May 2, 1939. F. A. KUCERA 2,156,535

NEEDLE GUIDE FOR SEWING MACHINES

Filed April 4, 1936 2 Sheets-Sheet 1

FIG. I

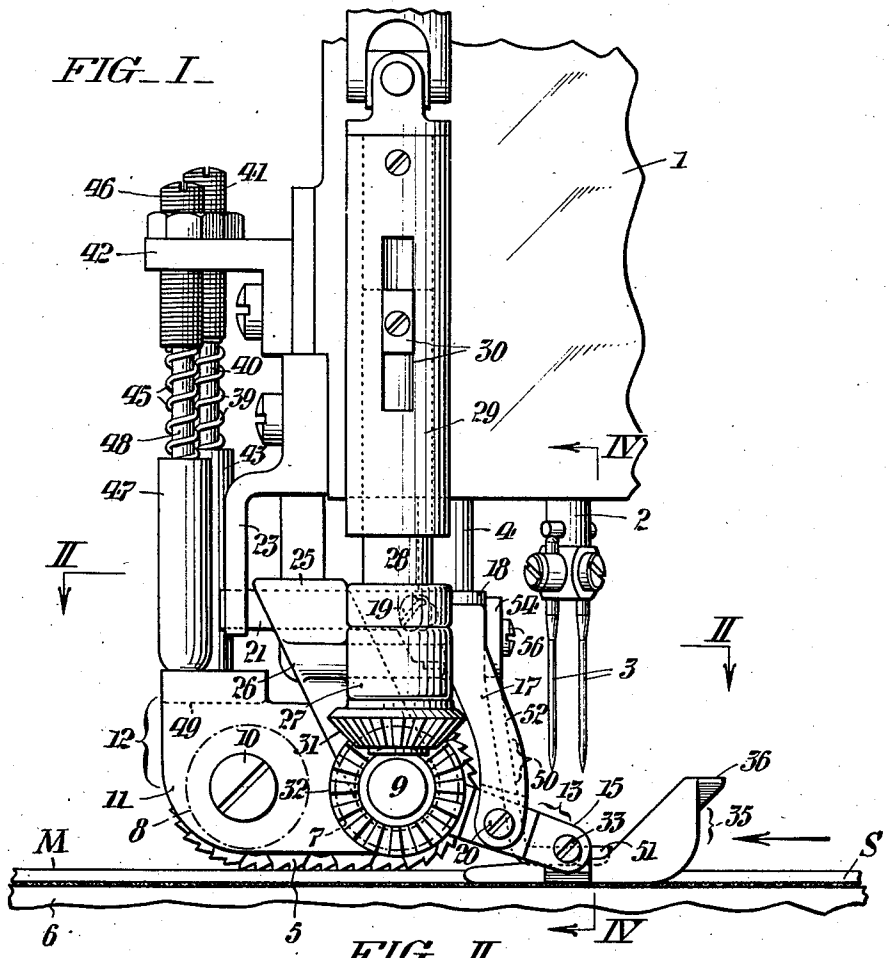
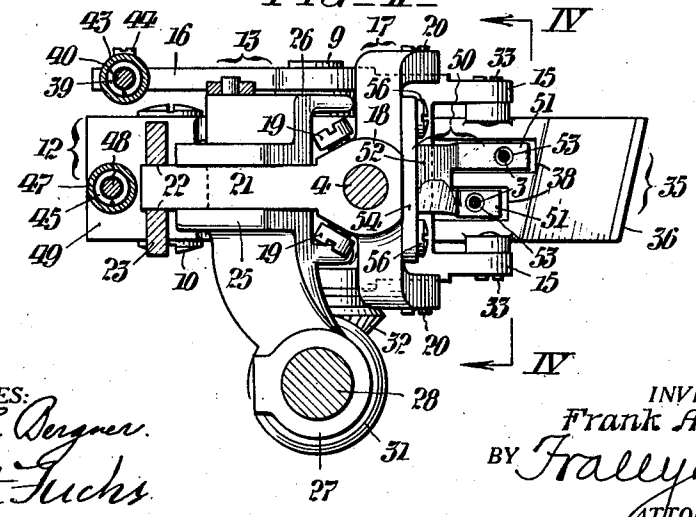



FIG. II




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FIG. III.

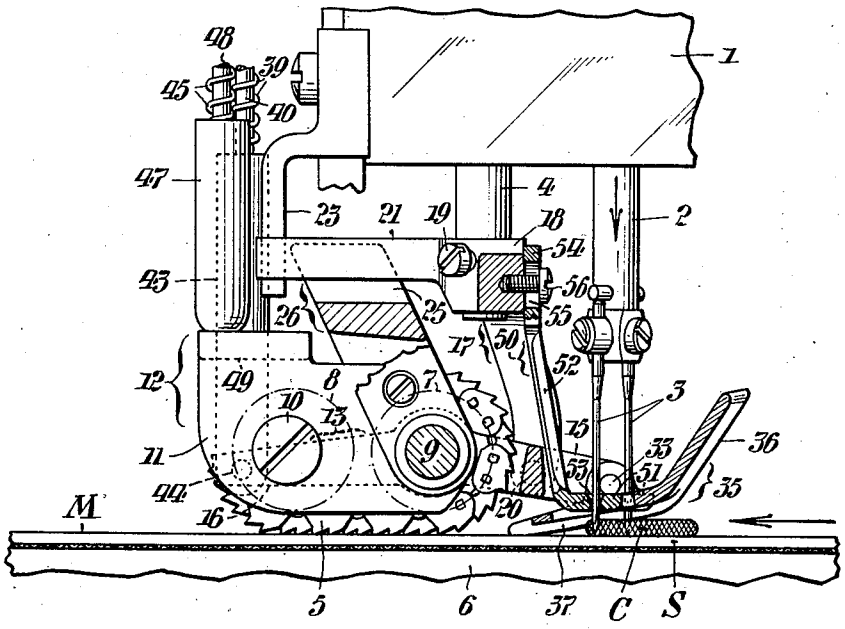



FIG. IV.

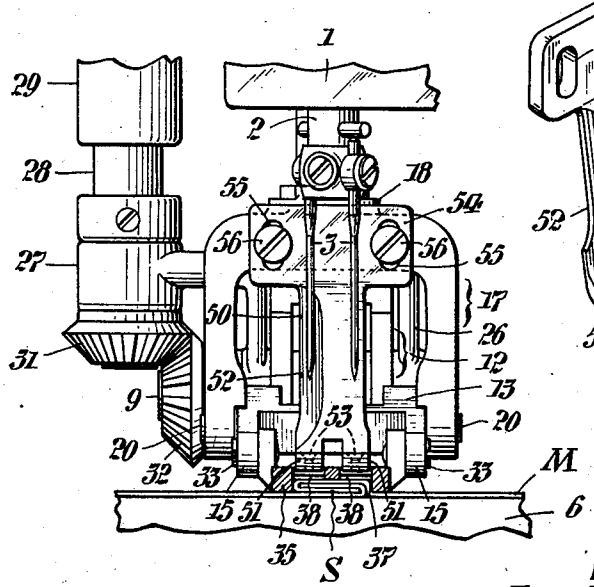
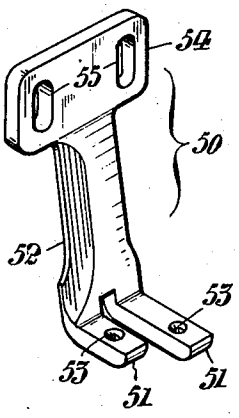



FIG. V.




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# UNITED STATES PATENT OFFICE

2,156,535

## NEEDLE GUIDE FOR SEWING MACHINES

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Application April 4, 1936, Serial No. 72,764

7 Claims. (Cl. 112—261)

This invention relates to needle guides for sewing machines. More particularly, it has reference to needle guards useful in connection with sewing machines wherein the presser feet are movable angularly and vertically to facilitate passage beneath them of irregularities such as heavy double lapped cross seams in the material being sewed. In order to clear the needles of such sewing machines, such presser feet must of necessity be formed with slots for passage of the needles through them. These slots are however too large to effectively guide or brace the needles against flexing or springing from the true path of movement as sometimes occurs incident to operation upon heavy materials, especially when encountering the sloping approaches of the cross seams. Under strains so induced, the needles are often fractured or bent, or parts, like the feed dogs and throat plates of the machines in the path of them, broken or mutilated.

The chief aim of my invention is to preclude contingencies of the sort mentioned, which objective I attain, as hereinafter more fully explained, through provision of a guide with a hole or holes to receive the needle or needles with a snug fit, which will allow rocking movement of the presser foot normally to the maximum extent necessary without interfering with feeding of the fabric beneath it, and which, as the presser foot rises bodily, is concurrently lifted but to lesser extents with increases in the thickness of the fabric. Accordingly, when the work is abnormally thick as at cross seams, the guide is actually closer to the fabric than ordinarily so that the needles are more effectively braced against flexing or springing when the resistivity of the fabric to penetration is greatest.

In a form suitable for sewing machines provided with caterpillar feed mechanism such as featured in a copending patent application, Serial No. 25,094, filed jointly by Norman V. Christensen, Charles F. Rubel, Clarence C. Smith and Harold J. Le Vesconte on June 5, 1935, wherein the presser foot is operatively coordinated with the feed instrumentalities, my improved needle guide may move compensatively with the presser foot but vertically only with its guide holes always accurately aligned with the needles.

Other objects and attendant advantages will appear from the following detailed description of the attached drawings, whereof Fig. I is a fragmentary view in side elevation of a sewing machine with caterpillar feed mechanism of the type featured in the copending patent application supra, conveniently embodying my improved needle guard.

Fig. II is a plan sectional view taken as indicated by the arrows II—II in Fig. I.

Fig. III is a view similar to Fig. I with certain parts broken away and others shown in longitudinal section.

Fig. IV is a fragmentary sectional view taken as indicated by the arrows IV—IV in Figs. I and II; and

Fig. V is a perspective view of the needle guide.

The head 1 of the partly illustrated sewing machine affords vertical guidance to a needle bar 2, which, in this instance carries two needles 3, and also to a presser bar 4 which is yieldingly urged downward by a comparatively heavy spring, not shown. Briefly described, the feed mechanism of the machine comprises a horizontally-arranged endless chain 5 with toothed links for engaging and progressing the material M being sewed along the work support indicated at 6. As shown, the feed chain 5 is trained about spaced sprocket wheels 7 and 8 whereof the first is affixed to, or integrally formed with a shaft 9, while the second is rotatable about an axis screw 10 extending crosswise between the side cheeks 11 of a journal member 12 which is freely fulcrumed for up and down movement about said sprocket shaft 9. Also fulcrumed on the sprocket shaft 9 is a yoked horizontal rocker 13 with a pair of laterally-spaced forward arms 15, and a single rearwardly-extending arm 16. Straddling the horizontal rocker 13 is a vertical yoke member 17 with a boss 18 at the top thereof secured, by means of set screws 19, to the lower end of the presser bar 4, said member having its pendant arms pivotally connected at 20 to the forward arms 15 of said rocker 13 about midway of their length. The presser bar 4 is restrained against rotation in the head 1 through sliding engagement of a horizontal rearward projection 21 of the boss 18 of the yoke 17 within the vertical slot 22 of a pendant guide 23 secured to the head 1. At the same time, the chain 5 is maintained aligned in the direction of feeding (indicated by the arrows in Figs. I and III) through engagement of the horizontally slotted top end 25 of an inclined yoke bracket 26 with the rearward projection 21 of the vertical yoke member 17, said bracket overreaching the journal member 12 with its side arms freely engaging the sprocket shaft 9. At one side, the bracket 26 is formed with a boss 27, in alignment with the sprocket shaft 9, in which boss is journaled a short vertical shaft section 28. As shown in

Fig. I, this shaft section 28 telescopically engages within a tubular companion section 29, the two being held against relative rotation through a key and slot connection 30. At its lower end, the shaft section 28 carries a miter pinion 31 which meshes with a miter pinion 32 secured to one end of the sprocket shaft 9. Through suitable connections with the drive shaft (not illustrated) of the machine, the telescoping shaft 28, 29 is intermittently rotated, which movement is imparted, through the miter gears 31, 32, to the sprocket shaft 9 and in turn to the feed chain 5. Interposed between and pivotally connected at 33 to the ends of the forwardly extending arms 15 of the horizontal rocker 13 is a presser foot 35 whereof the front end is inclined as at 36 to facilitate entry of the material M beneath it, and its bottom longitudinally grooved as at 37 to clear the folds of the seam S in said material. For a purpose later on explained, the presser foot 35 is moreover provided in its horizontal position with a pair of longitudinal slot-like openings 38. The downward pressure of the presser bar 4 is communicated through the vertical yoke 17 to the horizontal rocker 13 intermediate the fulcrum 9 of the latter and the presser foot pivots 33 with the result that the portion of the chain 5 directly beneath the sprocket wheel 7 and the horizontal portion of said presser foot are maintained in firm contact with the material M. A helical compression spring indicated at 39 in Figs. I and III exerts yielding downward pressure upon the rearward arm 16 of the rocker 13. As shown, this spring 39 surrounds the diametrically reduced downward stem prolongation 40 of an abutment screw 41 which is adjustable in a fixed lateral bracket piece 42 on the head 1. The lower end of the spring 39 bears upon a sleeve 43 which telescopes on the reduced stem prolongation 40 of the set screw 41 and which has its bottom end pivotally connected with the rearward arm 16 of the rocker 13 at 44. In a similar manner, a spring 45 regulatable by another set screw 46 in the bracket piece 42 is influential upon a round-ended sleeve 47 which telescopes on the pendant stem projection 48 of said screw and bears upon a cross web 49 connecting the side cheeks 11 of the journal member 12 at the rear of the latter, and thus yieldingly resists independent rocking movement of the feed chain unit bodily about the sprocket shaft 9.

The needle guide with which the present invention is more especially concerned, is comprehensively designated in the drawings by the numeral 50, and, as shown in Fig. V, is of L-shaped configuration with laterally-spaced bevel ended toes 51 projecting horizontally from the bottom end of an upright shank 52 which is slightly inclined to the vertical. The toes 51 of the guide 50, it will be noted, are provided with small guide holes 53 for the needles said holes being of a diameter corresponding to that of the needles; while the shank 52 is somewhat broadened at its upper end as at 54 and there provided with a pair of laterally spaced vertical slots 55. The guide 50 is secured to the front of the vertical yoke member 17, with its toes 51 extending forwardly as shown in Figs. I and III, by screws 56 which pass through the slots 55 of the shank 52 and engage into the upper or arch portion of said yoke member.

In practice, the guide 50 is adjusted vertically in accordance with the thickness of the cross seams, such as shown at C in Fig. III, in the material M, with its toes 51 positioned somewhat above the normal level of the horizontal portion of the presser foot 35 as shown in Fig. I, i. e., above the top of the seam clearing groove 27, so as not to protrude beneath the bottom of the presser foot and interfere with feeding of the fabric when said presser foot has swung to its extreme positions.

Normally, the presser foot 35 rests directly on the material M clearing the longitudinal seam S within its slot 37. However, upon approach of a cross seam C in the material M, the presser foot 35 assumes an angular position such as shown in Fig. III, this being possible by virtue of its pivotal connections 33 with the forward arms 15 of the rocker 13 and by reason of the capacity of said rocker to move about the sprocket shaft 9 as a center, this action being opposed by the downward pressure of the presser bar 4 on the vertical yoke member 17 attached thereto. As a consequence of the attendant vertical movement of the vertical yoke member 17, the guide 50 is raised concurrently and compensatively with the presser foot 35 but to a lesser degree due to the shorter leverage connection of said yoke member with respect to the sprocket shaft 9 as compared with that of the presser foot. Accordingly, as the presser foot 35 and the guide 50 are elevated, they approach each other with the result that the toes 51 of the guide enter the openings 38 provided for them in the horizontal portion of said presser foot. Irrespective of the angular movement of the presser foot 35, the toes 51 are maintained horizontal, since the guide is confined to vertical movement as a consequence of its attachment to the vertical yoke member. Thus, under all conditions of operation, the needles 3 pass through the small holes 53 in the horizontal toes 51 of the guide 50 before they enter the material M, and are thereby accurately guided and effectively braced against being deflected or bent as they are forced through said material. The differential upward movement of the guide 50 in respect to the presser foot 35 is highly advantageous in that the toes 51 of said guard are nearer to the material M as a cross seam C passes beneath them than ordinarily and the needles 3 accordingly braced nearer their ends during penetration of said seam. The guide 50 will thus allow rocking of the presser foot 35 to the maximum extent required and be itself maintained at all times as close as possible to the fabric to effectively brace the needles against flexure and rupture.

While I have herein illustrated and described my invention in connection with a combined feed and presser foot mechanism, it is not to be regarded as limited to this field, since, by suitable modifications within the scope of the appended claims, it can be adapted generally to machines wherein the presser foot has pivotal movement in respect to the presser bar.

Having thus described my invention, I claim:

1. In a sewing machine comprising a vertically-reciprocating needle, a presser foot, a rocker arm to the end of which the presser foot is pivotally connected for capacity to move vertically and angularly incident to passage therebeneath of irregularities like cross seams in the material being sewed, and a supporting member confined to vertical movement and having a pivotal connection with the rocker arm at an intermediate point; the combination of a guide with a guide hole therein for bracing the needle against being bent or broken by abrupt thickness offsets in the fabric influencing the presser foot, said guide being secured to the supporting member aforesaid at an elevation above the normal level of the presser foot, and adapted to be received in a clear-

ance opening in the presser foot when the latter moves angularly and vertically as aforesaid.

2. In a sewing machine comprising a vertically reciprocating needle, a presser bar, a presser foot, and feed mechanism including a rotary member for engaging and progressing the material being sewed, a horizontal rocker arm freely fulcrumed on the axis of the rotary member to the swinging end of which the presser foot is pivotally connected for capacity to move angularly and vertically in facilitating passage therebeneath of irregularities such as cross seams in the material, and a supporting member secured to the presser bar and having pivotal connection with the rocker at an intermediate point in the latter; the combination of a guide secured to said supporting member having a portion thereof normally above the presser foot and a guide hole therein for bracing the needle against being bent or broken by abrupt thickness offsets in the fabric influencing the presser foot, and being adapted to enter an opening in the presser foot when the latter is moved angularly and vertically as aforesaid.

3. In a sewing machine comprising a vertically reciprocating needle, a presser bar, a presser foot, and feed mechanism including a rotary member for engaging and progressing the material being sewed, a horizontal rocker arm fulcrumed on the axis of said rotary member to the swinging end of which the presser foot is pivotally connected for capacity to move angularly and vertically in facilitating passage therebeneath of irregularities such as cross seams in the material, and a supporting member secured to the presser bar and having a pivotal connection with the rocker arm at an intermediate point in the latter; the combination of a guide vertically adjustable on said supporting member, said guide having a portion positioned normally above the presser foot with a guide hole therein for bracing the needle against being bent or broken by abrupt thickness offsets in the fabric influencing the presser foot and being adapted to enter an opening in the presser foot when the latter foot is moved angularly and vertically as aforesaid.

4. In a sewing machine comprising a vertically reciprocating needle, a presser bar, a presser foot, and feed mechanism including an endless chain for engaging and progressing the material being sewed, an intermittently driven sprocket wheel for the chain, a horizontal rocker arm freely fulcrumed on the axis of the sprocket wheel to the swinging end of which the presser foot is pivotally connected for capacity to move angularly and vertically in facilitating passage therebeneath of irregularities such as cross seams in the material, and a supporting member secured to the presser bar and pivotally connected to the rocker arm at an intermediate point in the latter; the combination of a guide secured to said supporting member having a portion normally above the presser foot with a guide hole therein for bracing the needle against being bent or broken by abrupt thickness offsets in the fabric influencing the presser foot and being adapted to enter an opening in the presser foot when the latter foot is moved angularly and vertically as aforesaid.

5. In a sewing machine, the combination of a needle; a rocking presser foot capable of rising and falling and assuming angular positions in adapting itself to irregularities in the thickness of the fabric fed beneath it; a needle bracing guide with a hole permitting passage of the needle with a snug fit, said guide being elevated above the presser foot to allow full rocking movement of the latter without interfering with progression of the fabric; and means interconnecting the needle guide and the presser foot whereby the guide is lifted incident to rises of the presser foot but to lesser extents with increases in the thickness of the fabric.

6. In a sewing machine, the combination of a needle; a rocking presser foot capable of rising and falling and assuming angular positions in adapting itself to irregularities in the thickness of the fabric fed beneath it; a needle bracing guide with a hole permitting passage of the needle with a snug fit, said guide having a horizontal toe portion elevated within a clearance opening in the presser foot so as to allow rocking movement of the latter without interfering with progression of the fabric; and means interconnecting the needle guide and the presser foot whereby the guide is lifted incident to rises of the presser foot but to lesser extents with increases in the thickness of the fabric.

7. In a sewing machine, the combination of a needle, a rocking presser foot capable of rising and falling and of assuming angular positions in adapting itself to irregularities in the thickness of the fabric fed beneath it, said presser foot having a longitudinal seam clearing groove in its bottom; a needle bracing guide with a hole receiving the needle with a snug fit, said guide having a horizontal toe portion disposed within a clearance opening in the presser foot above the top of the seam clearing groove so as to allow rocking movement of the presser foot without interfering with progression of the fabric; and means interconnecting the needle guide and the presser foot whereby the guide is lifted incident to rising of the presser foot but to lesser extents with increases in the thickness of the fabric.

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