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NEEDLE STABILIZER FOR SEWING MACHINES

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2 Sheets-Sheet 1

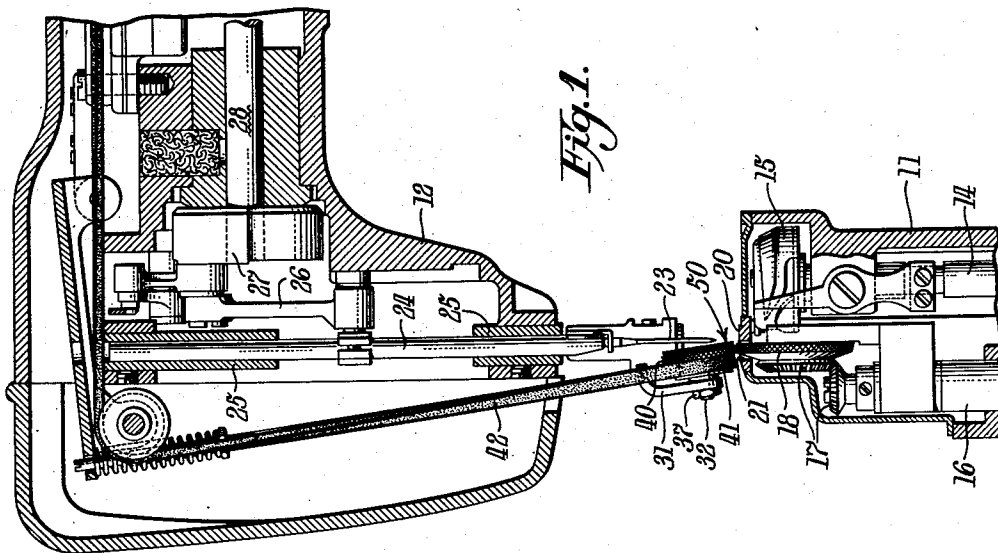


Fig. 1.

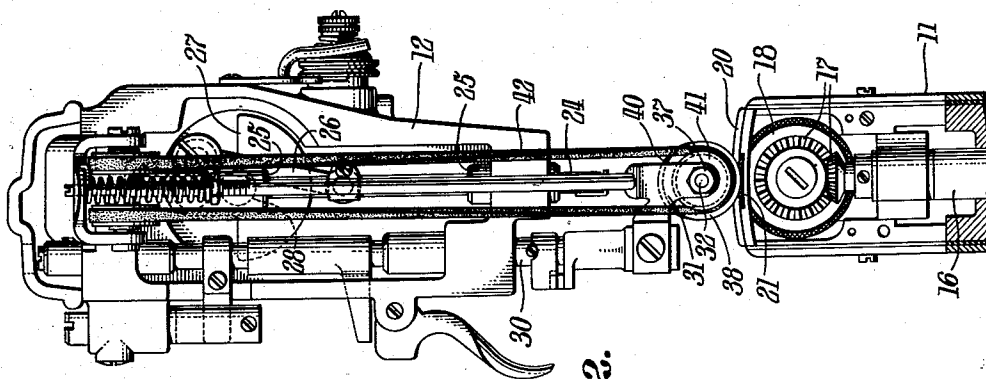


Fig. 2.

WITNESS

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Fig. 3.

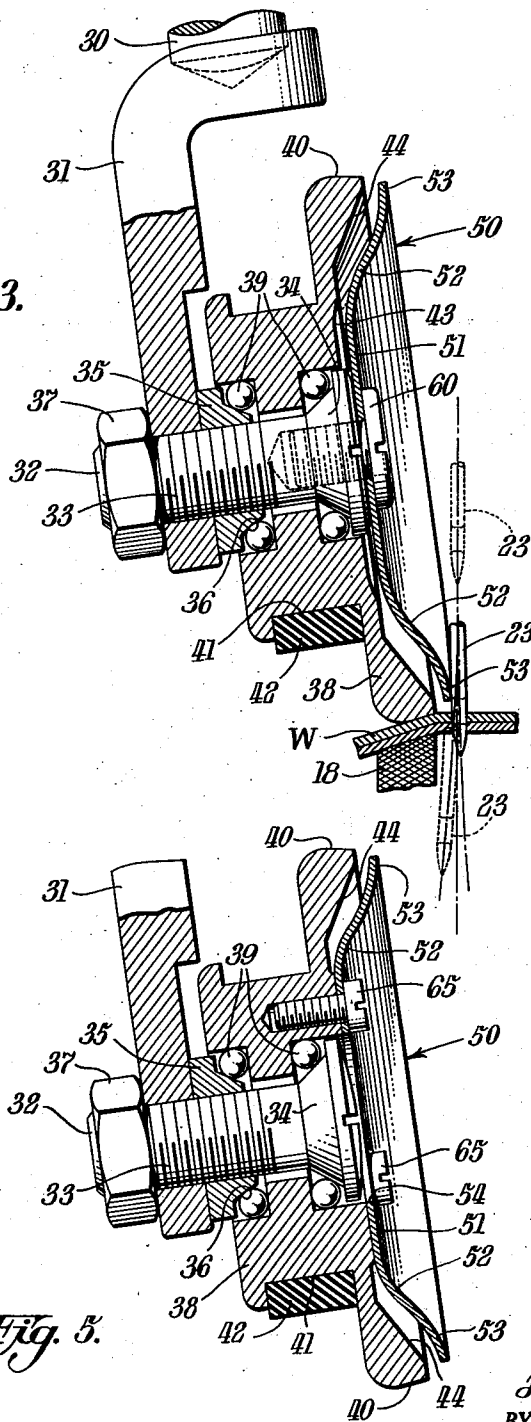


Fig. 5.

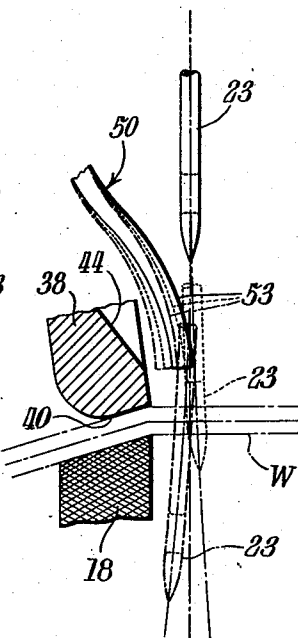


Fig. 4.

WITNESS

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NEEDLE STABILIZER FOR SEWING
MACHINES

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10 Claims. (Cl. 112—214)

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This invention relates to needle stabilizing devices for a sewing machine and particularly to a needle stabilizing arrangement adapted for use with a sewing machine having either a freely rotatable presser-wheel or a driven work-feeding presser-wheel.

It is an object of this invention to provide a needle stabilizer which is effective accurately to guide the point of a slender needle to the desired stitch line with a minimum of frictional drag or bending of the needle, thereby prolonging the useful life of the needle.

When stitching a straight seam in a material such as leather, it is frequently desirable to guide the needle point to the work, thereby overcoming the effect, for instance, of needle vibration due to the use of a relatively slender needle. One highly efficient type of needle stabilizer construction involves the use of an unyielding needle guiding surface arranged at a sharp angle with the needle bar and against which the needle point glances so as to be cammed into proper work penetration position. As an example, the patent to Knox, No. 1,864,136, June 21, 1932, discloses this type of needle stabilizer in which the needle guiding surface is formed as an integral part of the roller presser.

In the various embodiments of that described type of needle stabilizer construction, the needle guiding surfaces are firmly supported to prevent movement thereof laterally of the line of stitch formation. Apparently it was felt that the needle point must be cammed into proper position in the most positive manner. As a result, considerable friction is developed between the needle blade and the guiding surface, which friction has a detrimental effect on the needle. In the Knox construction, an attempt was made to alleviate this objectionable excessive friction by inclining the needle from the vertical so that, in theory, only the needle point would touch the guiding surface formed on the presser roller. In practice, however, it has been observed that with certain types of materials the needle, after penetration of the work, is drawn laterally in the direction of the presser roller thus causing increased friction therebetween. The consequent effect of such excessive friction is detrimental to the life of the needle and in certain instances results in an objectionable permanent bend in the needle blade.

We have found that absolute rigidity of the needle stabilizer against movement laterally of the line of stitch formation is not essential to satisfactory needle positioning but, on the con-

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trary, a considerable amount of flexibility is permissible. With a somewhat flexible needle stabilizer, it becomes apparent that the action of the stabilizer upon the slender needle point is more in the nature of a parrying than a camming action. Accordingly, we provide in the present invention, a needle stabilizer which is yieldable laterally of the line of stitch formation. In normal unflexed position, the stabilizer extends across the axis of the needle bar and it is spaced sufficiently from the surrounding objects so that movement is permissible to compensate for the above described lateral drawing effect. With this flexible stabilizer, the frictional drag between the needle blade and the stabilizer is substantially constant depending in amount primarily upon the flexibility of the stabilizer.

Other objects and advantages will appear from the following specification and the accompanying drawings which illustrate the preferred embodiment of our invention and in which:

Fig. 1 represents a longitudinal sectional view of a portion of a sewing machine to which the invention is applied and taken in a vertical plane passing substantially through the needle.

Fig. 2 is an end elevational view, partly in section, of the portion of the sewing machine illustrated in Fig. 1 with the end cover plates removed.

Fig. 3 is an enlarged front elevation view, partly in cross section, of the rearward presser and needle stabilizer of Figs. 1 and 2, with the adjacent parts illustrated fragmentarily.

Fig. 4 is an enlarged fragmentary view of that portion of the roller presser and needle stabilizer of Fig. 3 adjacent the work, and in which the needle and the stabilizer are illustrated in three different positions during a typical cycle of stitch formation.

Fig. 5 is a front elevational view partly in cross section and similar to Fig. 3, but showing a modified form of roller presser and needle stabilizer.

The selected embodiment the invention is illustrated as applied to a lock stitch post machine which comprises a frame of which a vertically arranged work supporting post 11 and an overhanging bracket-arm 12 are illustrated. Rotatably journaled in the post 11, is a hook shaft 14 to which a rotary hook 15 is secured, and a feed driving shaft 16 which is connected by bevel gears 17—17 to a lower feed wheel 18. The hook shaft 14 is driven in the usual continuous fashion and the feed drive shaft 16 is rotated intermittently in one direction by a suitable driving

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mechanism (not shown) disposed in the machine frame. Secured upon the upper end of the post 11 is a work-supporting throat-plate 20 which is slotted at 21 to accommodate the lower feed-wheel 18 and to provide clearance for the needle 23.

A needle carrying bar 24 is journaled vertically in bearings 25—25 in the overhanging bracket-arm 12 and is operatively connected for endwise reciprocatory movement by means of a driving link 26 and a crank 27 fast on a rotary shaft 28 arranged within the bracket-arm. Also endwise slidably journaled in a bracket-arm 12 is a presser-bar 30 to the lower extremity of which is secured a supporting arm 31 for an inclined stud-shaft 32. A portion of the stud-shaft is threaded, as at 33, and is formed on the unthreaded extremity with a conical ball bearing race 34. Engaging the stud shaft threads 33 is a bearing confining member 35 having a second conical ball bearing race 36 formed thereon. The stud shaft 32 is rigidly secured to the arm 31 by a clamp arrangement between the bearing confining member 35 and a fastening nut 37. A driven presser wheel 38 which is rotatably journaled on the stud shaft 32 by means of bearing balls 39—39, is provided with a knurled peripheral portion 40 which is arranged above the lower feed wheel 18. The slight inclination of the stud shaft 32 and consequently of the presser-wheel 38 provides clearance for the needle bar and permits the presser wheel to be disposed nearer to the needle path. Integral with the presser wheel 38 is a pulley 41 which is engaged by an endless belt 42 connecting the presser wheel with the feed wheel drive shaft 16 through suitable connections (not shown) in the machine frame.

Referring to Figs. 3 and 5, the needle stabilizer, indicated generally as 50, is carried by the presser device. The stabilizer is preferably fabricated of sheet metal in the form of a dish-shaped circular disk. More particularly, the stabilizer is formed with a flat central portion 51 which defines a single plane. The flat central portion merges into a generally frusto-conical marginal portion 52 and of which an outer peripheral rim 53 is bent into a plane substantially parallel to the plane of the flat central portion 51.

With the instant stabilizer, the dished configuration thereof is the dominant feature in determining the flexibility of the rim 53 with respect to the central portion 51. Since with modern production methods the configuration of the disk can be maintained constant within very close tolerances, a high degree of uniformity as to the flexibility of the stabilizer may be obtained. This uniformity makes possible convenient interchangeability where replacement of a worn stabilizer becomes necessary.

The constructions illustrated in Figs. 3 and 5 differ from each other only in regard to the manner in which the stabilizer is secured to the presser device. In each construction, however, the stabilizer is inclined from the vertical because of the inclination of the stud shaft 32 and presser wheel 38. In Fig. 3, the stabilizer is fastened at its center to the free end of the stud shaft 32 by means of a single fastening screw 60 which is threaded into a hole formed centrally of the stud shaft. The shape of the marginal portion 52 and the rim 53 of the stabilizer is generally similar to that of the adjacent face 44 of the presser wheel, and consequently the space between the stabilizer and the face 44 is available to permit maximum freedom of flexibility of the

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rim 53 without contact between the stabilizing disk and the face 44. The presser wheel 38 of Fig. 3 is preferably provided with a shallow angular recess 43 in order to provide additional clearance for flexing of the stabilizer. The stabilizer of Fig. 3 therefore, remains locked against turning as does the stud shaft 33. By means of the fastening screw 60, however, the stabilizer may be readily loosened and turned to a new angular position to present a fresh face to the needle in case of wear.

In Fig. 5 a construction is illustrated in which the stabilizer is secured to a portion of the adjacent face 44 of the presser wheel and therefore, rotates with the presser wheel so that the rim portion of the stabilizer which is presented to the needle is constantly varied. Preferably a plurality of fastening screws 65—65 are utilized for this purpose, each being threaded into the presser-wheel 39. With this construction, an aperture 54 is provided in the center of the stabilizing disk to provide access to the stud-shaft 32 so that the presser device may be disassembled without removing the stabilizing disk.

Figs. 3 and 4 each illustrate the needle 23 in three positions during a typical cycle of needle reciprocation. In each figure, the uppermost position illustrates the needle during that portion of the cycle in which it is raised free of the work and the stabilizer; the intermediate or central position illustrates the needle during initial penetration of the work W; and the lowermost position illustrates the needle as it begins to rise. In Fig. 3 the intermediate or central needle position is illustrated in solid lines and the rim 53 of the stabilizer 50 is shown in the position which it will occupy as the needle initially penetrates the work, while the upper and lowermost needle positions are illustrated in dotted lines.

In Fig. 4 the uppermost illustrated position of the needle 23 is shown in solid lines as is the corresponding unflexed position of the needle stabilizer rim 53. The central position of the needle 23 in Fig. 4 is illustrated in dotted lines as is the corresponding position of the stabilizer rim 53. In striking the stabilizer rim prior to penetration of the work, the point of the needle is shifted or parried slightly to the right as exaggerated slightly in Fig. 4, in the interest of clarity. A corresponding shift of the stabilizer rim occurs in the opposite direction. The slight shifting of the needle under control of the stabilizer has been found to be generally sufficient to eliminate objectionable vibration which may exist in the slender needle, and accurately to position the needle point just as it enters the work to insure straight seam formation. In Fig. 4, the lowermost position of the needle, which represents the position of the needle as it begins its upward movement, is shown in dot-and-dash lines. Similar lines have been used to illustrate the corresponding position of the stabilizer rim 53. As this dot-and-dash line position illustrates, the needle is drawn laterally toward the cooperating lower feed-wheel and the presser-wheel 38 by the action of the work on the needle, which lateral drawing effect has been found to occur when certain leathers are being stitched. The flexible needle stabilizer is yieldable to accommodate such lateral shifting of the needle, and since sufficient clearance exists between the stabilizer and the adjacent face 44 of the presser-wheel to permit yielding of the stabilizer without contacting the presser-wheel, the frictional forces between the needle blade and the stabilizer remain at a very

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low and unobjectionable value. It will be obvious that if the needle stabilizer was inflexible, the action of the work tending to move the needle laterally toward the roller presser would increase the force with which the needle is pushed or pulled laterally against the inflexible stabilizer. Such increased friction, it has been found, is sufficient permanently to bend the needle out of its normally straight form, resulting in a short life of the needle.

Having thus set forth the nature of the invention, what we claim therein is:

1. A needle stabilizer for a sewing machine having a presser-mechanism including a presser-wheel and means supporting said presser-wheel adjacent the path of said needle, comprising a flexible needle deflecting disk adapted to be carried by said presser-supporting means, a rim portion on said disk formed to extend in spaced relation to said presser-wheel and in the path of said needle.

2. In a sewing machine having an endwise reciprocatory needle and work feeding mechanism including opposed work engaging members, a dish-shaped needle stabilizing disk open toward the needle and having a flexible rim portion disposed for engagement by said needle at the needle penetrating side of the work.

3. In a sewing machine having a vertically reciprocable needle and a work feeding mechanism including opposed work engaging members, a vertically inclined needle stabilizing disk supported by one of said opposed work engaging members, said disk having a flexible rim disposed for engagement by said needle.

4. In a sewing machine, stitch-forming mechanism including a needle reciprocable in a vertical path, opposed work-engaging wheels disposed at one side of said needle path, and a flexible needle stabilizing disk supported coaxially with one of said wheels, said disk having a rim portion arranged in laterally spaced relation to said coaxial wheel and extending into the path of said needle.

5. A needle stabilizer for a sewing machine having an endwise reciprocable needle, a feed mechanism and a presser mechanism including a presser-wheel, comprising a sheet metal disk having a flat central portion, means associated with said central portion for fastening said disk to said presser mechanism in coaxial relation with said presser-wheel, said disk having a frusto conical marginal portion joining said central portion, and a rim formed on the periphery of said frusto-conical portion, said rim being disposed in a plane substantially parallel to said central portion and extending into the path of needle reciprocation.

6. In a sewing machine having an endwise reciprocating needle bar and work feeding mechanism including opposed work engaging members, a needle stabilizing disk carried by said work

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feeding mechanism, said disk having a flexible rim extending into the path of needle reciprocation, and means providing for selective positioning of any of portion of said rim in the path of the needle.

7. In a sewing machine having an endwise reciprocating needle bar and work feeding mechanism including opposed work engaging members, a needle stabilizing disk carried by said work feeding mechanism, said disk having a flexible rim disposed for engagement by said needle, and means effective upon operation of the machine for constantly varying the rim portion of said disk engaged by said needle.

8. In a sewing machine having an endwise reciprocatory needle, a feed mechanism, and a presser mechanism including a presser-bar, a stud-shaft carried by said presser bar, and a presser wheel journaled on said stud shaft, a needle stabilizer comprising a sheet metal disk, fastening means securing said stabilizer disk to said stud-shaft in spaced relation to said presser-wheel, said disk having a rim portion extending into the path of needle reciprocation.

9. In a sewing machine having an endwise reciprocatory needle, a feed mechanism, and a presser mechanism including a presser-bar, a stud-shaft carried by said presser-bar, a presser-wheel journaled on said stud-shaft, and means associated with said stud-shaft for retaining said presser-wheel in predetermined axial position on said stud-shaft, a needle stabilizer comprising a sheet metal disk having a central portion arranged in abutting relation with said presser wheel, said central portion having an access opening formed therein exposing said presser wheel retaining means, and a rim portion formed on said stabilizer-disk and disposed in spaced relation with said presser-wheel.

10. A needle stabilizer for a sewing machine having an endwise reciprocable needle, a presser mechanism including a presser-wheel, and means supporting said presser-wheel adjacent the path of reciprocation of said needle, comprising a needle deflecting member adapted to be secured to said presser-mechanism and including a portion adapted to extend into the path of needle reciprocation in spaced relation to said presser-wheel, said portion being flexible transversely of the axis of needle reciprocation.

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