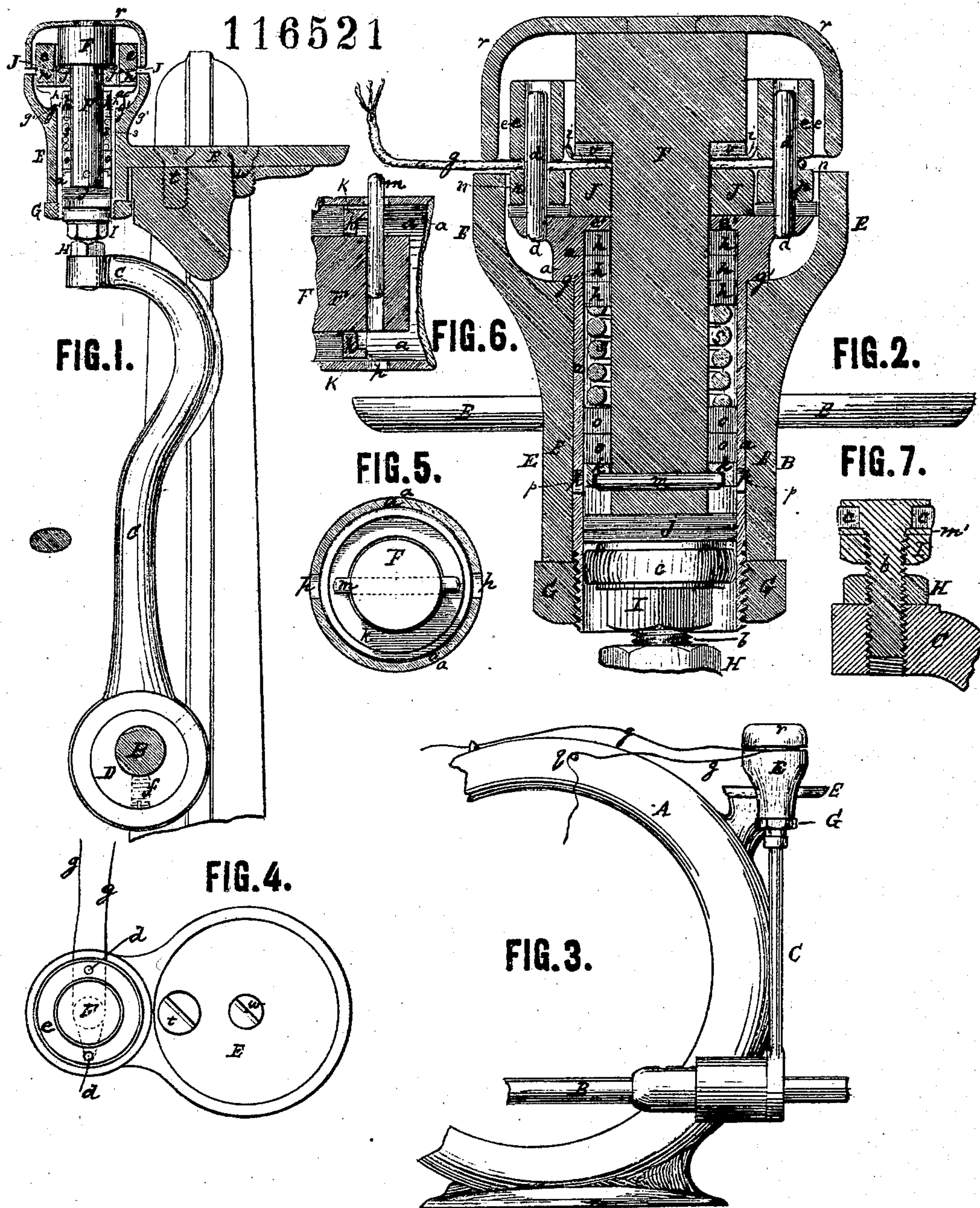


CHARLES H. WILLCOX  
AND  
CYRUS CARLETON.

SEWING MACHINE.  
PATENTED JUN 27 1871  
TENSION.



Willcox & Carleton  
by *A. Pollok*  
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WITNESSES. C. B. Nottingham



# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 116,521, dated June 27, 1871.

### *To all whom it may concern:*

Be it known that we, CHARLES H. WILLCOX, of the city, county, and State of New York, and CYRUS CARLETON, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification:

This invention relates to a tension for sewing-machines, operating in accordance with the tension described and claimed in Letters Patent granted to CHARLES H. WILLCOX on the 9th of August, 1864—that is to say, a tension which is not regulated by the operator to every size of thread, length of stitch, or thickness of goods; but is automatic in its operation, the thread being clamped firmly between suitable surfaces until the loop is almost or quite drawn up to the cloth, and then suddenly released, with a nominal friction upon it for security against too much being drawn through the surfaces for the requirements of the next stitch. The invention consists in certain improvements in the construction, arrangement, and combination of the various parts of the tension, whereby we are enabled to secure greater perfection in sewing, more durability in the tension devices, greater quietness in operation, and increased facility both in manufacturing the tension in large quantities and in fitting it to the machine. These improvements can best be explained and understood by reference to the accompanying drawing, in which—

Figure 1 is a rear view of that portion of the frame of a Willcox & Gibbs' sewing-machine to which our invention is in this instance applied, the tension being represented in vertical central section. Fig. 2 represents, on an enlarged scale, a vertical central section of the tension at right angles with the line of section in Fig. 1. Fig. 3 is a side view, on a reduced scale, of the tension and a portion of the sewing-machine frame. Fig. 4 is a top view of the tension, with the cap removed. The remaining figures are views of detached parts, which will be hereinafter referred to.

The thread-clamping and tension mechanism is supported by and partly in a tube, *a*, which is placed in and fits a tubular case, *E*, a shoulder, *g*, on the upper part of the tube, resting on a corresponding shoulder formed in the case. The upper part of the case is enlarged to receive the flange

on the top of the tube *a*, which supports the lower clamping and tension plates *J n*. A nut, *G*, is fitted to the screw-threaded lower end of the tube, which projects below the case, and, by screwing up this nut, the shoulder *g'* of the tube *a* will be drawn tightly down upon the corresponding shoulder of the case, and the parts will thus be held firmly and tightly together. By unscrewing the nut *G* the tube *a* and the tension mechanism can be lifted bodily out from the case whenever desired. The case *E* is provided on one side with a projecting disk or equivalent device, by means of which, and the screws *tw*, it is fastened to the frame *A* of the machine, as seen in Fig. 4. Upon the top of the tube *a* rests a thick metal ring, *J*, the smooth top of which forms the lower of the two surfaces, between which the thread is intermittently clamped. The upper clamping-surface is formed of a thin metallic ring or annular disk, *i*, placed above the ring *J*, and below the enlarged head of the spindle *F*, which head is caused to exercise an intermittent pressure on the disk *i* for the purpose of causing it to press in like manner upon the ring *J*, and thus clamp the thread, which is drawn between the two surfaces. Between the disk *i* and the head of the spindle *F* is a washer, *v*, of wool or other equivalent material, which is placed there for the purpose of deadening the sound when the spindle suddenly closes the thin metal disk *i* upon the lower clamping-surface *J*. The ring *J* and disk *i*, thus arranged, constitute the two surfaces of the tension, between which the thread is intermittently and firmly clamped. In order to exert at all times upon the thread a slight but constant pressure, just sufficient to prevent too much being drawn through the tension for the requirements of a stitch, we arrange upon the outside of the ring *J*, and concentrically therewith, a second ring, *n*, which rests upon the flanged top of the tube *a*. Above this ring is another ring, *e*, which rests upon the ring *n* by its mere gravity, and is of such weight as to produce a slight but constant pressure upon the thread, which passes between it and the lower ring, just sufficient for the purpose above stated. The rings *n* and *e* are centered or held in their proper relation to one another by means of studs *d*, which are secured to the top of the tube *a* and pass up through the lower ring and into or through the upper one.



The studs are arranged in this instance about diametrically opposite each other, and in line, or nearly so, with the pull-off, a part of which is shown at *q*, Fig. 3, so that the thread *g* will pass from the pull-off around the rear pin, and thence back on the opposite side of the spindle to the take-up, as indicated in Fig. 4. The stud in this case has the additional office of keeping off the thread from the rear part of the spindle *F* and holding it in such position as will allow it to be acted on to the best advantage by the clamping-surfaces and pressure-rings. A washer, *x*, of wool or other suitable material, is interposed between the ring *n* and the top of the tube *a* to prevent the jar which is produced by the connecting-rod *C* striking the spindle *F*, as will be presently explained, from being communicated to the ring *n* and ring-weight *e*; but for this the rings would be shaken by the vibration, and would allow the thread to escape from between them. To the top of the spindle *F* is riveted a cap, *r*, which covers the clamping-rings and protects the mechanism from injury, leaving only a small space between its lower edge and the upper edge of the case *E* for the passage of the thread. The spindle *F* is considerably smaller in diameter than the tube *a*, within which it is placed. In the upper end of the tube, and bearing against the inward flange *e'*, formed at its top, are one or more leather rings, *h*—three, in this instance—which fit the bore of the tube *a*, and serve as a bearing for the upper part of the spindle. Near the lower end of the spindle are one or more leather rings, *o*, similar to those at the upper end of the tube, serving as a bearing and side support for the spindle *F*. Between these upper and lower rings a spiral spring, *s*, is placed, encircling the spindle, and pressing at one end against the stationary rings *h*, and at the other against the rings *o*. This downward pressure of the spring is communicated to the spindle through the pin *m*, which passes through the spindle, and supports upon its ends the metallic ring *k*, smaller in diameter than the bore of the tube *a*, upon which the leather rings *o* rest, and are pressed by the spring.

In this manner the spindle is pressed downward and its head is caused to bear forcibly upon the clamping-ring *i*, which is thereby pressed tightly upon the lower clamping-surface *J*, and, consequently, upon any thread placed on said surface. A hole, *p*, is formed in the side of the tube *a*, through which the pin *m* can be inserted into the spindle *F* by bringing opposite to it a corresponding hole formed in the spindle, as shown clearly in Fig. 6. The ring *k* is provided with an annular downwardly-projecting flange, as shown in the figure referred to, which, when the pin is once in place, closes or fits over its ends and holds it securely in position, as indicated in Figs. 2 and 5. The intermittent action of the clamping-surfaces is produced by means of devices operated by the eccentric *D*, which is secured on the main shaft *B* of the sewing-machine by a set-screw, *f*, or other suitable means. With the eccentric is combined, in the usual manner, a connecting-rod, *C*, into the upper end of which is screwed the tappet *b*, placed immediately under-

neath the lower end of the spindle *F* in the open tube *a* in such manner that, as it rises and falls with the connecting-rod at each revolution of the eccentric, it will cause a corresponding movement of the spindle, and thus produce the intermittent clamping action desired. This tappet *b* is adjustable, or can be screwed up and down in the end of the rod *C*, nearer to or further from the bottom of the spindle *F*, so as to properly time its action on the spindle in relation to the action of the needle and take-up; and when once adjusted is kept permanently in place by the check-nut *H*. Between the head of the tappet *b* and the end of the spindle *F* is interposed a wooden or other suitable sound-deadening disk, *j*. The tappet *b* is provided with a head or flange, shown in Fig. 7, under which is a leather ring, *c*, which is kept against the flange by a nut, *l*, and the metal washer *m'*. This leather ring is of larger diameter than the head of the tappet, and works up and down in the lower end of the tube *a*, giving the necessary steadiness and lateral support to the upper end of the connecting-rod *C*.

The operation of the improved tension is as follows: In order to thread up the machine, the eccentric on the main shaft is revolved to its highest point, carrying up the connecting-rod, which, by means of the tappet *b*, lifts the spindle *F* away from the disk *i*, relieving it of its pressure. The thread may now be drawn from the spool and passed into a pull-off, thence around the spindle *F* and stationary pins *d*, beneath the weight *e* and disk *i*, and thence through suitable eyes to the needle and stitch-forming mechanism. During the operation of sewing the thread is held firmly between the clamping-surfaces *i* and *J* until the loop is almost or quite drawn up to the cloth, the operating pull-off, meanwhile, drawing from the spool all the thread needed for the next stitch, so that, when the pressure is removed from the ring *i*, the only friction on the thread at the tension is the ring-weight *e*. The head of tappet *b* is now brought, by the eccentric *D*, against the woolen disk *j* and end of the spindle *F*, and lifts the spindle-head from the ring *i*, entirely relieving the thread from pressure at this point. The stitch-forming mechanism can now draw whatever thread is needed for the purposes of the next stitch, but is prevented from drawing too much on account of the gentle pressure on the thread produced by the ring-weight *e*. The noise which would be produced by the end of the connecting-rod *C* suddenly striking the spindle *F*, and the shoulder of this same spindle being drawn suddenly against the metal ring *i*, is deadened by interposing the woolen washer *v* and disk *j*. The spindle *F* requires no oil, being kept from contact with the metal tube *a* by the stationary leather rings *h* and the movable leather rings *o*. The upper end of the connecting-rod *C* requires no oil because of the tappet *b* being surrounded by the leather ring *c*, which works up and down in the tube *a*.

Having described our invention and the manner in which the same is or may be carried into effect, what we claim, and desire to secure by Letters Patent, is—



1. A tension device for sewing-machines, composed of the following elements in combination: first, a thread-rest, consisting of a support upon which the thread in its passage to the needle is held by a smooth-surfaced ring or its equivalent, resting upon the thread by mere gravity, so as to exercise a gentle but permanent pressure thereon, substantially as shown and described; secondly, a thread-clamping device, consisting of a stationary support for the thread and a movable clamping-surface, actuated by a spring to compress or firmly hold the thread, substantially as shown and described; thirdly, a thread-relieving device, consisting of an eccentric operating the movable clamping-surface at proper intervals to release its pressure on the thread, substantially as shown and described.

2. The combination, with the thread-holding rest and the support thereof, of a washer, of wool or equivalent material, interposed between the two, substantially as shown and described, for the purpose of preventing the jars which attend the action of the eccentric through the connecting-rod on the spindle or case from being communicated to the thread-holding surfaces, and thereby causing the thread to escape from between them.

3. To avoid the use of oil, and therefore render access to the interior of the tension for this purpose unnecessary, the combination, with the spindle and its supporting-tube, of washers, of leather or other suitable material, interposed between the two, keeping said parts out of contact and forming the bearings for the spindle, substantially as shown and described.

4. A complete tension device, organized substantially as shown and described, so that all its parts, excepting such as connect it with the eccentric of the sewing-machine, shall be inclosed ready to be fitted in a case which is attached to or forms part of the frame of the machine.

5. In combination with the spindle and the thread-clamping surface, and connecting-rod with which said spindle is alternately in contact, the sound-deadening washers interposed between the spindle and said parts, substantially as shown and described.

6. The combination, with the tension and the connecting-rod, of a tappet for raising the tension-spindle, made adjustable in said rod, substantially as shown and described, so that its action on the spindle may be properly timed in relation to the action of the needle and take-up.

7. The construction of the tappet which actuates the tension-spindle when moving in the tension-tube, substantially as shown and set forth—that is to say, provided at or near its upper end with a leather or equivalent washer, fitting in a tubular bearing so as to move to and from the tension-spindle, as herein described.

In testimony whereof we have signed our names to this specification before two subscribing witnesses.

CHAS. H. WILLCOX.  
CYRUS CARLETON.

Witnesses:

THEO. A. TAYLOR,  
HENRY L. BESSEY.