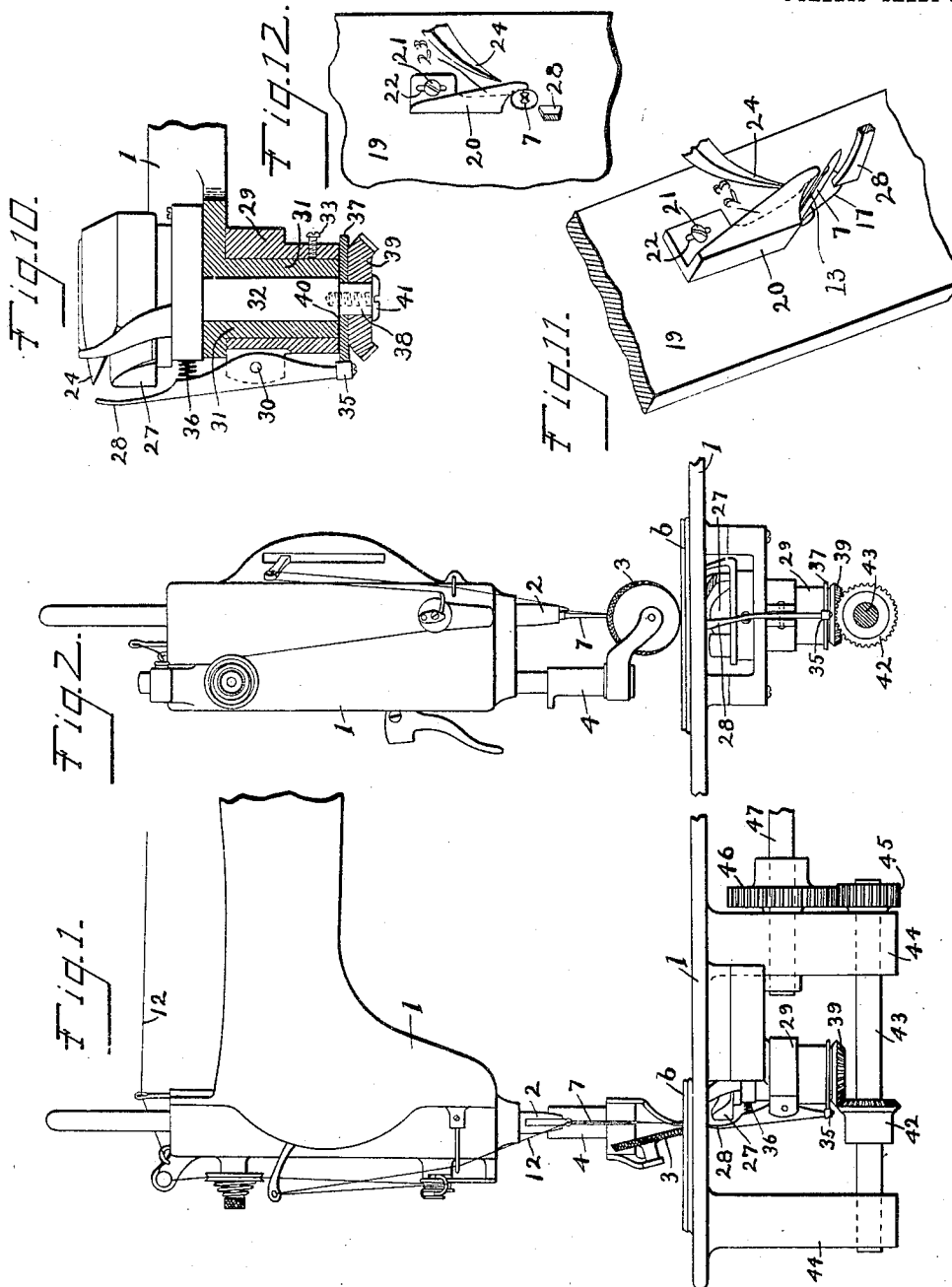


W. F. LAUTENSCHLAGER.
SEWING MACHINE.
APPLICATION FILED APR. 17, 1907.

959,948.

Patented May 31, 1910.

3 SHEETS—SHEET 1.



Witnesses.

Homer Bradford.
Cordelia O'Hearn.

Inventor.

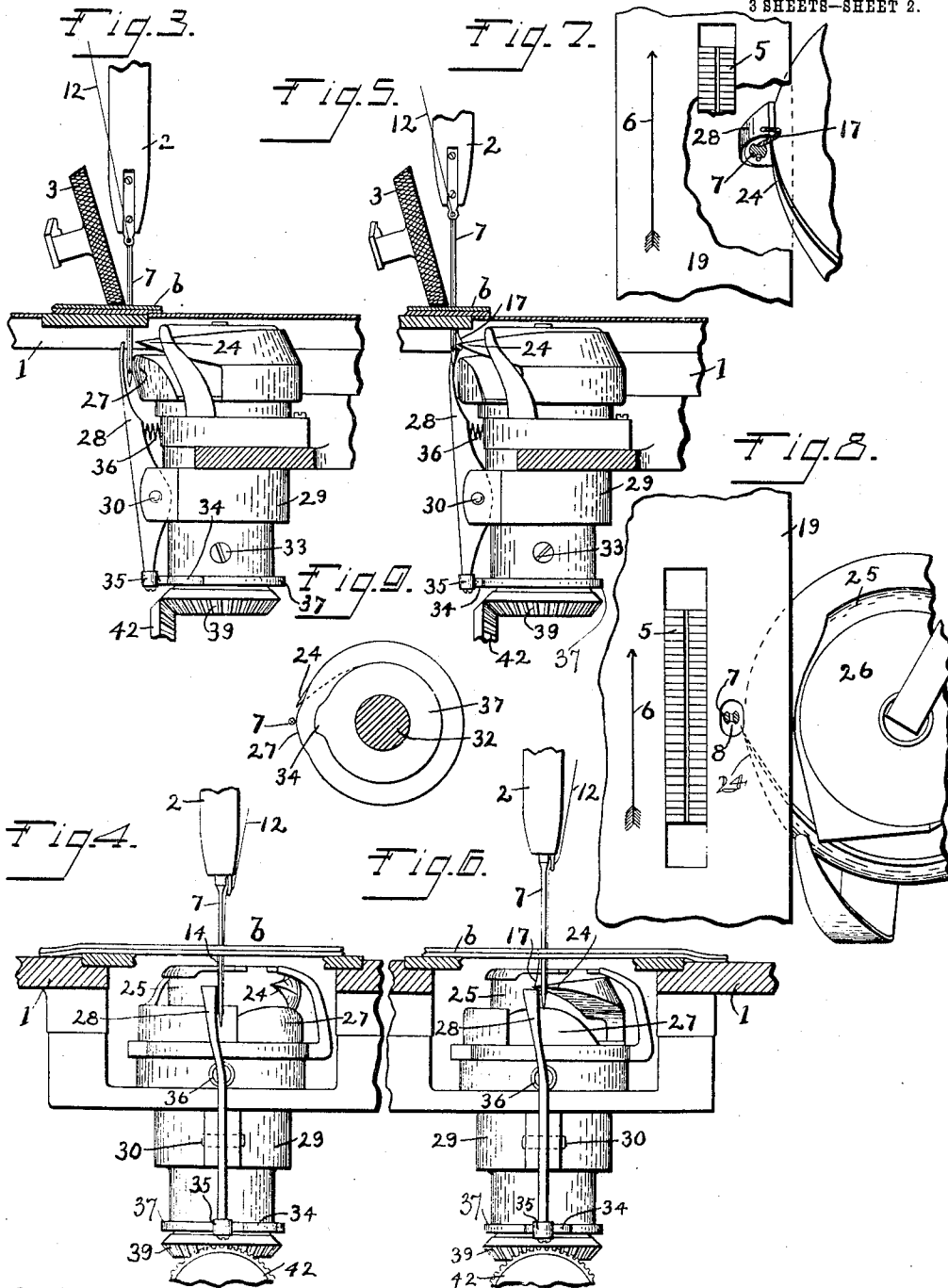
William F. Lautenschlager,
by R. F. Heitzler,
His Attorney.

W. F. LAUTENSCHLAGER.
SEWING MACHINE.
APPLICATION FILED APR. 17, 1907.

959,948.

Patented May 31, 1910.

3 SHEETS—SHEET 2.



Witnesses.
Homer Bradford.
Gordelia O'Hearn

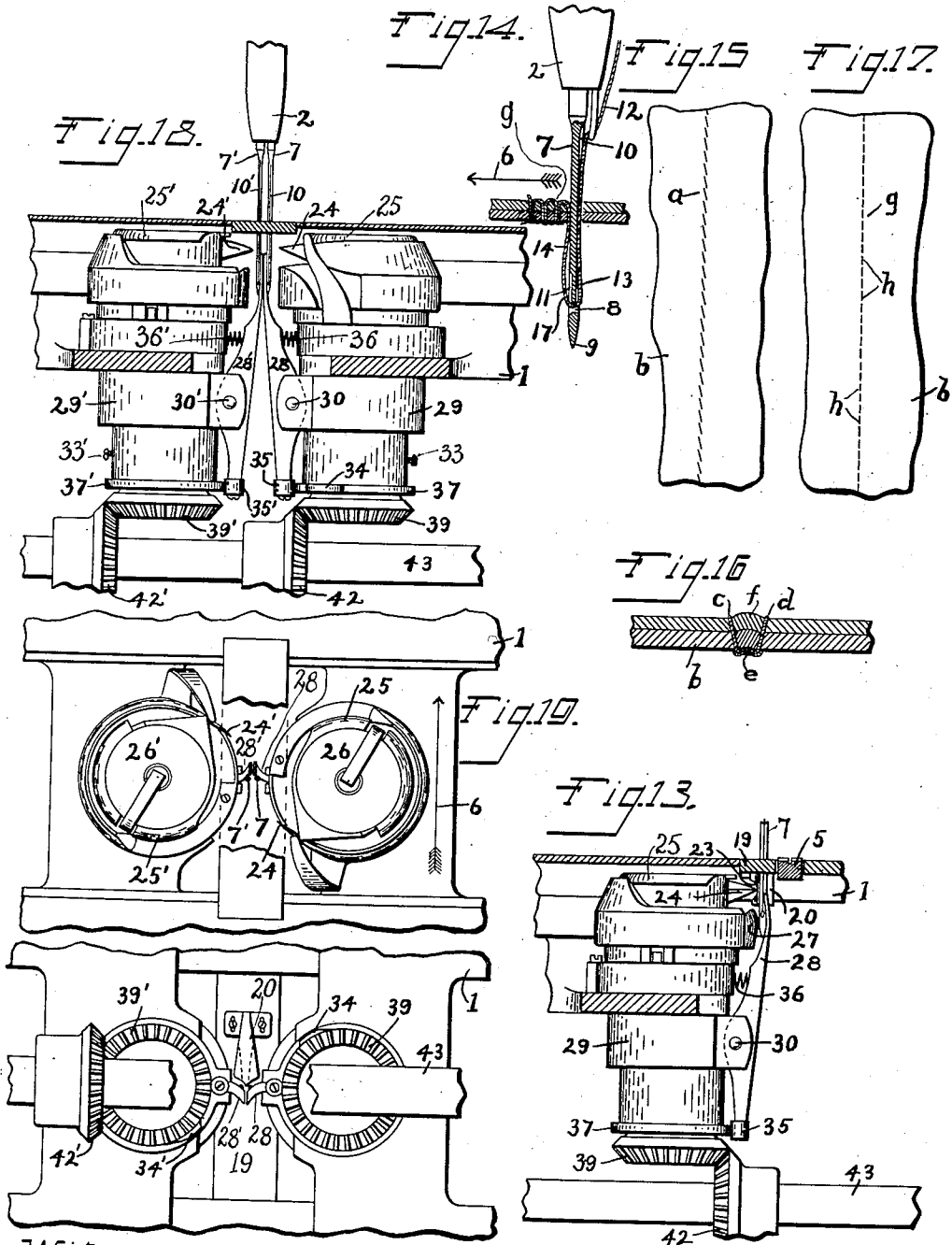
Inventor
William F. Lautenschlager,
By H. P. Hulsbath
Attorney

W. F. LAUTENSCHLAGER.
SEWING MACHINE.
APPLICATION FILED APR. 17, 1907.

959,948.

Patented May 31, 1910.

3 SHEETS—SHEET 3.



Witnesses. Fig. 20.
Homer Bradford.
Dorothy O'Stearn

Inventor
William F. Lautenschlager,
by H. S. Harkley
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM F. LAUTENSCHLAGER, OF CINCINNATI, OHIO.

SEWING-MACHINE.

959,948.

Specification of Letters Patent. Patented May 31, 1910.

Application filed April 17, 1907. Serial No. 368,735.

To all whom it may concern:

Be it known that I, WILLIAM F. LAUTENSCHLAGER, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

My invention relates primarily to a sewing machine employing a needle having an eye at its penetrating end extending or opening in a direction substantially parallel with the seam or feed so that the loop formed by the withdrawal of the needle will also be normally substantially parallel with said seam or feed.

The invention consists in providing new and improved adjustable means whereby said loop is directed sidewardly for being properly received by a loop-taker or penetrator moving at the side of the needle, whether said loop-taker or penetrator be a hook, shuttle, or other reciprocating, rotary or oscillating loop-taking or penetrating device.

My invention consists further in providing a rotary loop-taker and a loop-shifter, the loop-taker having a hook and the loop-shifter being operated by a cam, the said hook and cam being so located about the rotary axis of said loop-taker as to cause operation of the loop-shifter in advance of the arrival of said hook at the loop position; and further in means for shifting the angular positions of the loop-shifter.

My invention consists further in providing new and improved adjustable means for protecting the supply-limb of said loop from engagement by the hook of the loop-taker or penetrator.

My invention consists further in providing a multi-needle sewing machine with a plurality of loop-takers or penetrators, and with needles having eyes opening in substantially the direction of feed of the machine located between said loop-takers or penetrators, and with means for directing the thread-loops in opposite directions for engagement by said respective loop-takers or penetrators; and further, in the parts, and in the construction, arrangement and combinations of parts, hereinafter more fully described and claimed.

In my improved device I employ a needle having an eye projected in substantially the direction of the seam or feed for forming a loop at the back of the needle, which loop I

guide laterally for causing it to extend in a direction transverse to the direction of extension of the needle-eye, and I employ a loop-taker or penetrator at the side of the needle for taking or penetrating the loop thus guided or directed out of its normal position, and I prefer that the loop-taker or penetrator at the initiating of the loop-taking or penetrating shall move substantially parallel with the direction of extension of the needle-eye at the point adjacent to the needle when receiving or penetrating the loop.

I have illustrated one form of device which my invention may assume, illustrating my invention in connection with a so-called rotary loop-taker for forming a lock-stitch, with a mechanically operating loop-shifter for directing the loop into the path of the hook of the loop-taker.

In the drawings: Figure 1 is a front elevation of so much of a sewing machine as is necessary to show in connection with my invention, the same having my invention applied thereto, with the supply-limb shield omitted for better illustration of parts. Fig. 2 is a head-end elevation of the same. Fig. 3 is an enlarged front elevation of my invention, with the supply-limb shield omitted, showing the needle in its lowermost penetrated position, with the needle about to ascend for forming the loop. Fig. 4 is a side elevation of the same. Fig. 5 is a front elevation of my invention, with the supply-limb shield omitted, showing the loop formed and directed sidewardly and just received by the loop-taker or penetrator. Fig. 6 is a side elevation of the same. Fig. 7 is a plan view, partly broken away, showing my invention, with the loop-taker or penetrator in its position for initially receiving or penetrating the loop. Fig. 8 is a plan view partly broken away showing the relation between the needle and its eye, the loop-taker or penetrator, and the direction of feed. Fig. 9 is a bottom view showing the relation between the loop-taker or penetrator, the needle, the needle guard, and the actuating cam for the loop-finger. Fig. 10 is a side elevation partly in central vertical section, of the loop-taker and finger and showing the operative connection between the same. Fig. 11 is a bottom perspective view showing the relation between the needle, the loop-taker, the finger, and the shield for the supply-limb of the needle-thread.

Fig. 12 is a bottom view of the same. Fig. 13 is a rear view of my invention with the supply-limb shield in position. Fig. 14 is an enlarged view, in side elevation, partly in section, showing the needle being withdrawn from the material, with the thread-loop partially formed. Fig. 15 is a plan view showing the face side of the stitching made when employing a needle having a sidewardly opening eye and a loop-taker or penetrator at the side of the needle. Fig. 16 is a cross-section of the stitching made on a two-needle sewing machine employing a single loop-taker or penetrator for both loops of the two needle threads. Fig. 17 is a plan view showing the face side of stitching made when employing my invention. Fig. 18 is a front elevation of my invention as applied to a two-needle sewing machine, with the supply-limb shield omitted. Fig. 19 is a plan view thereof, partly broken away; and Fig. 20 is a bottom view of my invention applied to a two-needle sewing machine.

1 represents the frame of a sewing machine in which a needle-bar 2 is caused to reciprocate in any suitable or usual manner.

3 is a presser-wheel which may also take the form of a presser-foot and be supported on a presser-bar 4 in any suitable manner.

5 is a feeder which is caused to reciprocate forwardly and back in any suitable manner for causing the material, shown at *b*, to be fed under the needle, not more particularly shown because well-known, the direction of movement of the feeder and the normal direction of extension of the seam being indicated by the arrow 6.

7 is a needle which has an eye 8 adjacent its point 9, which eye extends in the direction of the seam, that is, parallel with the direction of reciprocation of the feed-rack as indicated by the arrow. The needle has its long groove 10 at its front and at its rear it has its short groove 11. The thread 12 passes through the eye with its supply-limb 13 received by the long groove 10 when piercing the goods and its seam-limb 14 received by the short groove 11 when the needle pierces the material. The stretch of the needle-thread passing through the needle-eye with the supply-limb 13 and the seam-limb 14 lies in a line parallel with the line of movement of the feeder. This insures that the laying of the needle-thread will be continuously in the direction of the seam or feed both during the formation of the seam and after the seam is completed. In this manner a straight seam *g* is formed in which the stitches *h* are parallel with the seam as shown in Fig. 17, the zig-zag effect, shown at *a* in Fig. 15, resulting from the employment of a needle having an eye extending at right angles to the line of feed, being avoided.

When the needle has pierced the material and its ascent or return is initiated, a loop 17 is formed which normally extends in a direction parallel with the needle-eye. This loop comprises the seam-limb 14 at the short groove side of the needle, shown at the rear side of the needle in the present exemplification, which is the part of the loop adapted to receive the loop-taker or penetrator. This seam-limb extends from the seam already formed to the needle-eye. The loop also comprises the supply-limb 13. The bend in this part of the loop is however slight. It is formed at the long-groove side of the needle, but as the thread at this side of the needle lies in the long groove, the frictional contact between the thread and the material is thereby relieved and the thread of this supply-limb has a tendency to pass upwardly with the needle so that but a slight bend is formed therein. In order however to protect this bend or supply-limb from being engaged by a loop-taker or penetrator, I provide the throat-plate 19, through which the needle passes, with a shield 20, between which shield and the needle, the supply-limb of the loop is received. This shield is adjustably secured to the throat-plate by a screw 21 passing through a slot 22 in the shield into the throat-plate. The shield has a clearance-recess 23 for the loop-taking hook.

At the side of the needle I provide a suitable loop-taker or penetrator which may be of suitable form or design. In the present exemplification of my invention I have shown a rotary loop-taker of usual construction, comprising a rotating hook 24 adapted to engage the loop 17 and guide it around a suitable bobbin-holder or shuttle 25 having a bobbin 26 therein, the bobbin carrying the lower or locking-thread of the seam, the present exemplification of my invention showing a lock-stitch sewing machine. This loop-taker may also have a usual needle-guard 27 thereon, shown as a protrusion on the loop-taker, against which the needle may impinge in its descent for preventing bending or breaking of the needle, or contact therewith by the loop-taker. The loop formed at the short-groove face of the needle is normally projected parallel with the seam or direction of feed, and suitable mechanism is employed for directing this loop out of its normal position laterally into a position for being received by the loop-taker or penetrator at the side of the needle. I have shown this loop-shifter as a moving device comprising a finger adapted to engage the loop and force it sidewardly into the path of the hook or receiving-point of the loop-taker or penetrator. Thus, in the present exemplification, a finger 28 is adapted to engage the loop for shifting the same. 29 is a collar to which the finger is pivoted

on a pin 30, the collar in the present instance being adjustable about the bearing 31 in which the loop-taker shaft 32 is journaled, a set-screw 33 securing the collar in place after adjustment.

34 is a cam for moving the finger. It is secured to the shaft 32. The finger may be provided with an anti-friction roll 35 adapted to be contacted by the cam. A spring 36 bearing against the finger and a stationary part of the machine normally holds the finger out of loop-shifting position.

I have found it desirable to operate the finger from the loop-taker shaft, as by this means proper relative sequence of operation may be assured between the motion imparted by the cam to the finger and the bringing of the loop-taker hook into proper position for taking the loop thus shifted. Suitable adjustment may be provided between the cam and said shaft as by placing the cam on a disk 37 received about the reduced end 38 of the shaft and adjustably positioned and clamped between the bevel-gear 39 on the shaft 32 and the shoulder 40 on the shaft by means of a bolt 41 threaded into the end of the shaft. This adjustment permits relative timing between the operation of the finger and the arrival of the loop-taking hook at the loop-taking position, and permits wear to be taken up. The adjustment between the collar 29 and the bearing 31 is provided so that the finger may be shifted nearer to or farther from the needle for properly engaging the loop while avoiding contact with the needle. For driving the bevel-gear 39, it may be meshed by a bevel-gear 42 on a shaft 43 journaled in bearings 44 and having a pinion 45 thereon meshed by a gear 46 on the crank-shaft 47 of the machine.

A further advantage of my invention is that smaller needles may be employed for a given number in thickness of thread because a needle having a shallower long longitudinal groove may be used, as in my invention the contact of the thread and needle-groove is removed from the presser-roll or presser-foot and also from the needle-guard. This contact of the needle-thread with the presser-roll or presser-foot and needle-guard in previous constructions resulted in injuring the fiber of the needle-thread by continual abrasion against the presser-roll or foot and guard in the up and down reciprocation of the needle, rendering the thread liable to be torn. The continual contact between the walls of the long longitudinal groove of the needle with the presser-roll or foot in previous constructions also resulted in wearing down the groove and in turn further damaging the thread by abrasion with the presser-roll or foot. In order to reduce this difficulty to the minimum, in old constructions it was customary to use a

comparatively large needle for a given thread. As I remove the grooves from contact with the presser-roll or foot, I avoid the damaging effect to both thread and needle, and I am further permitted thereby to use a smaller needle for a given number of thread as the needle-thread lies in the path of the feed or seam and removed from contact with the presser-roll or foot and needle-guard. This has the further advantage that in machines employing a plurality of reciprocating needles simultaneously, I am permitted to bring the seams closer together through my ability to employ smaller needles, and instancing for instance a two-needle machine, by reason of my being able to employ needles of smaller cross-section, I make smaller holes in the material being sewed, thereby causing less damage to the material and leaving greater unpierced material between seams, resulting in stronger finished goods, and I further avoid bunching of the goods between seams.

In old constructions of two-needle machines in which the needle-threads extended laterally through the eyes of the needles, provision had to be made for holes, penetrating the material being sewed, of sufficient diameter to receive in lateral extension not only two needles but also two limbs each of two needle-threads, namely, the supply and seam-loop limbs, making two needles and four threads in all. In my invention, however, the needle-threads extending in the direction of the length of the seam or feed, no provision need be made for thread-limbs between needles, thus enabling me to bring the needles closer together or else leaving greater uninjured stock between the seams.

In the exemplification of my invention as applied to a two-needle machine shown in Figs. 18, 19 and 20, the needles are represented as placed side by side. In this exemplification of my invention the seam-loop of each seam normally extends in substantially the direction of length of the seam or feed as shown in the single-needle machine, and I provide a loop-shifter for each loop for shifting each loop laterally out of its normal plane of extension so that the two loops will be directed away from each other toward opposite sides of the respective needles and sidewardly of the respective needles for being received by suitable loop-takers or penetrators operating at the respective sides of the needles. I provide a separate loop-taker or penetrator for each needle-thread so that two distinct seams will be formed for permitting the material to lie in its normal plane, without danger of being bunched or forming ribs between the seams as shown in Fig. 16, in which *f* shows the rib, *c d* represent the two seams, and *e* the knot at the back of the seams which is formed when a single loop-taker is em-

ployed for both seams. Thus I provide a loop-taker, bobbin-holder and bobbin, which may also take the form of a shuttle, boat or other desirable loop-taker or penetrator, and loop-shifter, at the respective right-hand and left-hand sides of the needles. In this exemplification of my invention I have in the drawings designated the parts on the left of the needles by similar reference numerals to those by which the parts at the right-hand side are designated, but provided with the exponent prime.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a sewing machine, the combination with a needle having a thread-eye, of a rotary loop-taker having a loop-penetrating hook, a loop-shifter having a contact-part thereon in rear of said needle for directing the seam-limb of the loop laterally into the plane of operation of said loop-penetrating hook, operating means between said loop-taker and shifter for operating the same in unison, a shield acting on the supply-limb of said loop maintaining said supply-limb out of range of said hook of said loop-taker, and means for adjusting said shield toward and from the path of movement of said needle, substantially as described.

2. In a sewing machine, the combination with a needle having a thread-eye, of a rotary loop-taker, a loop-shifter having a contact-part thereon in rear of said needle for directing the seam-limb of the loop laterally into the plane of operation of said loop-taker, operating means between said loop-taker and shifter for operating the same in unison, a shield acting on the supply-limb of said loop for maintaining said supply-limb out of range of the point of said loop-taker, and means for adjusting said shield toward and from the path of movement of said needle, said shield having a clearance-recess for said loop-taker, substantially as described.

3. In a sewing machine, the combination with a needle having a thread-eye extending substantially parallel with the direction of feed of the machine, of a loop-penetrator operating at the side of said needle, means for directing the seam-limb of the loop formed by withdrawal of said needle laterally of the needle for receiving said loop-penetrator, said means having a contact-part for said seam-limb in rear of said needle, a shield acting on the supply-limb of said loop for maintaining said supply-limb out of range of the point of said loop-taker, and means for adjusting said shield toward and from the path of movement of said needle, substantially as described.

4. In a sewing machine, the combination with a needle having an eye at its piercing end, a loop-taker operating at one side and a

loop-shifter having an engaging part for the seam-limb of the loop normally at the other side of the vertical plane of extension of said needle-eye, said loop-shifter operating across the rear face of said needle, a supply-limb shield at the forward face of said needle acting on the supply-limb of the loop for maintaining said supply-limb out of range of the point of said loop-taker, and means for adjusting said shield toward and from the path of movement of said needle, substantially as described.

5. In a sewing machine, the combination with a needle having a thread-eye extending substantially parallel with the direction of feed of the machine, a loop-taker rotating at the side of said needle, a finger for directing the seam-limb of the loop laterally into the plane of operation of said loop-taker, said finger having a contact-part for said loop operating across the rear face of said needle, means for rotating said loop-taker, a cam rotated by said latter means for operating said finger, means for adjusting said cam about its rotary axis and a spring for normally retracting said finger, substantially as described.

6. In a sewing machine, the combination with a needle having a thread-eye extending substantially parallel with the direction of feed of the machine, a loop-taker rotating at the side of said needle, a finger for directing the seam-limb of the loop laterally into the plane of operation of said loop-taker, said finger having a contact-part for said loop operating across the rear face of said needle, means for rotating said loop-taker, a shield for the supply-limb of said loop, a cam rotated by said latter means for operating said finger, means for adjusting said cam about its rotary axis and a spring for normally retracting said finger, substantially as described.

7. In a sewing machine, the combination with a needle having a thread-eye extending substantially parallel with the direction of feed of the machine, a loop-taker rotating at the side of said needle, a finger for directing the seam-limb of the loop laterally into the plane of operation of said loop-taker, means for rotating said loop-taker, a cam rotated by said latter means for operating said finger, and a spring for normally retracting said finger, said cam and finger having adjustment between them for timing the operation of said finger, substantially as described.

8. In a sewing machine, the combination with a needle having a thread-eye extending substantially parallel with the direction of feed of the machine, a loop-taker rotating at the side of said needle, a finger for directing the seam-limb of the loop laterally into the plane of operation of said loop-taker, means for rotating said loop-taker, a shield for the supply-limb of said loop, a cam ro-

tated by said latter means for operating said finger, and a spring for normally retracting said finger, said cam and finger having adjustment between them for timing the operation of said finger, substantially as described.

9. In a sewing machine, the combination of a rotary loop-taker, a loop-shifter for shifting the loop formed by withdrawal of the needle laterally into the plane of operation of said loop-taker, said loop-taker having a loop-taking hook, a cam for operating said loop-shifter, said cam and loop-taker rotating together, and said cam and hook located radially of the rotary axis of said loop-taker in such positions as to shift said loop-shifter by said cam in advance of the arrival of said hook at the loop-position in its rotation, substantially as described.

10. In a sewing machine, the combination of a rotary loop-taker, a loop-shifter for shifting the loop formed by the withdrawal of the needle laterally into the plane of operation of said loop-taker, said loop-taker having a loop-taking hook, a cam for operating said loop-shifter, said cam and loop-taker rotating together, said cam and hook located radially of the rotary axis of said loop-taker in such positions as to shift said loop-shifter by said cam in advance of the arrival of said hook at the loop-position in its rotation, and means for relatively adjusting the angular distance between said cam and hook, substantially as described.

11. In a sewing machine, the combination, of a loop-penetrator, a loop-shifter for shifting the loop formed by the withdrawal of the needle laterally into the path of operation of said loop-penetrator, and means for permitting adjustment of said loop-shifter toward and from the longitudinal axis of said needle.

12. In a sewing machine, the combination, with a needle having an eye at its piercing end extending in substantially the direction of feed of said machine, a loop-penetrator operating at the side of said needle, a finger for shifting the loop formed in the needle-thread by withdrawal of said needle laterally into the path of said loop-penetrator, and means for permitting adjustment of said finger toward and from the longitudinal axis of the needle.

13. In a sewing machine, the combination of a rotary loop-taker, a finger having a contact-part for shifting the loop formed in the needle-thread by withdrawal of the needle laterally into the path of said loop-taker, a pivot for said finger, and means for permitting adjustment of said pivot for adjusting the contact-part of said finger for the loop toward and from the longitudinal axis of said needle, substantially as described.

14. In a sewing machine, the combination, of a rotary loop-taker, a finger having a

contact-part for shifting the loop formed in the needle-thread by withdrawal of the needle laterally into the path of said loop-taker, a pivot for said finger, means for permitting adjustment of said pivot for adjusting the contact-part of said finger for the loop toward and from the longitudinal plane of said needle, a cam for operating said finger, and means permitting adjustment between said cam and finger, substantially as described.

15. In a sewing machine, the combination, of a rotary loop-taker, a finger having a contact-part for shifting the loop formed in the needle-thread by withdrawal of the needle laterally into the path of said loop-taker, a pivot for said finger, means for permitting adjustment of said pivot for adjusting the contact-part of said finger for the loop toward and from the longitudinal plane of said needle, and a cam for operating said finger, substantially as described.

16. In a sewing machine, the combination, with a needle having a thread-eye at its piercing end substantially parallel with the direction of feed of said machine, of a rotary loop-taker at the side of the vertical plane of extension of said eye, a finger for shifting the loop formed by the withdrawal of the needle into the path of operation of said loop-taker, a collar adjustable about the rotary axis of said loop-taker, and a pivot for said finger on said collar, substantially as described.

17. In a sewing machine, the combination with a needle having a thread-eye at its piercing end substantially parallel with the direction of feed of said machine, of a rotary loop-taker at the side of the vertical plane of extension of said eye, a finger for shifting the loop formed by the withdrawal of the needle into the path of operation of said loop-taker, a collar adjustable about the rotary axis of said loop-taker, a pivot for said finger on said collar, and a cam for said finger rotating with said loop-taker, substantially as described.

18. In a sewing machine, the combination, with a needle having a thread-eye at its piercing end substantially parallel with the direction of feed of said machine, of a rotary loop-taker at the side of the vertical plane of extension of said eye, a finger for shifting the loop formed by the withdrawal of the needle into the path of operation of said loop-taker, a collar adjustable about the rotary axis of said loop-taker, a pivot for said finger on said collar, a cam for said finger rotating with said loop-taker, and means for permitting adjustment of said collar and said cam about the rotary axis of said loop-taker, substantially as described.

19. In a two-needle sewing machine, the combination with the needles, each of which has an eye opening in substantially the di-

rejection of feed of said machine, of a loop-penetrator for the needle-thread of each needle operating at the side of its needle, and means for directing the loops formed by the withdrawal of said needles laterally in opposing directions into the respective paths of operation of said respective loop-penetrators.

20. In a two-needle sewing machine, the combination, with a pair of needles, each of which has a thread-eye extending substantially parallel to the direction of feed of the machine, a loop-penetrator for the thread of each needle operating at the side of its needle and at opposite sides of said needles, and loop-shifting means operating upon said needle-threads between the vertical planes of extension of said respective needle-eyes for shifting the loops formed by the withdrawal of said needles laterally into the paths of operation of said loop-penetrators and thereby separating said loops.

21. In a two-needle sewing machine, the combination, with a pair of needles, each of which has a thread-eye extending substantially parallel to the direction of feed of the machine, a loop-penetrator for the seam-limb of each needle operating at the side of its needle and at opposite sides of said needles, loop-shifting means operating upon said seam-limbs between the vertical planes of extension of said respective needle-eyes for shifting the loops of said seam-limb formed by the withdrawal of said needles laterally into the paths of operation of said loop-penetrators and thereby separating said seam-limbs of said loops, and a shielding device for the supply limbs of said loops.

22. In a two-needle sewing machine, the combination with a pair of needles each having a thread-eye extending substantially

in the direction of feed of the machine, a rotary loop-taker for each needle, a loop-shifter for shifting the seam-limb of the loop of each needle formed by the withdrawal of said needle into the plane of operation of its loop-taker, and shielding means for the supply limb of each loop.

23. In a two-needle sewing machine, the combination with a pair of needles each having a thread-eye extending substantially in the direction of feed of the machine, a rotary loop-taker for each needle, and a loop-shifter for shifting the seam-limb of the loop of each needle formed by the withdrawal of said needle into the plane of operation of its loop-taker.

24. In a two-needle sewing machine, the combination with the pair of needles, of a loop-penetrator for each needle, means for separating the thread-loops formed by the withdrawal of said needles respectively into the paths of operation of said respective loop-penetrators, and adjustable means for operating said loop-shifting means.

25. In a two-needle sewing machine, the combination with the pair of needles, of a loop-penetrator for each needle, shifting means for separating the thread-loops formed by the withdrawal of said needles respectively into the paths of operation of said respective loop-penetrators, and means for permitting adjustment of said shifting means toward and from the longitudinal axes of said needles.

In testimony whereof, I have subscribed my name hereto in the presence of two subscribing witnesses.

WILLIAM F. LAUTENSCHLAGER.

Witnesses:

THEODERE C. JUNG,
CORDELIA O'HEARN.