

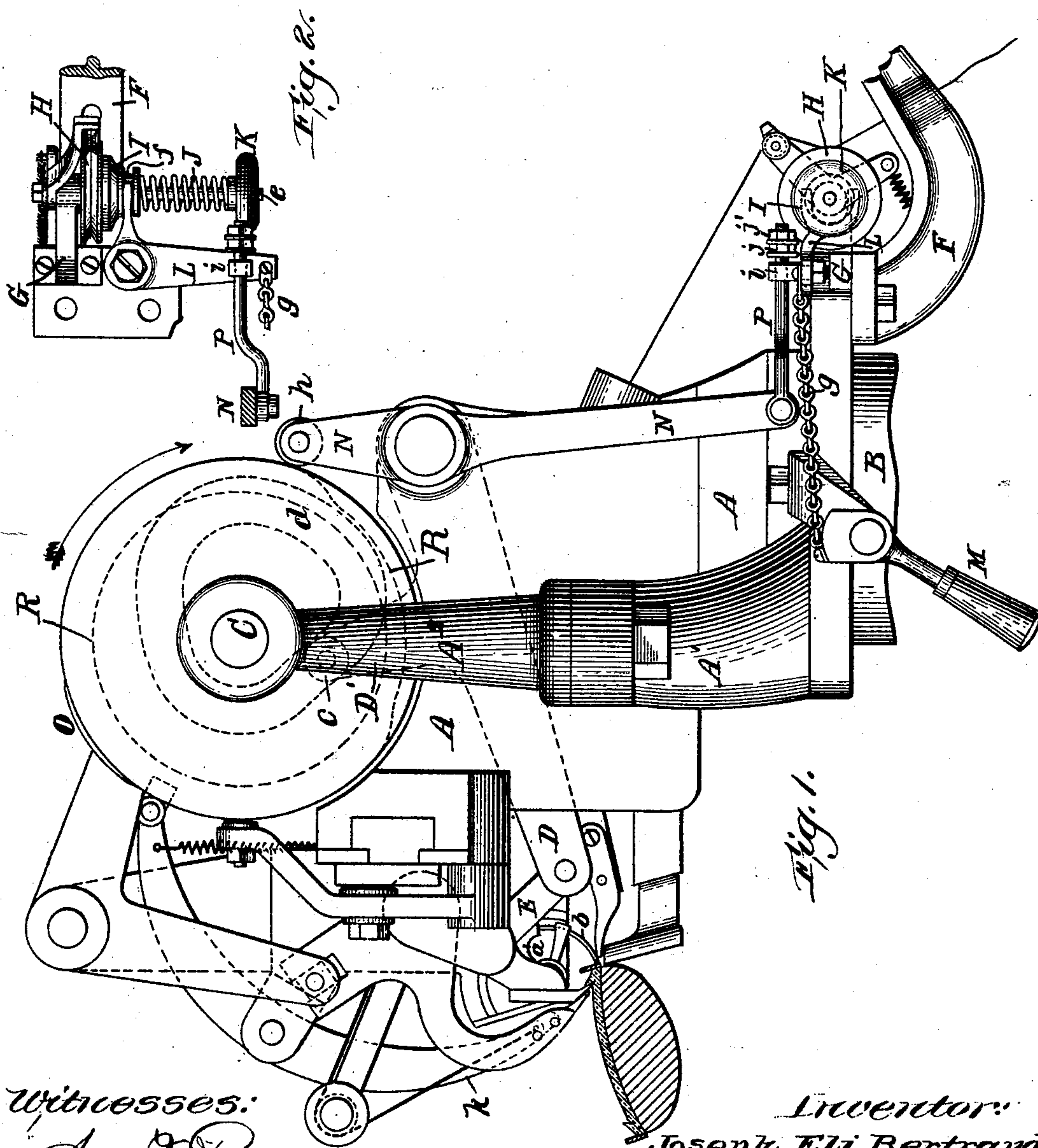
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J. E. BERTRAND.
TENSION FOR SEWING MACHINES.

(Application filed Sept. 17, 1898.)

(No Model.)



Witnesses:

Arthur D. Randall.

Charles B. Choate.

Inventor:

Joseph Eli Bertrand
by N. G. Lombard

Attorney.

UNITED STATES PATENT OFFICE.

JOSEPH E. BERTRAND, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE
BAY STATE SHOE MACHINERY COMPANY, OF SAME PLACE AND PORT-
LAND, MAINE.

TENSION FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 637,225, dated November 21, 1899.

Application filed September 17, 1898. Serial No. 691,180. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH ELI BERTRAND, of Boston, Suffolk county, Massachusetts, have invented certain new and useful Improvements in Variable Tensions for Wax-Thread Chain-Stitch Sewing-Machines, of which the following is a specification.

Wax-thread chain-stitch sewing-machines which are especially intended for sewing lasted boots and shoes have for many years been provided with stitch-forming mechanism consisting of a curved hooked needle which advances and retreats through the work being sewed, a looper which loops the thread around the hook of the needle and in the throat thereof when the needle is advanced and extends through the work being sewed, and in connection therewith a tension which applies the necessary strain to the thread and determines the tightness of the stitches, which in the case of boots and shoes is necessarily considerable, in order that the sewed seam may be firm and durable. In all prior machines of this character the tension has remained uniform during the cycle of movements involved in forming a stitch, applying at all times an equal strain to the thread, and this strain, as just stated, is that which is necessary in order to set the stitches. Unless therefore some special means is provided to obviate it it follows that after the loop has been laid by the looper in the throat of the hook of the needle and the needle is retracted to draw the freshly-laid loop through the work the needle during its entire retractile stroke draws upon thread which is held taut by the tension, thus causing the taut thread to render or reeve through the throat of the needle, which tends to abrade the thread, thereby weakening it, and sometimes to break or cut through the thread. Heretofore this difficulty has been obviated by equipping the machine with additional devices, which pull off the thread from the tension independently of the needle and which subsequently retract to slacken the thread, so that the needle during its retracting movement when drawing the loop through the work pulls upon slack thread; but these prior expedients involved

additional operating devices upon the machine both for pulling off the thread independently of the needle and for properly controlling the thread left slack by them.

Now the object of the present invention is to avoid the difficulties and objections due to the thread being under tension when the needle is drawing the freshly-laid loop through the work without the equipment of the machine with any additional mechanism or devices acting upon the thread; and to this end the present invention consists in providing automatic tension-controlling mechanism operatively connected with the mechanisms which control the movements of the needle and looper, so as to insure the proper relative timing, the tension-controlling mechanism being so operated as to relieve the thread of tension after the looper has laid the fresh loop in the throat of the needle and while the needle is executing its retracting movement and drawing the fresh loop through the work. Consequently the needle pulls upon thread which is under substantially no tension at all during its loop-drawing stroke, and hence there is no injurious abrasion, breaking, or cutting of the thread. The tension is again automatically applied before the needle has completed its retracting stroke, but after it has entirely emerged from the work, so that during the termination of the retracting stroke of the needle it pulls against the full force of the tension, thus firmly setting the stitch. The tension remains applied in its full force until after the next succeeding loop is laid by the looper, so that the tension is normally operative, being relieved only during a small fraction of the time required for the formation of each stitch, this fraction being in the specific embodiment hereinafter described about one-eighth of the time consumed in the formation of each stitch. Owing to the circumstance that the tension is thus relieved during the loop-drawing stroke of the needle it becomes practicable to use a tension of any desired force, so that the seam may be sewed as tightly as can be desired under all conditions.

For the purpose of illustrating the im-

proved tension-releasing mechanism it is shown in the accompanying drawings as applied to a well-known type of wax-thread chain-stitch shoe-sewing machine, the machine selected for illustration being substantially identical with the machine set forth in the United States Letters Patent No. 190,709, granted May 15, 1877, to Christian Dancel.

In the drawings, Figure 1 is a side elevation of the machine; and Fig. 2 is a horizontal detail, partly in section, of the tension mechanism.

As shown in the drawings, *b* is the curved hooked stitch-setting needle.

k is the looper, and *H* is the tension.

The needle *b* is carried by a rocking segment *a*, which is connected by link *E* with pivoted lever *D*, said lever having a projecting arm *D'*, carrying a cam-roll *c*, which co-operates with a cam-groove *d* in a cam disk or wheel on the main drive-shaft *C* of the machine. This shaft is supported in bearings at the upper ends of columns *A*², mounted upon arms *A'*, (of which one only is shown,) carried by the frame *A* of the head of the machine, which in turn is mounted upon a supporting-column *B*, only a small portion of which is shown. The looper *k* is given a compound movement in the usual way by means of a cylinder-cam and a face-cam. (Indicated by the dotted lines *R* in Fig. 1.) The stitch is set by the needle as it completes its retractile or loop-drawing stroke. In all of these respects the illustrated machine is substantially identical with the said Dancel patent. Fig. 1 also illustrates the usual feed-awl and feed-slide, the channel-gage, and the work-support, all of which are too well known to require description, being substantially like the corresponding parts in said Dancel patent. Fig. 1 also illustrates in section a lasted shoe in position to be sewed.

The tension device in itself may be of any well-known type; but the drawings illustrate the same as being substantially identical with that set forth in United States Letters Patent No. 607,404, granted to me July 12, 1898. The tension is located at the rear of the machine and is carried by the same bracket *F*, which supports the usual wax-pot, which is not shown. The thread after emerging from the wax-pot passes around the peripheral groove of a tension-wheel *H*, which turns on the spindle *e*, said spindle being secured to a stand *G*, bolted to the bracket *F*. The requisite tension is applied to the tension-wheel by means of a friction-disk *I*, which surrounds the spindle *e* and which is pressed against one face of the friction-wheel by means of a coiled spring *J*, the force of which may be regulated by means of the thumb-nut *K*, which screws upon the threaded end of the spindle *e*, as shown in Fig. 2.

The usual means are illustrated for removing the effect of the tension device, due to the tension-spring *J*, by hand, as may be desired. The means shown for this purpose

comprises an elbow-lever *L*, pivoted to the bracket *F*, the short arm of which is forked and engages a groove *f* in the hub of the friction-disk *I* and the long arm of which is connected by a chain *g* with a pivoted hand-lever *M*.

The drawings illustrate the thread after passing around the tension-wheel as passing over a grooved wheel or truck of a spring take-up on its way to the looper, the thread passing from thence through the head of the machine in the usual manner. Such spring take-ups are usual on machines of this character; but a spring take-up is not essential in connection with the present improved machine and may be altogether omitted.

As thus far described the machine possesses no novelty.

The automatic tension-releasing mechanism which, when properly timed with reference to the movements of the looper and needle, constitutes the present improvement is operatively connected with the cam mechanisms which operate the needle and looper. In the specific embodiment of the invention illustrated in the drawings one of the usual cam-disks on the drive-shaft *C* (the needle cam-disk, as shown) is provided with a projecting peripheral cam *O*, which occupies only a small proportion of the periphery of the cam-disk, (about one-eighth, as shown.) This face-cam *O* co-operates with a cam-roll *h* on the upper end of a lever *N*, pivoted to the head of the machine, said lever at its lower end being connected by a link *P* to a swiveling lug or ear *i*, carried by the same lever *L* which is utilized for controlling the tension by hand. The link *P* is adjustably fitted to the said lug or ear *i* by means of contact-nut *j* and check-nut *j'*. A stitch is formed at each revolution of the drive-shaft *C*, and it is obvious that when the cam *O* encounters the cam-roll *h* at the upper end of the lever *N* the pressure-disk *I* will be removed from the tension-wheel *H*, thus removing the tension due to the tension-spring *J*, and that as soon as the cam *O* passes the cam-roll *h* the tension will be immediately and automatically applied by the spring *J*. Since the cam *O* occupies only a small proportion of the periphery of its cam disk or wheel, it follows that the tension is normally applied and is relieved during only a fraction of the duration of the formation of a single stitch. The cam *O* is so connected to and located with reference to the cams which operate the needle and the looper that the tension is relieved after the looper has operated, remains relieved while the needle is drawing the loop through the work, and is again applied before the needle completes its retracting stroke, so that the thread is under tension and the stitch is set as the needle completes its backward stroke, and it remains applied during the forward movement of the needle and the subsequent action of the looper. Thus the thread is substantially without tension when the needle draws

the loop and there is no objectionable rendering or reeving of the thread in the throat of the needle.

5 With a tension device such as is shown the tension due to its spring is entirely removed from the thread, so that during the loop-drawing stroke the only friction against which the needle has to pull is that due to the passage of the thread around such guide-pulleys as 10 may be employed and through the usual stripper of the wax-pot; but the friction due to these causes is or may be too inconsiderable to be noticed.

15 It will be noted that when the needle moves forward to penetrate and pass through the work the loop which is drawn by the needle through the work is slackened, thus furnishing slack thread for the feed and for the looper.

20 An advantage flowing from the present improvement is that a needle of small diameter can be utilized without breaking or bending, because the main strain on the needle is removed.

25 It will be noted that the important features of the present improvement are that in the making of each stitch the thread is substantially relieved of tension when the needle is pulling the loop through the work, but is 30 under tension when the stitch is being set.

I claim as my invention—

1. A wax-thread chain-stitch sewing-machine having, in combination, a stitch-setting hooked needle, a looper, a normally-operative 35 tension, and means for automatically relieving the tension while the needle is drawing the loop through the work and for again applying the tension before the needle completes its retracting stroke so that the needle 40 sets the stitch with the thread under the tension strain, substantially as set forth.

2. A wax-thread chain-stitch sewing-machine having, in combination, a curved stitch-setting hooked needle, a looper, a tension, and connected mechanisms for operating the 45 needle and looper, and for controlling the tension, the mechanism for controlling the tension operating to automatically relieve the same after the looper has acted to loop the thread around the needle, and to again apply 50 the tension before the needle has completed its loop-drawing stroke, whereby the tension is relieved while the needle is drawing the loop through the work and is operative when the needle sets the stitch, substantially as 55 set forth.

3. A wax-thread chain-stitch sewing-machine having, in combination, the curved stitch-setting needle *b*, the looper *k*, the drive-shaft *C*, having cam-disks provided with cams 60 for operating said needle and looper through connecting instrumentalities, said connecting instrumentalities, a grooved tension-wheel *H*, a friction-disk *I*, a spring *J*, pressing said friction-disk against said tension-wheel, a 65 cam *O*, carried by the said shaft *C*, and intermediate devices between said cam *O*, and said friction-disk *I*, whereby said friction-disk is automatically removed from said tension-wheel *H*, while the needle is drawing a 70 loop through the work and is in operative contact with said tension-wheel when the needle sets the stitch, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of 75 two subscribing witnesses, on this 14th day of September, A. D. 1898.

JOSEPH E. BERTRAND.

Witnesses:

N. C. LOMBARD,
GEO. A. SEWALL.