

July 2, 1929.

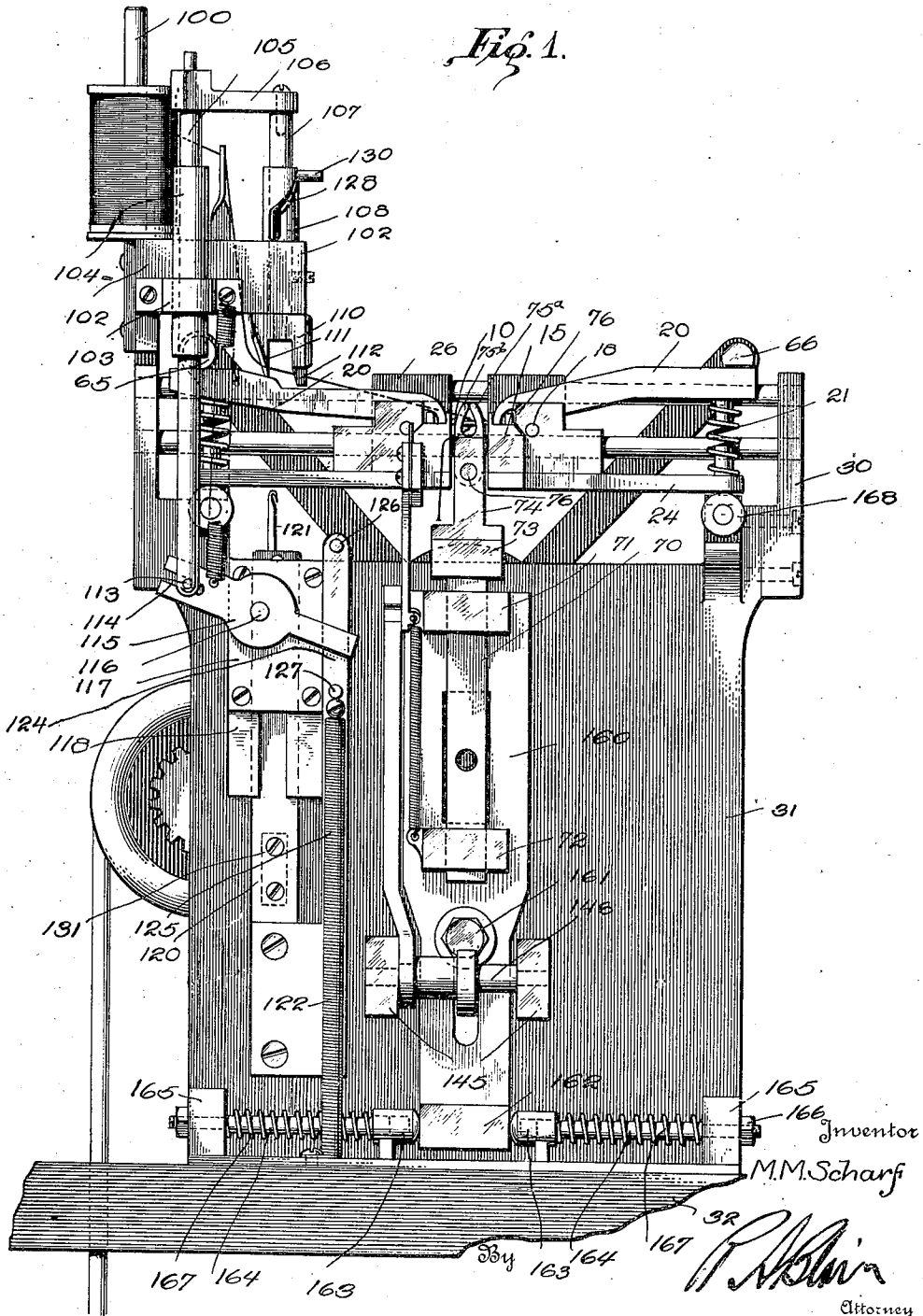
M. M. SCHARF

1,719,785

SEWING MACHINE

Filed May 5, 1925

7 Sheets-Sheet 1



July 2, 1929.

M. M. SCHARF

1,719,785

SEWING MACHINE

Filed May 5, 1925

7 Sheets-Sheet 2

Fig. 2.

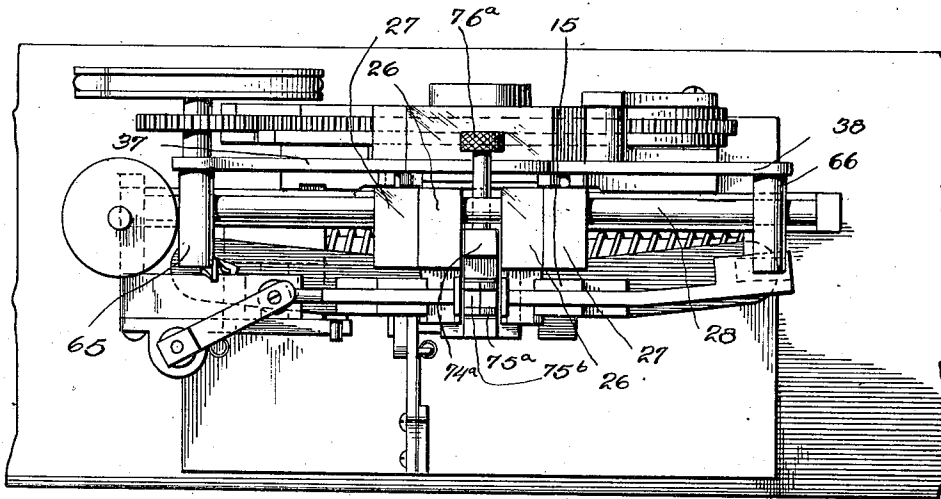


Fig. 6.

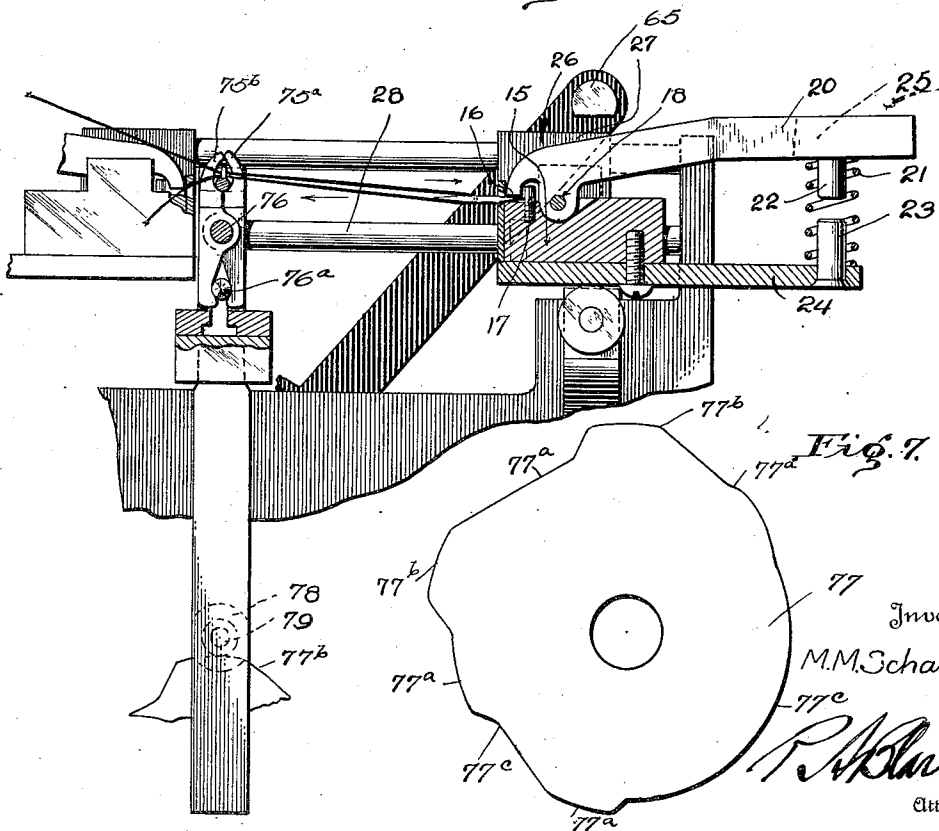


Fig. 7.

Inventor

M. M. Scharf

R. K. Blair

Attorney

July 2, 1929.

M. M. SCHARF

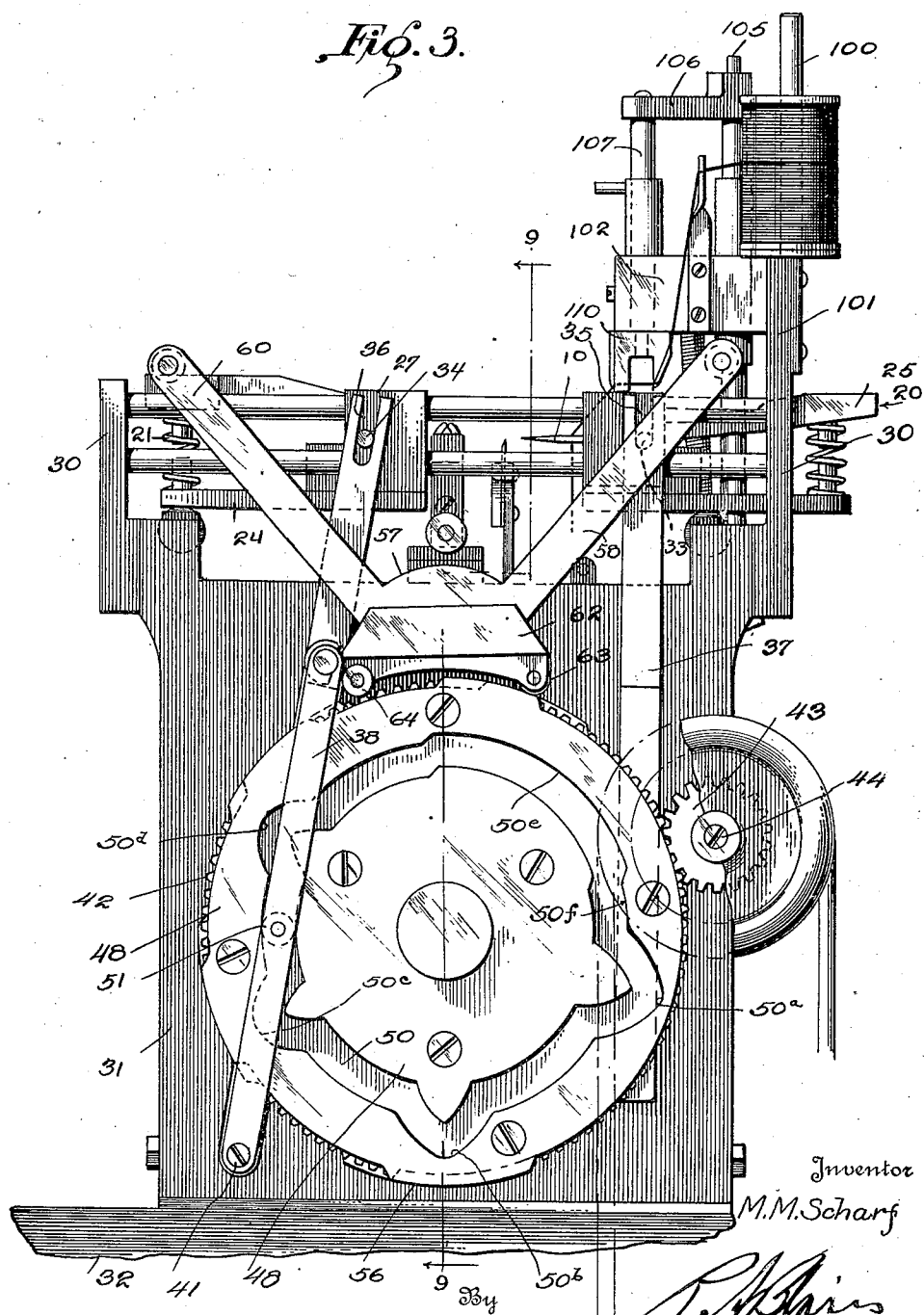
1,719,785

SEWING MACHINE

Filed May 5, 1925

7 Sheets-Sheet 3

Fig. 3.



July 2, 1929.

M. M. SCHARF

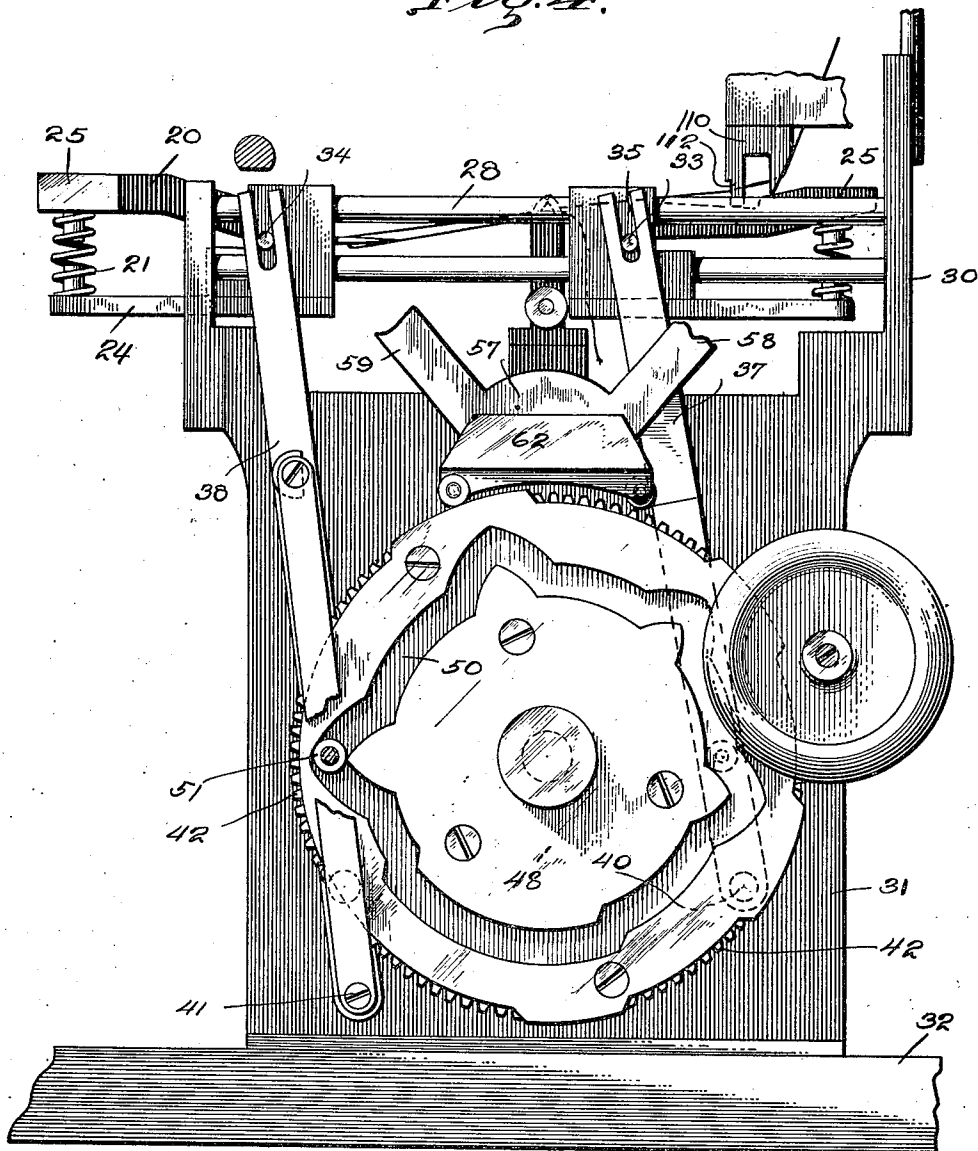
1,719,785

SEWING MACHINE

Filed May 5, 1925

7 Sheets-Sheet 4

Fig. 4.



Inventor
M. M. Scharf

By

R. Blair

Attorney

July 2, 1929.

M. M. SCHARF

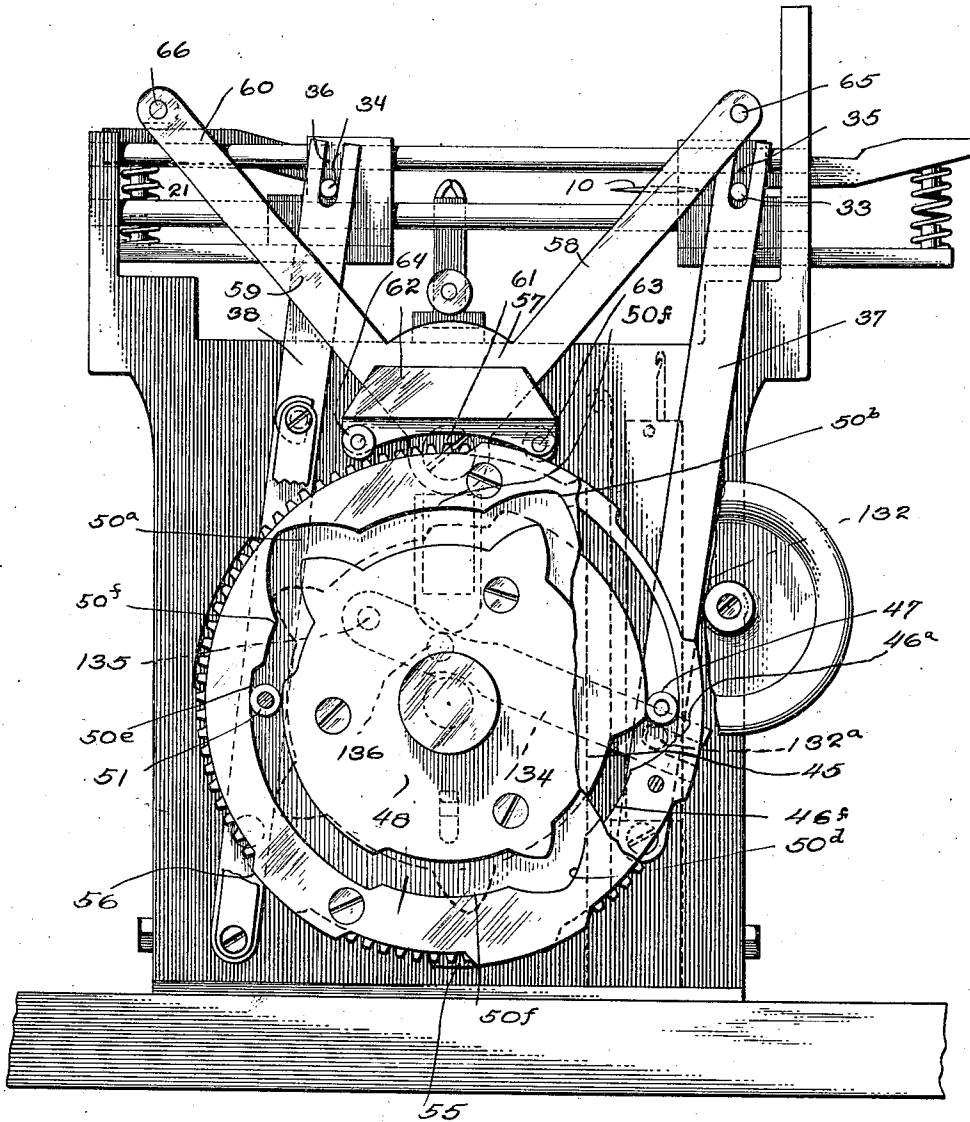
1,719,785

SEWING MACHINE

Filed May 5, 1925

7 Sheets-Sheet 5

Fig. 5.



Inventor

M. M. Scharf

By

R. A. Davis

Attorney

July 2, 1929.

M. M. SCHARF

1,719,785

SEWING MACHINE

Filed May 5, 1925

7 Sheets-Sheet 6

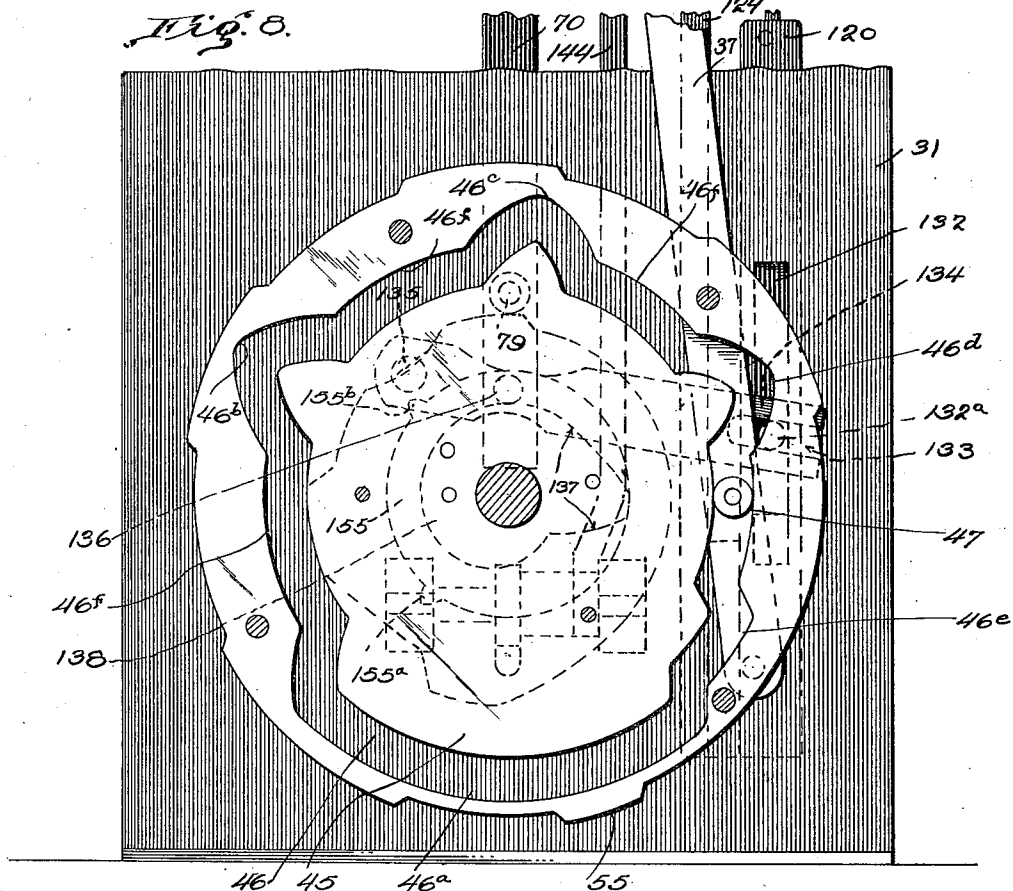


Fig. 12

Fig. 13.

Fig. 14.

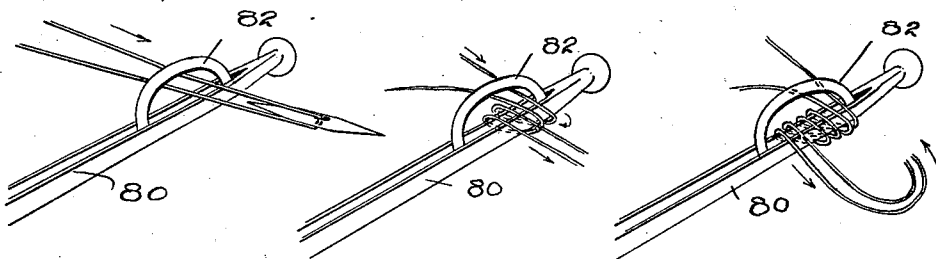
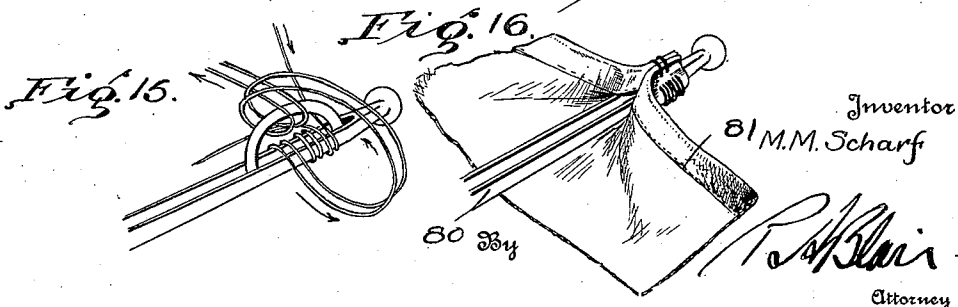


Fig. 16.



Inventor

81 M.M. Scharf

Attorney

July 2, 1929.

M. M. SCHARF

1,719,785

SEWING MACHINE

Filed May 5, 1925

7 Sheets-Sheet 7

Fig. 9.

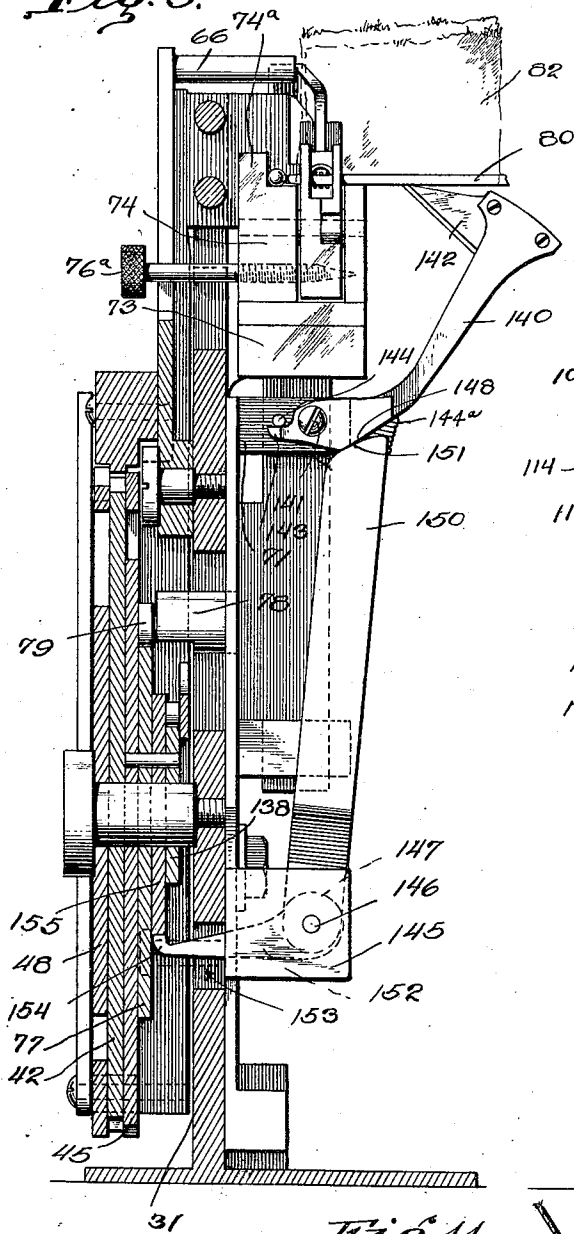


Fig. 10.

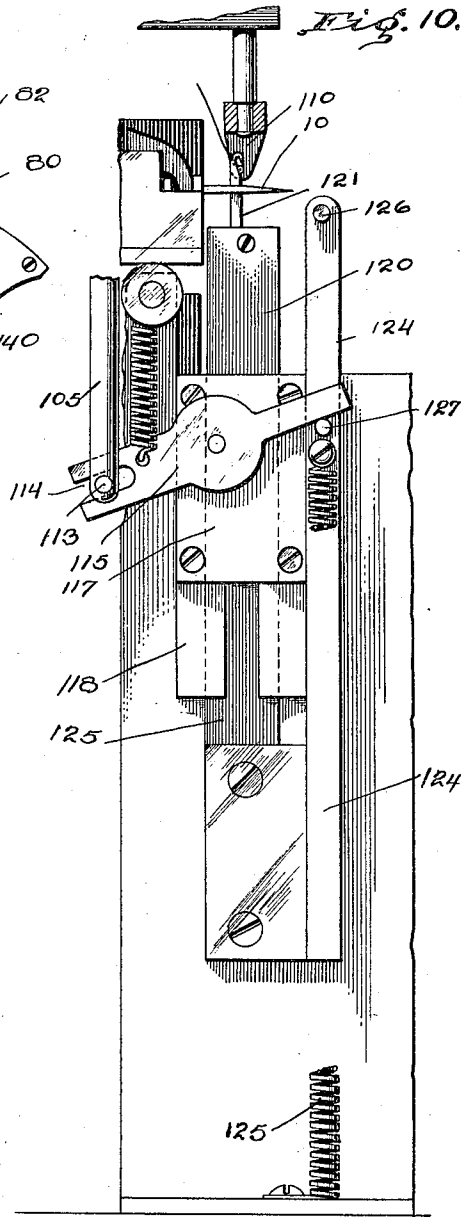
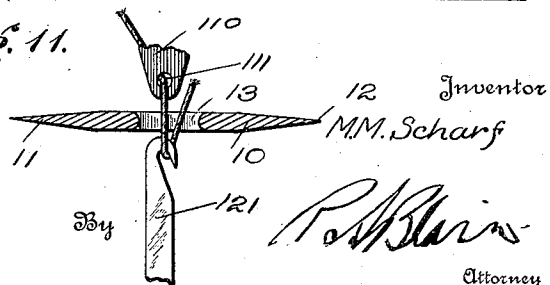


Fig. 11.



Inventor
M. M. Scharf

By

Attorney

UNITED STATES PATENT OFFICE.

MICHAEL M. SCHARF, OF LANCASTER, PENNSYLVANIA.

SEWING MACHINE.

Application filed May 5, 1925. Serial No. 28,148.

This invention relates to improvements in sewing machines and more particularly to a sewing machine of that type particularly adapted for tipping umbrellas.

As well known to those familiar with the subject of the manufacture of umbrellas, parasols and the like, the cover or fabric portion of the umbrella is composed of a plurality of triangular segments stitched together along their adjacent edges parallel to the ribs constituting the frame. On completion of the cover, it is stitched over the central rod and the outer periphery of the cover is then stitched or sewed by hand to the end of the rib. The rib tip is provided with a small eye or aperture, and the end of the cover turned inwardly adjacent the eye, where it is sewed to the rib, the thread passing several times thru the fabric and eye and around the upper side and then the under side of the cover. The present invention contemplates a sewing machine for performing this stitching operation which heretofore has always been done by hand.

It is therefore one of the objects of the present invention to provide a simple and practical sewing machine of the above general character which will be so far as possible entirely automatic in its operation.

A further object of this invention is to provide a machine of the above character that will automatically grip the cover in proper position about the end of the rib in predetermined relation to a reciprocating needle which will stitch the cover to the rib.

A further object is to provide a machine of the last mentioned character with suitable mechanism for reciprocating the needle at periodical intervals and simultaneously shifting the work support or that part which grips the fabric and rib whereby the stitching thread is caused to pass thru the eye of the rib and above and below the same in exactly the manner that the stitching operation has been heretofore performed by hand.

A further object is to provide a machine for automatically compensating the throw of the thread with respect to the amount of thread used whereby the thread will be drawn taut at each stitching operation.

A further object is to provide a mechanism of the above described character for severing the thread at the completion of the stitching operation.

A further object is to provide a simple and

practical mechanism for automatically rethreading the needle prior to the starting of a subsequent tipping operation.

A further object is to provide a mechanism of the above general character having relatively few parts, which is unlikely to get out of order and which may be inexpensively manufactured, assembled and installed.

A further object is to provide a sewing machine of the last above mentioned character which may be easily operated, will be safe to handle and which will not require the co-operation of a skilled operator.

Other objects will be in part obvious from the annexed drawings and in part indicated from the following analysis of this invention.

The invention accordingly consists in the features of construction, the combination of parts, and in the unique relation of the various members and the relative proportioning and dispositioning thereof, all as more clearly outlined herein.

To enable others skilled in the art to fully comprehend the underlying features thereof, in order that they may embody the same, by numerous modifications in structure and relation contemplated by this invention, drawings depicting a preferred form of the invention have been annexed as part of this disclosure, and in such drawings like characters of reference indicate corresponding parts throughout all the views, of which—

Figure 1 is a front elevation of the device with the needle transfer devices in operative transferring relationship;

Figure 2 is a plan view of the device; as shown in Figure 1;

Figure 3 is a rear elevation showing one of the needle clamps in substantially retracted position;

Figure 4 is a part rear elevation showing the other of the needle clamps in retracted position after projecting the needle and thread carried thereby thru the rib eye and fabric;

Figure 5 is a rear view of parts of the device, showing both needle mechanisms in their original starting positions.

Figure 6 is a view partly in section showing the rib clamp and raising and lowering mechanism therefor and the needle clamping mechanism;

Figure 7 is a face view of the rib clamp cam;

Figure 8 is a view showing the arrangement

of cams, the outer cam plate as seen from the rear being removed;

Figure 9 is a section along the line 9—9 in Figure 3, showing the thread cutting mechanism;

Figure 10 is a partial sectional view of the threader mechanism;

Figure 11 is a detail showing the manner of operation of the threader arm;

Figures 12 to 15 represent the through, under, and over form of stitching provided; and

Figure 16 is a detail representing a finished product.

Referring now to the drawings, the numeral 10 designates a needle, as more clearly shown in Figure 11, having a centrally disposed eye 13 and preferably pointed at both ends as at 11 and 12, whereby the needle is reversible. A single pointed needle having its eye intermediate the ends would have equal utility, however, and is included in the scope of this invention. The needle 10 is initially held in a needle clamping mechanism, hereafter designated as the #1 needle mechanism, and is adapted to be longitudinally reciprocated and transferred into a second needle clamping mechanism, hereafter designated as #2 needle mechanism, from whence it is transferred again to the #1 needle mechanism to form a complete stitch, the number of such transfers depending upon the number of stitches desired.

The #1 needle clamping mechanism comprises an L-shaped block 15, see Figure 6, having one of its face portions cut away for the reception of a plate 16 apertured to receive the needle 10. A stop pin 17 mounted in the block 15 is provided to limit the degree of entrance of the needle through the apertured plate 16. Pivoted at 18 in the block 16 is a clamp arm 20 which is urged upwardly into needle clamping position by means of springs 21 embracing a stud 22 upon the rear lower surface thereof and likewise surrounding a stud 23 fixed to arm 24 upon which the block 15 is rigidly positioned. The clamping arm 20 is also provided at its rear portion with a camming surface 25, the purpose of which will be hereinafter described. Thus the needle 10 is resiliently held in proper position with relation to the block 15 by the arm 20 urged downwardly thereagainst.

The block 15 extends rearwardly and upwardly to form a bearing block, as shown at 26, and has joined to its rear face a second bearing block 27. The block 26 and associated bearing block 27 are suitably apertured for the reception of rods 28, upon which the blocks 26 and 27 are adapted to slide and which are mounted in arms 30 extending from a standard 31 of the device suitable supported from a base 32. I do not wish to be limited to this form of bearing surface, however, as many forms of bearings to provide a

sliding surface for the blocks 27 and 28 might be provided, and such are intended within the scope of this invention.

The #2 needle clamping mechanism is substantially similar to the #1 needle clamping mechanism, as described, and inasmuch as only those parts which are necessary to a complete understanding of the device are described, further description of the #2 needle mechanism to this point is considered unnecessary.

Extending rearwardly of bearing blocks 27 of both the #1 and #2 needle mechanisms and mounted therein are pins 33 and 34 which are adapted to lie in slots 35 and 36 of arms 37 and 38 pivoted at points 40 and 41, see Figure 4, to the upright 31.

There is likewise mounted in rotatable relation with respect to the upright 31 and at the rear thereof, a circular plate 42 having a series of gear teeth arranged about the outer periphery thereof. A pinion 43 mounted on stud 44 projecting from the upright 31 is positioned adjacent the gear plate 42 and adapted to mesh therewith, suitable means to rotate the pinion 43 either by a hand crank or belt drive or the like, being provided.

Positioned on the inner face of the gear plate 42 and rigid therewith is a cam plate 45, see Figure 8, having cut therein a cam track 46. A roller 47 on the arm 37 is adapted to follow the cam track and to be guided thereby to determine movement of arm 37 about its pivot point 40. On the opposite face of the gear plate 42, there is provided a second cam plate 48, see Figures 3, 4, and 5, having therein a cam track 50 in which a roller 51 rotatably mounted on the arm 38 is adapted to be positioned and to be guided thereby.

The cam paths or grooves 46 and 50 in cam plates 45 and 48 respectively are of substantially similar configuration, although the cam track 46 is positioned relatively in advance of the cam track 50. It will be seen from the above that upon rotation of the pinion 43, the gear plate 42 is likewise rotated carrying with it both cam plates 45 and 48. The roller 47 on the arm 37 must necessarily follow the path as defined by the cam groove 46 causing the arm 37 to pivot about its pivot point 40 in an arc defined by the portions having greater radii as 46^a, 46^b, 46^c, 46^d, and 46^e of the cam track 46. This pivotal travel of the arm 37 by its engagement with pin 33 fixed to block 27 causes blocks 26 and 27 carrying the #1 needle mechanism to be reciprocated longitudinally upon guide rods 28.

Likewise the arm 38 with its roller 51 is forced thru an arc as defined by the portions 50^a, 50^b, 50^c, 50^d, and 50^e of the cam track 50 cut in cam plate 48, and longitudinally reciprocates, by its association with blocks 26 and 27 of the #2 needle mechanism, this needle mechanism, on guide rods 28. The

relationship of the cam tracks 46 and 50, as hereinbefore described, is such that the #2 needle mechanism is operated after the #1 needle mechanism has been reciprocated.

5 The operation upon rotation of the cams 45 and 48 and the resulting actuation of the needle mechanisms is as follows. In the preferred initial position, it is desired that the #1 mechanism be at the extreme end of its reverse stroke and about to start upon its forward stroke. Such a position is determined, by the roller 47 of the bar 37 being positioned at the high point 46^a of the cam track 46, see Figure 5. At this instant, the position of the #2 needle mechanism is determined by the position of roller 51 of bar 38 in that portion of cam track 50 designated by 50^a, or almost at its furthest advanced position. Rotation of the gear 42 causes roller 47 to ride down the path 46^a to the portion 46^f, and results in reciprocation of the blocks 26, 27, and needle 10 of the #1 needle mechanism thru its forward stroke, the portion 46^f of cam track 46 being an arc of uniform radius and defining the innermost position of the #1 needle mechanism. The #2 needle mechanism is brought into needle reception position with relation to the #1 needle mechanism by the roller 51 riding into the portion 50^f of the cam track 50, which is an arc of uniform radius and defines the innermost position of the #2 needle mechanism. Thus, as the #1 needle mechanism reaches the end of its forward stroke, it is closely adjacent the #2 needle mechanism which then begins its reverse stroke or travel as defined by the roller 51 riding up the portion 50^a of the cam track 50. At that portion of the travel of both needle mechanisms in which they are closely adjacent, as above described, they are spaced apart an amount permitting both mechanisms for an instant to be in operative gripping engagement with the needle 10, and mechanism is provided, as described in the following, whereby the #1 needle mechanism releases the needle 10 at the moment that the #2 needle mechanism grips it, or in other words, the needle is transferred to the #2 needle mechanism. Positioned on the standard 31 and arranged between the #1 and #2 needle mechanisms on their most forward positions, are work holding clamps, also hereinafter described, and it will be seen from the following that during the transfer of the needle 10 from the #1 to the #2 needle mechanism, the needle passes thru the article to be stitched, which is held in the work clamps.

The #2 needle mechanism, which now carries needle 10, then travels thru its reverse and forward stroke as defined by cam portion 50^a of cam plate 48, the #1 needle mechanism during such travel being maintained at the end of the forward stroke in needle reception position as defined by cam track 46^f. At the end of the travel of the #2 needle mechanism,

both needle mechanisms are in transfer position, and the needle 10 is transferred to the #1 needle mechanism which then travels thru the reverse and forward stroke as defined by cam portion 46^b.

With relation to the drawings, it is seen that cam tracks 46 and 50 are each provided with four such cam tracks as 46^a, 46^f, and 50^a, 50^f, respectively, whereby the needle 10 may be transferred four times during one complete revolution of the gear 42 from the #1 needle mechanism to the #2 needle mechanism, then back to the #1 needle mechanism the same number of times upon completion of the reverse and forward travel of the #2 needle mechanism, whereupon the #1 needle mechanism, which now carries the needle 10, is returned to its substantially initial position. It is to be understood, however, that any number of such transfers depending upon the number of stitches desired to be taken might be provided for, and I therefore do not wish to be limited to only four such transfer operations.

It will be noted that the track 46 of cam plate 45 is provided with the portion 46^e continued thru a relatively larger arc than are the tracks 46^b and 46^f, such portion 46^a being provided to hold the #1 needle mechanism stationary during the thread cutting operation, to be hereinafter described. The portion 46^a is also continued along an arc of uniform radius, whereby the #1 needle mechanism is held in its outermost position during the needle threading operation, also to be described in the following. Portion 50^e of the cam track 50 is of greater radius than that of cam track portion 50^f, whereby the #2 needle mechanism is maintained a slight distance from its innermost forward position during the threading operation.

The cam plate 45 has on its outer periphery a plurality of cam surfaces 55, and positioned about the periphery of the cam plate 48 are likewise provided a plurality of cam surfaces 56 which slightly lag the surfaces 55. A V-shaped member 57, see Figures 3 and 5, having arms 58 and 60, is pivoted as at 61 to the upright 31 and carries at its lower portion thereof a rearwardly extending block 62. The block 62 has mounted on its inner lower extension or at the right thereof, as viewed in Figures 3 and 5, a roller 63, and at its outer and left end a roller 64, the roller 63 being adapted to engage the cam surfaces 55 and the roller 64 adapted to engage the cam surfaces 56 upon rotation of gear plate 42.

The arms 58 and 60 carry at their upper extremities and at right angles thereto studs 65 and 66. It will thus be seen that upon rotation of the pinion 43 and gear plate 42 and resulting reciprocation of both the #1 and #2 needle carrying mechanisms, at certain points of the travel thereof, the V-shaped member 57 is pivoted about its center by the

engagement of rollers 63 and 64 with cam surfaces 55 and 56. For instance, as the #1 needle mechanism begins its first forward stroke, the roller 63 engages one of the cam surfaces 55 to tilt the V-shaped member 57 in a counterclockwise direction (Figures 3 and 5), causing the stud 66 to engage cam 25 on the end of the pivoted clamping arm 20 of the #2 mechanism and depress the same for the reception of needle 10. The #2 needle carrying mechanism at this instant has completed its relatively forward stroke, and, due to the relationship of the cam tracks 46 and 50 is about to be returned upon its out or reverse stroke. When the #1 needle mechanism has completed the end of the forward stroke, the roller 63 rides off cam surface 55, simultaneously with the engagement of the roller 64 with one of the cam surfaces 56 to throw the member 57 in clockwise direction to cause stud 65 to engage cam 25 of the #1 needle mechanism. This movement permits of release of the needle in the #1 mechanism and likewise releases the clamping arm 20 of the #2 needle mechanism which operates to firmly grasp the needle and carry it on its out stroke. During the reverse and forward stroke of the #2 needle mechanism, the needle clamp 20 of the #1 needle mechanism is held in open position, but as the former completes its forward stroke the reverse operation of the clamping mechanism occurs, and the needle is transferred and grasped in the #1 needle mechanism. So that, upon continued rotation of pinion 43 and resulting rotation of the gear plate 42, there is an alternate engagement by the studs 65 and 66 with the clamping arms 20 of both the #1 and #2 needle mechanisms, thereby to alternately release and engage the needles.

Positioned on the front face of the upright 31 is a rib clamping mechanism. This mechanism comprises, (see Figures 1, 2 and 9) an upright 70, adapted to be reciprocated within confined limits within guides 71 and 72. The bar 70 carries at its upper portion a base plate 73 on which is rigidly mounted a clamp supporting member 74. Rib clamps 75^a and 75^b are pivotally mounted within the member 74 by means of pin 76 and have their ends interlocking (see Figure 6) about an adjusting screw 76^a which projects from the rear through the rib carrying member 74 and between the ends of the clamps 75^a, 75^b, whereby they may be opened and closed for the reception and release of the umbrella rib. At the rear of the member 74 is an upwardly projecting extension 74^a which acts as a stop to limit the degree of entrance of the rib into the clamps 75^a and 75^b.

Carried by the gear plate 42 and rearwardly of the cam plate 45 is a rib clamp cam 77, (see Fig. 7,) adapted to rotate upon rotation of gear 42. The upright 70 has rigidly joined

to its rear face an arm 78 (see Figure 9) adapted to project through a slot in the upright 31, and carrying a roller 79 which coacts with the rib clamp cam 77 having a cam surface about the periphery thereof adapted to vertically reciprocate the upright 70 and rib clamps 75^a and 75^b at intervals during the rotation of the rib clamp cam 77 resulting upon the rotation of gear 42.

The periphery of the cam 77 has on its outer face the following cam surfaces; the character 77^a denotes portions thereof, which by the engagement of the roller 79 therewith causes the upright 70 to maintain the clamps 75^a and 75^b in such position that the needle 10 may pass through the article to be stitched. Rotation of the cam 77 causes roller 79 to engage the cam surface 77^b of the cam 77 which raises the upright 70 and clamps 75^a and 75^b so that the needle passes relatively under the article held in the rib clamp; while the portions 77^c, when engaged by the roller 79, cause the clamping device to drop and permit the needle to pass relatively over the article held in the clamps 75^a and 75^b without engagement therewith.

Inasmuch as the sewing mechanism proper has now been described, the operation of this mechanism so far described will be briefly explained in order that a clearer perception may be had of the threading and thread cutting mechanisms to be described in the following.

As hereinbefore described, the cover or fabric portion of the umbrella is sewed to the umbrella rib through an eye provided at the end thereof. Such an operation comprehends the successive steps of passing a thread through the fabric and eye, thence about the upper side of the cover, thru the fabric and eye and about the upper side of the cover again, through the eye and about the underside of the cover, and again through the eye and about the under side of the cover. The mechanism as above described automatically performs these necessary operations in the following manner:

Referring to Figures 12 to 16, an umbrella rib 80 with the fabric or cover 81 wrapped around the end of the same is position in the clamps 75^a and 75^b and held therein by operation of the adjusting screw 76^a, with the thread retaining means such as the eye 82 of the rib tip pointing upwardly. At the beginning of the operation of the machine, the #1 needle mechanism carrying therewith the needle 10 with thread running through its eye 13 is in retracted position, the needle clamping arm 20 firmly holding the needle in working position, and the #2 needle mechanism, being approximately at the end of its forward stroke and in needle reception position, as hereinbefore explained. Rotation of the gear 42 causes the #1 needle mechanism to complete its forward stroke, the

needle 10 being projected through the fabric 81 and eye 82 of the rib 80 held in clamps 75^a and 75^b, during this travel, and then gripped by the #2 needle mechanism. During the transfer of the needle 10 the roller 79 of the rib clamp mechanism engages surface 77^a of the cam 77, and the doubled thread is passed through the fabric and eye of the rib 80. The #2 needle mechanism then on its reverse stroke pulls the thread through the eye and fabric and on its forward stroke carries the needle back and transfers it to the #1 needle mechanism. During the latter transfer, however, the roller 79 engages the surface 77^b of the cam 77 which raises the clamps 75^a and 75^b, and the needle is passed into the #1 needle mechanism relatively below the rib and fabric, causing the doubled thread to wrap itself about the outer side of the rib and associated fabric, the #1 needle mechanism then completing its reverse stroke. This cycle of operation is next repeated a second time causing a second stitch to be taken through the eye of the rib and then below or about the relatively outer side 81 of the fabric. The third forward stroke of the #1 needle mechanism projects the needle 10 and thread carried thereby through the eye for the third time, when it is transferred to the #2 mechanism as above described. Upon the third return of the needle to the #1 needle mechanism, however, the roller 79 engages the cam portion 77^c, which causes the rib clamping mechanism to drop, and the needle travels above the clamps 75^a and 75^b and the thread is wrapped over the relatively under side of eye 82 and rib 80. This last above operation is repeated on the fourth and last forward and return stroke of the #1 needle mechanism. The thread is then cut by cutting mechanism hereinafter described, and the rib with fabric sewed thereto is then removed from the clamps 75^a and 75^b to be followed by subsequent severing operations.

It is seen from the above that the needle 10 is transferred through the eye of the rib four times upon one complete cycle of rotation, by the #1 needle mechanism, is received the same number of times by the #2 mechanism and returned to the #1 needle mechanism twice below and twice above the rib and fabric in the clamps 75^a and 75^b. Stitches are thus formed in the same portion of the work in that no appreciable lateral movement is permitted the work held in the rib clamping mechanism.

I also provide thread carrying and cutting mechanisms whereby when the fabric has been sewed to one rib and the thread cut therefrom by means of a cutting device hereinafter described, the needle is automatically rethreaded for the necessary operation. Referring to Figure 3, it will be seen that a spool carrying arm 100 is provided upon which a spool of thread is adapted to be loose-

ly mounted. The arm 100 is rigidly fixed to a plate 101 forming a continuation of the rod bearing arms 30 and is thereby rigidly associated on the upright 31. The plate 101 extends forwardly for a slight distance and has fastened to it an arm 102 having associated thereon by means of a clamp 103 a hollow bushing 104. In the said bushing 104 is mounted for vertical reciprocation a rod 105, having at its upper portion a cross arm 106 having a depending rod 107 joined thereto. The rod 107 is slidably mounted within a second bushing 108 mounted in the arm 102 and carries at its lower end a substantially U-shaped threading element 110. Positioned in one leg of the element 110 is an aperture 111 adapted for reception of a thread from the spool and the other leg has a cutaway portion, as shown at 112, for the purpose herein-after described.

Mounted at the lower end of the rod 105 is a pin 113 adapted to engage in a slot 114 in an arm 115 pivoted as at 116 to a plate 117. The plate 117 forms a cover for a U-shaped bearing block 118 rigidly fastened to the standard 31. Within this bearing is mounted for vertical reciprocation a threader arm 120 carrying at its upper end a threading needle 121.

The threader arm 120 has joined to its lower extremity an L-shaped member 122, having its vertical arm 124 extending upwardly and parallel with the threader arm 120. A spring 125 joined to the arm 124 and to the base 32 normally urges the threader arm and its associated threader needle 121 into its down or retracted position. Positioned on arm 124 and in cooperative relationship with the pivoted member 115 are pins 126 and 127 which define the limits of the arc through which the arm 115 is adapted to swing about its pivot pin 116.

The bushing 108 has cut therein a helical groove 128, into which a pin 130 on rod 107, which is adapted to be reciprocated within the bushing 108, projects. Thus, as the threader arm 120 is projected upwardly, pin 127 will engage arm 115 to lower the rod 105, rod 107, and the threader member 110 carried thereby is caused to rotate through an arc of approximately 90°.

The threader arm actuation mechanism is as follows: The arm 120 carries a portion 131 which projects through a slot 132 in the upright standard 31, and which carries a pin 132^a engaging in a slot 133 of a rod 134 pivoted to the rear face of the standard 37 as at 135. The pivoted rod 134 carries a roller 136 adapted to engage a cam surface 137 of a cam 138 rigidly associated with the cam plate 45 and adapted to rotate upon rotation of gear wheel 42. Thus, upon rotation of the cam 138 roller 136 engages the cam surface 137 causing the arm 134 to swing about its pivot point which carries upwardly through

the medium of slot 133 the threader arm 120. This upward movement thereof raises the threader needle 121 into operative threading relationship, with respect to the eye 13 of the needle 10, and at the same time, by means of the downward reciprocation of rod 105 carrying with it threader member 110, also rotates the member 110 into operative threading position.

With relation to Figure 8, the operation of the threader mechanism is timed with relation to the needle transfer mechanisms so that the threading operation takes place while the #1 needle mechanism is in retracted position, that is, while the roller 47 thereof is following the portion 46^a in cam plate 45. Thus, as seen in Figure 10, when the #1 needle mechanism is in retracted position the threader mechanism is adapted to raise the threader arm 120 to project the threader needle 121 through the eye 13 of the needle 10. In this position, the threader member 110 is in lowered position and is swung around to face the operator, as shown.

It is to be noted at this point that the needle 10 carries through the fabric on the first actuation of the #1 needle mechanism a doubled thread, one portion of which is single and a continuation of the thread from the spool, the #2 threader mechanism pulling the amount of thread through the fabric on its first reverse stroke necessary during the entire stitching operation. This single thread passes through aperture 111 and is guided by the cutaway portion 112 of the U-shaped threader member 110, during such feeding operation. Upon upward actuation of the threader arm 120 at the end of the last stitching stroke, the member 110, as hereinbefore explained, drops and brings the thread across the eye 13 of needle 10 in a direction transverse to the needle. The threader needle 121 projecting at that time through the eye 13, hooks over the thread, and draws the same through the eye 13 subsequent to which the thread is cut, the needle then being threaded for the next stitching cycle.

With relation to Figure 9, there is also provided a thread cutting mechanism which comprises an arm 140 pivoted at 141 to support 71 of the rib clamping support, which arm carries at its upper portion a knife blade 142. A projecting lug 143 is provided at the base of the arm 140 and engages a pin 144 mounted in the support 71 to limit the outward rotation of the arm 140. The arm 140 with its knife 142 is resiliently urged to the utmost of its outward or inoperative position as by spring 144^a.

Rigidly mounted on the upright 31 are two brace members 145 in which a rod 146 is rotatably supported. Fixed to this rod 146 is a bell crank lever 147, having an upwardly projecting arm 150 adapted to engage

a cam surface 148 on cutter arm 140 at its co-acting cam surface 151. The second arm 152 of the bell crank lever projects thru a slot 153 in the support 31 and has at its end portion a cam finger 154. This cam finger is adapted to engage the knife cam 155 rigidly associated between the threader cam 138 and the cam plate 45 and adapted to rotate upon rotation of gear 42. About the periphery of the cam 155 are two projecting cam surfaces 155^a and 155^b which, by their engagement with the cam finger 154 serve to rock the bell crank lever 147 about its pivot point 146 which causes the knife arm 140 to be twice swung into operative cutting relation during one complete rotation of the gear 42.

The operation of the first cutting stroke of the arm 140 and knife 142, as determined by the relation of cam surface 155^a with the cam plate 45 and cam tracks cut therein, occurs as the #1 needle mechanism is temporarily retained in intermediate position between its innermost and retracted positions, upon its last reverse stroke, in which position the roller 47 rides in cam portion 46^a. This cutting stroke severs the doubled thread carried by the needle 10 over the clamps 75^a and 75^b, a characteristic of the last transfer operation from the #2 needle mechanism to the #1 needle mechanism, as hereinbefore described. The needle 10, freed of the thread, is then retracted to its furthestmost position for the threading operation.

The second cutting operation, as determined by cam 155^b is operative to cut the single thread running from the spool through the eye 82 and fabric 81, after the thread carried by needle 10 has been cut, and is operative when the #1 needle mechanism carrying the needle 10 is in fully retracted position as determined by the roller 47 riding in the cam track 46^a. When the threader needle 121 has been projected through the eye 13 of needle 10 and is drawing the same, the cam 155^b causes the arm 140 and knife 142 to swing through its cutting arc. The roller 136 has at this point reached the high point of the cam surface 137 of the threader actuating cam 138, and is free to ride down the inclined surface thereof to permit the threader arm 120 to drop. The threader arm 121, however, is hooked over the thread and the weight of the arm 120 and associated parts is substantially sustained from the thread, thus exerting tension thereon, and providing a degree of tautness, which permits the knife 142 upon completion of the travel of arm 140 to easily sever the same. After the thread is severed the threader arm drops back into its retracted position, the threader arm 121 having then completed the threading of the eye of the needle 10, and the knife 142 and arm 141 are urged out of operative position by the spring 144^a. Upon removal of the rib 80 and fabric stitched thereto from the clamps 75^a and 75^b

the device is then ready for the next succeeding stitching operation.

It is to be particularly noted that cam tracks 46 and 50 of cam plates 45 and 48 of the #1 and #2 needle mechanisms are so designed as to automatically compensate the throw of the needle to the amount of thread used by the successive operations of the complete stitching cycle. With relation to Figs. 5 and 8, it is seen that the cam surface 46^a has the greatest radius, and the cam portions 46^b, 46^c, 46^d and 46^e decrease as to their respective radii causing a decrease of the travel of #1 needle mechanism, an amount which compensates for the travel of the thread through and about the umbrella rib 30 and associated fabric. In like manner the cam portions 50^a of cam plate 48 of the #2 needle mechanism has the greatest radius which permits the needle to pull through the eye 82 of the rib 80 and fabric associated therewith upon the first transfer of the needle from the #1 and the #2 needle mechanism, a length of doubled thread sufficient to compensate for the wrapping of the thread under and over the rib during the following stitching and transfer operations, as determined by cam portions 50^b, 50^c and 50^d of decreasing radii, and also to leave a certain amount of thread free about the rib after the cutting operation has taken place.

The guides 71 and 72, hereinbefore described, are mounted on an adjuster plate 160, see Figure 1, which is pivoted to the upright 31 by a pin 161. The plate 160 is suitably apertured to permit the part 78 of the rib clamp mechanism, and the cam finger 154 of the cutting mechanism, to pass there-thru. Positioned at the lowermost extremity of the plate 160 is an outwardly extending portion 162 which is engaged by heads 163 of adjusting screws 164. The said adjusting screws are mounted in arms 165 by adjusting bolts 166 and are resiliently urged into engagement with block 162 by means of springs 167 coacting between parts 162 and 165. A movable mounting of the work clamping mechanism as well as the thread cutting mechanism is thus provided, for, being supported on the plate 160, these mechanisms are permitted the slight pivotal movement allowed to the plate, but will return to their original positions due to the resilient action of the springs 167. This feature is desirable for adjusting purposes, and also for equalizing the strain on the thread or the needle as it is held or passed thru the work clamped to the work support.

There are also provided rollers 168 mounted on upright 31 which are engaged by the arms 24 of the needle mechanism both to support the same during their various reciprocations and to lessen the friction between the moving parts and the stationary mountings therefor.

The above described sewing machine thus automatically performs the various steps in the sewing of an umbrella cover to the eye at the end of the rib in an uninterrupted sequence of operations, all of which were previously performed by hand, and in a practical and efficient manner. It is obvious that such a device including automatic sewing, thread severing, and needle threading mechanisms lessens to the lowest possible minimum the time factor in the manufacture of umbrellas as well as decreasing the cost of labor therefor, whereby the production cost of an umbrella is materially decreased.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained. As many changes could be made in carrying out the above construction, without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a machine for sewing a cover to the rib tip of an umbrella, the tip being provided with thread retaining means, in combination, means for clamping the cover to the tip, a needle, means to position the tip with the thread retaining means operatively disposed in the path of the needle, and mechanically operated means to pass successively a thread carried by the needle into the retaining means and thru the associated cover, and about the tip and cover.

2. In a machine for sewing a cover to the rib tip of an umbrella, the tip being provided with thread retaining means, in combination, means for clamping the cover to the tip, a needle, means to position the tip with the thread retaining means operatively disposed in the path of the needle, and mechanically operated means to pass successively a thread carried by the needle into the retaining means and thru the associated cover, and about both sides of the tip.

3. In a device of the character described, in combination, a needle, a work holding clamp adapted to hold an umbrella rib or tip having an aperture therein and fabric to be stitched thereto, means to reciprocate said holding clamp, needle clamps disposed on both sides of said holding clamp, and means to transfer said needle from one to the other of said needle clamps thru the fabric and umbrella rib or tip, said holding clamp being provided with means to position the rib or tip whereby the needle passes thru the aperture therein.

4. In a device of the character described, in combination, a needle, needle clamps adapted to frictionally hold said needle, means to transfer said needle from one to the other of said clamps, and a reciprocable work holding

clamp being provided with means to grip an umbrella rib or tip having an eye therein and fabric to be stitched thereto and to position the rib or tip therein whereby the needle passes thru the eye thereof during the said needle transfer.

5. In a stitching machine of the character described, in combination, a work holding clamp adapted to grip the work therein, a needle, reciprocating needle clamps disposed on both sides of said work clamp, means to transfer said needle from one to the other of said needle clamps, means to return said needle to said first mentioned needle clamp, and means to reciprocate the work clamp and work held therein into and out of, and in a single plane normal to the path of the needle, whereby the needle passes thru and about the work.

6. In a stitching machine of the character described, in combination, a needle, reciprocating needle clamping mechanisms, a work clamp disposed between said needle clamping mechanisms, means to transfer the needle from one of said mechanisms to the other of said mechanisms, and to return the needle to said first mentioned mechanism upon reciprocation of said needle clamping mechanisms, and means to reciprocate said work clamp in a single plane normal to the path of the needle and prior to the return of said needle to said first mentioned mechanism whereby the thread is passed thru and wrapped about the work held in the work clamp.

7. In a machine for sewing an umbrella fabric to the rib tip of an umbrella frame, the rib having an eye or aperture therein, in combination, a needle, needle clamping mechanisms, a supporting clamp for the fabric and tip positioned between said needle clamping mechanisms, means to alternately reciprocate said needle clamping mechanisms, means to transfer said needle from one of said clamping mechanisms to the other of said mechanisms during such reciprocation, means to return said needle to said first mentioned mechanism upon further reciprocation, and means to reciprocate said work support in a plane normal to the path of the needle, said transfer means being operative upon actuation of both said reciprocating means to pass successively the needle thru the eye or aperture in the tip and to return the needle to the first named clamping mechanism about the tip and the fabric associated therewith.

8. In a stitching machine of the character described, in combination, a needle, needle clamping mechanisms, a work supporting clamp disposed between said needle clamping mechanisms, means to transfer the needle from one of said mechanisms to the other of said mechanisms, and to return the needle to said first mentioned mechanism, and means to reciprocate said work supporting clamp in a single plane normal to the path of the needle

prior to the return of said needle to said first mentioned mechanism, whereby the thread is passed thru and wrapped relatively over and under the work held in the work clamp.

9. In a stitching machine of the character described, in combination, a needle, needle clamping mechanisms, a work supporting clamp positioned between said needle clamping mechanisms, means to alternately reciprocate said needle clamping mechanisms, means to transfer said needle from one of said clamping mechanisms to the other of said clamping mechanisms during such reciprocation, means to return said needle to said first mentioned mechanism upon further reciprocation, and means to actuate the work clamp in a plane normal to the path of travel of the needle and out of and back to an initial position in which the work is in the path of travel of the needle during its transfer movement, whereby successive stitches are taken thru and about the same portion of the work.

10. In a stitching machine of the character described, in combination with a set of needle clamps for a needle, and mechanism to cause a plurality of transfers of the needle thru the article to be stitched from one needle clamp to the other needle clamp, of means including a rotatable member having progressively decreasing cam surfaces thereon to decrease the travel of the needle clamps whereby to compensate the travel of said needle clamps with respect to the amount of thread used during the successive stitches.

11. In a stitching machine of the character described, in combination with a set of needle clamps for a needle, and mechanism to cause a plurality of transfers of the needle thru and relatively about the work to be stitched from one needle clamp to the other needle clamp, a thread cutting mechanism operative after the last transfer of the needle and thread carried thereby relatively about the work to sever the doubled thread carried by said needle during such transfer, and to subsequently sever the thread extending from the source of thread supply thru the work resulting from the first transfer of the needle thru the article to be stitched.

12. In a stitching machine of the character described, in combination with a set of needle clamps for a needle, and mechanism to cause a plurality of transfers of the needle thru and relatively about the work to be stitched from one needle clamp to the other needle clamp, of means to sever the thread extending from the source of thread supply thru the work resulting from the first transfer of the needle, and means to rethread the needle, said last mentioned means being operative to tension the thread during said cutting operation.

13. In a stitching machine of the character described, in combination with a set of needle clamps for a needle, and mechanism to cause

a plurality of transfers of the needle from one needle clamp to the other and vice versa, of work clamping mechanism disposed between the needle clamps adapted to hold the work to be stitched, and means to reciprocate the work supporting mechanism in a single plane normal to the path of the needle to relatively raise the work prior to at least one of the needle transfer operations to permit the needle to pass relatively under the work held in said work clamping mechanism and means to reciprocate the work clamping mechanism at least once to permit the needle to be transferred relatively above the work held in said work clamping mechanism.

14. In a stitching machine of the character described, in combination, a needle, a set of needle clamps, a work supporting mechanism positioned between said clamps, means to alternately reciprocate said clamps, means to cause a plurality of transfers of said needle from one needle clamp to the other needle clamp and vice versa during such reciprocation of said clamps, means to raise and lower said work supporting mechanism prior to at least two of the transfer operations to permit the needle to be transferred from one needle clamp to the other needle clamp both under and over the work carried in the work supporting mechanism, means to compensate the throw of said clamps with respect to the amount of thread used, means operative to sever the thread carried by said needle during its last transfer actuation, and to sever the thread extending from the source of thread supply and carried by the needle on its first transfer actuation, and means to rethread the needle.

15. Mechanism for sewing the fabric cover to an apertured umbrella rib or tip, comprising means for holding said rib or tip and fabric in associated relation, means to suc-

cursively pass a needle and thread carried thereby thru the fabric and aperture of the rib or tip, means to move said fabric and rib or tip out of the path of said needle whereby the thread is passed about the fabric and rib or tip, and means to position the rib or tip in said first named means whereby the needle passes thru the aperture in the rib or tip.

16. In a machine for sewing a cover to the rib tip of an umbrella, the tip being provided with an eye, in combination, a needle, means for clamping the umbrella cover to the tip, means to position the tip with the eye operatively related to the needle, and mechanically operated means to successively pass a thread carried by the needle thru the eye of the tip and associated cover, and about the tip and cover.

17. In a machine for sewing a cover to the rib tip of an umbrella, the tip being provided with an eye, in combination, a needle, means for clamping the umbrella cover to the tip, means to position the tip with the eye operatively related to the needle, and mechanically operated means to successively pass a thread carried by the needle thru the eye of the tip and associated cover, and about either side of the tip.

18. In a machine for sewing a cover to the rib tip of an umbrella, the tip being provided with an eye, in combination, a needle, means for clamping the umbrella cover to the tip, means to position the tip with the eye operatively related to the needle, and mechanically operated means to successively pass a thread carried by the needle thru the eye of the tip and associated cover, and about both sides of the tip.

Signed at Lancaster, Pennsylvania this 13th day of April 1925.

MICHAEL M. SCHARF.