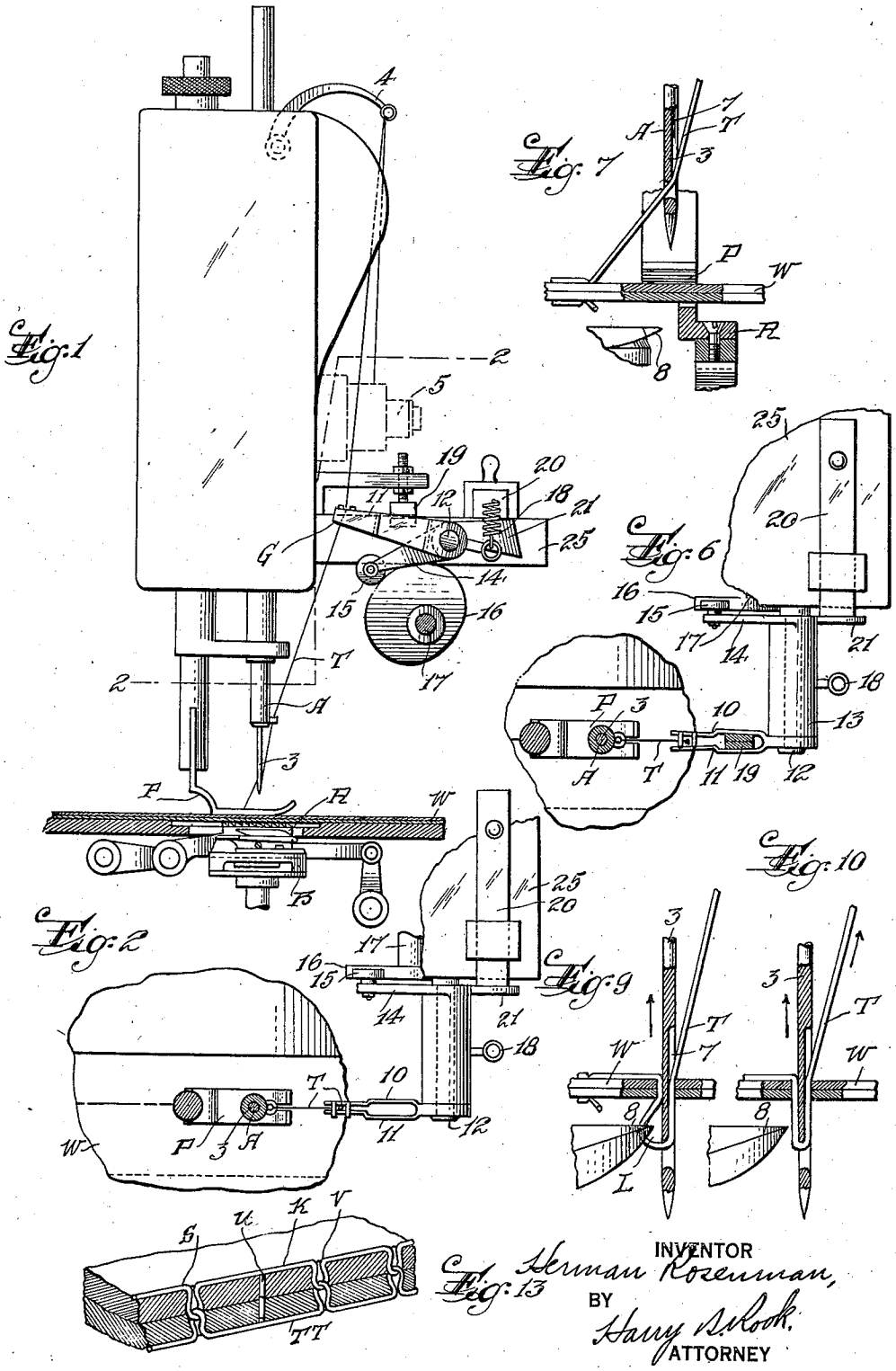
June 8, 1937. H. ROSENMAN 2,083,095

METHOD OF SKIPPING OR SLIPPING OF STITCHES WITH A SEWING MACHINE

Filed Feb. 19, 1935 3 Sheets-Sheet 1



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METHOD OF SKIPPING OR SLIPPING OF STITCHES WITH A SEWING MACHINE

Filed Feb. 19, 1935 3 Sheets-Sheet 2

Fig. 3

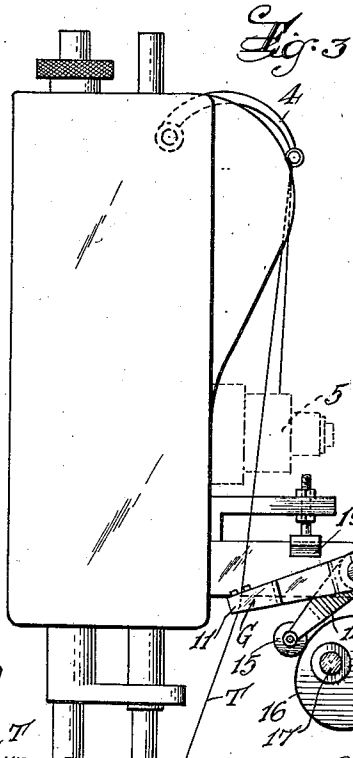


Fig. 5

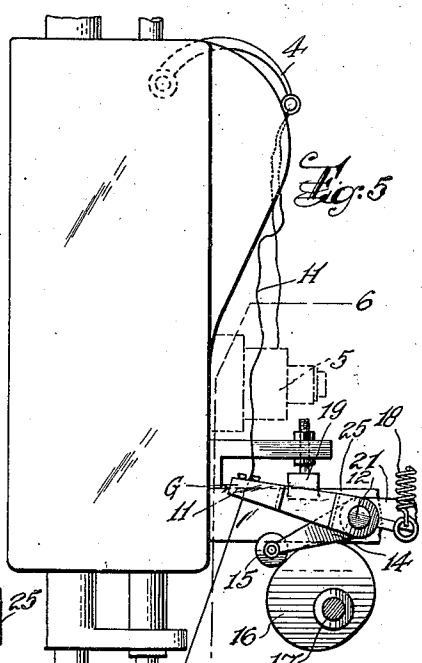


Fig. 8

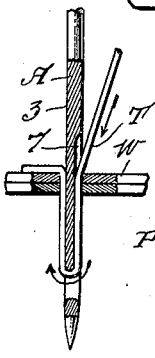


Fig. 4

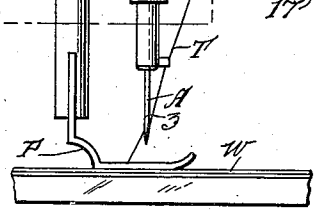
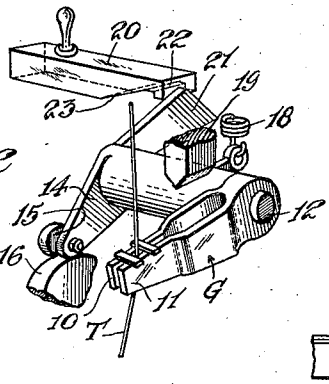


Fig. 12



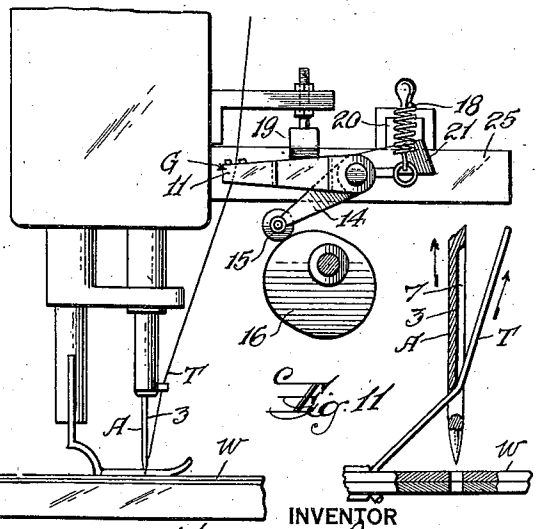


Fig. 11

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METHOD OF SKIPPING OR SLIPPING OF STITCHES WITH A SEWING MACHINE

Filed Feb. 19, 1935 3 Sheets-Sheet 3

Fig. 14

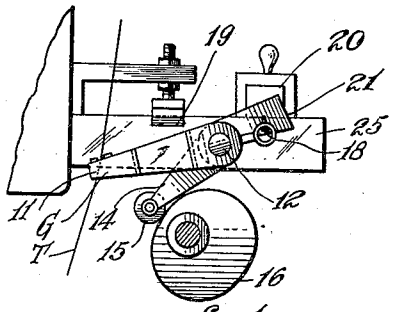


Fig. 15

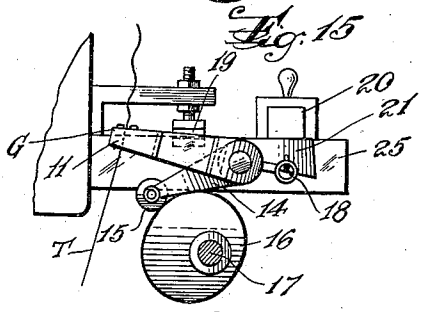


Fig. 16

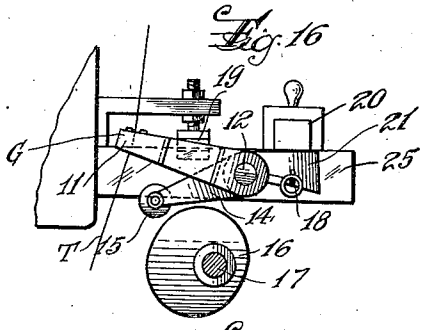


Fig. 17

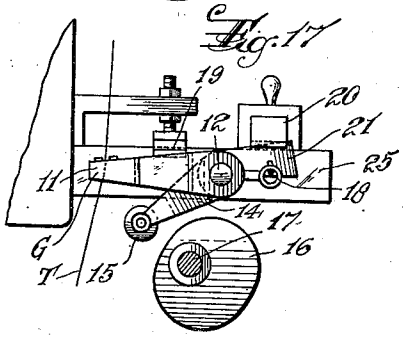


Fig. 18

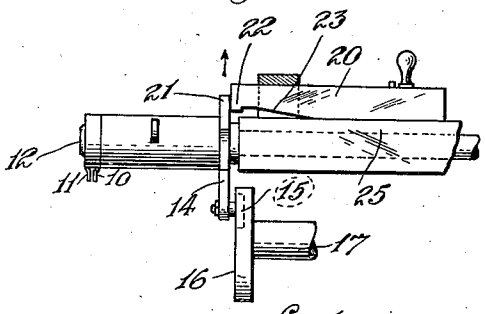


Fig. 19

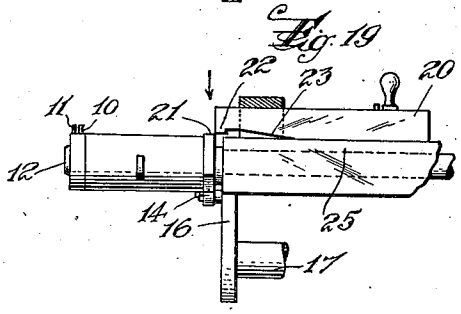


Fig. 20

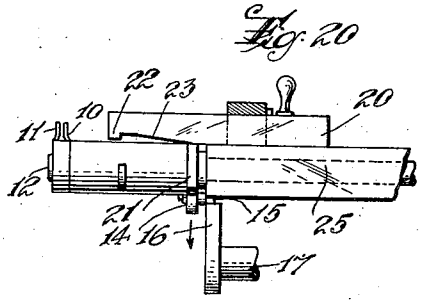
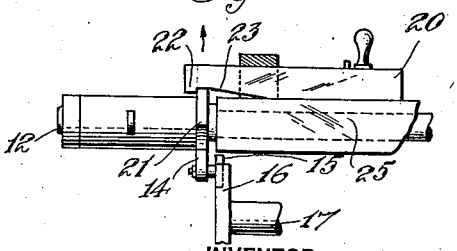


Fig. 21



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UNITED STATES PATENT OFFICE

2,083,095

METHOD OF SKIPPING OR SLIPPING OF STITCHES WITH A SEWING MACHINE

Herman Rosenman, Newark, N. J.

Application February 19, 1935, Serial No. 7,223

13 Claims. (Cl. 112—241)

This invention relates to a method for causing skipping or slipping of stitches in a line of stitches formed in work by a sewing machine, the method being especially useful in the manufacture of corsets and particularly for stitching the coverings for the stays.

The invention is also adaptable for use with two needle sewing machines to permit turning of corners either right or left, for example making two double rows of stitches at angles to each other, the invention making it possible to cause slipping of stitches by either needle during the turning operations. With known types of two needle machines, a corner may be turned in only one direction.

My invention contemplates a method wherein a needle forms a loop in the thread which is picked up by a loop taker and interlocked with another thread, for example, from a bobbin mechanism, for completing a stitch during normal operation of the machine, although the invention is susceptible to use with other types of sewing machines, including multiple needle machines.

It has been proposed to skip stitches in a line of stitches formed by a sewing machine, either by interrupting the reciprocation of the needle bar so that the needle is prevented from penetrating the work, or by throwing the needle bar out of cooperation with the loop taker of the bobbin mechanism, or by throwing the loop taker out of cooperating relation with the needle, so that the loop taker cannot pick up the loop which is formed by the needle during normal operation in making a stitch. All of these methods involve complex operations and require modification of the usual stitch forming mechanism for accomplishing the skipping of stitches, and furthermore in these machines no provision is made to take up or compensate for the surplus thread which results from the skipped stitches, so that the thread tangles.

The prime objects of my invention are to provide a novel and improved method for preventing formation of one or more stitches at will or at intervals by manipulation or control of the thread instead of modifying and manipulating the bobbin mechanism or the needle bar, whereby one or more stitches can be skipped simply and independently of the operation of the normal stitch forming mechanism of a sewing machine; and to provide such a method which can be used in connection with multiple needle machines to cause slipping of stitches by either or both needles. Especially the invention contemplates the pulling of the thread so as to prevent the formation of a loop in the thread and thereby prevent cooperation of the loop taker with the needle thread to prevent formation of a stitch or stitches.

In normal operation, the loop of course requires a predetermined quantity of thread, and the loop is formed normally during withdrawal of the needle from the work but before the needle is disengaged from the work. In accordance with my invention, tension is exerted on the needle thread during withdrawal of the needle from the work and at the same time a predetermined or measured quantity of thread which is necessarily present to permit formation of a loop to cooperate with the loop taker, is pulled out or withdrawn from the work in timed relation to the movement of the needle, so as to ensure that enough thread shall be withdrawn to prevent formation of the loop and at the same time the thread shall not be broken by excess tension.

The invention further contemplates a method whereby the thread may be controlled or withdrawn in a regular cycle in timed relation to the movement of the needle whereby the operation shall be simple and reliable and can be executed by simple mechanism that may be independent and have no effect upon operation of the stitch forming and work feed mechanism of a sewing machine. Accordingly, in my method when it is desired to slip a stitch, preferably control of the thread is started by gripping the thread above the eye of the needle while the needle is approximately at its uppermost position and preferably while the thread is taut between the point of gripping and the point of interlocking of the thread in the work on the last previously formed stitch. The grip is maintained substantially throughout the work penetrating and withdrawing movements of the needle, and normal movement of the thread is permitted except during a short period when the loop would be normally formed as the needle withdraws from the work; during this period the thread is pulled slightly faster than the normal movement of the thread to prevent formation of the loop. When it is desired to stop slipping of stitches and resume normal formation of stitches, the grip on the thread is released while the needle is approximately at the end of its movement away from the work. Accordingly, it is practically ensured that formation of a loop shall be prevented when it is desired to slip stitches, no breaking of the thread shall occur, and there shall be no mal-

adjustment or disarrangement of the thread to interfere with normal formation of stitches after slipping of stitches has been stopped.

Further objects of my invention are to provide a method of the character described wherein the surplus thread which is present due to the pulling out of the loop or skipping of a stitch or stitches by throwing the needle out of cooperating relation to the loop taker or vice versa, shall be moved above the needle independently of the normal stitch forming mechanism to prevent entanglement of the surplus thread with the needle and thereby avoid breaking of the thread during the formation of subsequent stitches; and to provide such a method wherein the thread shall be maintained under control at all times so that stitches may be formed or skipped as desired.

Other objects are to provide a method which is in effect auxiliary to or independent of the normal operation of the machine, whereby the method can be carried out by mechanism which can be simply attached to a known type of sewing machine for controlling the thread without any necessity for modification or change in the usual stitch forming mechanism, and to obtain other advantages and results as will be brought out by the following description.

Referring to the accompanying drawings in which corresponding and like parts are designated by the same reference characters throughout the several views,

Figure 1 is an end elevation of a known type of sewing machine, fragmentarily illustrated and delineating the first step in the method, portions of the bed of the machine being broken away and shown in section for clearness in illustration.

Figure 2 is a horizontal sectional view on the line 2—2 of Figure 1.

Figure 3 is a view similar to Figure 1 illustrating the second step in the method.

Figure 4 is a like view illustrating the next step.

Figure 5 is a similar view illustrating the last step in the method of skipping one stitch.

Figure 6 is a horizontal sectional view on the line 6—6 of Figure 5.

Figure 7 is an enlarged transverse sectional view through a portion of the needle and work illustrating the position of the needle at the beginning of the formation of a stitch, as shown in Figure 1.

Figure 8 is a similar view showing the needle at the limit of its penetration of the work and just prior to the beginning of the formation of the thread loop.

Figure 9 is a similar view showing the rising of the needle and the normal formation of a loop in the needle thread.

Figure 10 is a similar view showing the rising of the needle and the pulling of the thread according to the method to prevent the formation of a loop.

Figure 11 is a like view showing the thread completely pulled from the work.

Figure 12 is a detached fragmentary perspective view schematically illustrating mechanism for carrying out the method.

Figure 13 is an enlarged longitudinal sectional view through work having a line of stitches therein and illustrating a skipped stitch.

Figures 14, 15, 16 and 17 are fragmentary schematic side views of the thread pulling mechanism showing the various relations of the parts for ensuring gripping and releasing of the thread by the gripper when the needle is at approximately its uppermost position and disconnecting the thread gripper from the operating cam during normal stitch forming operation of the sewing machine, and

Figures 18, 19, 20 and 21 are front elevations of the thread pulling mechanism as illustrated in the respective views of Figures 14 to 17 inclusive.

For the purpose of illustrating the principles of my invention I have shown it schematically in connection with a known type of sewing machine which includes the usual frame having the usual stitch forming mechanism including a needle bar A reciprocable therein by known mechanism (not shown). The needle bar carries the usual needle **3**, and the machine also includes a take-up lever **4** which is utilized for supplying and taking up the thread in cooperation with the loop taker. The needle has the usual eye and the longitudinal groove **7** at one side in which the thread is seated as the needle penetrates and is removed from the work which is designated W.

The machine also includes suitable known work feed mechanism which includes the reciprocating feed dog R for advancing the work beneath the needle in steps each equal to the length of one stitch, and a presser foot P of known structure is included to hold the work against the feed dog. For the sake of simplicity these parts are only schematically and fragmentarily illustrated.

Cooperating with the needle bar is the bobbin mechanism B of known type which includes a loop taker hook **8** to pick up the loop formed in the needle thread during the normal operation of the machine in the formation of a stitch.

As usual, the thread T is threaded from a supply spool or the like through the tension device **5**, the eye of the take-up lever **4** and the eye of the needle, and during normal operation of the machine, the needle reciprocates and on its descent penetrates the work to carry the thread through the work as shown in Figure 8 of the drawings. As the needle rises, normally the thread at one side of the needle frictionally engages the work while the thread at the other side of the needle is in the groove **7**, so that as the needle rises a loop L in the thread is formed below the work, as shown in Figure 9, and this loop is picked up by the loop taker 8, carried around and interlocked with the bobbin thread to form a stitch S indicated in Figure 13. After the needle leaves the work, the work feed mechanism R moves the work forwardly a distance equal to the length of one stitch, preparatory to the next work penetrating movement of the needle for the next stitch. When the needle is in its uppermost position, the thread between the take up lever and the point in the work where the threads are interlocked to form the last previously formed stitch, is substantially taut, and there is sufficient thread present to form a loop for the next stitch.

As above indicated, when it is desired to slip a stitch, I propose to manipulate or control the thread T so as to prevent the formation of the loop L; and when it is desired to slip a stitch, control of the thread is preferably started while the needle is in approximately its uppermost position, while when it is desired to resume formation of normal stitches after one or more stitches have been slipped, control of the thread is released while the needle is in approximately its uppermost position.

For the purpose of schematically illustrating

the method, the pulling mechanism for the thread is shown as including a gripper G which includes two gripping jaws 10 and 11 normally influenced toward each other from opposite sides of the thread by their inherent resiliency to frictionally grip the thread as shown in Figure 2. These jaws are connected together at one end and mounted for oscillation in a vertical plane about a shaft 12 which may be mounted in suitable brackets not shown. As illustrated, the arms have connected thereto a sleeve 13 which also has an arm 14 that carries a roller 15 which follows a cam 16 journaled on a stub shaft 17. The roller 15 is caused to follow the cam by a tension spring 18. The cam 16 is rotated in timed relation to the needle bar A so as to oscillate the gripper G through regular cycles and through a path of predetermined length. As shown, the cam makes one complete revolution for each stitch.

The cam 16 is so shaped and timed that the thread gripper G is located at its uppermost position as shown in Figure 1 when the needle reaches its uppermost position and the gripper is swung downwardly approximately synchronously with the movement of the thread T by the needle so that the gripper is in its lowermost position when the needle reaches its lowermost work penetrating position. As the needle rises the cam 16 actuates the gripper upwardly into position as shown in Figures 1 and 5. During the withdrawal of the needle from the work, the gripper pulls out an amount of thread that is present for forming a loop so as to prevent formation of a loop, as shown in Figure 10. During the movement of the needle to the point which locates the thread above the loop taker, the movement of the gripper is in advance of the movement of the needle to ensure pulling out of the thread that is present for normal formation of the loop; and during the remainder of the upward movement of the needle the gripper preferably moves at a speed to maintain the thread beneath the gripper substantially taut.

When the gripper is in its approximately upper position the gripping jaws are separated so as to release the thread as shown in Figure 6, by a wedge 19 which may be mounted on a suitable fixed support such as the sewing machine, the upward movement of the gripper under the influence of the cam forcing the jaws 10 and 11 over the wedge so that the latter are spread apart; and when the cam 16 permits the gripper to move downwardly under the influence of the spring 18 the jaws are slipped off the wedge and moved together under their inherent resiliency to grip the thread as shown in Figure 2.

To ensure that the gripper shall grip the thread only when the needle is at approximately its uppermost position and while the thread is substantially taut with a predetermined quantity of thread between the gripper and the point of interlock of the threads in the last previously formed stitch, I have shown a control device which includes a slide bar 20 mounted on a suitable fixed support 25 to cooperate with an extension 21 on the sleeve 13. The slide bar 20 moves transversely of the extension 21 and has a lug 22 at its extremity and an inclined or wedging surface 23 adjacent said lug. When the gripper has been moved to its upper position by the cam 16 as shown in Figure 15, the slide 20 may be pushed over the extension 21 as shown in Figure 19, and upon continuation of this movement of the slide the wedge or inclined portion 23 will engage the extension to swing the gripper further upwardly to clear the follower roller 15 from the cam as shown in Figures 16 and 20, and thereby completely disconnect the gripper from the driving mechanism. Therefore, it will be observed that with the parts in the positions shown in Figures 16 and 20 the gripper cannot operate, and in order to permit operation of the gripper the slide 20 must be disengaged from the extension 21 as shown in Figure 19. Due to the lug 22, operation of the gripper cannot be started until it reaches its upper position, because as shown in Figures 17 and 21 any attempt to disengage the slide 20 from the extension 21 while the gripper is below its uppermost position, is prevented by engagement of the lug 22 with the extension.

It will also be observed that when the gripper is in its intermediate or lower positions as shown in Figures 14 and 18, the slide bar cannot be slid over the extension 21, and therefore the operation of the gripper cannot be stopped until the gripper has reached its uppermost position shown in Figure 19.

From the foregoing it will appear that while the gripper is out of operation it is always located at its uppermost position as shown in Figures 1 and 20, and when it is desired to skip a stitch the control slide 20 must be disengaged from the extension 21 of the gripper as shown in Figure 19. This permits the roller 15 to engage the cam 16, and due to the timed relation of the cam 16 to the reciprocation of the needle bar A, when the needle bar is in approximately its uppermost position, the cam will permit the gripper to move downwardly under the influence of the spring 18 to grip the thread as shown in Figures 1 and 2. Thereupon the gripper is swung downwardly with the jaws continuing their grip on the thread to their lowermost position shown in Figure 3. The grip of the jaws on the thread is continued as the jaws move upwardly through the positions shown in Figure 4 to the position of Figure 5, whereupon the jaws are moved apart to release the thread by engagement of the jaws with the wedge 19. During the movement of the jaws upwardly the thread is pulled out as shown in Figure 10 to prevent the formation of the normal loop illustrated in Figure 9, and the surplus thread that is present as the result of skipping of the stitch is moved above the needle by the clamping jaws, this thread being generally indicated at H in Figure 5. This prevents entanglement or wrapping of the thread around the needle so that breaking of the thread during formation of subsequent stitches is obviated.

It will be understood that during the pulling of the thread the work feed R will have moved the work forwardly in the normal way a distance equal to the length of one stitch and the needle will have penetrated the work so as to leave a hole U in the work as shown in Figure 13. Preferably the jaws will be released from the thread slightly before they reach their uppermost position of Figure 5 and will be held released from the thread by the wedge 19 a sufficient time to permit the take up lever 4 to adjust the thread for the next stitch. If another stitch is to be skipped or slipped the slide 20 will be left in the position shown in Figure 19 and the operation of the gripper is repeated, while if the normal line of stitches is to be continued with complete stitches, the slide 20 will be operated to the position shown in Figure 20 to stop operation of

the gripper, and the jaws will remain disengaged from the thread.

It will be observed that the thread is maintained substantially taut between the needle and the gripper throughout the reciprocation of the needle from the beginning of its descent as shown in Figure 7 to its lowermost work penetrating position shown in Figure 8, and then through its upward movement shown in Figures 10 and 11 back to its uppermost position; and due to the constant grip on the thread during the movement of the gripper there is ensured the exact and measured amount of thread between the point of gripping and the interlock of the thread in the last previously formed stitch, by reason of which formation of the loop may be positively prevented and breaking of the thread is obviated. Preferably the grip by the jaws on the thread is frictionally yielding so that the thread may be pulled through the jaws to compensate for irregularities or variations in the normal feed of the thread to the needle.

The method makes it possible to utilize simple mechanism operable in regular cycles. Moreover, the method makes it possible to use mechanism which is substantially independent of the operation of the stitch forming mechanism of the machine.

In Figure 13 I have shown complete stitches S and a skipped or slipped stitch K to show what is meant by a slipped or skipped stitch. It will be noted that between the two stitches S and V the needle thread T and bobbin thread TT have not been interlocked as they are at S when the stitches are formed.

Where the invention is to be used with the multiple needle sewing machine wherein the needles are simultaneously operable, one thread pulling mechanism may be utilized for controlling both needle threads and each thread will be adjusted so as to be gripped or not to be gripped by the jaws 10 and 11 selectively as desired, whereby all or any needles may be caused to slip a stitch or stitches when desired, for example in turning corners on the work or forming a plurality of sets of multiple rows of stitches at angles to each other.

Another advantage of my method is that it can be used with a multiple needle machine wherein the work is fed by the needle and work feed dog conjointly while the needles are in the work, which makes possible the turning of corners, as above described, when stitching heavy or thick work. Known multiple needle machines by which corners can be turned in one direction, are limited to light or relatively thin work because the work is fed while the needles are out of the work and the feed is too weak for heavy work.

My method of compensating or taking up the surplus thread that is present as the result of slipping of stitches may of course be utilized where the stitches are slipped in other ways than by preventing formation of the loop, for example where a needle is thrown out of cooperating relation to the loop taker or vice versa.

It should be understood that the apparatus shown is schematic and shown simply for the purpose of illustrating the method and that the method may be carried out with many different forms of apparatus. Moreover, the exact steps of the method may be somewhat modified by those skilled in the art without departing from the spirit or scope of the invention, the main feature of the method being the control of the thread to prevent formation of a stitch, and particularly the pulling of the thread to prevent the formation of a loop by the needle; and another feature is the maintaining of the thread under control after the loop has been pulled out or the stitch has been otherwise slipped to prevent entanglement around the needle of the surplus thread resulting from the skipping of stitches.

Having thus described my invention, what I claim is:

1. The method of slipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in positively gripping and manipulating the thread to prevent engagement of said loop taker with said thread, and moving above the needle the surplus thread present as the result of the slipped stitches to prevent entanglement of the thread around the needle.

2. The method of slipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in positively gripping and pulling out as the needle rises the thread that is present for forming a loop to prevent formation of a loop, and moving above the needle the surplus thread present as the result of the slipped stitches to prevent entanglement of the thread with the needle.

3. The method of slipping one or more stitches in a line of stitches formed with a sewing machine wherein a reciprocating needle normally forms a loop in the making of a stitch, consisting in gripping the thread as the needle descends and moving the point of gripping synchronously with the thread during descent of the needle, then exerting tension on the thread as the needle rises approximately synchronously with the movement of the thread by the needle to pull out the thread that is present for forming a loop and prevent formation of a loop.

4. The method of slipping one or more stitches in a line of stitches formed with a sewing machine wherein a reciprocating needle normally forms a loop in the making of a stitch, consisting in gripping the thread as the needle descends and moving the point of gripping synchronously with the thread during descent of the needle, then exerting tension on the thread as the needle rises approximately synchronously with the movement of the thread by the needle to pull out the thread that is present for forming a loop and prevent formation of a loop, and maintaining the thread substantially taut between said needle and the gripping point as the needle rises to prevent entanglement with the needle of the surplus thread that is present as the result of the slipped stitches.

5. The method of slipping one or more stitches in a line of stitches formed with a sewing machine wherein a reciprocating needle normally forms a loop in the making of a stitch, consisting in gripping the thread as the needle descends and moving the point of gripping synchronously with the thread during descent of the needle, then exerting tension on the thread as the needle rises approximately synchronously with the movement of the thread by the needle to pull out the thread that is present for forming a loop and prevent formation of a loop, and moving above the needle the surplus thread that is present as the result

of the slipped stitches to prevent entanglement of the thread around the needle.

6. The method of skipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in preventing engagement of the loop taker with the needle thread to prevent formation of a stitch, and positively gripping and moving above the needle the surplus thread which is present as a result of the skipped stitches to prevent entanglement of the thread with the needle.

7. The method of slipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in controlling the thread while the needle is rising from the work to prevent formation of a loop to slip a stitch, and releasing said control while the needle is in approximately its uppermost position to thereafter permit formation of stitches.

8. The method of slipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in frictionally gripping the thread while the needle is in approximately its uppermost position and thereafter manipulating the thread while so gripped and at the point of gripping to prevent formation of a loop and slip stitches.

9. The method of stitching consisting in the steps of forcing a thread through the work, forming a loop in the thread at one side of the work and interlocking another thread through said loop, and moving the work intermittently, all of said steps being in timed relation to each other to normally form a line of stitches, and at intervals gripping the first-mentioned thread before it is forced through the work, continuing the grip but permitting normal movement of the thread through the work, exerting tension on the thread while it is in the work to prevent formation of the normal loop, and releasing said grip after said first-mentioned thread has been removed from the work, whereby to slip a stitch.

10. The method of stitching consisting in the steps of forcing a thread through the work, forming a loop in the thread at one side of the work and interlocking another thread through said loop, and moving the work intermittently, all of said steps being in timed relation to each other to normally form a line of stitches, and at intervals gripping the first-mentioned thread before it is forced through the work, continuing the grip but permitting normal movement of the thread through the work, exerting tension on the thread while it is in the work to prevent formation of the normal loop, and maintaining said grip and pulling said first thread from the work so as to hold the thread substantially taut between the point of gripping and the point of interlocking of the two threads in the last preceding stitch, whereby to slip a stitch and prevent entanglement of the thread.

11. The method of slipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in positively gripping the thread above the needle and manipulating the thread to pull out said loop and prevent engagement of said loop taker with said thread, and maintaining the grip upon the thread and pulling the thread substantially taut between the gripping point and the point of interlocking of the thread in the work, to prevent entanglement of the thread around the needle.

12. The method of skipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in preventing engagement of the loop taker with the needle thread to prevent formation of a stitch and positively gripping the thread above the needle and pulling the thread substantially taut between the gripping point and the point of interlocking of the thread in the work to prevent entanglement of the thread around the needle.

13. The method of slipping one or more stitches in a line of stitches formed in work with a sewing machine wherein a thread loop is formed by a reciprocating needle and engaged by a loop taker during normal operation of the machine in making a stitch, consisting in frictionally gripping the thread while the thread is substantially taut above the needle and with a predetermined length of taut thread between the point of gripping and the point of interlock of the thread in the work including the amount necessary normally to form a loop and then manipulating the thread while it is so gripped and at the point of gripping to prevent formation of a loop and slip a stitch.

HERMAN ROSENMAN.