This invention relates to improvements in multiple-needle sewing machines, and particularly to that class of machines in which means are provided for throwing one of the needles temporarily out of action during the continued reciprocation of the other needle or needles, as exemplified for instance by the two-needle sewing machine of my prior patent reissued Dec. 4, 1900, under No. 11,576.

Multiple needle machines of this character are particularly advantageous in the production of angular seams constituted by two independent rows of stitches. It has been the common practice heretofore to temporarily disconnect one of the needle-bars from its actuating mechanism by manually controlled means and to re-connect said needle-bar with its actuating mechanism, under manual control, after a desired interval of operation, all without stopping of the machine.

The present invention has for its primary object to provide automatically acting means for recoupling a needle-bar with its actuating mechanism after a predetermined period of operation of the machine subsequent to the throwing out of action under manual control of the disconnected needle-bar.

Another object of this invention is to provide adjustable means for predetermining the period that the disconnected needle-bar remains idle.

Other and more specific objects of the invention will be apparent from the following description and claims.

In its preferred embodiment, the present improvement comprises two needle-bars normally connected by a coupling-pin for unison reciprocation, said coupling-pin being operatively connected with a treadle-actuated lever through a ratchet-and-pawl mechanism constituting in effect a stitch-counting device. By means of the treadle-control provided, one of the needle-bars may be thrown out of operation at any point in the formation of a continuous seam, the operation of the treadle-actuated lever throwing the counting device into effective action. In the formation of angular seams, the work may be turned by the operator about the operative needle while it is in the work, the counting-device being trip-read by an adjustable release-element whereby its actuating mechanism is rendered ineffective and the disconnected needle-bar is re-coupled with the other needle-bar at the proper point to form continuous parallel seams.

In the accompanying drawings, Fig. 1 is a sectional elevation of a portion of a sewing machine in which the present improvements have been embodied, the counting device being disconnected from its actuating mechanism and the needle-bars being coupled for unison reciprocation. Fig. 2 is a top-plan view of the bracket-arm of the machine and of the normally inactive counting device attached thereto. Fig. 3 is a side elevation of the counting-device as viewed from the rear side of the machine. Fig. 4 is a detail view of the ratchet-wheel actuating pawl, together with its supporting bracket. Fig. 5 is a detail sectional view of the ratchet-wheel and its support. Fig. 6 is a view in elevation of the ratchet-wheel. Fig. 7 is a sectional view on the line x—x of Fig. 1. Fig. 8 is a detail perspective view of the upper ends of the needle-bars. Fig. 9 is a detail perspective view of the needle-holders. Fig. 10 is an elevation of the upper ends of the needle-bars and the buffer-sustaining rod as viewed from the right in Fig. 1.

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 terminating 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 a screw 8 upon a main needle-bar 9. The needle-bar 9 is journaled for endwise reciprocation in suitable bearings provided in the head 2 and is formed with a longitudinal rectangular groove 10 in which is slidingly disposed an auxiliary slab-sided needle-bar 11. A slight clearance is provided in the collar 7 for the open side of the needle-bar 11, where-by the needle-bar 9 may be reciprocated by the link 5 independently of the needle-bar 11. Secured by means of a screw 12 upon
the lower end of the needle-bar 9 is a segmental collar 13 of a needle-holder 14 in which is suitably fastened a needle 15, and secured by means of screws, as 16, upon the needle-bar 11 is a collar 17 of an auxiliary needle-holder 18 carrying a needle 19.

A collar 20 rigidly secured upon the upper end of the needle-bar 11 provides sufficient clearance for the needle-bar 9 to permit the latter to reciprocate with respect thereto, a coupling-pin 21 being slidingly disposed within a transverse aperture formed in said collar. The coupling-pin 21 is carried by a vertically apertured slide-block 22 and is constantly disposed in an aperture 23 provided in the needle-bar 11, said coupling pin also normally entering an aperture 24 formed in the upper portion of the needle-bar 9 to compel reciprocation of said bars in unison. The slide-block 22 is adapted to reciprocate upon a vertical guide-rod 25 suitably fixed upon one end of a horizontal endwise-shiftable slide-bar 26 disposed within an aperture of a guide-strap 27 secured by screws, as 28, upon a bracket 29 projecting from the head 2. Pivotally connected by means of a screw 30 threaded into a stop-block 31 rigid with the slide-bar 26 is one end of a lever 32 fulcrumed on the pivot-screw 33 upon the bracket 29. The other end of the lever 32 is pivotally connected by a screw 34 with one end of a link 35 of which the other end is connected in like manner, by means of a screw 36, with a swinging frame 37 fulcrumed upon a pivot-screw 38 threaded into an ear 39 on the face of a stationary bracket 40. The base of the bracket 40 is fastened by means of a screw 41 upon the overhanging arm 1 of the machine adjacent the usual arm cover-plate 42, and serves as a support for the ratchet-and-pawl mechanism constituting the counting-device about to be described.

Suitably secured in an aperture provided in the upper end of the swinging frame 37, is an extension-pin 44 upon the projecting end of which is secured a sleeve 45 by means of a set-screw 46. The sleeve 45 is therefore rigid with the frame 37 and constitutes in effect a lateral extension thereof to afford a bearing for a ratchet-wheel 47 and an adjusting disk 48 disposed upon opposite sides of a peripheral-rib 49 of said sleeve. The ratchet-wheel 47 has a lateral annular-flange 50 spaced from the hub thereof to afford a housing for a coiled torsion-spring 51, of which one end 52 enters an aperture in the ratchet-wheel and of which the outer coil is clamped against the sleeve 45 by means of a washer 53 and a screw 54 threaded into the sleeve. A portion of the periphery of the ratchet-wheel 47 is toothed and another portion thereof is provided with a stop-shoulder 55, which under the action of the spring 51 normally engages the end of a curved arm 57 secured by means of a screw 58 upon the swinging frame 37. The disk 48 is formed with an arcuate slot 59 so that it may be adjustably secured by means of a screw 60 upon the ratchet-wheel 47, said disk being provided with a trip-lug 61 and with an indicating pointer 62, which latter overlies the graduated periphery of the ratchet-wheel.

Secured upon the base of the bracket 40, by means of a screw 63 is a stationary supporting arm 64 having a laterally offset upper end 65 upon which is pivotally mounted a latch-lever 66 by means of a pivot-screw 67. An apertured tail portion 68 of said latch-lever 66 is entered by one end of a spring 69 secured by means of a screw 70 upon the arm 64. At its opposite end the latch-lever 66 is provided with a trip-finger 71, positioned to be engaged by the trip-lug 61 under the action of the spring 69, said latch-lever also having a hook 72, adapted in the operative position of the counting device to latch the shank of a screw 73 threaded into the upper end of the swinging frame 37.

In order to swing the frame 37 into operative position in which it is held for a predetermined period by the latch-lever 66, there is provided a bellcrank-lever 74, 75 fulcrumed on the machine frame. The arm 74 of this lever is adapted to engage the under side of the curved arm 57 of the swinging frame 37 and the other arm 75 of said lever is connected with a suitable treading (not shown). A coil-spring 76 secured at one end upon the arm 57 and at its opposite end upon a bracket 77 on the machine-arm functions to maintain the swinging frame in its forward or unlatched position during the normal operation of the machine, i.e., with both needle-bars reciprocating in unison and the ratchet-wheel 47 idle. When however the lever 74, 75 is actuated to render the counting mechanism operative, the ratchet-wheel is rotatively advanced one tooth for each reciprocation of the needle.

The ratchet-wheel 47 is intermittently rotated under the action of a pawl 78 pivotally mounted upon a vibratory arm 79 fulcrumed upon the bracket 40. The pawl 78 has a tail 80, normally pressed against a stop-pin 81 on the arm 79 by means of a spring 82 also upon the arm 79. The arm 79 has a ball-joint connection with one end of a pin-man 83 of which the other end carries a strap 84 embracing an eccentric 85 upon the main-shaft 8. During the effective operation of the ratchet-wheel, retrograde movement thereof is prevented by means of a stop-pawl 86 which is pivotally mounted by means of a screw 87 upon an extension 88 of the bracket 40. A spring 89 presses the pawl 86 toward the ratchet-wheel, the
action of the spring 89 being limited in the inoperative position of the ratchet-wheel by the engagement of the pawl 86 with the pawl 78.

5 During the normal operation of the machine, the swinging-frame 37 is in its forward position in which it is disengaged from the latch-lever 66 and in which the ratchet-wheel 37 is disengaged from its actuating pawl 78. This position is determined by the engagement of the arm 74 with the spring-bracket 77, under the action of the spring 76. When the frame 37 attains this position, its movement thereto is transmitted to the link 35, which causes the coupling-pin 21 to engage the needle-bar 9, whereupon both needle-bars reciprocate in unison as will be self-evident. While also capable of other uses, the present improvement is particularly well adapted for employment in the formation of angular seams comprising independent rows of parallel stitches and serves to eliminate the superposed and skipped stitches at the seam-angle incidental to the throwing into operation under manual control of the disconnected needle-bar at the improper time. Consequently the present improvement not only speeds production by reason of its semi-automatic character, but it increases the sightliness of the product.

With both needle-bars in operation, as the stitching approaches the point where the seams are to change their direction, the operator manipulates the treadle to actuate the lever 74, 75 to swing the frame 37 against the action of the spring 76 into position wherein it is held latched by the lever 66 and wherein the pawls 78 and 86 are in operative engagement with the teeth of the ratchet-wheel. This movement of the frame 37 causes the link 35 to uncouple the pin 21 from the needle-bar 9. Obviously, however, the needle-bar 11, while idle, should preferably occupy substantially the position of its upper limit of stroke. To insure that the needle-bar 11 will be carried into this position when uncoupled from the other needle-bar, regardless of the uncoupling position, the needle-bar 9 is partially cut away at its upper end to provide shoulders 90, overlying which are the shoulders 90’ formed by correspondingly enlarging the needle-bar 11. In order to prevent the uncoupled needle-bar 11 from following the needle-bar 9 in the latter's succeeding downward movement, under the sliding frictional engagement between the bars, there is provided a stop-finger 91 which in this position of the parts underlies the slide-block 22. Should the needle-bar 11 be uncoupled from the needle-bar 9 near the lower limit of stroke of said bars, the stop-finger 91 may yield sufficiently to permit the carrying of the needle-bar 11 into its upper limit of movement, by reason of the slightly resilient character of the shank of the stop-finger 91. The shank of the stop-finger 91 is secured by means of a screw 92 in an apertured collar 93 suitably fixed upon a supporting rod 94 fastened in the head 2 of the machine.

While the stop-finger 91 prevents a downward movement of the uncoupled needle-bar 11, the sliding frictional engagement between the needle-bars also has a tendency to raise said uncoupled needle-bar 11 above the limit of its normal up stroke. To prevent this occurrence there is provided a yielding buffer-rod 95, overlying the needle-bars and slidingly mounted within a depending sleeve 96 of a buffer-bracket 97 suitably secured upon the upper end of the supporting-rod 94. A collar 98 upon the upper end of the buffer-rod 95 limits the downward movement thereof under the action of a coil-spring 99.

When the needle-bar 11 is uncoupled from the needle-bar 9 by the movement of the swinging frame 37 by manual operation of the lever 74, 75, the pawl 78 will thereupon rotatively advance the ratchet-wheel one tooth for each succeeding reciprocation of the needle-bar 9, whereby the trip-lug 61 is caused to approach the finger 71 of the latch-lever 66 and the stop-shoulder 55 is carried away from the end of the arm 57. The distance between the needles and the length of the stitches are factors determining the point when the needle-bar 11 must be recoupled with the needle-bar 9 and to accommodate these conditions, the trip-lug 61 may be adjusted by a repositioning of the disk 48 with respect to the ratchet-wheel. The work having been turned by the operator at the proper time, the latch-lever 66 is thereafter tripped by the lug 61, whereupon the spring 76 swings the frame into its inoperative position to thereby automatically recouple the two needle-bars for unison reciprocation. When the ratchet-wheel swings away from the stop-pawl 86, the spring 31 promptly rotates the ratchet-wheel into initial position determined by the engagement of the stop-shoulder 55 with the end of the arm 57. Preferably the movement of the swinging frame into operative position is limited by a stop-lug 100 provided on said frame adjacent its pivot-axis, the stop-lug 100 being disposed to engage a stop-wedge 101 suitably secured upon the base of the bracket 40.

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

1. In a sewing machine, in combination, a needle-carrying bar, means for endwise reciprocating said bar, manually controlled means operable during the operation of the machine for at will disconnecting said bar from its reciprocating means, and automatically operating means for recoupling the
disconnected needle-bar with its reciprocating means after a predetermined interval of operation of the machine.

2. In a multiple-needle sewing machine, the combination with a plurality of needle-bars, and means for reciprocating said needle-bars in unison, of means operable during the operation of the machine for at will disconnecting one of said needle-bars from its reciprocating means during the continued reciprocation of the other needle-bar, and automatically operating means for recoupling the disconnected needle-bar with its reciprocating means after a predetermined interval of operation of the machine.

3. In a sewing machine, in combination, a needle-carrying bar, means for endwise reciprocating said bar, manually controlled means operable during the operation of the machine for at will disconnecting said bar from its reciprocating means, and a countering device thrown into effective action by the operation of said manually controlled means for predetermined the period of inactivity of the disconnected bar.

4. In a sewing machine, the combination with two needle-bars normally coupled for reciprocation in unison, and manually controlled means for disconnecting one of said needle-bars from the other during the continual operation of the machine, of automatically operating means for recoupling said disconnected needle-bar with the continuously reciprocated bar, and adjustable means for determining the period of inactivity of the disconnected bar.

5. In a sewing machine, in combination, a needle-carrying bar, means for endwise reciprocating said bar, manually controlled means operable during the operation of the machine for at will disconnecting said bar from its reciprocating means, means acting to compel said needle-bar when disconnected from its reciprocating means to occupy substantially the position of its upper limit of stroke, and automatic means for recoupling the disconnected needle-bar with its reciprocating means after a predetermined period of operation of the machine.

6. In a multiple needle sewing machine, the combination with a plurality of needle-bars, and means for normally reciprocating said needle-bars in unison, of a normally ineffective ratchet-and-pawl mechanism, a treadle actuated lever to at will render said mechanism effective and simultaneously disconnect one of said needle-bars from its reciprocating means, and automatically acting after a predetermined interval of operation of the machine for again rendering said ratchet-and-pawl mechanism ineffective and for simultaneously therewith recoupling the disconnected needle-bar with its reciprocating means.

7. In a multiple needle sewing machine, the combination with a plurality of needle-bars, and means for normally reciprocating said bars in unison, of a ratchet-wheel and a normally ineffective actuating pawl therefor, manually controlled means for relatively shifting said ratchet-wheel and pawl during the operation of the machine to effect an intermittent rotary movement of said ratchet-wheel and to simultaneously disconnect one of said needle-bars from its reciprocating means, means for latching said ratchet-and-pawl mechanism in effective ratchet-driving position, and means for tripping said latching means after a predetermined interval of operation of the machine to thereby effect a recoupling of the disconnected needle-bar with its reciprocating means.

8. In a two-needle sewing machine, the combination with two needle-bars and means for coupling said needle-bars for reciprocation in unison, of a treadle-operated lever for uncoupling one of said needle-bars from and during the continued reciprocation of the other, means for latching the said uncoupling means whereby the disconnected needle-bar is held inactive for a predetermined interval of operation of the other needle-bar, and automatically acting means for tripping said latching means to thereby reconnect the needle-bars for unison reciprocation.

9. In a sewing machine, the combination with two needle-bars, means for reciprocating one of said bars, a coupling-element for connecting the needle-bars for unison reciprocation, a swinging-frame operatively connected with said coupling-element, means yieldingly holding said frame in needle-bar coupling position, a treadle-operated lever for swinging said frame to thereby shift the coupling element to uncouple the needle-bars, means for latching said frame in needle-bar uncoupled position, and means for automatically tripping said latching means.

10. In a sewing machine, the combination with two needle-bars, means for reciprocating one of said bars, a coupling-element for connecting the needle-bars for unison reciprocation, a swinging-frame operatively connected with said coupling-element, means yieldingly holding said frame in needle-bar coupling position, a treadle-operated lever for swinging said frame to thereby shift the coupling element to uncouple the needle-bars, means for latching said frame in needle-bar uncoupled position, means for automatically tripping said latching means, and adjustable means for predetermined the time of action of said tripping means.

11. In a sewing machine, the combination with two needle-bars, means for reciprocating one of said bars, a coupling-element for connecting said needle-bars for unison re-
ciprocation, a swinging-frame operatively connected with said coupling-element, a ratchet-wheel carried by said frame, a continuously reciprocated ratchet-wheel actuating pawl, means for yieldingly holding said frame in needle-bar coupling position whereby said pawl is ineffective to actuate the ratchet-wheel, means operable at will during the operation of the machine for swinging said frame to thereby shift the coupling-element to uncouple the needle-bars and to render said pawl effective upon said ratchet-wheel, means for latching said frame in needle-bar uncoupled position, and means rendered effective by said ratchet-wheel for automatically tripping said latching means.

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

JOHN KERR.