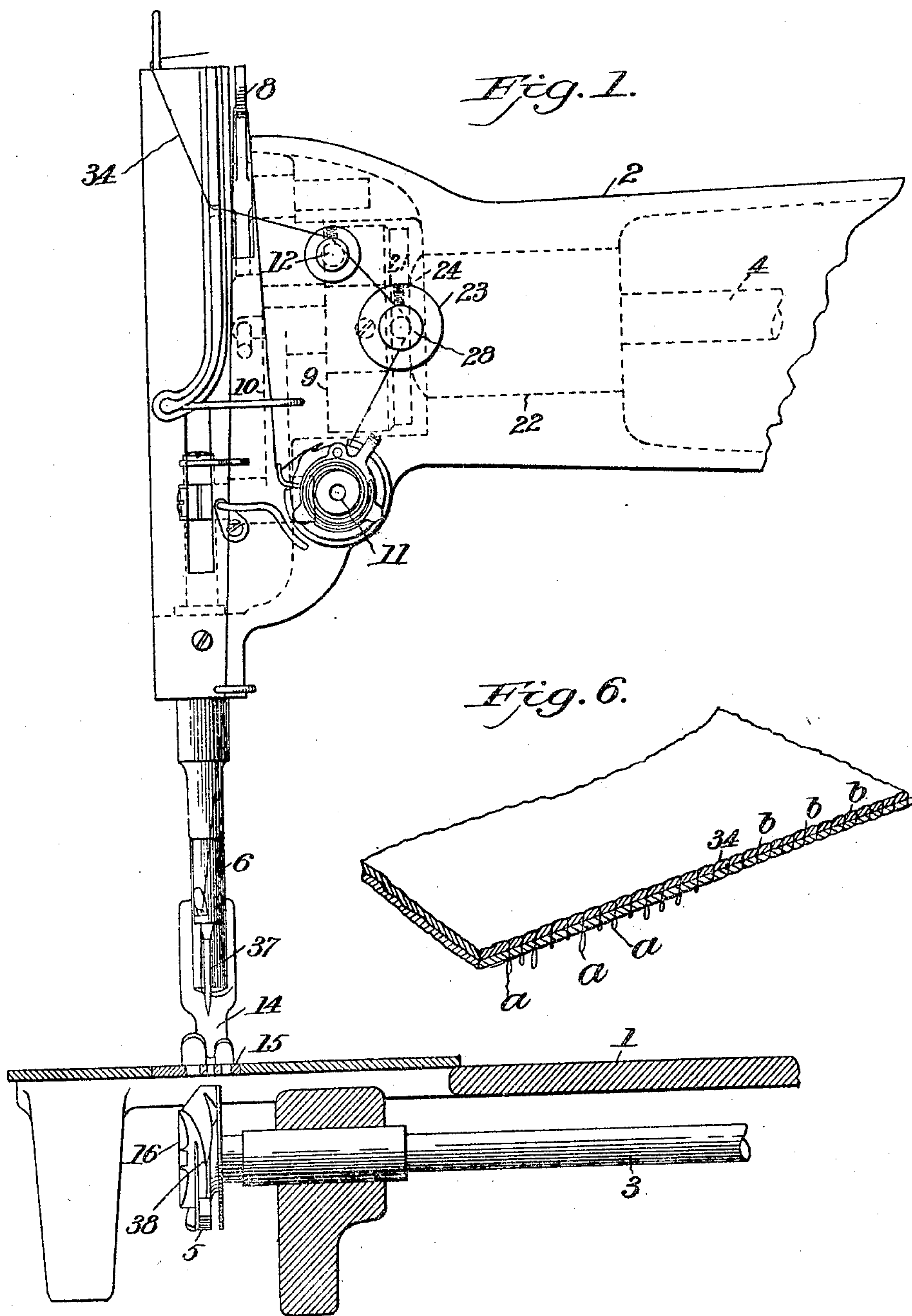


No. 798,020.

PATENTED AUG. 22, 1905.

G. M. EAMES & C. W. THOMAS.
THREAD TENSION FOR SEWING MACHINES.
APPLICATION FILED NOV. 3, 1904.

2 SHEETS—SHEET 1.



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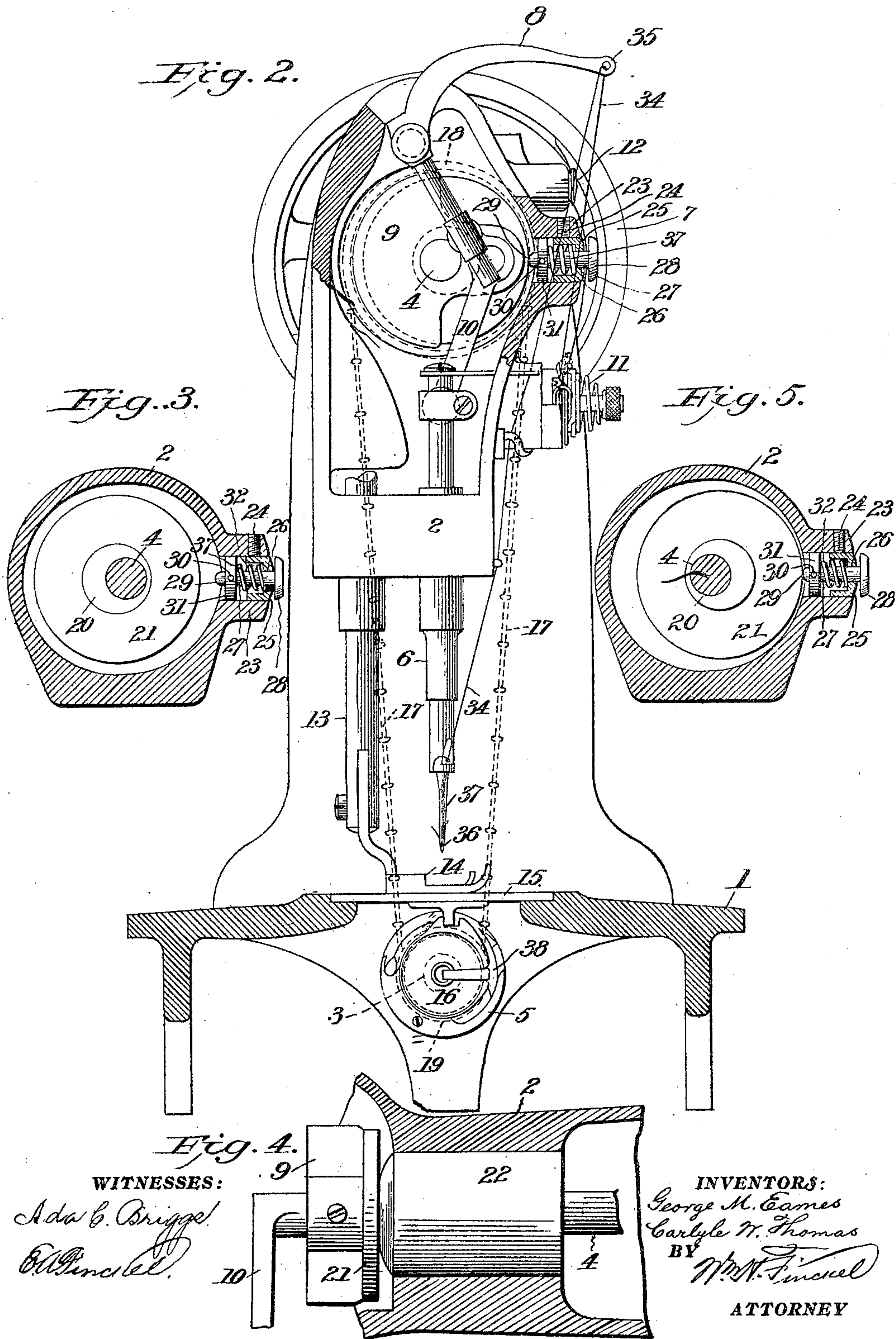
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2 SHEETS SHEET 2.



UNITED STATES PATENT OFFICE.

GEORGE M. EAMES AND CARLYLE W. THOMAS, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO WHEELER & WILSON MANUFACTURING COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

THREAD-TENSION FOR SEWING-MACHINES.

No. 798,020.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed November 3, 1904. Serial No. 231,277.

To all whom it may concern:

Be it known that we, GEORGE M. EAMES and CARLYLE W. THOMAS, citizens of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Improvement in Thread-Tensions for Sewing-Machines, of which the following is a full, clear, and exact description.

Recent improvements in lock-stitch sewing-machines have had mainly in view increased speed to the extent of nearly, if not quite, double the speed of constructions which from five to six years ago were considered to possess the limit of speed consistent with practical operation. There has been also a demand for the use of cheaper, and consequently poorer, sewing-thread, making it necessary to reduce the degree of tension applied to the thread and yet draw as tight a stitch as was formerly done at less speed and with better thread. Such increase of speed and use of inferior thread have developed many obstacles in the way of properly tightening the stitch.

The nature of the circumstances governing the use of inferior sewing-thread in connection with increased speed demands an easier manipulation of the sewing-thread, and a very important feature is the degree of tension applied to such thread. If an extremely-light tension be applied to the needle-thread, as is demanded in connection with high speed and the use of poor thread, the tension is irregular and loops of thread are liable to be formed at the under side of the seam; but if the same machine be run at a much slower speed, using the poorer grades of sewing-thread, the stitches will be formed without the difficulty of looping, demonstrating that the increased speed and lighter thread-tension are responsible for the thread looping at the under side of the seam.

It has been found in sewing at a speed of from three thousand to four thousand stitches per minute that when the take-up makes its initial movement to draw the needle-thread loop through and into the material just as the loop has been cast off from the loop-taker the resistance of the thread forming the loop is sufficient to cause the take-up to draw thread through the needle-thread tension, due mainly to the loop of thread twisting about itself as

it is cast off from the loop-taker, and added to this is the liability of the loop to be thrown up to the under side of the throat-plate, thus increasing its resistance to the action of the take-up and the tendency of the loop-taker to draw thread through the needle-thread tension just as the loop is being cast off, as it is at this point in the formation of the stitch that the needle-thread is under strain between the needle-thread-tension and the loop-taker.

The present invention consists of a sewing-machine of otherwise well-known construction and operation having mechanism for forming any desired kind of stitch, and including a needle and complementary loop-forming medium cooperating with a thread-gripper embodying a spring-pressed plunger acted upon periodically in the formation of the stitch by a shiftable ring mounted upon a rotating cam, so that the needle-thread will be released at a predetermined time to complete the formation of the stitch and draw off thread for the next succeeding stitch.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a front elevation, partly in section, of sufficient of the bed-plate and overhanging arm of a sewing-machine to show the application of the invention. Fig. 2 is an end elevation and partial vertical section. Fig. 3 is a cross-section, and Fig. 4 is a longitudinal section, of the overhanging arm, showing the thread-gripper actuator in gripping position. Fig. 5 is a cross-section of the overhanging arm, illustrating the thread-gripper actuator in releasing position. Fig. 6 is a perspective view illustrating the character of seam effected with and without the invention when the sewing-machine is operated under certain conditions of speed and tension.

The cloth-feeding mechanism and other old parts may be of any approved construction common to sewing-machines generally and also to such special machines as button-sewing, buttonhole-sewing, and eyelet-sewing machines.

We have shown our invention applied to the well-known Wheeler & Wilson sewing-machine commercially known as "High Speed, No. 61," in which the bed-plate 1, overhanging arm 2, looper-actuating shaft 3, nee-

dle-actuating shaft 4, loop-taker 5, needle-bar 6, band-wheel 7, take-up 8, shaft-flange 9, eccentric needle-bar connection 10, thread-tension 11, thread-check 12, presser-bar 13, presser-foot 14, throat-plate 15, bobbin-case 16, flexible connection 17, and pulleys 18 and 19 (the latter shown in dotted lines only) may be as herein shown or of other construction common to lock-stitch sewing-machines employing a flexible connection for the looper-driving and needle-driving shafts.

The loop-taker is rotated (by the employment of the two-to-one pulleys 18 19, mounted, respectively, on the shafts 4 and 3 and connected by the flexible belt 17) two revolutions to one complete actuation of the needle-bar for the formation of the stitch, as is common to the Wheeler & Wilson High Speed No. 61 sewing-machine.

The invention comprises an eccentric 20, secured to the needle-actuating shaft 4, a concentric ring 21, loosely mounted upon said eccentric and held against displacement longitudinally of the shaft 4 by the shaft-flange 9 and needle-actuating shaft-bushing 22. In a suitable boss 23, formed integral with the overhanging arm 2, is secured by a screw 24 a bushing 25, provided with an opening 26, through which passes a thread-gripper stud 27, provided at its outer end with a head 28, its opposite end 29 being free to contact with the ring 21 when such ring is moved eccentrically of the needle-actuating shaft 4 through the action of the eccentric 20. Secured to the stud 27 by a screw 30 is a disk 31, which by means of a spring 32 in bushing 25 is normally pressed inward toward the periphery of the loosely-mounted concentric ring 21, thereby projecting the end 29 of the stud 27 into the path of travel of the larger diameter of the eccentric 20, thus giving to the stud 27 an outward movement in opposition to the spring 32.

In the rotation of eccentric 20 with the shaft 4 the concentric ring 21 is rotated in an arc eccentric with the axis of the needle-actuating shaft.

In Fig. 5 the eccentric 20 and ring 21 are in position to release the pressure of the thread-gripper on the thread.

The use of the ring 21 is desirable, since it distributes the wear of the end 29 of the stud 27 around its entire periphery, because said ring is retarded in its rotation while in contact with the end 29 of the stud, thereby causing the ring to shift its position relatively to the eccentric.

The needle-thread 34 is passed from the usual spool (not shown) mounted upon or convenient to the overhanging arm, then through the thread-check 12 under the head 28 of the thread-gripping stud 27 in such manner that the thread will be periodically released by the action of the ring 21 at each revolution of the needle-actuating shaft 4, then through the thread-tension 11, from which latter the thread

is led through the eye 35 of the take-up 8, and then through suitable thread-leaders to the eye 36 of the needle 37, by which latter it is carried through the material to be caught by the point 38 of the looper 5 and carried around the bobbin as usual.

When, as previously stated, tight tension is employed in connection with excessively high speed, loops *a*, Fig. 6, of needle-thread are likely to be formed on the under side of the work; but when the needle-thread is held against lengthwise movement through the needle-thread tension as the take-up is drawing the loop of needle-thread through the needle-hole in the throat-plate and to the under side of the work the stitches are regularly and uniformly formed and positioned, as at *b*. To obviate the difficulty of looping, as at *a*, the eccentric (20 or 33) is timed relatively to the shaft 4, so that it will not actuate the gripper-stud 27, but will permit the gripper to grip the needle-thread between the head 28 of the stud 27 and the outer surface of the bushing 25 from the time that the looper is about to cast off the loop of needle-thread until the take-up is about to complete the tightening of the stitch, and then the stud 27 will be engaged and moved outward, thereby releasing the thread and permitting the take-up to complete the stitch and at the same time draw sufficient thread for the succeeding stitch. Fig. 3 shows the eccentric in an ineffective and Fig. 5 shows it in an effective position for release of the needle-thread.

The duration of time that the needle-thread may be held against lengthwise movement is not limited to the time above stated, as it would in no way affect the stitching if the thread were gripped during the entire formation of the stitch, except at the time when the take-up is tightening the stitch, at which time the take-up draws thread for the succeeding stitch; but it is preferable to grip the thread only during such time as the take-up and loop-taker are liable to accidentally draw thread through the needle-thread tension.

What we claim is—

1. In a sewing-machine, a stitch-forming mechanism, including a take-up, a needle-actuating shaft, a needle, a needle-carrier, a loop-taker, a loop-taker-actuating shaft, a needle-thread tension, and means for connecting said shafts, in combination with a thread-gripper, an actuating-cam on the needle-shaft and a shiftable ring on said cam, constituting an automatically-actuated thread-gripper to hold the needle-thread against lengthwise movement through the needle-thread tension when the loop-taker is about to cast off the loop of needle-thread and the take-up is drawing the needle-thread loop preparatory to the completion of the stitch.

2. In a sewing-machine, a stitch-forming mechanism, a needle-actuating shaft, a needle, a needle-carrier, a loop-taker, a loop-

taker - actuating shaft, a needle - thread tension, and means for connecting said shafts, in combination with a thread-gripper having a spring-pressed plunger, and means for automatically actuating said thread - gripper including a cam mounted on the needle-actuating shaft, and a ring shiftably mounted on said cam, said ring coacting with said plunger to release the needle - thread at a predetermined time in the formation of each stitch.

3. In a lock-stitch sewing-machine, a stitch-forming mechanism including a take - up, a needle-actuating shaft, a needle, a needle-carrier, a loop - taker, a loop - taker - actuating shaft, a needle-thread tension, and means for connecting said shafts, in combination with a thread - gripper having a spring - pressed plunger, and means for automatically actuating said thread - gripper, including a cam mounted on the needle-actuating shaft and a ring shiftably mounted on said cam, said ring

coacting with said plunger to release the needle-thread at such time as the take-up is completing the formation of the stitch and drawing thread for the succeeding stitch.

4. In a sewing - machine, a stitch - forming mechanism including a needle and coacting loop-taker, in combination with a rotary cam, a thread-gripper including a spring-pressed plunger, and a ring, said ring shiftably mounted on said cam and coacting with said plunger to release the needle - thread at a predetermined time in the formation of the stitch.

In testimony whereof we have hereunto set our hands this 2d day of November, A. D. 1904.

GEORGE M. EAMES.
CARLYLE W. THOMAS.

Witnesses:

E. L. TOLLES,
A. M. DONIHUE.