July 25, 1939. T. H. DE SPAIN 2,167,104

SEWING MECHANISM

Filed Dec. 9, 1938 5 Sheets-Sheet 1

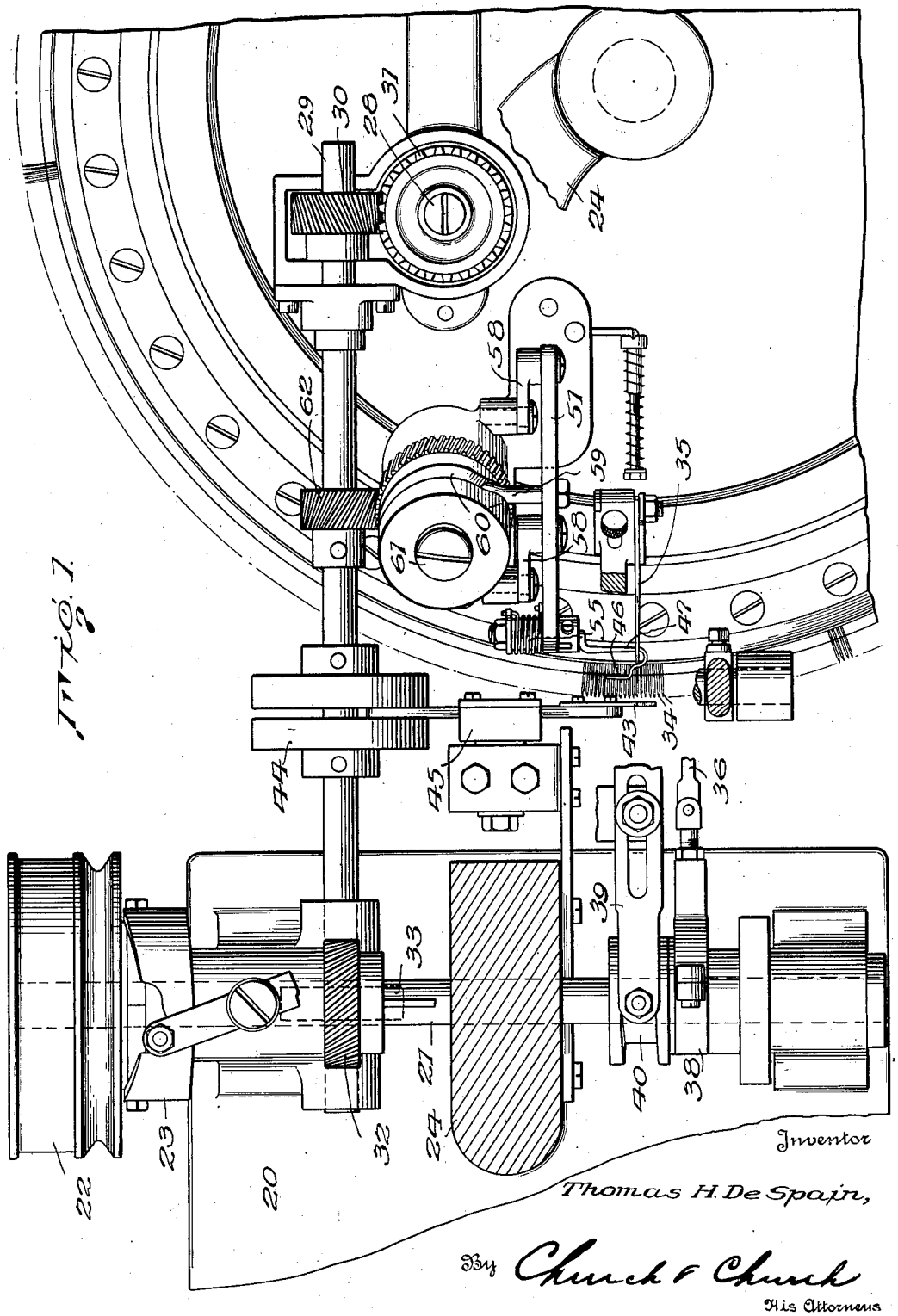


Fig. 1.

Inventor

Thomas H. De Spain,

By Church & Church

His Attorneys

July 25, 1939. T. H. DE SPAIN 2,167,104

SEWING MECHANISM

Filed Dec. 9, 1938 5 Sheets-Sheet 2

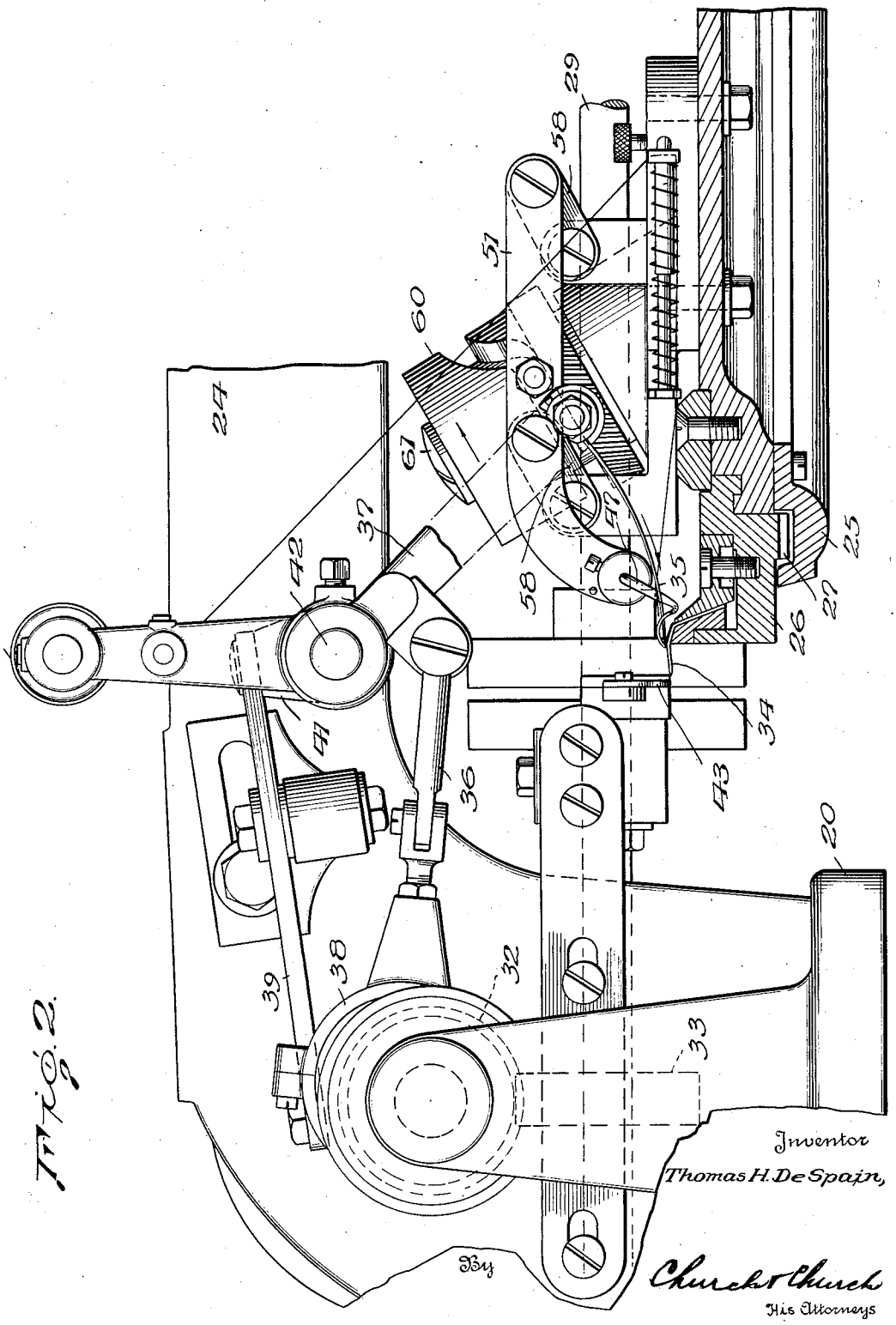


Fig. 2.

Inventor
Thomas H. De Spain,

By Church & Church
His Attorneys

July 25, 1939. T. H. DE SPAIN 2,167,104

SEWING MECHANISM

Filed Dec. 9, 1938 5 Sheets-Sheet 3

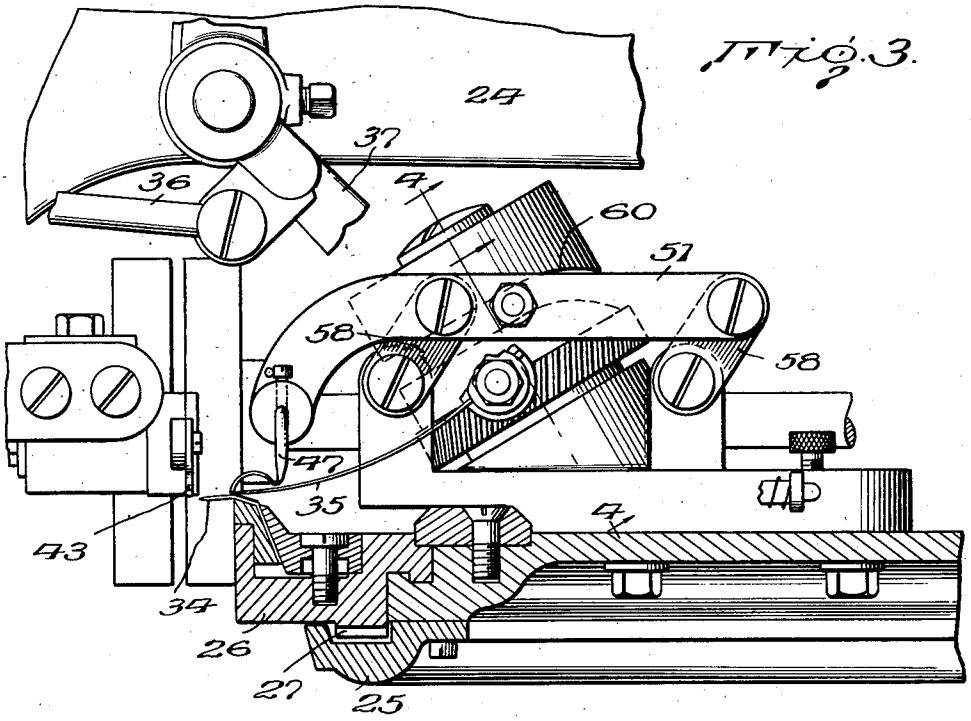


FIG. 3.

FIG. 4.

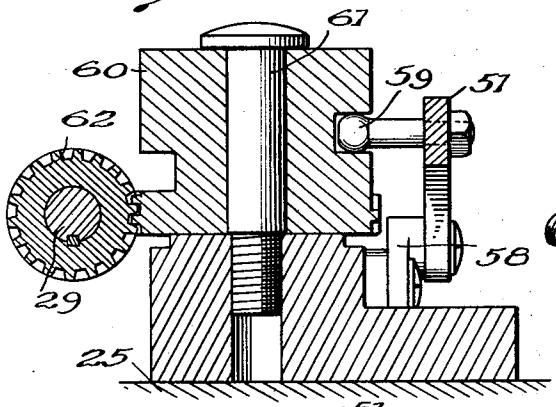
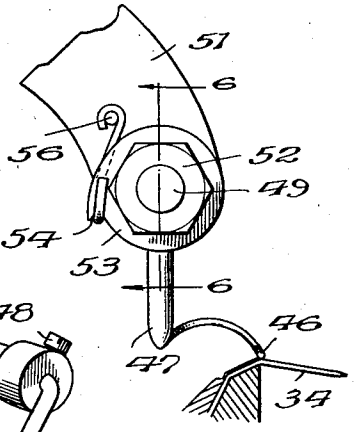


FIG. 5.



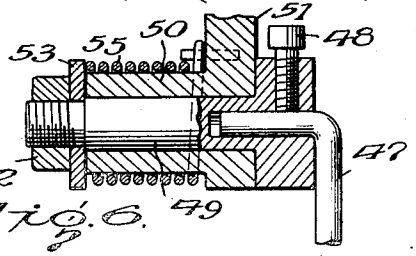


FIG. 6.



FIG. 7.

Inventor

Thomas H. De Spain,

By Church & Church

His Attorneys

July 25, 1939. T. H. DE SPAIN 2,167,104

SEWING MECHANISM

Filed Dec. 9, 1938 5 Sheets-Sheet 4

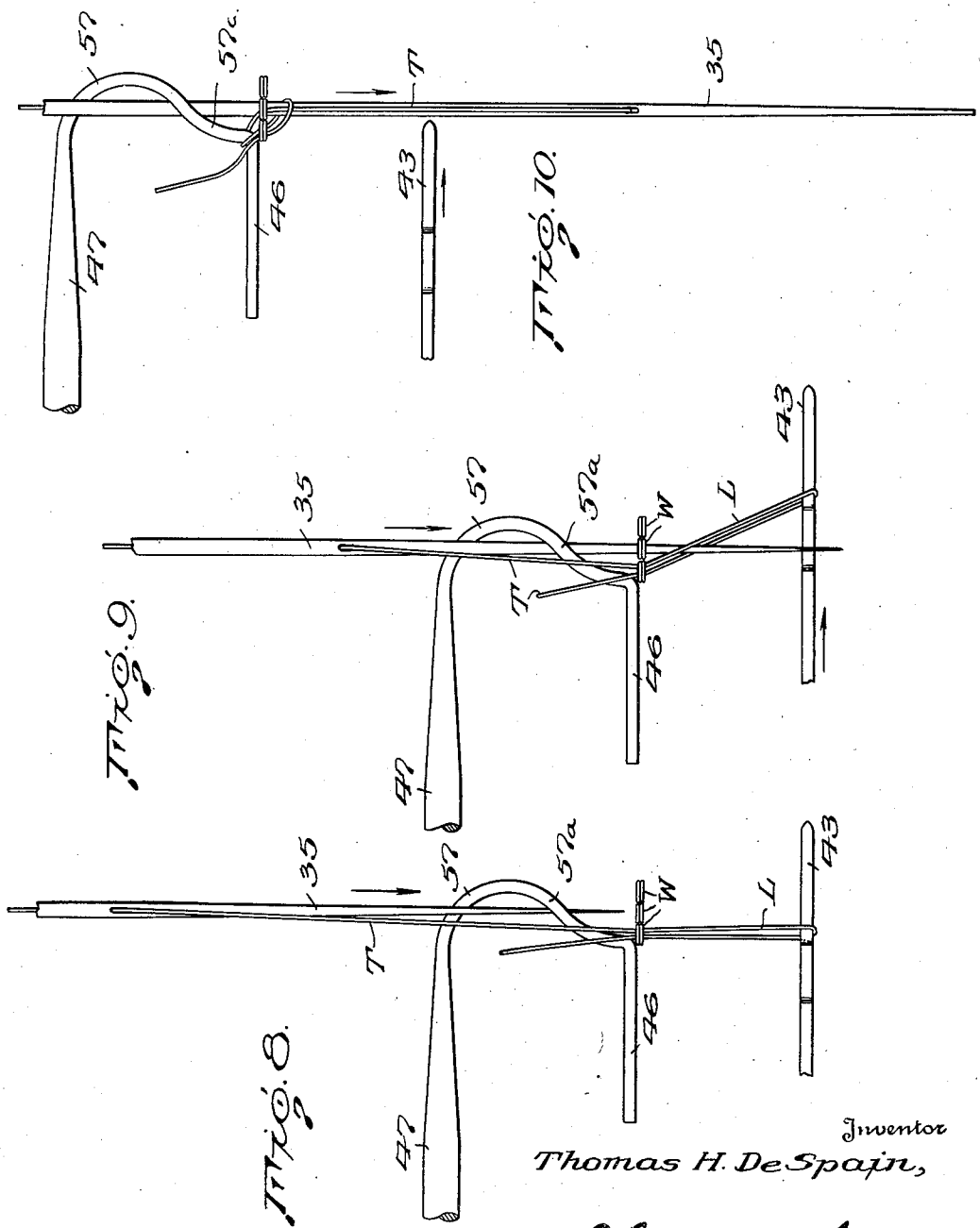


Fig. 10.

Fig. 9.

Fig. 8.

Inventor
Thomas H. DeSpain,
By Church & Church
His Attorney

July 25, 1939. T. H. DE SPAIN 2,167,104

SEWING MECHANISM

Filed Dec. 9, 1938 5 Sheets-Sheet 5

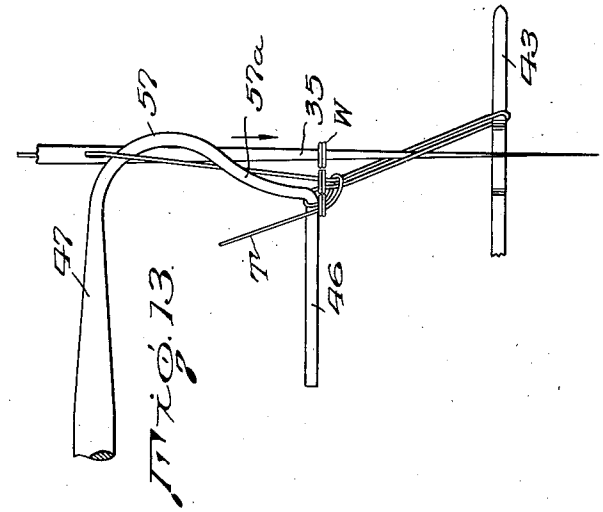


Fig. 13.

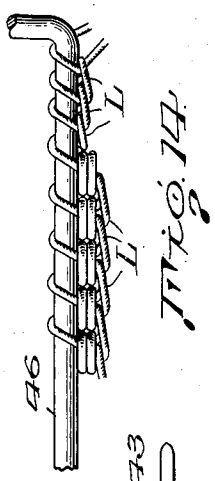


Fig. 14.

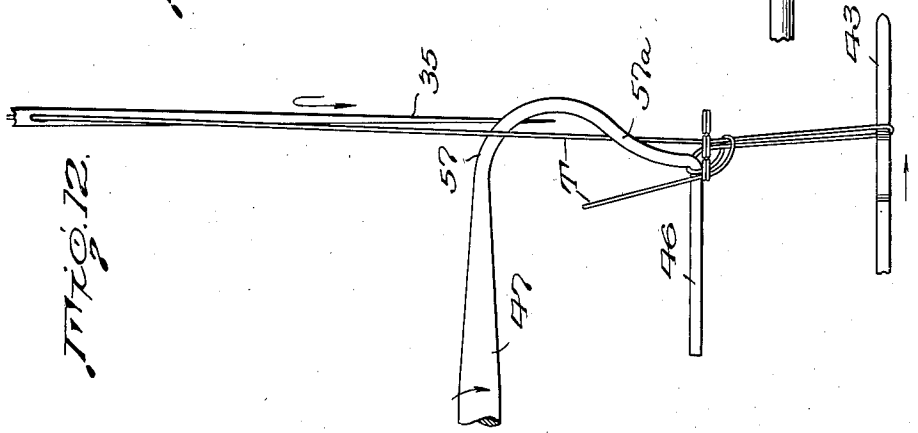


Fig. 12.

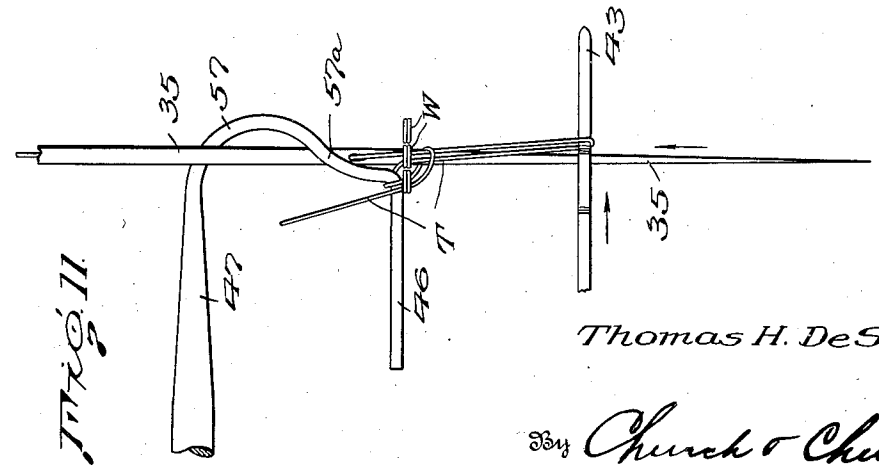


Fig. 11.

Inventor

Thomas H. DeSpain,

By Church & Church

His Attorneys

Patented July 25, 1939

2,167,104

UNITED STATES PATENT OFFICE

2,167,104

SEWING MECHANISM

Thomas H. De Spain, Paducah, Ky., assignor to Southern Textile Machinery Company, Paducah, Ky., a corporation of Kentucky

Application December 9, 1938, Serial No. 244,844

15 Claims. (Cl. 112—25)

This invention relates to improvements in sewing mechanisms and, particularly, to a chain-stitch attachment for such mechanisms.

While the invention is not limited to any particular type of machine, the present attachment has been especially designed for use on that type of machine known as a dial looper. As is well known, this type of sewing machine comprises a series of work-supporting elements, commonly called points, on which the loops of the work to be united are impaled and advanced past the sewing mechanism, usually comprising a reciprocatory thread needle and a looper. The work-supporting points are in dial formation so that they constitute an endless series and, in use, pieces of work are successively placed on the work points and, to prevent fouling of the thread after one piece of work has passed the sewing mechanism and before the next piece of work has reached the sewing mechanism, it is necessary that there be provided means for continuing the normal formation of stitches. In other words, it is necessary that a chain of stitches be formed between each two successive pieces of work operated upon. Hence, the term "chaining-off".

The primary object of the present invention is to provide an improved, but simplified, chaining-off device or chain-stitch mechanism.

Another object of the invention is to provide a chain-stitch mechanism which will remain operative at all times during the operation of the machine and will produce a limited slackness or looseness in the thread in the seam of pieces of work united. In other words, instead of the chain-stitch mechanism functioning in conjunction with the sewing mechanism only in the absence of work at the point to form a free chain of stitches, the present chaining-off device is so arranged as to continually cooperate with the sewing mechanism for forming a small loop in the thread of each stitch during the actual sewing operation, so that after the work is removed from the machine, these loops formed in the thread in the seam will result in a certain amount of looseness in the seam.

More specifically, the invention contemplates a chaining-off attachment comprising a chain-stitch finger so positioned with respect to the work-supporting points that it will lie close to the loops of work on said points at one side thereof and the thread needle, when being advanced through the loops of the work, will pass first on one side of the finger and then on the other, so that the thread carried by the needle is looped around the finger. As the work progresses by the advancing movement of the work points, the loops so formed around the finger at the side of the seam slip off of the finger and, when thus freed, the additional thread required in forming these loops results in a comparatively loose seam.

With these and other objects in view, the invention consists in certain details of construction and combinations and arrangements of parts, all as will hereinafter be more fully described, and the novel features thereof particularly pointed out in the appended claims.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in conjunction with a so-called dial looper machine, in which drawings—

Figure 1 is a top plan view of the supporting stand and dial of a dial looper, the overhanging bracket arm for the dial being shown in cross-section;

Fig. 2 is a side elevational view, with the dial in cross-section;

Fig. 3 is a view similar to Fig. 2, but illustrating a second position of the chaining-off attachment;

Fig. 4 is a sectional view on the line 4—4 of Fig. 3;

Fig. 5 is an end view of the stitch finger and the end portion of the support therefor;

Fig. 6 is a sectional view on the line 6—6 of Fig. 5;

Fig. 7 is a perspective view of the stitch finger;

Figs. 8 to 13, both inclusive, illustrate successive positions of the needle, looper and stitch finger in forming the stitches; and

Fig. 14 is a top plan view, on an enlarged scale, illustrating the stitch finger in conjunction with a short section of work that has been stitched and several chain-stitches which have been formed on the finger.

As indicated, a so-called dial looper sewing machine has been adopted for purposes of illustrating the present invention. A machine of this type is more fully illustrated and described in applicant's United States Letters Patent No. 2,050,563, dated August 11, 1936, and, as the present invention is not concerned with the specific construction of machines of this type, a detailed description of the same is unnecessary here. Suffice it to say, the machine comprises a base 20 formed with suitable bearings for a main drive shaft 21 to which power is supplied from a suitable source by means of a pulley 22 under the control of a clutch mechanism 23. The base has a rigid overhanging arm 24 and supported from said arm is a guard 25 on the usual bed plate in which is rotatably supported a sec-

tional ring member 26 formed on its under face with a ring gear 27. Meshing with this ring gear is a gear (not shown), driven from a shaft 28 which, in turn, is driven by a shaft 29 through gears 30, 31. Shaft 29 is driven from main shaft 21 by gears 32, 33.

Clamped in the ring 26 is the circular series of work-supporting pins or points 34 and, in the present type of machine, these points will be successively and continuously rotated and advanced past the thread needle 35, which is adapted to be reciprocated lengthwise of the work points by link 36 connected to the needle arm 37 and to an eccentric 38 on the shaft 21. A lateral or step-over movement of the needle, which is necessary by reason of the continuous rotation of the work points, is effected by a lever 39 provided at one end with a cam roller running in a cam-way 40 on shaft 21 and pivotally attached at its opposite end to an extension 41 of the needle arm whereby the latter can be shifted back and forth on the shaft 42 on which said needle arm is pivoted.

Each time the needle 35 is advanced, a loop is formed in the thread by the looper 43, and this loop is retained on the looper during the retraction of the needle and until the next succeeding advance movement thereof, at which time the needle on the succeeding stroke passes through the previously formed loop and removes the latter from the looper so that, when the needle is again retracted, complete withdrawal of the thread through the work is prevented, and the stitch formed. As is understood, however, during this second retractive movement of the needle, the looper again picks off another loop which is retained thereon pending the next advance of the needle. The movements required of the looper in performing these operations are imparted thereto by cams 44 on the shaft 29, the looper being reciprocable in its support 45 to permit it to partake of these required movements. This operation will be clarified by reference to Figs. 8 to 13, wherein the loop L, previously formed in the thread T, is held on the looper 43, as shown in Fig. 8. In Fig. 9, the needle has been projected through the loop, the looper having moved somewhat to the right to position the loop in the path of the needle. Fig. 10 illustrates the position of the looper after it has been withdrawn to free the previously held loop and is again being advanced to pick up the next loop before the needle is retracted. Fig. 11 shows the needle partially retracted and the newly formed loop on the looper; Fig. 12 shows the looper moving to the right to again position the loop in the path of the needle which has been fully retracted and is again being advanced; and Fig. 13 shows the needle partially projected through the last loop formed on the looper.

Under normal conditions, i. e., when there are work loops on the work points, there is no danger of the thread fouling, but when there are no work loops on the work points, as is the case between two successive pieces of work on the dial, it is necessary that means be provided for permitting the continuance of the formation of stitches until the second piece of work is presented to the sewing mechanism. These stitches, which are formed between two pieces of work or at the end of each piece of work, are referred to as chain-stitches and, in the present instance, their formation is facilitated by the provision of a chain-stitch finger 46 disposed over the work points adjacent the path traversed by the work loops as the latter are advanced by the rotating dial. The stitch finger proper rests on the upper surface of the work points and, for purposes which will presently appear, said finger is formed with an off-set lateral extension which merges into a shank portion 47 adjustably secured by a screw 48 in a pivot pin 49 rotatable in the sleeve-like portion 50 of an arm 51. Clamped against a shoulder on the pivot pin 49 by a nut 52 is a washer 53 formed with a shoulder 54. To yieldingly urge the stitch finger 46 downwardly against the work points, there is a spring 55 coiled around the sleeve 50, with one end of the spring engaging around the shoulder 54 on washer 53, and the other end of the spring engaging around a pin 56 on arm 51.

For the purpose of forming a loop of thread around the stitch finger 46, the thread needle is adapted to alternately pass on opposite sides of the finger during each two successive movements of said needle in the same direction. In other words, in the present instance, when the needle is advanced toward the looper, it will pass under the stitch finger on one advance stroke and over the stitch finger on the next succeeding advance stroke. To accomplish this result, the lateral extension of the stitch finger is off-set from the horizontal plane of the stitch finger and is formed of reversely bent portions 57, 57a. Preferably, this lateral off-set is merely arched upwardly, as best seen in Figs. 5 and 7, and is reversely bent by being curved, as clearly illustrated in Figs. 8 to 13. Also, the arm 51, in which the pivot pin 49 carrying the stitch finger is journaled, is adapted to be actuated to raise and lower the lateral extension of the stitch finger so that the reversely bent portion 57 of the finger will alternately be moved above and below the path of the advancing needle. For instance, arm 51 may be pivoted on links 58 and a cam roller 59 journaled on a stud on the arm 51 engaging in a cam 60 will cause the arm 51 to be reciprocated transversely of the stitch finger and to be depressed and raised with respect to the needle. Comparing Figs. 2 and 3, it will be seen that, in Fig. 2, the cam roller is engaged in the lower portion of the cam-way in cam 60, so that the shank of the stitch finger is below the needle 35, while in Fig. 3, said cam roller is in the higher portion of the cam-way, with the result that the arm 51 has been elevated and the shank of the stitch finger moved to a point above the thread needle. In the present instance, the cam 60, which is journaled on a stub shaft 61, may be driven by a gear 62 fixed on shaft 29.

It will be understood that the tension of spring 55 is such that the stitch finger 46 will be firmly but yieldingly held against the work points 34, and that the pivotal centers of the links 58 are so located that the compound motions of the arm 51, under the influence of cam 60, will effect a rocking of the stitch finger on its longitudinal axis. There is no movement of the stitch finger longitudinally of the work points or radially of the dial. The shank 47 of the stitch finger can be readily adjusted in the pivot pin 49 by easing up on the screw 48 and the tension on spring 55 can be varied by relieving the pressure thereon effected through the nut 52.

It is preferred that the lateral extension of the stitch finger formed by the reversely bent portions 57, 57a, project somewhat beyond the end of the stitch finger proper so that there will be no interference with the operation of the thread needle. In other words, it is not necessary for

the thread needle to actually come in contact with the stitch finger proper.

Referring more particularly to Figs. 8 to 13, the formation of the stitches on the chain finger will be more clearly understood. In Fig 8, the needle 35 is shown advanced over the off-set portion 57 of the chain finger extension and under the portion 57a of said lateral extension This position of the chain stitch finger and its extension corresponds to the position in which the elements are shown in Figs. 1 and 2. As indicated by the arrow in Fig. 8, the needle is advancing through work loops W, and the looper 43 is moving to the right to position the previously formed loop L in the path of the needle, as illustrated in Fig. 9. After the point of the needle has been projected through the loop L, looper 43 is withdrawn while the needle continues to advance, thus freeing the loop which will then be held on the needle, as seen in Fig. 10. However, before the full retraction of the needle, the looper again moves to the right, as shown in Figs. 10 and 11, to pick up another or the next succeeding loop of thread. It will be understood that, in the previous stroke of the needle, the thread T was disposed over the portion 57a of the finger extension so that, upon advance of the needle, as shown in Figs. 8 to 10, a loop of thread is formed around the finger extension. The finish on the surface of the finger and its extension permits this loop to readily slip along the extension and onto the stitch finger into which the extension merges, as best seen in Figs. 10 and 11. In Fig. 11, the needle is shown as having started its retractive movement, with another loop of thread held on the looper. In Fig. 12, the needle has completed its retractive movement and started its next succeeding advance movement but during the complete retraction of the needle and the first part of its advance, the stitch finger has been rocked by the cam 60 to raise the finger extension so that the needle will pass under the extension instead of over it. In other words, the position of the parts in Fig. 12 corresponds to the showing in Fig. 3. Thus, as the needle continues its advance to pass through the loop on the looper, the thread is wrapped around the reversely bent portion 57 of the finger off-set, all as shown in Fig. 13, and this loop around the extension will also slip along the extension and down onto the stitch finger. This substantially completes the cycle of operations, as the needle will continue to advance from the position in Fig. 13, and the looper will be first retracted and then again advanced to free the loop shown thereon and form another loop whereupon the needle will be retracted and the stitch finger rocked to depress the same so that, upon the next succeeding advance of the needle, the parts will cooperate, as shown in Fig. 8.

Fig. 14 shows, on a somewhat enlarged scale, the formation of the stitches, not only in the work, but additional stitches are formed after the last work loop in a piece of work has passed the sewing station. As illustrated in this figure, where work is operated upon by the sewing mechanism, the loops L formed by the looper are drawn against one face of the work, so to speak, while, at the opposite side of the work, the thread is looped around the stitch finger but, in the absence of work, the loops L formed by the looper are drawn against the stitch finger. As the dial continues to advance the work points, the loops formed on the stitch finger slide along the same and are successively freed therefrom and, as will be appreciated, there is thus formed a certain amount of slack or looseness in the seam in the work due to the release of the loops from the stitch finger. Thus, the finished seam possesses a desired elasticity. Of course, the seam should not be too loose and, for this reason, the stitch finger is of rather small cross-section, but the cross-section of the finger is immaterial so far as the formation of the chain-stitches is concerned. In view of the fact that the stitch finger is merely rocked on its longitudinal axis, it can be placed rather close to the path of the work loops and, while it is preferred, nevertheless it is not essential, that the stitch finger be disposed in the inner side of the work loops, as distinguished from the outer side, under which circumstances slack will be produced by the stitch finger being interposed between the work loops and the loops L formed by the looper in the stitch.

What I claim is:

1. In a sewing machine comprising a thread needle, means for advancing and retracting the needle through work to be sewed, and means for forming a loop in the thread after it has been projected through the work, the combination of a finger extending lengthwise of the seam formed in the work, and means for looping the thread around said finger as the thread needle is reciprocated, said thread needle being movable past said finger alternately at opposite sides of the latter during successive movements of the needle in the same direction, the loops on said finger being movable lengthwise of the finger.

2. In a sewing machine comprising a thread needle. means for reciprocating said needle through work to be stitched, and means for forming a loop in the thread while the needle is moved in one direction, the combination of a stitch finger disposed longitudinally of the seam formed in the work, and means for causing the needle and thread alternately to pass at opposite sides of said finger as the needle is reciprocated.

3. In a sewing machine comprising a series of work-supporting points, a thread needle, means for advancing the points past said needle, means for reciprocating the needle longitudinally of said points, and a looper for forming a loop in the needle thread, the combination of an elongated stitch finger disposed substantially parallel to the line of movement of the work points, and means for causing the needle and the thread carried thereby to pass alternately at opposite sides of said finger during successive movements of the reciprocating needle in the same direction.

4. In a sewing machine comprising a series of work-supporting points, a reciprocatory thread needle normally positioned at one side of work supported on said points, a looper at the opposite side of said work, and means for advancing the points past said needle and looper, the combination of a stitch finger disposed substantially parallel to the seam formed in the work, said finger having a lateral extension projecting beyond one end thereof, and means for moving said extension to position it at opposite sides of the path of the needle during successive movements of the needle in the same direction whereby the thread will be looped around said finger during said successive movements of the needle.

5. In a sewing machine comprising a series of work points, a reciprocating thread needle, means for advancing said points past the needle, and a looper engageable with the thread to form a loop therein each time the needle is advanced, the combination of an elongated stitch finger having a laterally and vertically off-set extension pro-

jecting beyond one end thereof, and means for rocking said finger to alternately position said extension above and below the needle each two successive movements of the needle toward said looper.

6. In a sewing machine comprising a series of work points, a looper, a thread needle, means for advancing said points past the needle and looper, and means for moving said needle toward and from the looper, the combination of a stitch finger intermediate said needle and looper, an extension on said finger laterally and vertically off-set with respect to the finger, a reverse bend in said extension, and means for moving said extension to position the reversely bent portion thereof at one side of the needle during one advance movement of the latter and at the opposite side of the needle during the next succeeding advance movement of said needle to form loops around said extension, said loops being free to slip along said extension onto said finger.

7. In a dial looper machine having a series of work-loop-supporting points, a thread needle, a looper, means for advancing work loops on said points past the needle and looper, and means for advancing and retracting said needle through said work loops, the combination of a stitch finger positioned beside the advancing work loops, and means for looping the thread around the finger as the needle passes through two successive work loops, said needle being movable past the stitch finger alternately at opposite sides thereof and said thread loops being removed from said finger by the continued advance movement of the work points.

8. In a dial looper machine having a revolving series of work points, a thread needle, a looper, and means for advancing and retracting said needle through work loops on said points, the combination of an elongated stitch finger positioned beside the path of work loops on said points, a lateral extension on said finger, and means for rocking said finger on its longitudinal axis, said extension being movable by the rocking motion of the finger to positions alternately at opposite sides of the needle during successive advance movements of the needle.

9. In a dial looper having a series of work-loop-supporting points, a thread needle, a looper, means for advancing said points past said needle and looper, and means for advancing and retracting said needle through work loops on said points, the combination of a stitch finger disposed along the path of work loops advanced by said points, a support for said finger, and means for reciprocating said support and simultaneously varying the elevation thereof to position a portion of said finger alternately above and below the path of the needle during two successive movements of the latter in the same direction.

10. In a dial looper having a series of work-loop-supporting points, a thread needle, a looper, means for advancing said points past the needle, and means for advancing and retracting said needle through work loops advanced by said points, the combination of an elongated stitch finger disposed substantially parallel to the path of work loops advanced past the needle, a support for said finger, a lateral extension on said finger, and means for rocking said finger on its longitudinal axis to position said finger extension alternately above and below the path of the needle during two successive advance movements of the needle, said last-mentioned means comprising means for reciprocating said finger support toward and from the work points and means for varying the elevation of said support with respect to said points.

11. A stitch finger for forming chaining-off stitches on a sewing machine, said finger being elongated to temporarily retain a plurality of loops of thread and a lateral extension projecting beyond one end of said finger, said extension having oppositely inclined reversely bent portions.

12. A stitch finger for forming chaining-off stitches on a sewing machine, said finger being elongated to temporarily retain a plurality of loops of thread and a lateral extension projecting beyond one end of said finger, said extension having oppositely inclined reversely bent portions, a sewing needle, and means for reciprocating said needle transversely of the finger extension, said needle being movable in paths alternately at opposite sides of one of the inclined portions of said finger extension during successive movements of the needle in the same direction.

13. A stitch finger for forming chaining-off stitches on a sewing machine, said finger being elongated to temporarily retain a plurality of loops of thread thereon, a lateral extension merging with one end of said finger, said extension having oppositely inclined reversely bent portions, a sewing needle, means for reciprocating said needle transversely of said finger, and means for moving said extension to alternately position one of said inclined, reversely bent portions at opposite sides of the needle during successive movements of the latter in the same direction.

14. In a sewing machine comprising a series of work points, a reciprocatory thread needle and means for advancing said points past said needle, the combination of a stitch finger, means for yieldingly pressing said finger against said points, a lateral extension on said finger having an off-set portion disposed transversely of the path of the needle, and means for alternately positioning said off-set portion of said extensions at opposite sides of the path of the needle during successive movements of the needle in the same direction.

15. In a sewing machine having a series of work points for supporting work loops, a reciprocatory needle, and means for advancing said points past the needle, the combination of a stitch finger, means for yieldingly pressing said finger against said points, said finger being positioned substantially parallel to the path of work loops carried by the points, a lateral extension on said finger having an off-set portion disposed transversely of the needle, and means for rocking said finger to alternately position the off-set portion of the finger extension at opposite sides of the path of the needle during successive movements of said needle in the same direction.

THOMAS H. DE SPAIN.