

Aug. 21, 1951

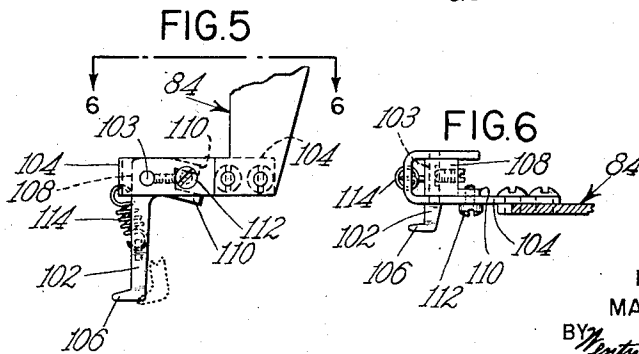
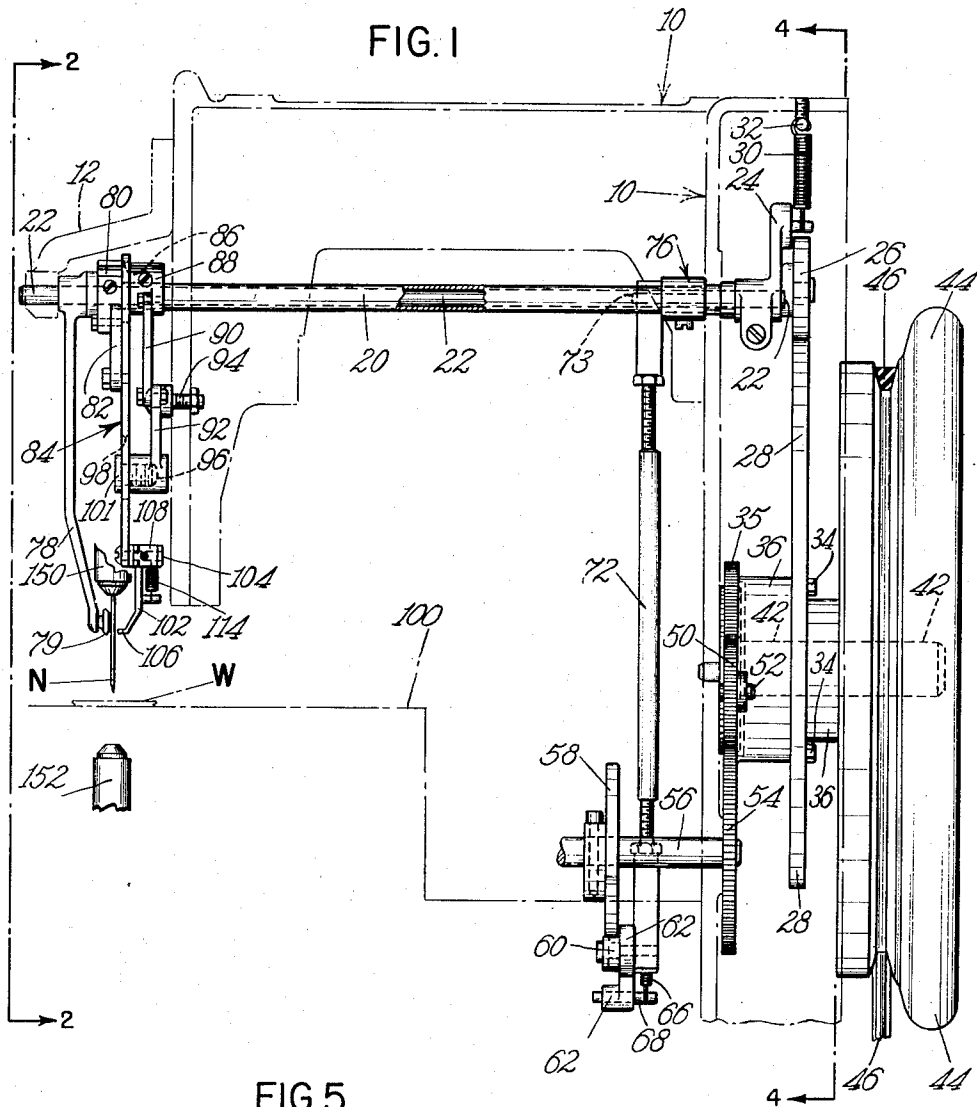
M. PEDERSEN

2,565,320

STITCH HANDLING MECHANISM FOR SEWING MACHINES

Filed April 10, 1948

3 Sheets-Sheet 1



INVENTOR
MATHIAS PEDERSEN.
BY *Montwork B. Clapham*
ATTORNEY

Aug. 21, 1951

M. PEDERSEN

2,565,320

STITCH HANDLING MECHANISM FOR SEWING MACHINES

Filed April 10, 1948

3 Sheets-Sheet 2

FIG. 2

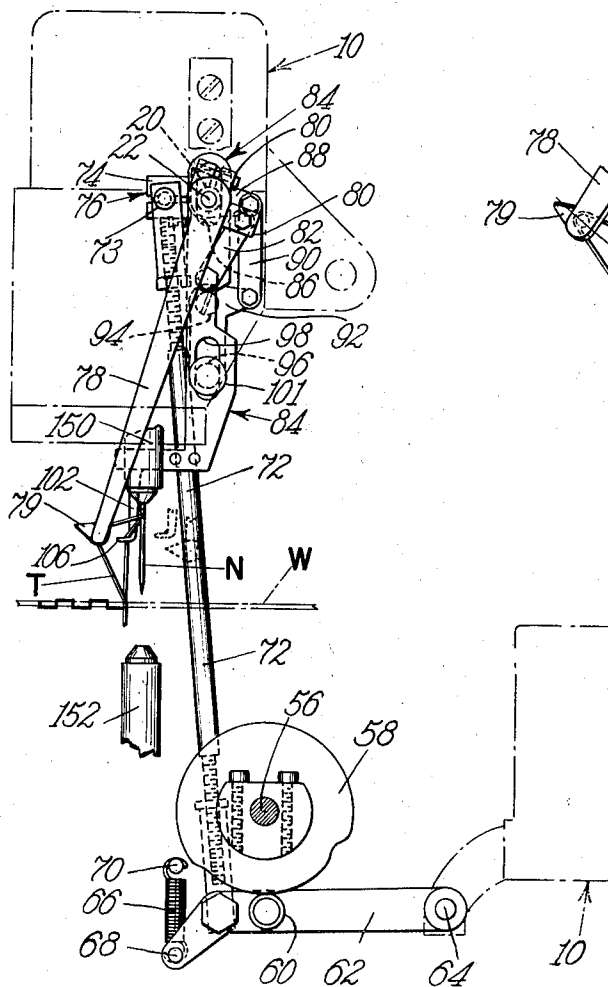


FIG. 3

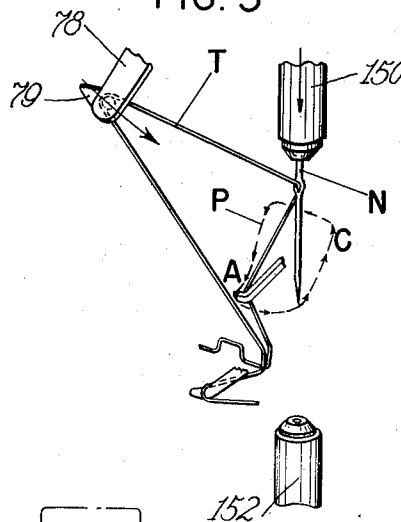
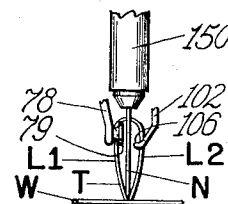


FIG. 2A



INVENTOR
MATHIAS PEDERSEN.
BY *Wentworth B. Clapham*
ATTORNEY

Aug. 21, 1951

M. PEDERSEN

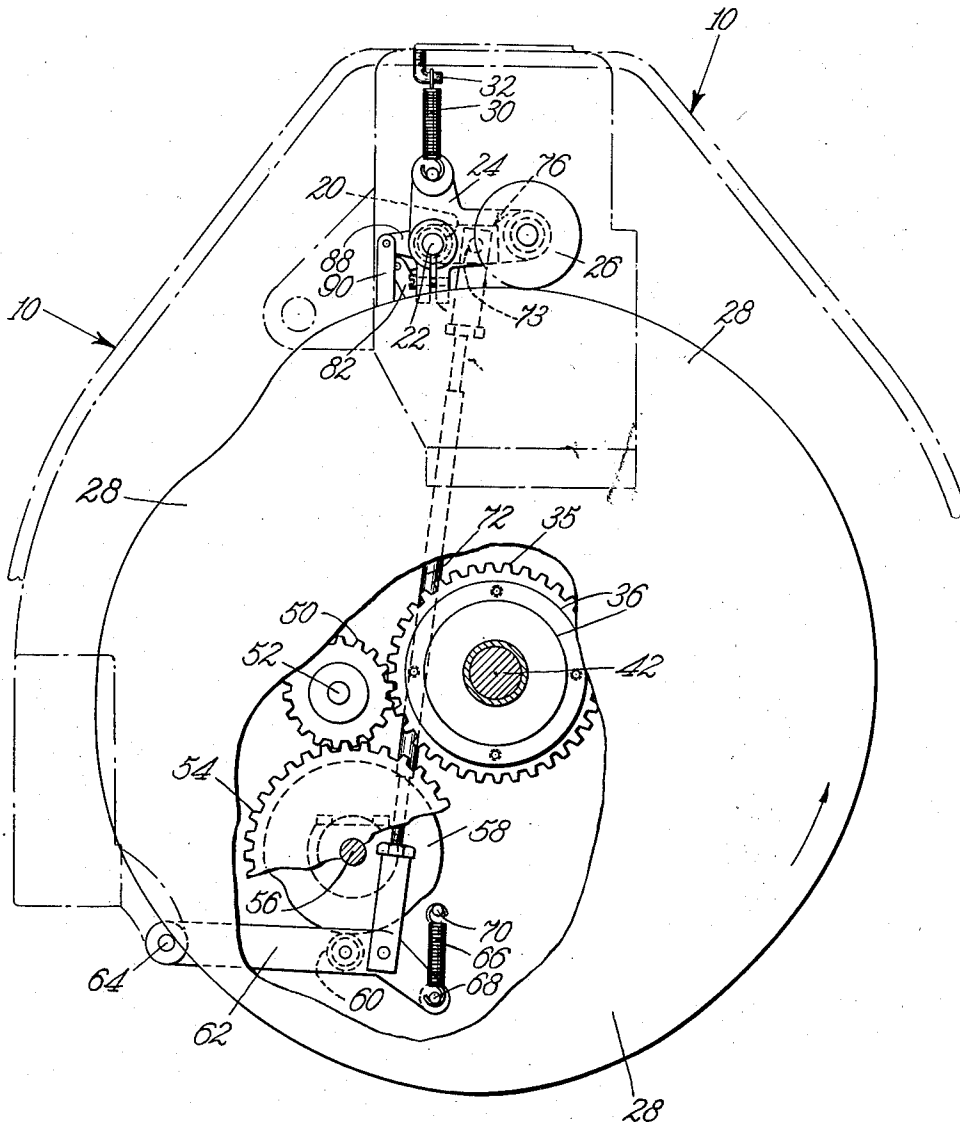
2,565,320

STITCH HANDLING MECHANISM FOR SEWING MACHINES

Filed April 10, 1948

3 Sheets-Sheet 3

FIG. 4



INVENTOR
MATHIAS PEDERSEN.
By *Wentworth B. Clapham*
ATTORNEY

UNITED STATES PATENT OFFICE

2,565,320

STITCH HANDLING MECHANISM FOR
SEWING MACHINESMathias Pedersen, Valley Stream, N. Y., assignor
to American Machine & Foundry Company, a
corporation of New Jersey

Application April 10, 1948, Serial No. 20,247

15 Claims. (Cl. 112-171)

1

This invention relates to sewing machines, and more particularly to improvements in thread handling mechanisms for use in machines of the type using a double pointed needle.

In a machine of this type, there is a tendency for the thread to twist and curl around the needle above the work to be stitched. This is especially true in certain kinds of thread, such as "nylon," and some silk thread. In such cases, it is difficult to prevent the thread from being split or spitted by the needle, or from becoming tangled with other operating parts of the machine, thereby resulting in breakage of thread and loss of valuable time.

The present invention solves the above noted problem because it provides a positively acting thread holding member or auxiliary looper which operates on one side of the upper needle bar in conjunction with a main thread looper which operates on the other side of the upper needle bar. The provision of the two loopers insures that the loop portions of a loop of thread formed by a movement of the needle downwardly towards the work will be engaged, held positively and thereby prevented from twisting, curling or otherwise getting in the path of the needle during its subsequent downward travel and into the work. The auxiliary looper, after engaging with one of the portions of the loop of thread, also travels downwardly with the needle bar, and releases the loop portion of thread which it holds and tensions only after the needle point has entered the work, or immediately prior thereto.

In the formation of certain types of stitches, such for example, as those employed in "pricking" men's and women's coats, it is desirable to have a minimum of the thread forming each stitch visible on the exposed surface of the work. The present invention makes it possible to form stitches of very short length and if desired, stitches which are substantially blind insofar as the exposed surface of the work is concerned. This is a feature of considerable value in making angle stitches mentioned above. According to the invention, the combined operation of the main looper and the auxiliary looper is such that as the upper needle bar moves the needle towards the work, the auxiliary looper holds a portion of the thread in resilient tension. The thread in the work is pressed thereagainst compressing the work fibres somewhat and opening up the hole last made when the needle passed upwardly through the work. When the needle next moves downwardly through the hole, or closely adjacent thereto, at the upper surface of the work, the

2

thread will be drawn into this hole or a short length will be disposed on the upper surface of the work. In the angle type of stitch where a major part thereof is disposed at an angle to the two surfaces of the work, the amount of work fed past the needle can be such that either a very short length of thread or substantially no thread will be visible on the exposed surface of the work according to the location at which the needle enters.

It is an object of the invention, therefore, to provide improved thread tensioning and supporting mechanism which coact and limit the amount of thread showing on the surface of the work being stitched and decorated.

It is an object of the invention to provide improved mechanism for engaging loop portions of thread and preventing them from moving into the path of movement of a needle.

The invention is also characterized by the provision of an auxiliary looper and a main looper which engage loops of thread on opposite sides of a needle and prevent the thread thus engaged from twisting, or getting into the path of a needle.

It is an object of the invention to provide a looper which moves into engagement with a portion of a loop of thread adjacent a needle, exerts tension thereon, restricts its movement and releases it substantially simultaneously with the movement of the needle into work to be stitched.

The invention also consists in the provision of a thread engaging and holding device operative to move into engagement with a loop portion of a length of thread located above work to be stitched, and travel downwardly in timed relationship with the movement of the needle while simultaneously maintaining the thread supported thereby tensioned and out of the path of travel of the point of the needle, and mechanism for effecting the release of the thread held by the thread holding device substantially simultaneously with the movement of the needle into the work.

The invention also consists of two coacting loopers located on opposite sides of a needle, which engage separate portions of loops of thread and wherein one looper is constrained to move in a substantially arcuate path, and the other looper travels downward with a needle bar and is operative to restrict the movement of the portion of thread engaged thereby until the point of the needle enters the work so that it cannot twist or get into the path of travel of the needle.

With these and other objects not specifically mentioned in view, the invention consists in cer-

tain features which will be hereinafter fully described, and then set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same or like parts:

Figure 1 is a front view showing the mechanism comprising the invention.

Figure 2 is a view taken on line 2—2 of Figure 1.

Figure 2a is a diagrammatic view showing the approximate positions of loop portions of thread relative to the needle when engaged by the loopers.

Figure 3 is a diagrammatic perspective view showing the coaction between the needle bars, main looper and auxiliary looper during the operation of the two loopers.

Figure 4 is a view taken on line 4—4 of Figure 1.

Figure 5 is a side view of the auxiliary looper; and

Figure 6 is a view taken on line 6—6 of Figure 5.

Referring to the drawings which illustrate a preferred form of the invention in Figure 1, there is disclosed in broken lines the outline of a sewing machine frame designated generally 10. This machine may be of the type shown and described in Johnson Patents 2,368,066 and 2,386,800, although the invention may be adapted for use in other machines. Secured to the front in frame 10 is a bracket 12 which provides a bearing for one end of shaft 22, the other end of which is suitably journaled at the rear of frame 10. A sleeve shaft 20 surrounds shaft 22. Clamped to one end of shaft 22 is a lever 24, on which is mounted a cam follower 26 running on a cam 28. A spring 30 having one end attached to lever 24 and the other fixed to pin 32, maintains follower 26 constantly in engagement with cam 28. Cam 28 is secured by screws 34 to hub 36 which may be integral with or attached to gear 35 rotatably mounted on stud shaft 42 suitably mounted in frame 10. Also secured to hub 36 is a combined pulley and handwheel 44. A belt 46 running on pulley 44, transfers the drive thereto from a suitable source of power (not shown).

Gear 35 meshes with and drives gear 50 on stud 52. Gear 50 meshes with and drives gear 54 on shaft 56 to which is secured cam 58 tracked by cam follower 60 on lever 62 fulcrumed on stud 64. A spring 66 having one end secured at 68 to lever 62, and the other end attached to pin 70 in frame 10, maintains cam follower 60 in engagement with cam 58.

Pivotally connected to lever 62 is one end of an adjustable connecting rod 72, the other end of which is pivotally connected to pin 73 secured in clamp arms 74 of lever 76 fixed to sleeve 20.

As shown in Figures 1 and 2, main looper arm 78, which is located to the left of upper needle bar 150, is attached to shaft 22. Also secured to shaft 22 is a lever 80 having an arm which is pivotally connected to one end of a link 82. The other end of link 82 is connected to a support member designated generally 84 having an elongated slot 86 through which extends sleeve 20. It is evident that by means of the connections described, whenever shaft 22 is rocked to swing looper arm 78, support 84 will be given a substantially vertical movement. When looper arm is moved to operative position, or clockwise as viewed in Figure 2, support 84 will move downwardly. A reverse movement takes place when looper arm 78 is swung counterclockwise.

A lever 88, fixed to sleeve shaft 20, is pivotally

connected to one end of link 90, the other end of which is pivotally secured to one end of bell crank lever 92 fulcrumed at 94 on frame 10 (Figure 1). The other end is provided with a pin 96 extending through a slot 98 in support member 84, and provided with a head 101 which maintains pin 96 in operative position in slot 98. By means of this mechanism and due to the rotation of shaft 56 and cam 58 thereon, support member 84 is also given a generally horizontal motion above work support table 100. The combined movements of support member due to the operation of cams 28 and 58, result therefore in the movement of auxiliary looper 102 mounted on support member 84 in a closed path to and from work table 100 conforming generally to path P indicated in broken lines in Figure 3.

Auxiliary looper 102 is swingably mounted in a bracket 104 attached to the free end of support member 84. Auxiliary looper 102 is provided with a thread engaging and holding nose 106, shaped preferably as shown in Figures 5 and 6. This design enables nose 106 to engage a portion of the loop of thread, designated L₂ (Figure 2a). Loop portions L₁ and L₂ are formed in a known manner when upper needle bar 150 is moved downwardly towards table 100 and dwells until further rotation of the needle bar operating cam (not shown) causes needle bar 150 to resume its downward movement and project needle N through work W.

Auxiliary looper 102 is provided with a block portion 108 in which is secured a pivot pin 103, the ends of which are rotatably supported in spaced portions of bracket 104. Block portion 108 has two vertically spaced arms 110 between which is located a stop pin or screw 112 limiting the rearward and forward swinging movement of auxiliary looper 102. A spring 114 having one end attached to auxiliary looper 102 and its other end secured to bracket 104, normally maintains auxiliary looper 102 in proper thread engaging, holding and tensioning position. (See Figure 5.)

As mentioned hereinabove, needle bars 150, 152 are reciprocated alternately to project needle N and thread T back and forth through work W in timed relation to the movement of the work feeding mechanism and thread puller (not shown) in order to form over and under stitches therein. Since the mechanism for operating the needle bars, thread puller and work feeding mechanism is shown and described in the above referred to Johnson patents and forms no part of the invention, no further disclosure or description herein is deemed necessary, and it is omitted in the interest of brevity.

Referring to Figure 2a, it will be seen that when in the formation of alternate stitches upper needle bar 150 is first moved toward work W and dwells, the thread between work W and the eye of the needle is bowed out to form two loop portions L₁ and L₂. Before needle bar 150 moves further downward due to the rotation of cams 28 and 58, main looper 79 on looper arm 78, and auxiliary looper 102 are moved into engagement with loop portions L₁ and L₂, respectively. This prevents either of the loop portions from twisting or curling about needle N or moving into the path of travel of the point thereof. In the case of certain types of thread, especially "nylon," the tendency to twist and get in the path of travel of the point of needle N is particularly troublesome. However, since each loop portion is now firmly held, this prob-

lem is overcome. Continued rotation of cam 28 causes main looper 79 to move outwardly, as shown in Figure 3, pulling slack in thread T, and moves support member 84 downward, which effects a downward movement of auxiliary looper 102. Since loop portion L₂ is held by nose 106 of auxiliary looper 102, this portion of the thread is also tensioned so that as auxiliary looper 102 moves downwardly along the tensioned thread, the thread is firmly held out of the path of travel of needle N. As shown in Figure 3, main looper 79 maintains the thread on one side of the needle tensioned. Simultaneously with the action of looper 79, auxiliary looper 102 also maintains a tension on that part of the thread between the eye of the needle and the fixed end of the thread in the work. This causes auxiliary looper 102 to move counterclockwise, as viewed in Figure 5, thereby tensioning spring 114. As needle bar 150 continues its downward movement, and the point of needle N nears work W, because of the shape of cam 28, arm 78 of main looper 79 is given a rearward movement. At this time auxiliary looper 102 swings forward under the action of spring 114, takes up the slack released by main looper 79 and holds the thread properly tensioned out of the path of the needle as the latter is projected into work W. The path of travel of auxiliary looper 102 is substantially as shown in broken lines in Figure 3. The maximum forward travel is at point A. As the point of needle N enters work W, auxiliary looper 102, which holds loop portion L₂ under tension of spring 114, is retracted by the action of cam 58, loop portion L₂ is released, and auxiliary looper 102 moves back to its inoperative position along the path A—C shown in Figure 3. The thread puller (not shown) beneath the work support table then completes the operation of pulling the loose end of thread T over main looper 79 and through the work. When this has been completed, cam 28 causes arm 78 to swing to inoperative position to the right of needle bar 150, as shown in broken lines in Figure 2. The concurrent rotation of cams 28 and 58, through the connections described hereinabove, effects the movement of auxiliary looper 102 along the path A—C as described.

The manner in which main looper 79 and auxiliary looper 102 coact insures that at all times slack thread above the work will be controlled properly. The controlled tensioning of thread also results in a minimum of puckering in work stitched. This is of especial value in work which is being "pricked" stitched or angle stitched, such as described in my co-pending application S. N. 20,198, filed April 10, 1948. After the lower needle bar 152 has passed needle N upwardly through work W, the latter is fed past needle N by suitable work feeding means (not shown), which may be similar to that disclosed and described in my above referred to co-pending application. The amount of work fed past the needle can be so controlled that a very short length of thread is visible upon the surface of work W as the result of the next downward movement of needle bar 150, or in such a manner that substantially no thread appears on the exposed surface of work W. These results are obtained by the conjoint action of main looper 79 and auxiliary looper 102, due to the action of spring 114 which causes auxiliary looper 102 to resiliently tension loop portion L₂. In effect, the fibres of the work adjacent the angularly disposed portion of the thread in the work are com-

pressed somewhat so that needle N in moving downwardly through the work, can enter it substantially at the position where the needle last left the work as it travelled upwardly there-through, or closely adjacent thereto, depending upon the amount of work fed prior to the movement of the needle N downwardly in forming the next stitch.

The invention above described may be varied in construction within the scope of the claims, for the particular device, selected to illustrate the invention, is but one of many possible concrete embodiments of the same. It is not, therefore, to be restricted to the precise details of the structure shown and described.

What I claim is:

1. Looper mechanism for use in a sewing machine having alternately operated opposed needle bars for projecting a double pointed needle back and forth through work to be stitched, a looper mounted at one side of one of said needle bars, an auxiliary looper mounted at the other side of said needle bar, means for moving said loopers into engagement with loop portions of thread formed in said thread adjacent said needle bar and the needle, means for swinging said looper to displace one of said loops of thread clear of the path of travel of said needle, and mechanism for imparting compound movement to said auxiliary looper to move said loop of thread engaged thereby laterally out of the path of travel of said needle, said last named mechanism including interconnected actuating links and levers connected to said auxiliary looper, and positively actuated means for operating said links and levers to impart combined substantially vertical and substantially horizontal movements to said auxiliary looper during the downward movement of said one of said needle bars.

2. Looper mechanism for use with a sewing machine having a double pointed needle and upper and lower alternately operating opposed needle bars for projecting said needle and a thread having a loose and a fixed end back and forth through said work, a main looper, an auxiliary looper, means mounting said loopers for operation on opposite sides of said upper needle bar, mechanism for moving said main looper into engagement with a loop of thread including said loose end of said thread, and mechanism for imparting combined substantially vertical and horizontal movements to said auxiliary looper to move said auxiliary looper into engagement with a loop of thread included in said fixed end portion, said last named mechanism including, a support for said auxiliary looper, devices mounting said support for said combined substantially vertical and horizontal movements, and positively actuated means for operating said devices for moving said support downwardly and substantially horizontally concurrently with the movement of said upper needle bar to control the position of said thread engaged by said second looper relative to said upper needle bar and needle.

3. Looper mechanism for use with a sewing machine having a double pointed needle and upper and lower alternately operating opposed needle bars for projecting said needle and a thread having a loose and a fixed end back and forth through said work, a main looper, an auxiliary looper, means mounting said loopers for operation on opposite sides of said upper needle bar, mechanism for moving said main looper into a loop of thread forming a part of said loose end of said thread, mechanism for moving said aux-

iliary looper into engagement with a loop of thread forming a part of said fixed end of said thread, said last named mechanism including means for moving said auxiliary looper downwardly concurrently with the movement of said upper needle bar to control the position of said thread engaged by said auxiliary looper relative to said upper needle bar and needle, and means operative to release said thread from said auxiliary looper substantially simultaneously with the movement of said needle point into said work.

4. Looper mechanism for use with a sewing machine having a double pointed needle and upper and lower alternately operating opposed needle bars for projecting said needle and a thread having a loose and a fixed end back and forth through said work, a main looper, an auxiliary looper, means mounting said loopers for operation on opposite sides of said upper needle bar, mechanism for moving said main looper into a loop of thread forming a part of said loose end of said thread, mechanism for moving said auxiliary looper into engagement with a loop of thread forming a part of said fixed end of said thread, said last named mechanism including means for moving said auxiliary looper downwardly concurrently with the movement of said upper needle bar to control the position of said thread engaged by said auxiliary looper relative to said upper needle bar and needle, resilient means operatively associated with said auxiliary looper for maintaining the thread engaged thereby under tension, and means operative to release said thread from said auxiliary looper substantially simultaneously with the movement of said needle point into said work.

5. A looper device comprising a support, means for mounting said support for reciprocatory and oscillatory movements, a thread engaging and displacing member mounted on said support, a needle bar adapted to move a needle and thread into work to be sewed, a lever connected to said support for imparting vertical reciprocatory movement to said support, a second lever also connected to said support for imparting substantially horizontal oscillatory movement to said support, and actuating means for moving said levers in proper timed relationship to cause said member on said support to engage a loop of thread and travel in an irregular closed path of movement downwardly in timed relation with the movement of said needle to locate said thread of said loop of thread engaged thereby in a predetermined position away from said needle.

6. A looper device comprising a support, means for mounting said support for reciprocatory and oscillatory movements, a thread engaging and displacing member mounted on said support, a needle bar adapted to move a needle and thread into work to be sewed, an actuating lever connected to said support to cause said member to engage a loop of thread and travel downwardly in timed relation with the movement of said needle to locate said thread engaged thereby in a predetermined position away from said needle, a second actuating lever also connected to said support for imparting positive rearward movement to said member to release said thread substantially simultaneously with the movement of said needle into said work, and means for operating said levers to effect said movements of said support.

7. The method of controlling loop portions formed in a portion of a thread being projected back and forth through work to be stitched by

a needle in making a succession of over and under stitches comprising engaging a loop portion on one side of a needle when formed, pulling one of said loop portions to form slack, supporting said slack at a point away from said needle, engaging another loop portion on the opposite side of said needle, moving said last-named engaged loop portion outwardly, away from and clear of the point of said needle, maintaining said last-named loop portion engaged and tensioned, and positioning out of the path of travel of said needle, moving said needle downwardly toward said work, and when said needle is about to enter said work releasing said last-named thread portion.

8. The method of preventing a plurality of loop portions of thread from moving into the path of travel of the point of a needle advancing towards work to be stitched, comprising engaging one of said loop portions, engaging another of said loop portions, moving said engaged first-named loop portion away from said needle and pulling slack in said thread, moving said second-named engaged loop portion while holding said first-named loop portion downwardly towards said work and tensioning said first-named loop portion of thread so held, partially releasing said first-named loop portion, displacing said second-named loop portion away from said needle to take up slack released by the partial release of said first-named loop portion, and releasing said second-named loop portion when said needle point is about to enter said work.

9. A looper device comprising a support, a pivoted looper finger mounted on said support, a resilient member normally maintaining said looper finger in tensioned thread engaging relationship with thread engaged inter-connected link and lever held thereby, and mechanism connected to said support for imparting combined vertical and horizontal movement to said support, positively actuated means for operating said mechanism to move said looper finger downwardly and outwardly along said thread to displace said thread held thereby out of the path of movement of a needle.

10. In a looper device adapted to coact with a reciprocating needle bar and engage a loop of thread formed by the movement of said bar to project a needle and a thread through work to be stitched, a support, a looper provided with a thread engaging and tensioning finger pivotally mounted on said support, mechanism for moving said support to engage said finger with said loop of thread including means for imparting a substantially vertical movement to said looper to move said finger along said thread engaged thereby, mechanism for imparting a substantially horizontal component of movement to said looper to take up slack when said looper approaches the lowermost point of its travel, and means for operating said mechanism when said needle moves into said work to effect the release of said thread from said finger and return said looper to an inoperative position.

11. A looper device comprising a support, a looper mounted on said support, a shaft, a sleeve shaft position on said shaft, a lever provided with a cam follower mounted on said shaft, a lever provided with a cam follower mounted on said sleeve shaft, a cam adapted to be engaged by said first-named cam follower, a cam adapted to be engaged by said second-named cam follower, an operating connection between said lever on said shaft and said support, an operating

connection between said lever on said sleeve shaft and said support, shafts mounting each of said cams, and means for driving said shafts to cause said support and looper to engage a loop of thread and travel therewith in a closed unidirectional path.

12. In a sewing machine of the type having opposed, alternately moving upper and lower needle bars adapted to project a double pointed needle and a thread back and forth through work to be stitched, a main looper adapted to engage and support a portion of the thread above said work, an auxiliary looper adapted to engage and support another portion of said thread above said work, and mechanism for imparting separate movements to said loopers whereby the thread is maintained at all times during the operation of said machine out of the path of travel of said needle during the downward movement of said needle to said work, said mechanism including means for imparting a substantially vertical movement to said auxiliary looper to travel said auxiliary looper downwardly along said thread engaged thereby.

13. In a sewing machine of the type having opposed, alternately operated needle bars adapted to project a needle and a thread back and forth through work to be stitched, a shaft, a main looper mounted on said shaft, a sleeve shaft encircling said shaft, a support, an auxiliary looper carried by said support, driving mechanism for rocking said shafts to move said loopers into spaced looped portions of said thread above said work, and operating connections between said shaft and sleeve shaft and said support for imparting arcuate movement to said looper, and moving said auxiliary looper in a closed irregular path to support said portions of thread engaged by said loopers out of the path of travel of said needle.

14. The method of controlling the position of loops of thread formed on opposite sides of a needle to be moved into work comprising engaging and holding a portion of the thread at one side of the needle, engaging and holding another portion of the thread located at the op-

posite side of the needle, moving said thread while so engaged and held downwardly and out of the path of travel of the point of said needle, maintaining said thread constantly tensioned while said thread is thus held and substantially simultaneously with the movement of said needle into said work releasing one of said portions of said thread.

15. The method of controlling the positions of loops of thread formed at opposite sides of a needle threaded with a thread having a fixed and a loose end, and preventing said loops from moving into the path of the needle advancing toward work to be stitched comprising engaging and moving a loop formed in said thread between one side of said needle and the loose end of said thread outwardly and away from said needle and concurrently therewith pulling a portion of said loose end of said thread through said work to provide slack, holding said slack under tension supported at a point remote from said needle, engaging and moving a second loop of thread at the opposite side of said needle formed in that portion of said thread between said needle and fixed end of said thread outwardly away from said needle and tensioning said portion of thread included in said loop, releasing the tension on said slack thread at said first-named side of said needle as said needle moves to a point of entry into said work and substantially simultaneously therewith moving said second loop of thread at the other side of said needle further away from said needle to take up said slack, and substantially simultaneously with the entry of said needle into said work releasing said second loop of thread.

MATHIAS PEDERSEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,368,066	Johnson	Jan. 23, 1945
2,386,800	Johnson	Oct. 16, 1945

Certificate of Correction

Patent No. 2,565,320

August 21, 1951

MATHIAS PEDERSEN

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 8, lines 38 and 39, for "inter-connected link and lever held thereby, and" read *and held thereby, inter-connected link and lever*; line 68, for "position" read *positioned*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of October, A. D. 1951.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.