therewith in the coupled position of the needle-bars, by the underlying free end of a stop-pawl 121 engaged by a pin 122 projecting from the inner side of the arm 85.

In the normal operation of the machine, the needle-bars are both coupled for reciprocation with the carrier 9 and the arm 85 is held against the stop-screw 88 by the spring 87, whereby the latch-pin 92 overlies and holds depressed the latch-lever 93, while the pawls 115 and 121 are held out of engagement with the ratchet-wheel as described, so that the arm 111 rocks idly. When it is desired to make an angle seam, the lever 91 is treadle-actuated to swing the arm 85 away from the stop-screw 88, whereupon said arm 85 is locked in position by the engagement of the latch-pin 92 with the notch of the latch-lever 93 and the pawls 115, 121 are permitted to engage the ratchet-wheel 116. The resulting intermittent rotation of the ratchet-wheel causes a step-by-step advance of the free end of the tappet 100 until it engages the wear-block 97 and depresses the latch-lever 93 to clear the pin 92, whereby the spring 87 is free

to return the arm 85 against the stop-screw 88. Should the machine operator inadvertently maintain pressure on the treadle during the time that the tappet 100 is depressing the lever 93, the arm 85 would be held against retraction by the spring 87 and consequently the pawls would continue to rotate the ratchet-wheel, thereby jamming the tappet against the completely depressed lever 93. In order to insure against this contingency there is provided a safety device comprising an arm 123 rigidly secured upon the lever 93, the free end of which arm engages a pin 124 on the actuating pawl 115 when the lever 93 has been depressed by the tappet 100 and thereby swings said pawl out of operative position. Upon the subsequent release of the ratchet-wheel by the holding pawl 121, the spring 117 returns the ratchet-wheel to its initial position.

It will be understood that the period of advance movement of the ratchet-wheel 116 depends upon the initial position of the tappet 100 and that this initial position is determined in advance by manual adjustment of the member 106 with respect to the disk 105, which in its retracted position preferably has its zero graduation in alinement with a stationary pointer 125. In the formation of angular seams the work must be turned to change the direction of seam-formation after a definite number of stitches have been made by the reciprocating needle subsequently to the uncoupling of the other needle from its actuating mechanism. The exact time when the work must be turned may be ascertained by observing the intermittent advance of the disk graduations past the pointer 125. In order to still more clearly indicate the work-turning time to an operator, an auxiliary pointer 126 is adjustably secured by any suitable means upon the member 106, which pointer 126 may be set at the required distance from the zero graduation so that the turning time is indicated by the pointers 125 and 126 coming into alinement upon operation of the counting device.

As in the machine of my prior application, the actuation of the arm 85, either under the manual or automatic control thereof causes a needle-bar to be uncoupled from or recoupled with its actuating mechanism, but in the present machine either needle-bar may be selectively coupled or uncoupled by the actuation of said arm 85, dependent upon the position of the hand-lever 75 as previously described. The uncoupling movements of the coupling-pins 40 and 41 are confined to the upper end of the needle-bar stroke, whereby to insure coordination with the counting device. To this end guards, as 127, are suitably supported upon the bracket portion 48, the free ends of said guards constituting rests for the coupling blocks 42, 43 when either of said blocks is shifted to uncoupled position. Preferably a yielding buffer 128 is also provided to overlie the needle-bars at the upper end of their stroke to insure that a disconnected needle-bar is not frictionally urged upwardly out of recoupling position.

Having thus set forth the nature of the invention, what I claim herein is:

1. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needles disconnectibly coupled with said actuating mechanism, a member operable in one direction to uncouple either needle from said actuating mechanism, and means for at will selectively determining which needle is disconnected from its actuating mechanism upon actuation of said member in said one direction.

2. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needles disconnectibly coupled with said actuating mechanism, a member manually operable in one direction to uncouple either needle from said actuating mechanism, and shiftable means for selectively determining which needle is disconnected from its actuating mechanism upon operation of said member in said one direction.

3. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needles disconnectibly coupled with said actuating mechanism, a member operable to uncouple either needle from said actuating mechanism, means for at will selectively determining which needle is disconnected from its actuating mechanism upon actuation of said member, and means for predetermining the idle period of the disconnected needle-bar with respect to the continued reciprocations of the other needle-bar.

4. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needle-carrying bars, a train of connections for uncoupling a needle-bar from its actuating mechanism, shiftable means interposed in said train of connections for rendering the operation of said train of connections in one direction selectively effective upon either needle-bar, and means for actuating said train of connections in the opposite direction for recoupling a disconnected needle-bar with its actuating mechanism.

5. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needle carrying bars disconnectibly coupled to said mechanism, a train of connections for selectively uncoupling either of the needle-bars from said actuating mechanism, and automatically acting means for recoupling an idle needle-bar with said mechanism.

6. The combination with the actuating mechanism of a sewing machine, of a reciprocatory carrier, a pair of needle-bars slid-

ably mounted upon said carrier, shiftable coupling elements disconnectibly coupling the needle-bars with said carrier, an actuable member, shiftable means for selectively connecting said member with the coupling elements of either needle-bar, and means for operating said shiftable means independently of the operation of said member.

7. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needle-bars, shiftable coupling elements disconnectibly coupling the needle-bars with said actuating mechanism, a vibratory lever, links interposed between said lever and each of said coupling elements, means for at will rendering either one of said links effective to shift a coupling element upon actuation of said lever, and means for actuating said lever.

8. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needle-bars, shiftable coupling elements disconnectibly coupling the needle-bars with said actuating mechanism, a vibratory lever, links interposed between said lever and each of said coupling elements, means for alternately shifting said links to a neutral position upon said lever to alternately shift the coupling elements upon actuation of said lever, and means for actuating said lever.

9. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needle-bars, shiftable coupling elements disconnectibly coupling the needle-bars with said actuating mechanism, a vibratory lever, links interposed between said lever and each of said coupling elements, means for at will rendering either one of said links effective to shift a coupling element upon actuation of said lever, means for manually actuating said lever in one direction, and automatically acting means for actuating said lever in the opposite direction.

10. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needle-bars, shiftable coupling elements disconnectibly coupling the needle-bars with said actuating mechanism, a link operatively connected with each of said coupling elements, a vibratory double-armed segment-lever, a shiftable connection between each of said links and an arm of said segment-lever in a stationary position of said lever, and means for actuating said segment lever.

11. The combination with the actuating mechanism of a sewing machine, of a pair of reciprocatory needle-bars, shiftable coupling elements disconnectibly coupling the needle-bars with said actuating mechanism, a vibratory segment-lever, link connections between said lever and said coupling elements, means for simultaneously shifting one of said links connections to an active portion of and the other link connection to a neutral position upon said segment lever, and means for actuating said segment-lever.

12. In a sewing machine, the combination with a pair of reciprocatory needle-bars, and actuating mechanism for said needle-bars including a disconnectible coupling-element for each needle-bar, of a segment-lever, separate connections between said lever and each of said coupling-elements alternately shiftable to a neutral position upon said lever, a vibratory arm, operative connections between said arm and the segment-lever, manually operable means for actuating the vibratory arm in one direction to shift a coupling element into uncoupled position, and a stitch-counting device acting automatically to effect a recoupling movement of said element.

13. In a sewing machine, the combination with a pair of reciprocatory needle-bars, and actuating mechanism for reciprocating said needle-bars, of means for disconnecting a needle-bar from and reconnecting it with its actuating mechanism including a vibratory arm, a latch-lever for holding said arm in position to temporarily maintain a needle-bar disconnected from its actuating mechanism, a stitch-counting device automatically acting to unlatch said arm to permit recoupling of the needle-bar with its actuating mechanism, and a safety member connected with said latch-lever for rendering said stitch-counting device inoperative when said vibratory arm is unlatched from said lever, regardless of the position of said arm.

In testimony whereof, I have signed my name to this specification.

FREDERIC M. CARD.