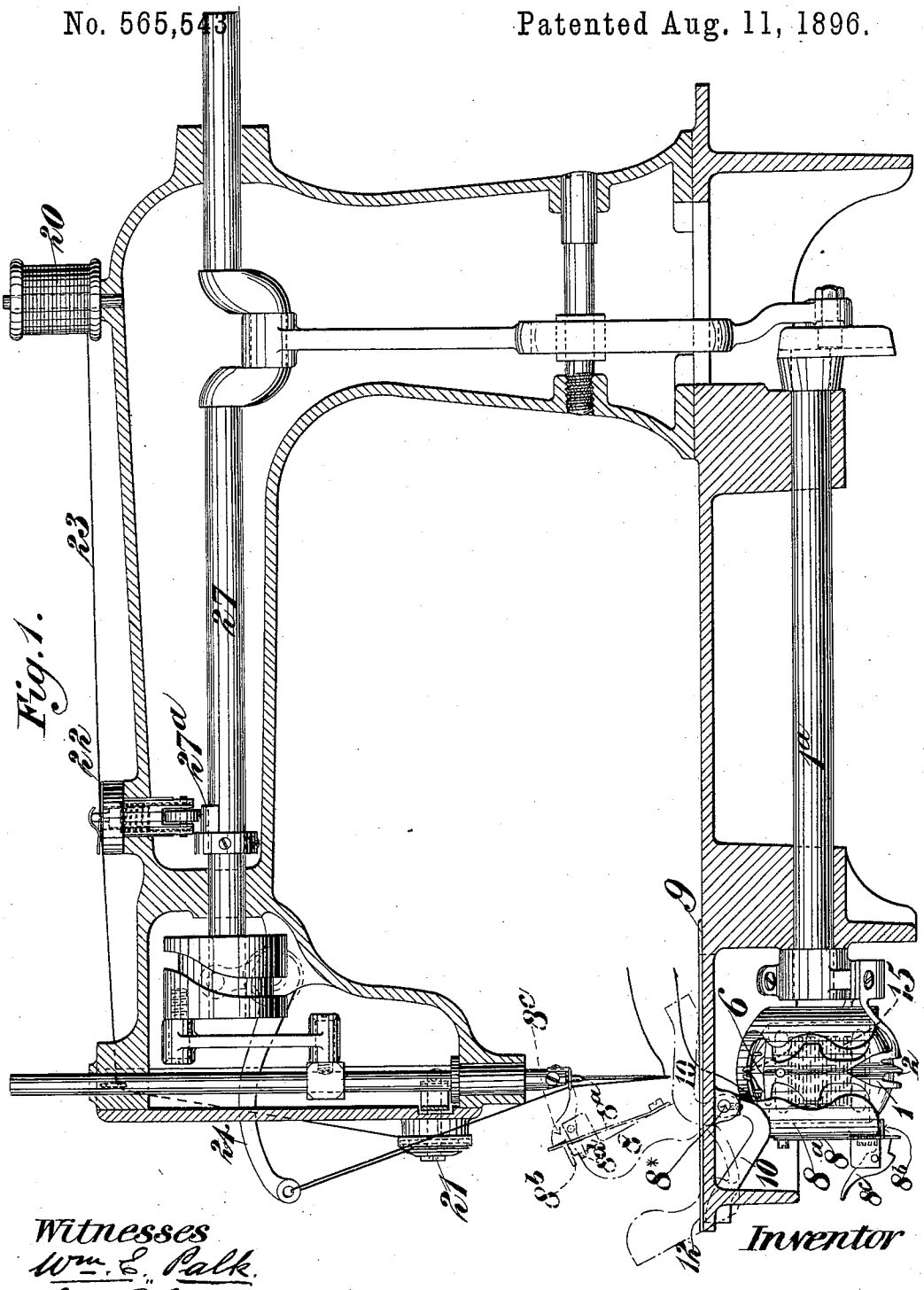
(No Model.) 5 Sheets—Sheet 1.

D. JONES.

SEWING MACHINE.

No. 565,543 Patented Aug. 11, 1896.



Witnesses
Wm. E. Falk.
Henry P. Trueman.

Inventor
Daniel Jones

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(No Model.) 5 Sheets—Sheet 2.

D. JONES.

SEWING MACHINE.

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Fig. 2.

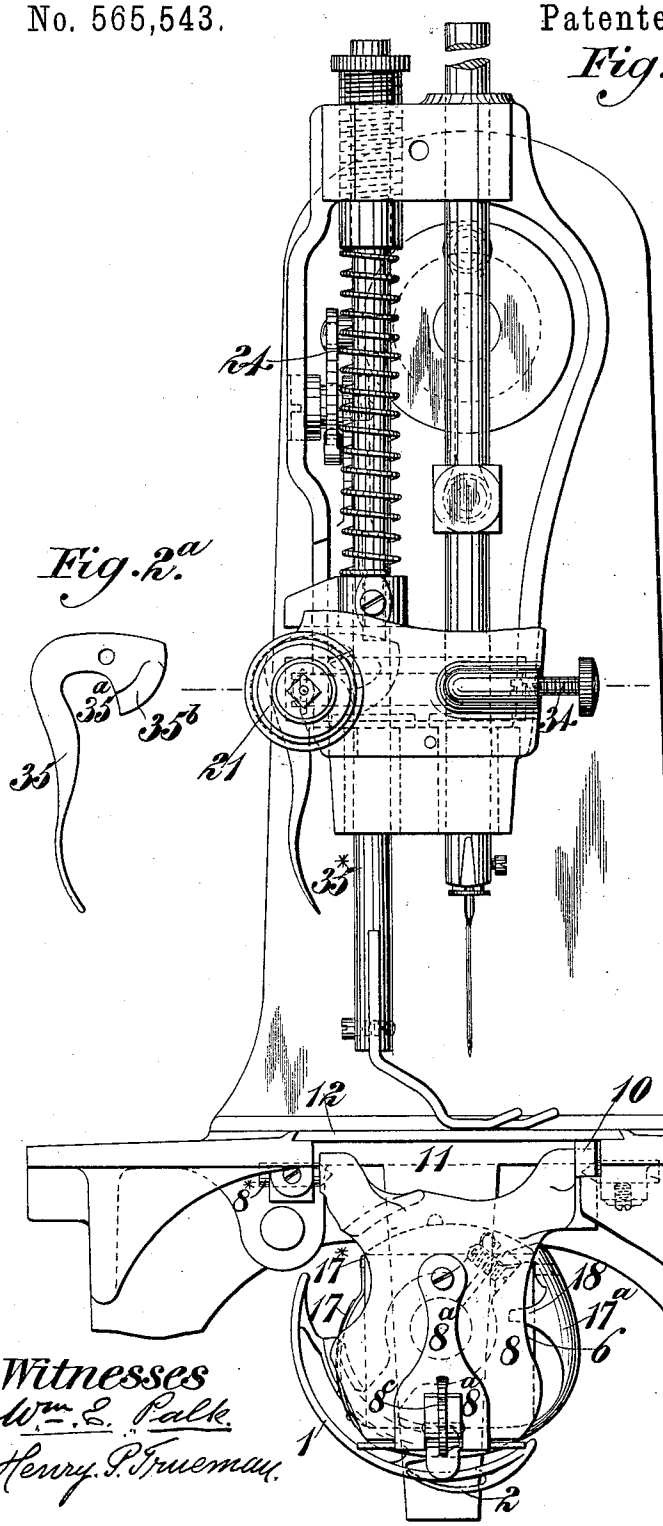


Fig. 2a.

Fig. 7.

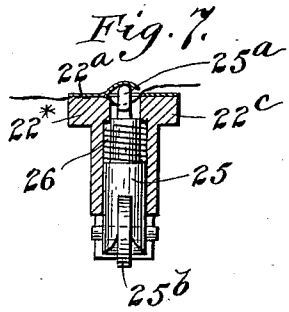


Fig. 8.

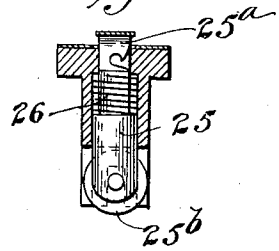
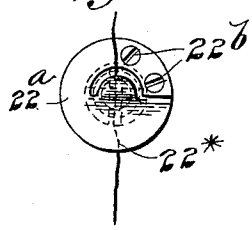


Fig. 9.



Witnesses
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(No Model.) 5 Sheets—Sheet 3.

D. JONES.

SEWING MACHINE.

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Fig. 19.

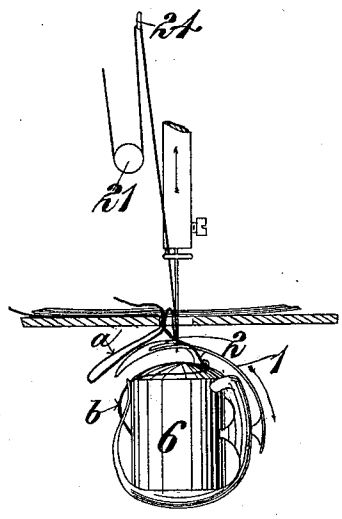


Fig. 20.

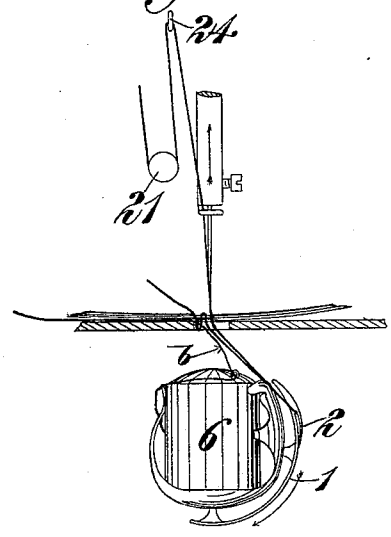


Fig. 3.

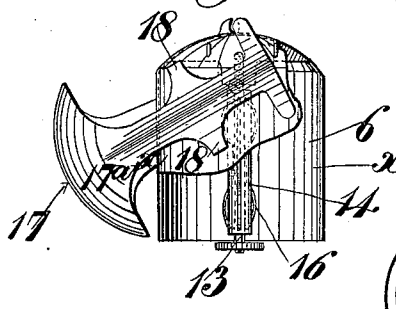


Fig. 5.

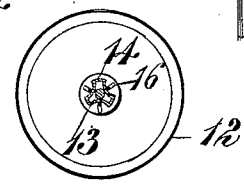


Fig. 4.

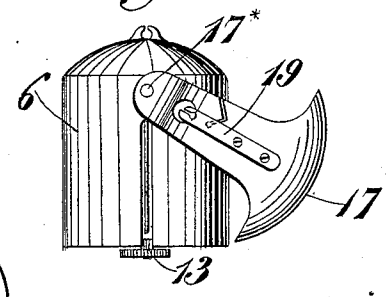


Fig. 10.

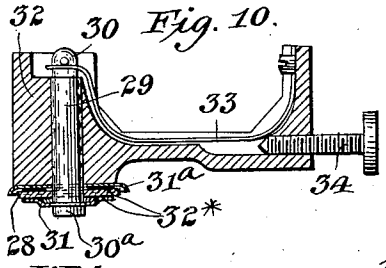
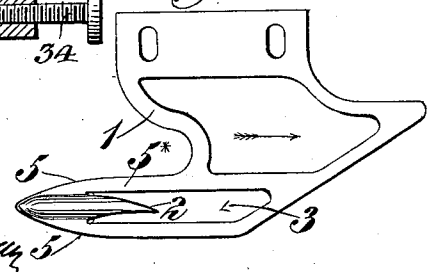


Fig. 6.



Witnesses

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(No Model.) 5 Sheets—Sheet 4.

D. JONES.

SEWING MACHINE.

No. 565,543. Patented Aug. 11, 1896.

Fig. 11.

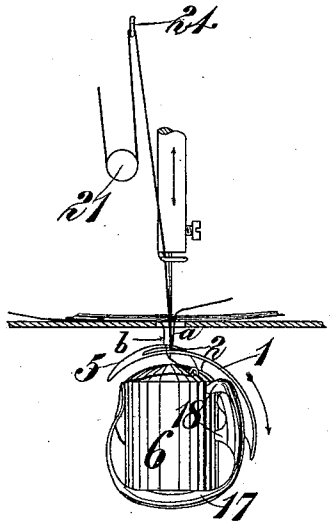


Fig. 12.

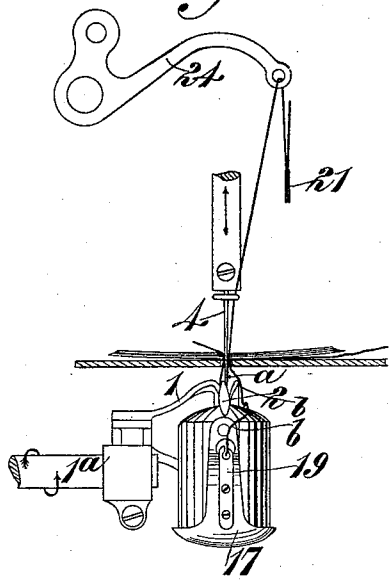


Fig. 13.

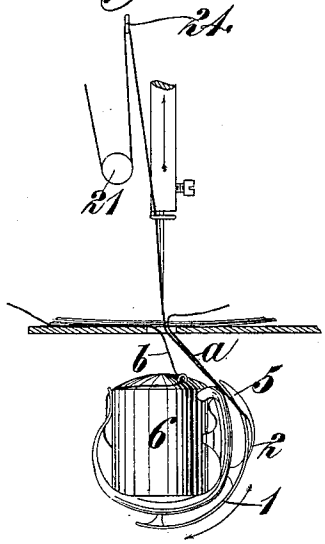
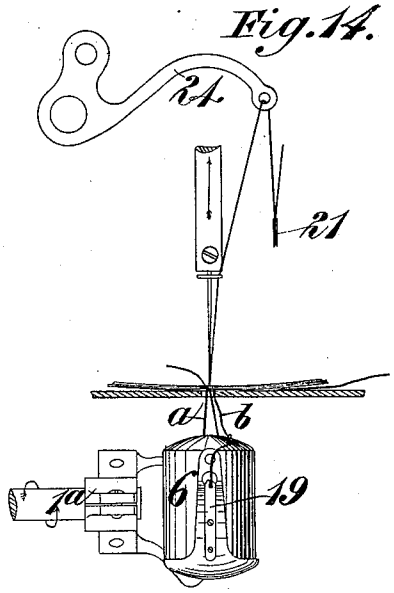


Fig. 14.



Witnesses

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(No Model.) 5 Sheets—Sheet 5.

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SEWING MACHINE.

No. 565,543. Patented Aug. 11, 1896.

Fig. 15.

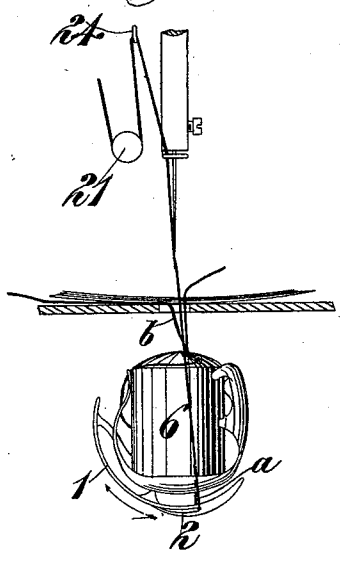


Fig. 16.

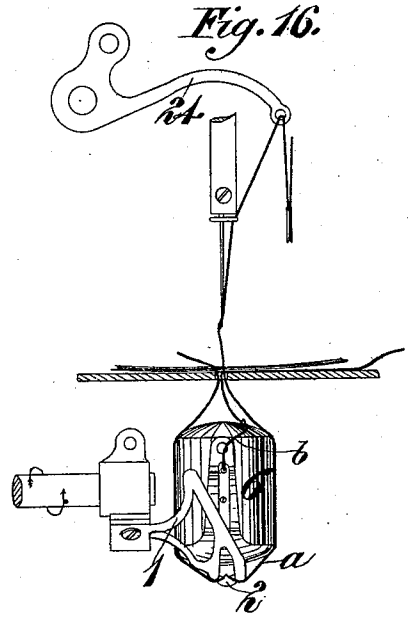


Fig. 17.

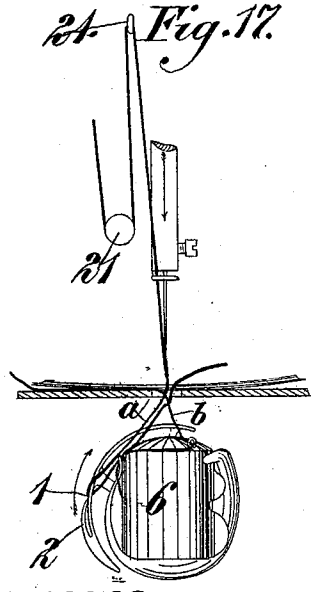
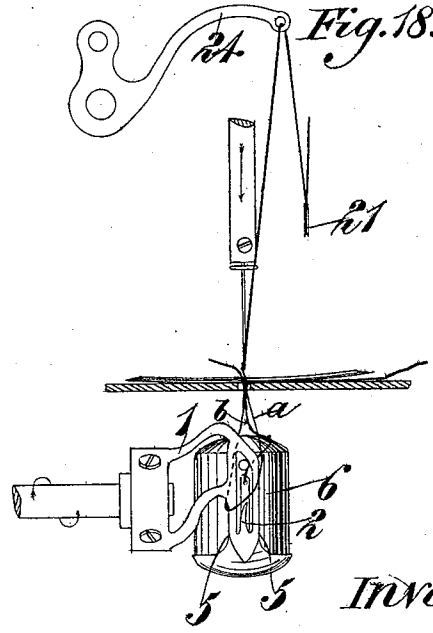


Fig. 18.



Witnesses
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DANIEL JONES, OF BIRMINGHAM, ENGLAND, ASSIGNOR TO THE TWO-REEL LOCK-STITCH SEWING MACHINE COMPANY, LIMITED, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,543, dated August 11, 1896.

Application filed June 3, 1893. Serial No. 476,531. (No model.) Patented in England December 15, 1892, No. 23,092; in France May 20, 1893, No. 230,224; in Germany May 20, 1893, Nos. 75,918, 76,075, and 79,312; in Switzerland May 25, 1893, No. 7,058; in Belgium May 25, 1893, No. 104,818, and in Italy June 30, 1893, No. 34,164/74.

To all whom it may concern:

Be it known that I, DANIEL JONES, a subject of the Queen of Great Britain and Ireland, residing at 62 Albion street, Birmingham, in the county of Warwick, England, have invented Improvements in Sewing-Machines, of which the following is a specification, the said invention having been patented in Great Britain by Letters Patent No. 23,092, dated December 15, 1892; in Belgium by Letters Patent No. 104,818, dated May 25, 1893; in France by Letters Patent No. 230,224, dated May 20, 1893; in Germany by Letters Patent Nos. 75,918, 76,075, and 79,312, dated May 20, 1893; in Italy by Letters Patent No. 34,164/74, dated June 30, 1893, and in Switzerland by Letters Patent No. 7,058, dated May 28, 1893.

This invention relates to improvements in lock-stitch sewing-machines of the kind in which a rotary looper having at its rearward part a hook is used in conjunction with a "take-up" in such a manner that when a loop has been carried by the hook partly around a reel-carrier which is freely supported in a holder carried by an articulated arm a part of the loop will be taken up by the take-up so that the loop will clear the hook, and the rest of such loop will be subsequently taken up by the action of the hook during the formation of the succeeding loop, and so on.

Now, the object of the present invention is to so construct and arrange the various parts of the stitch forming and tension mechanism of such a machine as to render the same more simple and durable and capable of being more readily manipulated than heretofore.

In the accompanying drawings, Figure 1 is a longitudinal vertical section, partly in elevation, of a sewing-machine constructed according to this invention, the presser-foot, feed mechanism, and other parts being removed for the sake of greater clearness. Fig. 2 is a front elevation of the same, the front cover being partly broken away. Fig. 2ª is a detail view hereinafter referred to. Fig. 3 is an elevation, partly in section, of the reel-carrier. Fig. 4 is an elevation thereof as seen from the opposite side to that shown in Fig. 3. Fig. 5 is a section on the line xx, Fig. 3. Fig. 6 is a development of the looper, except that the rearward hook is represented so as to point, as it does in the actual looper, in the direction of rotation. Fig. 7 and 8 are vertical sections at right angles to each other of a "finger-thread" clip according to this invention; and Fig. 9 is a plan of the same. Fig. 10 is a transverse section taken through the upper-thread tension device. Figs. 11 to 20 are diagrammatic views, hereinafter referred to, illustrating the formation of a loop and stitch.

Fig. 1 and Figs. 11 to 20, inclusive, are drawn to a smaller scale than the remaining figures.

Referring to Figs. 1 to 6, inclusive, 1 is the rotary looper, of curved-blade form, secured to the looper-shaft 1ª, which is mounted in bearings below the bed-plate of the machine. This looper, according to this invention, is provided with a hook 2, which points in the direction of rotation of the looper and projects into an opening 3, formed in the curved body of the looper, the arrangement being such that the point of the hook is either within or does not terminate outside the outer surface of the body of the looper. By this means the hook is prevented from reëngaging with the previously-formed loop, which has been partly drawn up by the take-up. The needle 4 of the machine descends through the opening in the work-plate, and the hook as it passes the eye of the needle engages with the loop of the upper thread presented in the ordinary way by the needle, the said loop being partially spread by the sides of the hook 2 as the same continues to rotate. The external or edge formation of the looper is such that during its continued movement the pointed rear portion 5* of the looper will turn or move into the loop, the inclined edges 5 5 of said rear portion acting to spread the loop and to assist in passing it under the reel-carrier 6.

24 is the take-up, by the action of which the loop is drawn clear of the hook 2 at a certain point in each rotation of the looper, that part of the loop which is not taken up by the take-up being taken up by the action

of the looper itself while forming the succeeding loop, as hereinafter explained.

8 is a reel-holder in which the reel-carrier 6 is supported. This holder is mounted between pivot-pins 8*, immediately under the bed or work plate 9, in such a manner that it can be turned upon said pivot-pins so as to occupy a position either above or below the work-plate at the will of the operator. The holder is provided with an arm 10, which serves as a handle for turning the holder into the desired position and also as a means for securing it in the working position. The front end of the bed-plate is formed with an opening or recess 11 to enable the holder to be turned above the bed-plate, as indicated by dotted lines in Fig. 1, so as to allow of the reel-carrier 6 being readily placed in or removed from the holder. The opening 11 is provided with a cover 12, arranged to slide in dovetail grooves, as shown in Fig. 2, and by means of which the arm 10 is held depressed so as to maintain the holder in proper working position. The holder, which may be tubular or may consist of a framework, is provided with a spring-catch for retaining the carrier 6 therein. This catch comprises a spring-blade 8^a secured to the outer side of the holder and provided with a bent portion 8^b, that normally projects beneath the lower edge of the carrier, and a spring-actuated catch 8^c, that extends through an opening in the said spring-blade. The inoperative position of the spring-blade is shown in dotted lines in Fig. 1, but when the blade is pressed inward the inner recessed end 8^d of the catch 8^c engages with it and maintains it in that position.

The reel-carrier 6, which is cup-shaped, is placed in the holder 8 with its closed end uppermost. Depending from its closed end is a pin or stud 13, upon which is mounted a tube 14. Upon this tube, which is free to revolve on the pin 13, the commercial reel 15 or other suitable thread-carrier is placed, springs 16 being provided on the tube 14, which prevent any movement of the reel relatively to the tube. The tube may advantageously be of the cross-section shown in Fig. 5. The lower open end of the reel-carrier 6 is closed by a swinging bail 17 or equivalent device, which will prevent any loose coils of thread that may drop from the reel during the rotation of the same falling in the path of the rotating looper 1, said loose coils being drawn away between the lower end of the pin 13 and the bail, as required. The bail at that side, 17^a, with which the loop is brought in contact is so shaped—for example, wedge-shaped, as shown—that it will tend to spread the loop over the reel-carrier. It is pivoted at 17* to the reel-carrier, so that it can be swung upon its pivots to uncover the open end of the carrier, as shown in Figs. 3 and 4, and is provided with spring horns or projections 18, which bear against the outer part of the reel-carrier and prevent the bail becoming accidentally displaced. The usual under tension-spring 19 is fixed to the bail in the example illustrated, but it may, if desired, be fixed to the reel-carrier 6 itself.

Between the upper reel 20 and the usual upper or needle thread tension device (shown at 21, Figs. 1 and 2) is arranged at the point 22, Fig. 1, a finger thread-clip adapted to normally press upon or clip the upper thread 23, which is released for a short period once during each revolution of the main shaft of the machine. This period of release is so regulated that only sufficient thread can then be drawn from the upper reel to form a stitch. The release occurs during the tying of the last-formed stitch in the material. The finger thread-clip that holds the thread 23 while the take-up lever 24 is operating to take up the slack thread prevents thread being drawn from the upper reel by the action of the take-up. This finger thread-clip, which is shown separately in Figs. 7, 8, and 9, comprises a flat circular sheet-metal spring 22^a, fixed by means of screws 22^b to the top of a flanged tube 22^c, which is arranged upon the arm of the machine in such a manner as to project into the interior thereof. Within the tube 22^c is arranged a finger or plunger 25, formed at its upper end with a hook 25^a, under which the thread 23 is passed. The plunger carries at its lower end an antifriction-wheel 25^b, that is pressed by the action of a spiral spring 26 toward the driving-shaft 27, on which is fixed a cam 27^a, by which the said wheel and plunger will be actuated once in each rotation of the shaft in such a manner that the upper hooked end of the plunger will at the required time come in contact with the spring 22^a and raise the same so as to release the upper thread. Upon the descent of the plunger the thread will be first clipped by the spring 22^a at the point 22*, after which the plunger 25, descending somewhat farther, will pull the thread into the tube 22^c and thus draw a fresh supply of thread from the upper reel, which thread will be taken up and used in the formation of a fresh stitch when the spring is again raised. By this means the drag of the reel is prevented from affecting the evenness of the tension.

The upper-thread tension device (indicated at 21 in Figs. 1 and 2, and shown in detail in Fig. 10) comprises a grooved wheel 28, around which the upper thread is passed, so that the wheel is caused to rotate by the passage of the thread. This grooved wheel is mounted to rotate upon a short sleeve or tubular boss 29, through which passes a loosely-fitting stud 30, the head 30^a of which acts against the grooved wheel either directly or, as shown, through a dished plate 31, which is fitted on the stud, and the rim of which acts to force the wheel inward toward the fixed abutment 32, between which and the wheel is or may be placed another dished plate 31^a.

32* are felt lubricating-washers, arranged between the sides of the wheel and the dished

plates 31 and 31ª. The inner end of the stud 30 engages with a suitably-bent spring 33.

34 is an adjustable set-screw, by which the effort or tension of the spring on the stud 30 can be adjusted so as to vary the power with which the stud forces the grooved wheel 28 inward against its abutment, and thus the resistance tending to prevent the wheel turning. The sleeve or tubular boss 29 serves to protect the stud from transverse strains due to the pull of the thread round the wheel, whereby the tension device is rendered more sensitive than those usually employed. The inner end of the said stud is arranged to engage with the presser-foot gear, so that the tension will be released simultaneously with the raising of the presser-foot. For this purpose, in the arrangement illustrated, the cam 35 used for raising the presser-foot 35* is formed with an aperture or recess 35ª, Fig. 2ª, which, when the presser-foot is down, comes opposite the inner end of the stud 30 and allows the said stud to be moved inward by the spring 33. The said cam is also formed with an inclined surface or groove 35ᵇ, which extends outward from the recess 35ª and gradually decreases in depth, the arrangement being such that when the cam is operated to raise the presser-foot the inner end of the stud will take into this groove and will be thereby forced outward against the action of the spring 33, so as to relieve the wheel 28 from pressure.

Referring to Figs. 11 to 20, inclusive, which illustrate diagrammatically the formation of a loop and stitch, Figs. 11 and 12 are views at right angles to one another, illustrating the looper with hook 2, the reel-carrier 6, with bail 17, the needle 4, the upper-thread tension device 21, and the take-up lever 24. In these figures the hook 2 of the looper is shown engaged with and in the act of spreading a loop *a* of thread which has been formed in the usual manner previous to the engagement of the looper-hook 2 therewith by the upward movement of the needle after it has passed through the material and work-plate into the opening 3 of the looper. The take-up lever 24 at this time is stationary.

Figs. 13 and 14 are similar views to Figs. 11 and 12, indicating approximately the relative positions of the parts after a partial rotation of the looper has caused the hook 2 to draw out the loop *a*, which as it is drawn out is spread by the inclined edges 5 of the rear portion of the looper.

Figs. 15 and 16 are corresponding views to Figs. 13 and 14, indicating approximately the relative positions of the parts at the moment the loop *a* is caused to pass the widest part of the reel-carrier 6. During the movement of the parts from the position shown in Figs. 13 and 14 to that shown in Figs. 15 and 16 the loop *a* will be still further spread or opened by the action of the wedge-shaped part 17ª of the bail 17, so as to facilitate its passage around the widest part of reel-carrier, and the take-up lever will descend to its lowest position. When the loop has passed this part of the carrier, the take-up will ascend so as to take up a portion of the slack thread, and as it rises more rapidly than the looper, it will act to draw the loop clear of the hook 2.

Figs. 17 and 18 show the relative positions of the parts when the take-up has thus drawn the loop clear of the hook 2. As the looper continues to rotate the take-up will continue its ascent until the rear portion of the looper has been withdrawn from the loop, and as the point of the hook terminates within the opening 3 of the looper, all liability of the point of the hook reëngaging the loop at this time is obviated. During the operation of the take-up the finger thread-clip at 22 is closed upon the upper thread, thus preventing thread being drawn from the upper reel by the action of the take-up.

Fig. 19 is a view corresponding to and showing the parts in the same relative positions as in Fig. 14, the looper having passed the loop *a* around the lower thread *b* and engaged a fresh loop presented by the needle. In drawing out this fresh loop the looper-hook 2 as it continues its movement will complete the taking up of the first loop and tie or tighten the stitch thus formed, Fig. 20. Immediately upon the completion of the tying or tightening operation the upper thread 23 is momentarily released from the finger thread-clip at 22, and the slack previously drawn thereby from the upper reel is taken up by the looper.

As will be obvious, some of the hereinbefore-described improvements may be used without others.

What I claim is—

1. In a sewing-machine, the combination of a needle, a take-up device, a lower reel-carrier, and a rotary looper constructed with a needle slot or opening for the passage of said needle and with a pointed rearwardly-projecting part located in rear of said slot or opening, and provided with two lateral outer guiding edges, and with an outwardly-bent hook, that extends forwardly over said slot or opening points in the direction of rotation, and has its point projecting into said slot or opening, the point of said rearwardly-projecting part of said looper being adapted, during the rotation of the looper, to pass through, and said two lateral edges to widen out in a direction perpendicular to the plane of rotation of the said hook, a loop of thread held by said hook, so as to facilitate the passage of said loop around said lower reel-carrier, substantially as herein described for the purpose specified.

2. A rotary looper for a sewing-machine, having a forward needle-slot 3 and a rearwardly-projecting part 5* provided with two lateral outer guiding edges 5 and with an outwardly-bent or external hook 2 that extends in a forward direction over said slot, points in the direction of rotation of the looper, and has its point terminating within said needle-slot, the point of said rearwardly-

projecting part being adapted, during the rotation of the looper, to pass through, and said lateral outer guiding edges being adapted to widen out in a direction perpendicular to the plane of rotation of said hook, a loop of thread held by said hook, substantially as herein described for the purpose specified.

3. In a sewing-machine the combination with a rotary looper and lower reel-carrier, of a reel-holder 8 mounted to turn about a horizontal axis immediately below an opening formed in the base-plate of said machine, and a spring-catch comprising a spring-plate 8^a secured to said holder and provided with a bent portion 8^b adapted to project beneath the lower edge of the reel-carrier within said holder, and a spring-catch 8^c formed with a recessed end 8^d adapted to extend through a slot in said plate 8^a and engage therewith and hold the same in its closed position substantially as herein described.

4. In a sewing-machine, the combination of a rotary looper, a lower pivoted reel-holder, and an inverted reel-carrier arranged within said holder and provided internally with a pin fitted with a spring-tube, and externally with a pivoted bail 17 adapted to extend around the lower open end of said reel-carrier and formed with a wedge-shaped part 17^a and with projecting parts 18 substantially as herein described for the purpose specified.

5. In a sewing-machine, the combination with the stitch-forming mechanism of a spring-plate arranged to press upon the thread, means for supporting the said spring-plate and against which the said plate presses the thread to cause tension, a plunger arranged to lift the said spring and provided with a hook which extends over the said thread, mechanism for lifting the said plunger at regular intervals and a spring arranged to force down the said plunger and cause its hook to draw on the thread substantially as and for the purpose set forth.

6. In a sewing-machine the combination with a needle, a lower reel-carrier with holder, a looper arranged to revolve around said carrier, and a take-up device, of a combined finger thread-clip and thread-supplier mounted upon the arm of said machine and comprising a spring-plate fixed at one part, adapted to bear at another part by its own elasticity against a fixed surface and slotted for the passage of the upper thread over the fixed part and under the spring part thereof, a tubular holder fixed to the said arm and to which said spring-plate is secured, a separate spring-plunger arranged to slide through said holder and formed at its upper end with a hook under which said upper thread passes, and a cam fixed on the driving-shaft of the machine and adapted to raise said plunger against the action of its spring, said plunger when raised acting against the under side of said spring-plate so as to lift the plate against its own elasticity and release the upper thread, and when lowered to first release the spring-plate and then draw off a fresh supply of thread from the thread-spool, substantially as herein described.

7. In a sewing-machine the combination of a needle a lower reel-carrier and its holder a looper arranged to revolve around said carrier, and a take-up device, of an upper-thread tension device arranged at the front of the machine and comprising a grooved wheel around which the upper thread passes, a stud fitted with a sleeve and extending through the fixed front part of the machine, a disk-plate 31 fitted upon said stud and arranged between the head thereof and said grooved wheel a disk-plate 31^a arranged between said wheel and the fixed part of the machine through which the stud passes, washers 32* of soft material arranged between said wheel and said disk-plates, a bent spring acting against the inner end of said stud so as to move the same inward, and a regulating-screw adapted to vary the action of said spring on said stud substantially as herein described for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL JONES.

Witnesses:
W. H. HARRIS,
REGINALD TREW MORGAN.