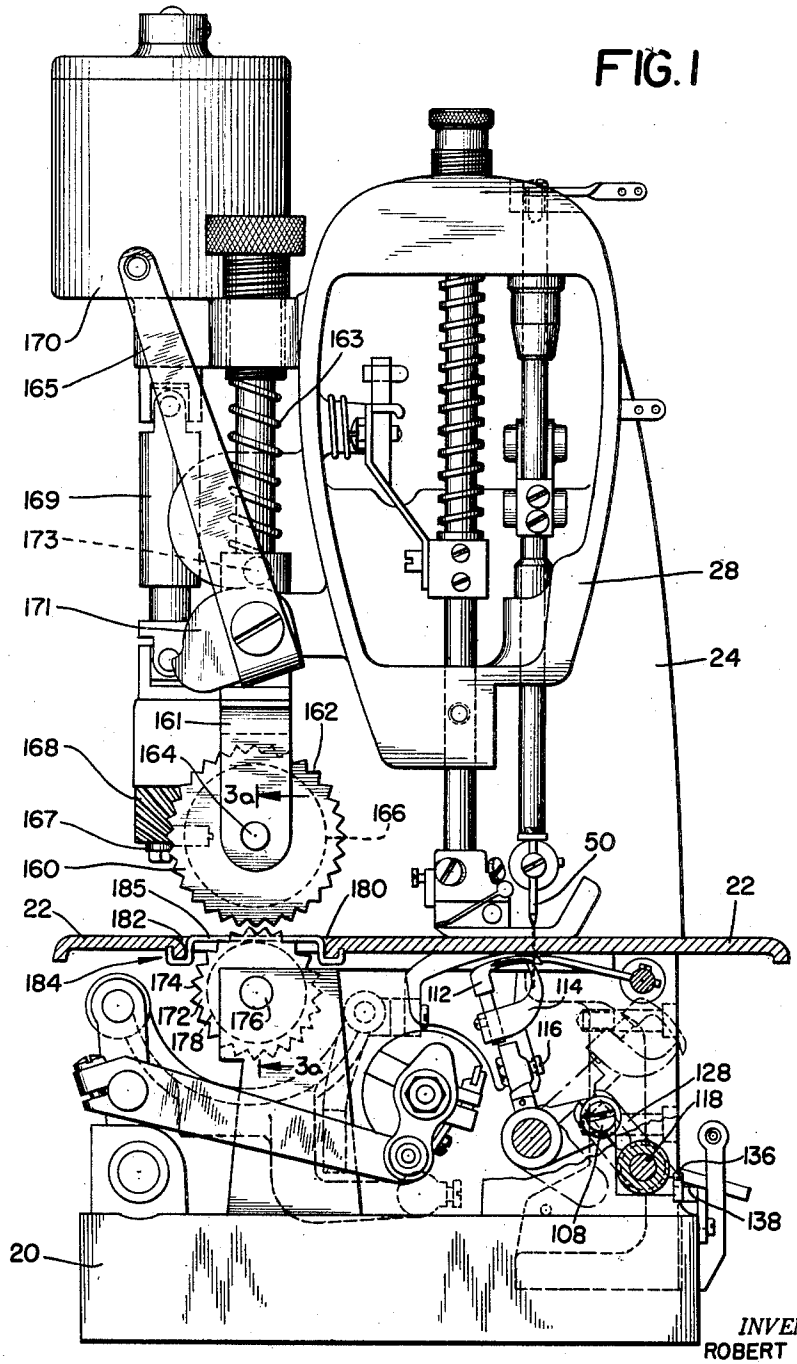
Sept. 7, 1954 R. A. HAYES ET AL 2,688,293

LOOPER MECHANISM FOR SEWING MACHINES

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FIG. 1



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FIG. 3

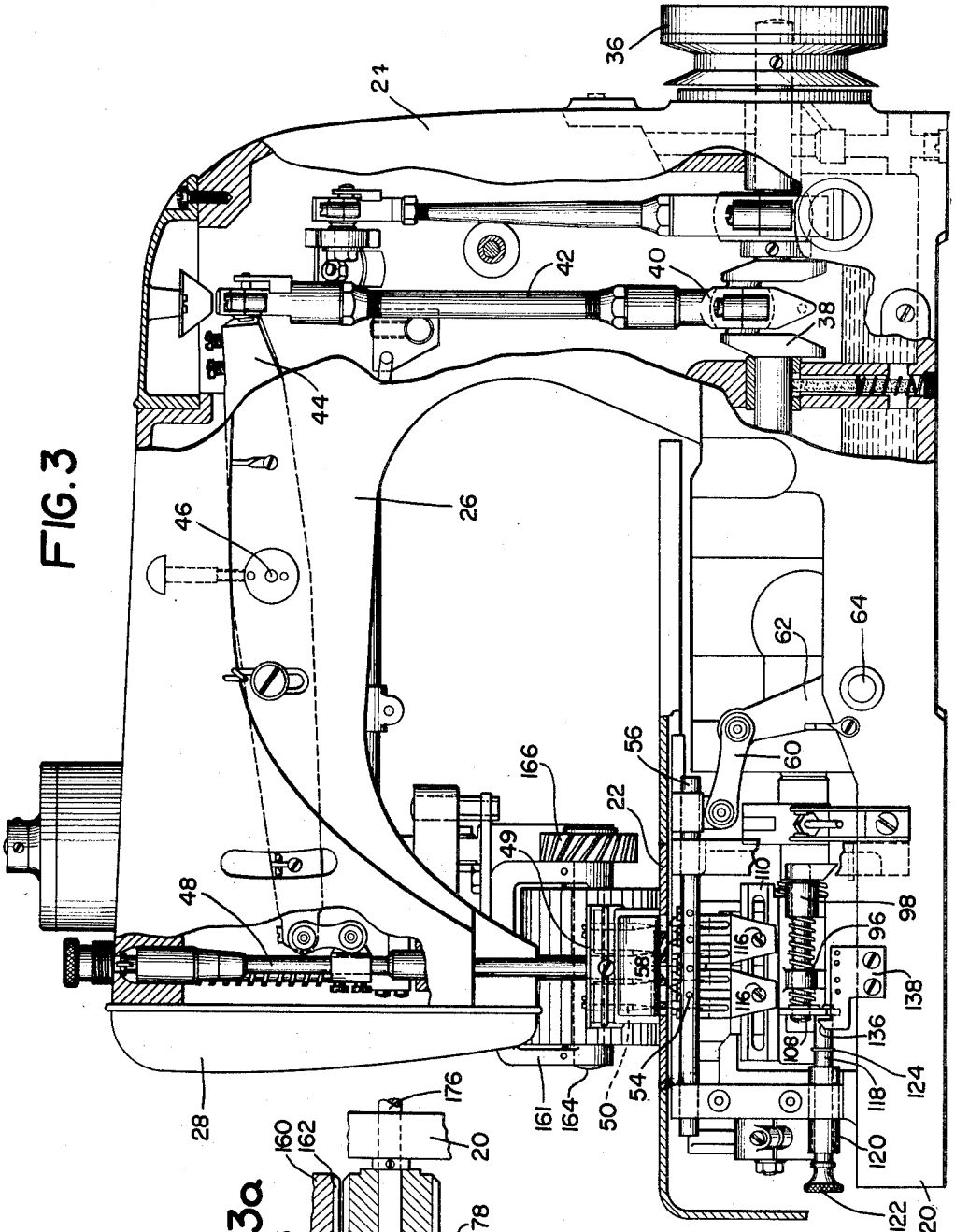
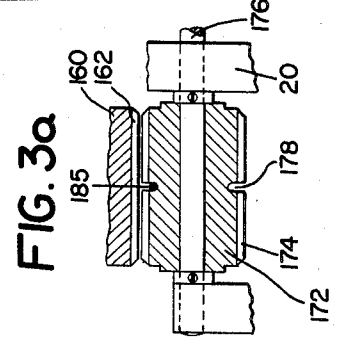


FIG. 3a



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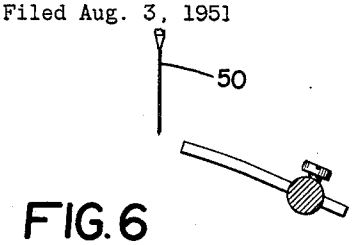
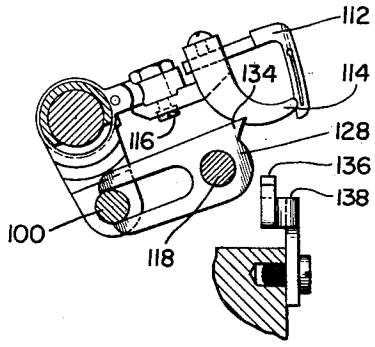


FIG. 6



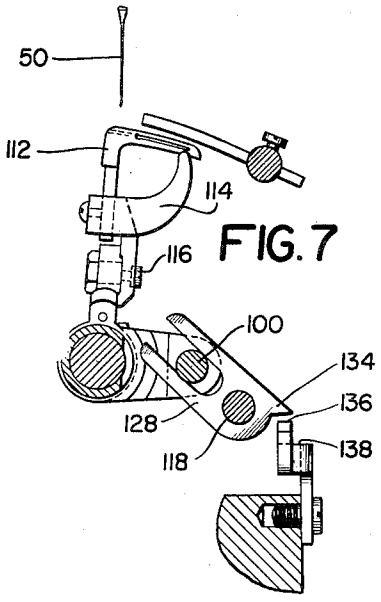


FIG. 7

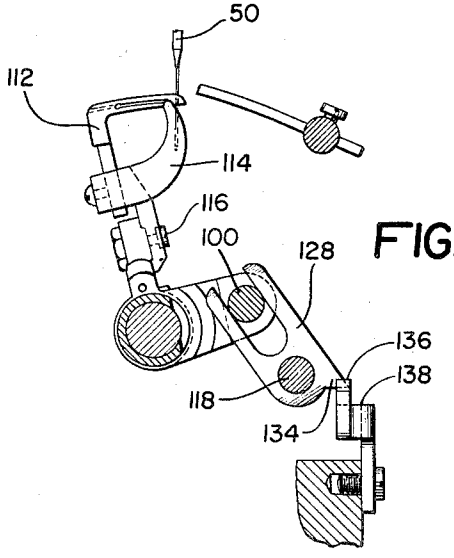


FIG. 8

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FIG. 5

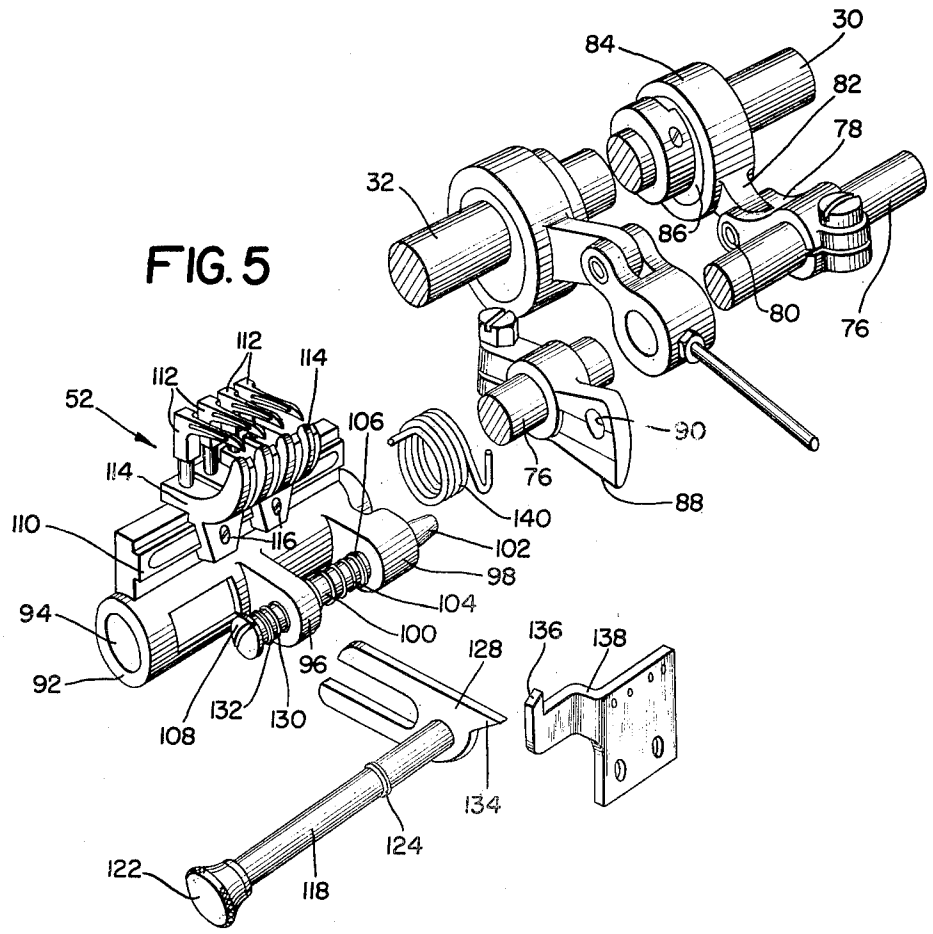
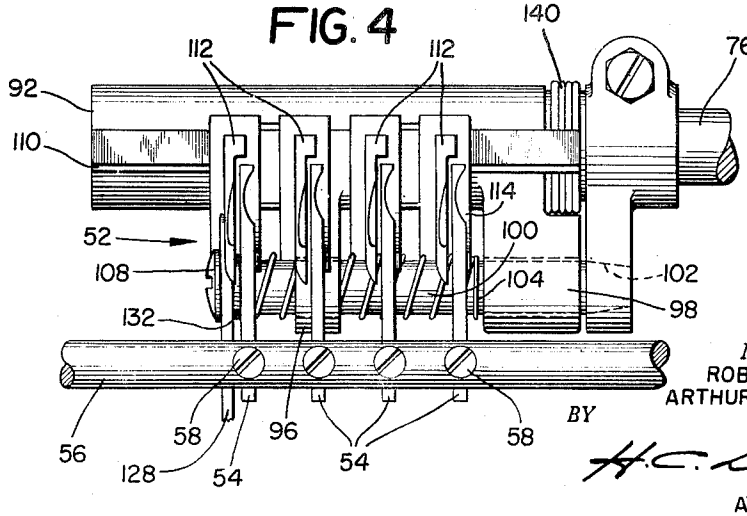


FIG. 4



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FIG. 2

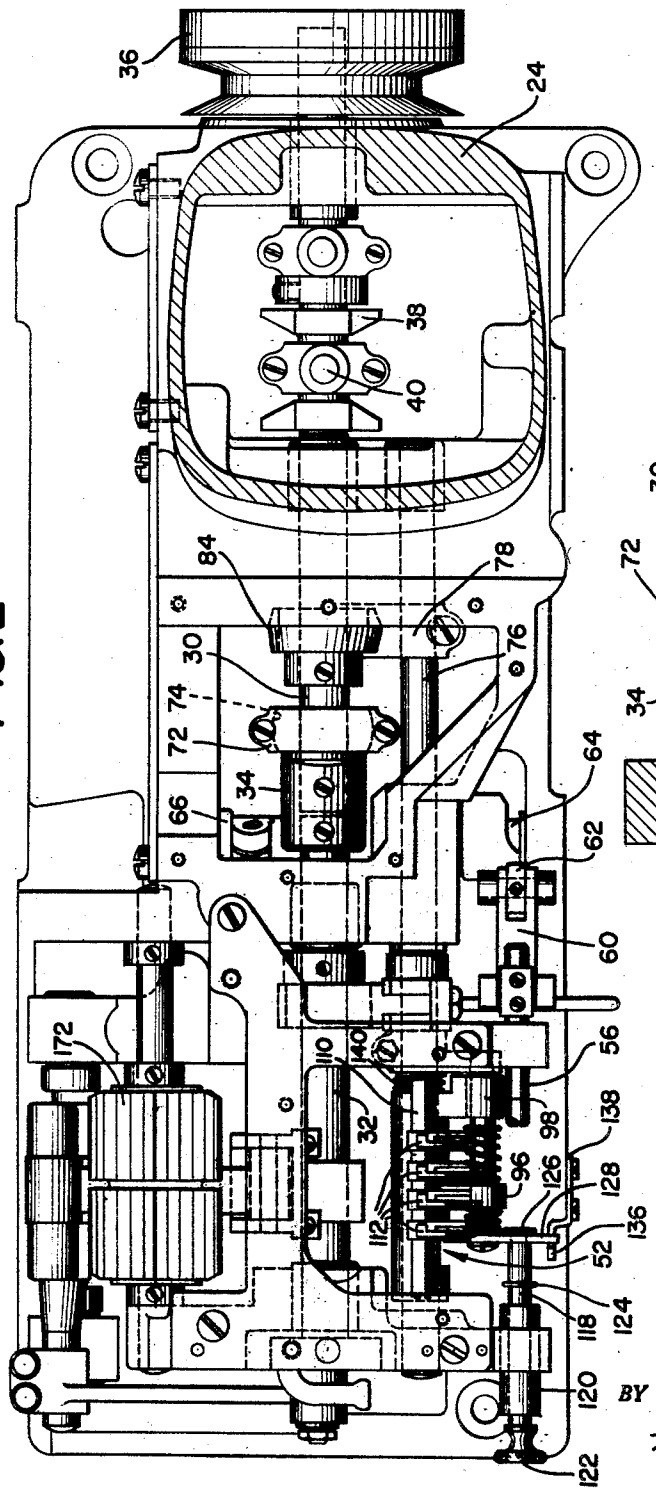
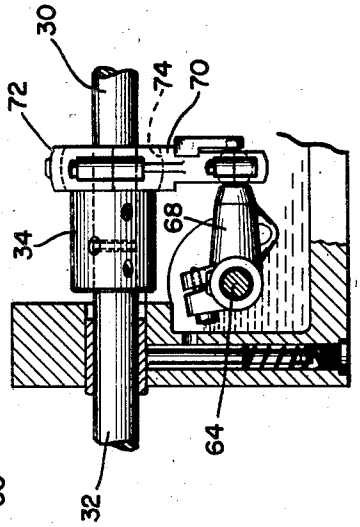


FIG. 2a



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FIG. 9

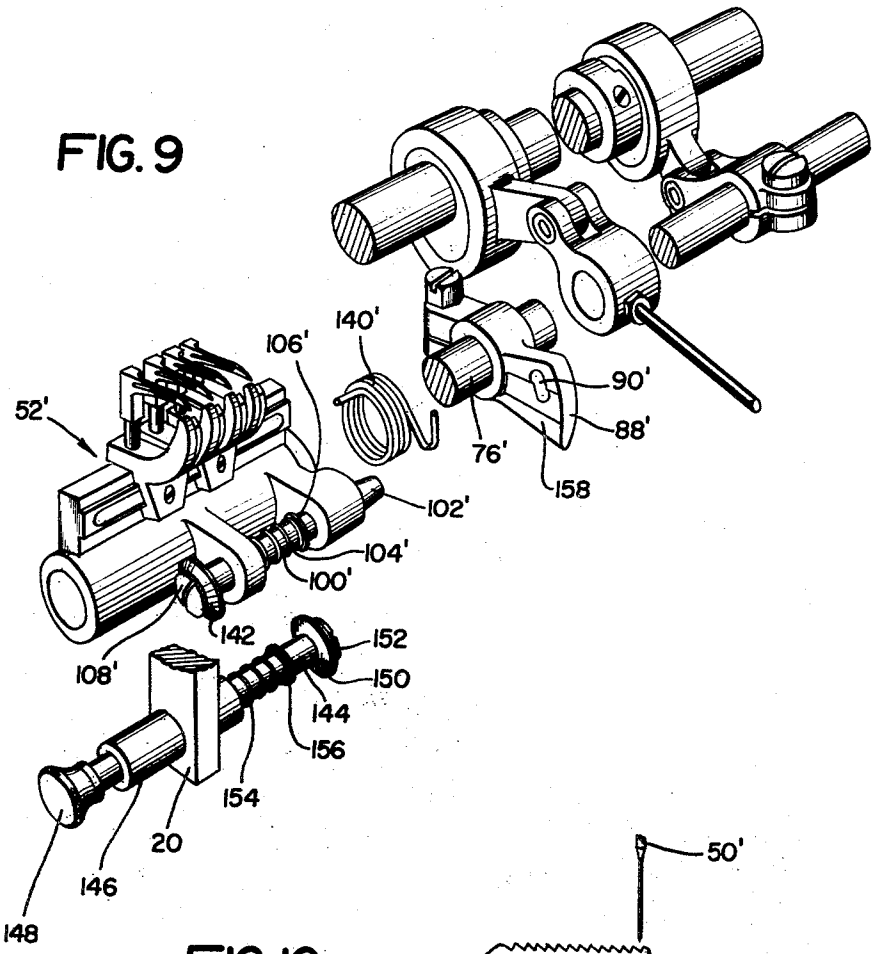
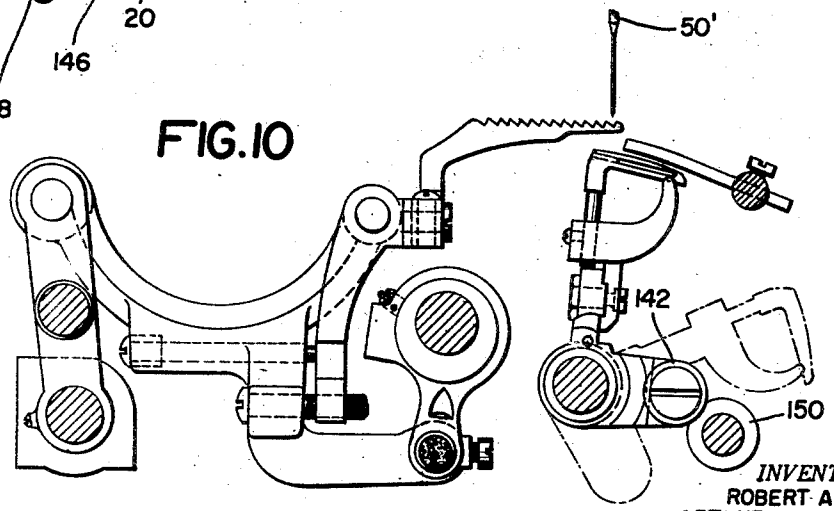


FIG. 10



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UNITED STATES PATENT OFFICE

2,688,293

LOOPER MECHANISM FOR SEWING MACHINES

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Application August 3, 1951, Serial No. 240,106

14 Claims. (Cl. 112—199)

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The present invention relates to sewing machines and more particularly to a throw-out means for the looper mechanism and a cloth feeding device applicable to sewing machines having a plurality of needles and a plurality of loopers and needle guards which are adjustably mounted in the machine so as to form a plurality of parallel lines of stitching which may be spaced from one another as desired within the limits of adjustability. Certain principles of the present invention, however, are applicable to machines of other types including single needle machines.

For purposes of illustration, the present invention will be disclosed in a multiple needle machine wherein the loopers and needle guards oscillate in the direction of the line of feed of cloth during stitch formation. In this machine the loopers are of the two-motion type and spreaders are used in a well-known manner for the purpose of opening the loops of the looper thread in a direction transverse of the line of feed. In the cycle of stitch formation, the needles are projected through the work and into the level in which the loopers and needle guards reciprocate. When the needles are in such position the loopers and needle guards have been swung into a position where the major parts of the supporting structure therefor are behind the needles and certain of these parts would collide with the needles if it were attempted at this time to swing the loopers forwardly, for example, to throw the loopers out into accessible position for threading.

According to the present invention, the loopers are arranged to be uncoupled from the rocking mechanism in order that they may be swung forwardly into a threading position and it is a particular feature of the present invention that the means for effecting such uncoupling of the loopers cannot be operated at any time when the needles are down in such position as to present the danger of collision with any part of the looper mechanism.

In accordance with one embodiment of this invention the looper uncoupling means is constantly connected with the looper carrier but is disabled by means of an interlock during such time as the needles are down. In another form the looper uncoupling device includes parts on the looper carrier and the machine frame which come into interengaging position only at such time as the needles are out of the way of any part of the looper mechanism.

Inasmuch as the needles and the loopers with their associated needle guards are adjustable transversely of the line of feed for the purpose of varying the distance between at least some of the adjacent lines of stitching, the cloth feeding mechanism, particularly a cloth feeding

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mechanism of the type which employs intermeshing cloth puller rolls beyond the needles, must be of such width as to pull directly in the line of any and all lines of stitching which the machine may form in all positions of adjustment of the needles and loopers. When a cloth puller of such width is employed, some provision must be made to prevent the cloth from following the lower feed roll below the cloth plate.

According to the latter phase of the present invention, there has been provided a guard particularly suitable for maintaining the cloth at the level of the cloth plate during its traverse of the feed rollers.

It is an object of the present invention to provide looper throw-out and cloth feeding mechanism of the type described above for cooperation with a sewing machine of the multiple needle type, although certain features of the looper throw-out mechanism are adaptable to machines of other types.

In the drawings:

Fig. 1 is an elevational view of one end of a sewing machine embodying the present invention, with parts in section and parts removed for purposes of illustration;

Fig. 2 is a generally horizontal sectional view of the machine with the cloth plate removed to reveal parts of the mechanism of the present invention;

Fig. 2*a* is a detail sectional view taken along the axis of the main drive shaft of the machine;

Fig. 3 is a front elevational view of the machine with parts in section and parts broken away;

Fig. 3*a* is a vertical section taken along the line 3*a*—3*a* in Fig. 1;

Fig. 4 is an enlarged fragmentary top plan view showing the relationship between the looper mechanism and the spreaders;

Fig. 5 is an exploded view of the looper mechanism and throw-out mechanism therefor;

Figs. 6, 7 and 8 are fragmentary detailed views illustrating the operation of the looper throw-out mechanism;

Fig. 9 is a view similar to Fig. 5 but showing a modified form of the invention; and

Fig. 10 is a fragmentary vertical sectional view showing the relationship between the modification illustrated in Fig. 9 and the feed dog tilting mechanism of a sewing machine in which it may be embodied.

Referring now to the drawings:

The frame of the machine comprises a base **20**, having a work supporting surface **22** from one end of which rises a standard **24** and over which extends an overhanging arm **26** terminating in a needle head **28**. The main drive shaft of the machine is made up of two aligned sections **30** and **32** connected by a coupling **34** and

this shaft extends longitudinally of the machine in suitable bearings formed in the base 20. As seen in Figs. 2 and 3 the right hand section 30 of the main drive shaft projects from the frame and carries a combined hand wheel and pulley 36 through which power may be supplied from any suitable source. The section 30 has formed therein a crank portion 38 carrying a strap member 40 connected through a pitman 42, extending upwardly through the standard 24, to the right hand end of a needle lever 44 pivoted at 46 in the overhanging arm 26. The needle lever 44 extends forwardly into the needle head 28 where it is pivotally connected with a needle bar 48 adapted to be verticaly reciprocated in the needle head in response to rocking of the needle lever 44 when the main drive shaft is rotated.

The needle bar 48 carries one or more needles 50, there being four such needles 50 illustrated in the particular embodiment of this invention chosen for illustration. The needles 50 are clamped in any desired positions relative to one another in a frame 49 carried by the needle bar 48.

Cooperating with the needles 50 in the simultaneous formation of four lines of stitching, there is provided a looper mechanism, generally indicated at 52, having provision for the handling of four looper threads. The looper mechanism is of the two-motion type arranged to cooperate with spreaders 54 carried by a longitudinally reciprocable spreader bar 56. As shown particularly in Fig. 4, the spreaders 54 are in the form of fingers, one for each of the threads handled by the looper mechanism. The spreaders 54 project through suitable openings in the bar 56 and are secured therein as by set screws 58. The spreader bar 56 is carried in suitable sliding bearings in the frame for reciprocation longitudinally of the machine and to the latter end is connected through a link 60 (see Fig. 3) with a rock arm 62 fixed to a rock shaft 64 extending transversely of the machine and arranged to rock in suitable timed relation with the rocking of the looper mechanism 52.

As seen in Fig. 2, the shaft 64 extends across the frame of the machine where it is received in a bearing 66 to which is clamped a rock arm 68 (see Fig. 2a). The arm 68 is connected to the lower end of a pitman 70 carried by an eccentric strap 72 mounted upon an eccentric 74 fixed to the section 30 of the main drive shaft. It will be apparent that, through the linkage just described, rotation of the main drive shaft will be effective to reciprocate the spreader bar 56.

The looper mechanism 52 is also rocked in response to rotation of the main drive shaft. For this purpose a looper rock shaft 76 extends longitudinally of the machine and is received in suitable bearings within the frame. On its forward end the looper rock shaft carries the looper mechanism 52 while toward its rearward end it has clamped thereto an arm 78 (see Fig. 5) which is pivoted at 80 to a lug 82 formed upon an eccentric strap 84 surrounding the main drive shaft section 30. The eccentric strap 84 rides on an eccentric 86 fixed to the main drive shaft section 30.

The looper rock shaft 76 also has clamped thereto a looper driving arm 88 having a perforation 90 therein with which a suitable part of the looper mechanism 52 engages when the latter is in position for operation.

The looper mechanism 52 includes a looper frame or carrier 92 having a smooth bore 94 freely rotatable upon the looper rock shaft 76. Spaced lugs 96 and 98 formed on the looper frame are perforated to receive a plunger 100 having a tapered end 102 adapted to be received in the perforation 90 of the looper driving arm 88. The plunger 100 is urged by a spring 104, one end of which bears against lug 96 and the other end of which bears against a flange 106 fixed to the plunger 100, into a position such as shown in Fig. 4 in which the tapered end 102 is projected into the perforation 90. In this position of the parts the looper mechanism 52 is coupled with the rock shaft 76. At its opposite end the plunger 100 is provided with a head 108 by which the plunger may be retracted against the force of spring 104 to withdraw the tapered end 102 from the perforation 90 whereby to uncouple the looper mechanism 52 from looper driving arm 88.

The looper frame or carrier 92 is provided with a rail 110 of dove-tail cross section upon which may be adjustably mounted the desired number of loopers 112 and needle guards 114. As shown in the drawings there are four loopers 112 and four needle guards 114 which may be secured in desired adjusted position along the rail 110 as by set screws 116. While each looper 112 and its associated needle guard 114 may be individually adjustable if so desired, the mechanism shown provides for adjustment of these elements in pairs. Thus two double seams may be formed with the distance therebetween adjusted as desired while the spacing within each seam remains constant.

As will be apparent from a consideration particularly of Fig. 1, the looper mechanism just described occupies a position beneath the cloth plate in which it is relatively inaccessible. According to the present invention, provision is made for swinging the looper mechanism downwardly and to the right as viewed in Fig. 1, to bring the loopers 112 into an accessible position for threading. Such position is illustrated in broken lines in Fig. 1. In general, the present invention provides a mechanism for uncoupling the looper mechanism 52 from the looper rock shaft 76 so that the looper mechanism may rotate freely about the rock shaft and thus be swung into an accessible position as aforesaid. The coupling mechanism is provided with an interlock or other form of disabling means which is effective to prevent swinging of the looper mechanism into a threading position when other parts of the machine are in positions such as to interfere with such swinging movement.

In a cycle of stitch formation, the needles 50 will be projected downwardly into the position shown in Fig. 1 wherein the points of the needles lie below the loopers 112 and they will thereafter be raised to a position above the cloth plate 22 as illustrated in Figs. 6 and 7. During this same time the loopers will rock with the rock shaft 76 in proper timed relation with the movement of the needles so as to carry the looper threads to the right of the needles 50 as viewed in Fig. 1. The spreaders 54 will thereafter move longitudinally of the machine to spread the looper threads into an open loop so that the needles and the needle threads carried thereby may be projected downwardly through such loops. After this operation the loopers will return to their initial positions as shown in Fig. 1. During a portion of each cycle of operation therefore, the needles 50 will be projected below the level of the loopers 112 and in such position they would be struck

by certain parts of the looper and needle guard assembly if it were attempted to swing the looper mechanism 52 toward a threading position. The interlock or disabling mechanism referred to above is so arranged that the looper mechanism cannot be moved toward the threading position at any time that the needles 50 are within the path of the loopers 112. However, during the portion of the cycle in which the needles are in or near their upper position, the looper mechanism may be thrown out for threading.

Referring now particularly to Figs. 5 through 8, one embodiment of the mechanism just discussed will be specifically described. In Fig. 5 the looper mechanism is shown in exploded relationship with the looper rock shaft 76 and various other parts heretofore described.

In Fig. 6 the needles 50 are in a position above the looper mechanism so that the looper mechanism may be swung into a threading position if so desired. In Fig. 7 the looper mechanism is shown swung into threading position. In Fig. 8 as in Fig. 1, the needles 50 have been projected downwardly below the level of the loopers 112 and in such position the looper mechanism cannot be swung to the right without collision. An interlocking mechanism is shown in these views, which mechanism is effective to prevent uncoupling of the looper mechanism when the parts are in or near the position shown in Figs. 1 and 8 and which will permit uncoupling when the parts are in or near the position shown in Figs. 6 and 7.

For the purposes thus generally described, the preferred form of the present invention provides a rock shaft 118, (see Figs. 2 and 3) rotatably mounted in a sleeve 120 fixed in a suitable opening in the lower portion of the frame. One end of the rock shaft 118 extends forwardly into a position accessible from the front of the machine and carries a knurled knob 122 by which the rock shaft may be manipulated. The rock shaft 118 is also free for limited sliding movement within the sleeve 120, the base of the knob 122 serving to limit such sliding movement inwardly of the machine and a split ring 124 fitted upon the shaft 118 serving to limit motion outwardly of the machine. As shown in Fig. 2 the inner end of the rock shaft 118 is threaded to receive a screw 126 by which a lever 128 is secured to the shaft 118. Referring now to Fig. 5, it will be observed that the lever 128 is bifurcated and straddles the plunger 100 in the region between the head 108 and the lug 96. The length of the bifurcated lever 128 is such that it remains engaged with the plunger 100 throughout the swinging movement of the looper mechanism 52 both in normal operation thereof and in the movement thereof to threading position. Preferably a spring 130 and washer 132 are arranged between the lug 96 and the inner face of the bifurcated lever 128 (see Fig. 2). The spring 130 is weaker than the spring 104 and serves merely to confine the bifurcated lever 128 against the head of the screw 108.

It will be apparent from the construction just described that the lever 128 will rock with the looper mechanism 152 but in an opposite angular direction. The lever 128 is provided with a tail 134 which rocks into and out of a position to engage a tooth 136 formed on a bracket 138 secured to the frame of the machine (see Figs. 2 and 3). The tail 134 and tooth 136 are so proportioned that the tail will lie below and behind the tooth at all times when the needles 50 are below the cloth plate to such an extent as to interfere with movement of the looper mechanism into threading position. So long as the tail 134 lies behind the tooth 136 the rock shaft 118 cannot be pulled forward and therefore the plunger 100 cannot be pulled forward to uncouple the looper mechanism from the looper actuating lever 88 (see Figs. 1, 3 and 8). At all times in which the needles 50 are above the level of the loopers the tail 134 will lie above the tooth 136 (see Figs. 6 and 7). Under the latter conditions the rock shaft 118 and plunger 100 may be pulled forward to disengage the tapered end 102 from the perforation 90 thus to uncouple the looper mechanism 52.

When thus uncoupled, the looper mechanism may be swung clockwise as viewed in Fig. 1 by an anti-clockwise rotation of the knob 122 to bring the looper mechanism into a threading position. Furthermore, if so desired, there may be provided a torsion spring 140 (see Fig. 5) extending between the looper driving arm 88 and the looper frame 92 and so arranged as to tend constantly to swing the looper frame in a clockwise direction or toward threading position. If such spring 140 is provided the looper mechanism will be automatically thrown out whenever the operator pulls the knob 122 provided, of course, that the tail 134 lies above the tooth 136.

After threading the loopers 112 the operator may rotate the knob 122 in a clockwise direction to return the looper mechanism 52 toward operative position. When such position is reached the spring 104 on the plunger 100 will be effective to project the tapered end 102 into the perforation 90 and the looper mechanism will be coupled with the looper rock shaft 76. For the latter operation the knob 122 need not be pulled out since the tapered end 102 of the plunger 100 will cam across the face of the looper actuating lever 88, compressing the spring 104 until it reaches a position to snap into the perforation 90. Actually it is preferred that the knob 122 be pressed inwardly during return of the looper mechanism, such operation being possible because the weaker spring 130 is readily compressed, inasmuch as this avoids the possibility of the knob 122 being snapped out of the operator's fingers when the plunger 100 seats in the actuating lever 88.

A modified and simplified form of the invention is illustrated in Figs. 9 and 10. In this modification an actuating knob is provided on a frame part of the machine and cooperating parts are provided between the knob and looper which are in position for engagement only when the looper mechanism has been rocked into a position which it assumes when the needles are out of the way. Since such mechanism does not include the constant connection between the looper mechanism and the actuating knob, as provided in the foregoing codification, it is necessary to provide a spring or equivalent means for throwing the looper mechanism out when it is disengaged by the actuating knob. Furthermore, in this simplified form of the invention the actuating knob cannot be used to reset the looper mechanism after threading and such operation must be performed manually.

In the modification shown in Figs. 9 and 10, the looper mechanism 52' is freely rotatable upon a looper rock shaft 76' which in turn is rocked by mechanism which may correspond in all details with that described above in connection with Figs. 1 through 8. A looper driving arm 88' having a perforation 90' therein is secured to the

rockshaft 76' and the looper mechanism 52' includes a plunger 100' having a tapered end 102' to enter the perforation 90' for coupling the looper mechanism with the rock lever 88'. The plunger 100' is provided with an expansive spring 104' which bears against a flange 106' fixed to the plunger 100' so as constantly to urge the plunger 100' to the right as viewed in Fig. 9.

The plunger 100' is provided with a head 108' to which there is secured a frusto-conical ring 142 having an outside diameter considerably greater than that of the plunger 100'.

A torsion spring 140' is stressed between the lever 88' and the looper mechanism 52' which constantly urges the latter to rotate clockwise about the rock shaft 76'. Thus, whenever the plunger 100' is moved toward the left, as viewed in Fig. 9, to withdraw the tapered end 102' from the perforation 90', the looper mechanism will automatically swing forwardly into the threading position shown in Fig. 10.

In this modification of the invention, collision between the looper mechanism and needles is avoided by so positioning an actuating knob that it can be effective to withdraw the plunger 100' only when the needles are out of the way. To this end a rod 144 is mounted for reciprocation in a sleeve 146 fixed to a portion of the base 20. The rod 144 is provided at one end with an actuating knob 148 and at the other end with a frusto-conical ring 150 secured to the rod as by a screw 152. An expansive spring 154 is positioned between the end of the sleeve 146 and a flange 156 fixed to the rod 144 so as constantly to urge the rod toward the right as viewed in Fig. 9.

The relative size and positions of the frusto-conical rings 142 and 150, carried respectively by the looper mechanism 52' and the rod 144, are such that portions thereof will become horizontally aligned only when the looper mechanism is rocked substantially into a position such as that shown in full lines in Fig. 10. When this occurs the rod 144 may be pulled forwardly and engagement between the flat surfaces of the rings 150 and 142 will cause retraction of the plunger 100' to uncouple the looper mechanism from the looper driving arm 88' whereupon the looper mechanism will be thrown forwardly into threading position by action of the torsion spring 140'. Such position is illustrated in broken lines in Fig. 10. After threading the looper mechanism is returned to operative position by manual operation during which the tapered end 102' of plunger 100' will be cammed across the face 158 of the lever 88' to a position wherein it will snap into the perforation 90'.

At all times during which the needles are projected below the cloth plate into a position such as to interfere with throwing out of the looper mechanism, the ring 142 will not be horizontally aligned with any portion of the ring 150 and therefore it will be impossible to uncouple the looper mechanism by actuation of the knob 148.

In Figs. 1, 2 and 3, there is shown a cloth pulling apparatus embodying an improvement particularly useful in connection with a multiple needle flat bed sewing machine in which the loopers rock in the direction of cloth feed. This improvement relates to a guard arranged to prevent cloth from following the lower feed roll below the surface of the cloth plate.

The mechanism just referred to includes an upper feed roll 160 which is provided with longitudinally extending teeth 162. The roll 160 is fixed to a shaft 164 to which there is also fixed a spiral gear 166 meshing with a smaller spiral gear 168 fixed to a vertical shaft 167 driven through a coupling 169 by a clutch mechanism 170. The clutch mechanism 170 imparts a step by step rotation to the feed roll 160 and may be of the form shown in United States Letters Patent No. 1,692,130 granted November 20, 1928 to Long et al.

The shaft 164 for the upper feed roll 160 is carried in a frame 161 which is yieldably urged downwardly by a spring 163 to place the roll 160 in feeding position. A lever 165 having a cam 171 arranged to abut a pin 173 on the frame 161 may be provided to lift the frame 161 and feed roll 160 when desired.

A lower idler feed roll 172 having longitudinally extending teeth 174 is carried by a shaft 176 freely rotatable in suitable bearings in the base 20 of the machine. Teeth 174 are of a size to mesh with the teeth 162 of the upper roll 160 when the latter is lowered into operative position.

The lower feed roll 172 is of such diameter, as clearly shown in Fig. 1, that the roots of the teeth 174 lie in a plane no higher than and preferably slightly below the plane of the top of the cloth plate 22. A circumferential groove 178 (see Fig. 3a) is formed in the lower feed roll 172, said circumferential groove being somewhat deeper than the teeth 174 for a purpose to be described.

The cloth plate 22 has a generally rectangular opening 180 formed therein. Preferably the cloth plate is curved downwardly along the longitudinal edges of said rectangular opening 180 to form rounded lips 182 which project slightly below the lower surface of the cloth plate thus providing smooth rounded edges extending transversely of the direction of cloth feed. A wire guard 184 is positioned across the opening 180 in the direction of cloth feed so as to lie within the groove 178 of the lower feed roll 172. Preferably the guard 184 is formed of wire which may be bent around and under the lips 182 where the ends may be secured as by soldering, welding or the like in shallow recesses in the lower surface of the cloth plate 22. The guard 184 is so positioned that the upper surface of the horizontally extending portion 185 thereof lies substantially within the plane tangent to the roots of the teeth of lower feed roll 172 adjacent the upper surface of the cloth plate 22 and parallel therewith. Thus the central part of the guard wire lies wholly within the groove 178 in the lower feed roll 172 and it is not necessary to provide a groove in the upper feed roll 160.

The horizontally extending portion 185 of the guard 184 serves to prevent cloth from following the lower roll 172 into the recess 180 where it might become entangled with operating parts of the machine. Obviously a plurality of guards such as 184 may be provided if so desired.

The simple and effective means, including the guard 184, just described is of particular utility in a machine of the general type disclosed herein. It will be apparent that in certain positions of adjustment at least, the four lines of stitching formed by this machine will extend over a considerable width of cloth. The feed rolls 160 and 172 must therefore have an axial length sufficient to span the lines of stitching at maximum spacing so as to pull directly in line with all of said lines of stitching. With rolls of such length there is increased likelihood of the cloth dropping below the far edge of the opening 180 and the

guard 184 thus assumes a particularly important status.

We claim:

1. In a sewing machine the combination of a bed, work feeding means, a reciprocating needle, looper mechanism rockably mounted on said bed, looper rocking means for rocking said looper mechanism through a path a portion of which intersects a portion of the path of said needle, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, movable means for coupling said looper mechanism with said rocking means, and a looper throwout means for moving said movable means to effect uncoupling of said looper mechanism from said rocking means, said looper throwout means including a first member carried by said bed and a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, one of said members being movable bodily to effect said uncoupling, said members having cooperating portions arranged for coaction during only a part of the rocking movement of said looper mechanism in the course of a stitch forming cycle and serving to render said looper throwout means ineffective to uncouple said looper mechanism from said rocking means at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

2. In a sewing machine the combination of a frame, a main drive shaft, work feeding means, a reciprocating needle, connections from said shaft for reciprocating said needle, looper mechanism, means mounting said looper mechanism on said frame for rocking movement through a path a portion of which intersects a portion of the path of the needle, a rock shaft operatively connected with said main shaft, coupling means for connecting said looper mechanism with said rock shaft, said coupling means including means movable with said looper mechanism during rocking thereof and movable relatively to said looper mechanism and said rock shaft between a position in which it connects said looper mechanism with said rock shaft for rocking of said looper mechanism and a position in which said looper mechanism is uncoupled from said rock shaft, actuating means mounted on the frame of said machine and accessible to the operator thereof, and means operatively connecting said actuating means with said coupling means, said connecting means including parts which are movable relatively to one another as an incident to the rocking of said looper mechanism, said parts when in certain relative positions enabling movement of said coupling means by said actuating means to uncoupling position and in other relative positions preventing such movement of said coupling means by said actuating means, said certain relative positions being assumed by said parts only during such time that said needle occupies a portion of its path which does not intersect the path of said looper mechanism.

3. In a sewing machine the combination of a bed, work feeding means, a reciprocating needle, looper mechanism rockably mounted on said bed, looper rocking means for rocking said looper mechanism through a path a portion of which intersects a portion of the path of said needle, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, movable means for coupling said looper mechanism with said rocking means, and a looper throw out means including a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, and a manually operable element connected with one of said members and arranged to move said movable means to effect uncoupling of said looper mechanism from said rocking means, the movement of said second member relative to said first member placing said members in a first relationship during a selected portion of each stitch forming cycle in which said element is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch forming cycle in which effective operation of said element is prevented, and means for moving said looper mechanism when uncoupled into a position readily accessible for threading.

4. In a sewing machine the combination of a bed, work feeding means, a cloth plate, a reciprocating needle, looper mechanism rockably mounted beneath said cloth plate, looper rocking means for rocking said looper mechanism to cooperate with said needle in the formation of a line of stitches, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, movable means for coupling said looper mechanism with said rocking means, and a looper throwout, a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, and a manually operable element connected with one of said members and arranged to move including means, said movable means to effect uncoupling of said looper mechanism from said rocking means, means for moving said uncoupled looper mechanism downwardly and outwardly of said cloth plate into a position readily accessible for threading and through a path at least a portion of which intersects a portion of the path of said needle, the movement of said second member relative to said first member placing said members in a first relationship during a portion of each stitch cycle in which said looper throwout means is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch cycle in which operation of said looper throwout means is prevented at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

5. In a sewing machine the combination of a bed, work feeding means, a reciprocating needle, looper mechanism rockably mounted on said bed, looper rocking means for rocking said looper mechanism through a path a portion of which intersects a portion of the path of said needle, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, a longitudinally movable plunger carried by said looper mechanism and adapted in one position to effect coupling between said looper mechanism and said rocking means, and a looper throwout means including a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper

mechanism, and a manually operable element connected with one of said members and arranged to move said plunger longitudinally to effect uncoupling of said looper mechanism from said rocking means, the movement of said second member relative to said first member placing said members in a first relationship during a portion of each stitch cycle in which said looper throwout means is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch cycle in which operation of said looper throwout means is prevented at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

6. In a sewing machine the combination of a bed, work feeding means, a reciprocating needle, looper mechanism rockably mounted on said bed, looper rocking means for rocking said looper mechanism through a path a portion of which intersects a portion of the path of said needle, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, a longitudinally movable plunger carried by said looper mechanism and adapted in one position to effect coupling between said looper mechanism and said rocking means, and a looper throwout means including a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, and a manually operable element connected with one of said members and arranged to move said plunger longitudinally to effect uncoupling of said looper mechanism from said rocking means, and means for moving said uncoupled looper mechanism into a position readily accessible for threading, the movement of said second member relative to said first member placing said members in a first relationship during a portion of each stitch cycle in which said looper throwout means is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch cycle in which operation of said looper throwout means is prevented at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

7. In a sewing machine the combination of a bed, work feeding means, a reciprocating needle, looper mechanism rockably mounted on said bed, looper rocking means for rocking said looper mechanism to cooperate with said needle in the formation of a line of stitches, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, a longitudinally movable plunger carried by said looper mechanism and adapted in one position to effect coupling between said looper mechanism and said rocking means, and a looper throwout means including a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, and a manually operable element connected with one of said members and arranged to move said plunger longitudinally to effect uncoupling of said looper mechanism from said rocking means, and means for moving said uncoupled looper mechanism into a position readily accessible for threading through a path at least a portion of which intersects a portion of the path of said needle, the movement of said second member relative to said first member placing said members in a first relationship during a portion of each stitch cycle in which said looper throwout means is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch cycle in which operation of said looper throwout means is prevented at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

8. In a sewing machine the combination of a bed, work feeding means, a vertically reciprocating needle, looper mechanism mounted on said bed for oscillation in vertical planes, looper rocking means for rocking said looper mechanism to cooperate with said needle in the formation of a line of stitches, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, a longitudinally movable plunger carried by said looper mechanism and adapted in one position to effect coupling between said looper mechanism and said rocking means, and a looper throwout means including a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, and a manually operable element connected with one of said members and arranged to move said plunger longitudinally to effect uncoupling of said looper mechanism from said rocking means, and means for moving said uncoupled looper mechanism into a position readily accessible for threading through a path at least a portion of which intersects a portion of the path of said needle, the movement of said second member relative to said first member placing said members in a first relationship during a portion of each stitch cycle in which said looper throwout means is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch cycle in which operation of said looper throwout means is prevented at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

9. In a sewing machine the combination of a bed, means for feeding material in a pre-determined direction through said machine, a vertically reciprocating needle, looper mechanism mounted on said bed for oscillation in a path parallel with the line of feed and a portion of which intersects a portion of the path of said needle, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, a longitudinally movable plunger carried by said looper mechanism and adapted in one position to effect coupling between said looper mechanism and said rocking means, and a looper throwout means including a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, and a manually operable element connected with one of said members and arranged to move said plunger longitudinally to effect uncoupling of said looper mechanism from said rocking means, means for moving said uncoupled looper mechanism into a position readily accessible for threading through a path at least

a portion of which intersects the path of said needle, the movement of said second member relative to said first member placing said members in a first relationship during a portion of each stitch cycle in which said looper throwout means is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch cycle in which operation of said looper throwout means is prevented at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

10. In a sewing machine the combination of a bed, work feeding means, a reciprocating needle, looper mechanism rockably mounted on said bed, looper rocking means for rocking said looper mechanism through a path a portion of which intersects a portion of the path of said needle, operating means for driving said needle and said looper rocking means in coordinated relation to provide a stitch forming cycle, said looper rocking means including a rock lever having an opening formed therein, a longitudinally movable plunger carried by said looper mechanism and adapted in one position to enter the opening in said rock lever to effect coupling between said looper mechanism and said rocking means, resilient means urging said plunger toward said position, and a looper throwout means including a first member carried by said bed, a second member connected with said looper mechanism and movable relative to said first member as an incident to rocking of said looper mechanism, and a manually operable element connected with one of said members and arranged to move for moving said plunger longitudinally against said yieldable means to withdraw the same from said opening in said rock lever to effect uncoupling of said looper mechanism from said rocking means, said uncoupled looper mechanism being free to move into a position readily accessible for threading, the movement of said second member relative to said first member placing said members in a first relationship during a portion of each stitch cycle in which said looper throwout means is operable at will to uncouple said looper mechanism from said rocking means and into a second relationship during a different portion of each stitch cycle in which operation of said looper throwout means is prevented at any time during which said needle occupies any portion of its path which intersects the path of said looper mechanism.

11. The apparatus set forth in claim 10 in which said second member is constantly connected with said plunger and comprises a slotted lever straddling said plunger, and in which is provided means for rotating said slotted lever to move said uncoupled looper mechanism either towards or from its threading position.

12. The apparatus set forth in claim 10 in which said means for moving said longitudinally movable plunger includes an operating knob accessible from the exterior of said sewing machine, and in which said second member comprises a lever constantly connecting said operating knob with said plunger and which rocks in response to the movements of said looper mechanism in a stitch forming cycle, and in which said first member comprises a stop fixed with respect to the frame of said machine, and a projection carried by said second member which rocks with said second member into such relationship with said first member as to prevent uncoupling of said looper mechanism at any time during a cycle of stitch formation in which said needle occupies any portion of its path which intersects the path of said looper mechanism.

13. The apparatus set forth in claim 10 in which said means for moving said longitudinal plunger comprises a rod mounted in the bed of said sewing machine for longitudinal reciprocation in a fixed path substantially parallel with the path of movement of said plunger said first member being mounted on said rod, and in which said second member comprises means on said plunger which moves into interengaging relation with said first member in which longitudinal movement of said rod may be transmitted to said plunger only when said looper mechanism is rocked in a cycle of stitch formation into a position which it occupies during the time that said needle is in positions outside that portion of its path of travel which intersects any portion of the path of travel of said looper mechanism.

14. In a sewing machine the combination of means for feeding material in a predetermined direction through said machine; a plurality of needles; means for vertically reciprocating said needles, a cloth plate; looper mechanism located beneath said cloth plate including a plurality of loopers corresponding respectively with said plurality of needles, and a needle guard associated with each of said loopers, said loopers and said needle guards being mounted for oscillation in vertical planes parallel with the line of feed; means for rocking said looper mechanism to move said loopers and said needle guards in said planes to cooperate with said needles in the formation of a plurality of parallel lines of stitching, said looper mechanism being thus rocked through paths having portions intersecting portions of the paths of said needles, said rocking means being so timed with said means for vertically reciprocating said needles that said needles and said looper mechanism occupy the intersecting portions of their respective paths at different times within a cycle of stitch formation; and looper throw-out means for uncoupling said looper mechanism from said rocking means and swinging said looper mechanism downwardly and outwardly from said cloth plate into a position readily accessible for threading said loopers, said looper throw-out means including an actuating knob accessible from the exterior of said machine, a longitudinally reciprocable plunger carried by said looper mechanism and having an end portion adapted in one position of said plunger to effect coupling between said looper mechanism and said rocking means, means including a bifurcated lever straddling said plunger and rigidly connected with said actuating knob for maintaining a constant connection between said plunger and said actuating knob whereby movement of said knob may be effective to withdraw said plunger from said rocking means, and means interposed in the path of a part of said looper throwout means for preventing movement thereof to uncouple said looper mechanism at any time during which said needles occupy the portions of their paths which intersect the path of said looper mechanism.

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