(Model.) 2 Sheets—Sheet 1.

G. H. DIMOND & W. F. DIAL.

AUTOMATIC TENSION FOR SEWING MACHINES.

No. 305,438. Patented Sept. 23. 1884.

Fig: 1.

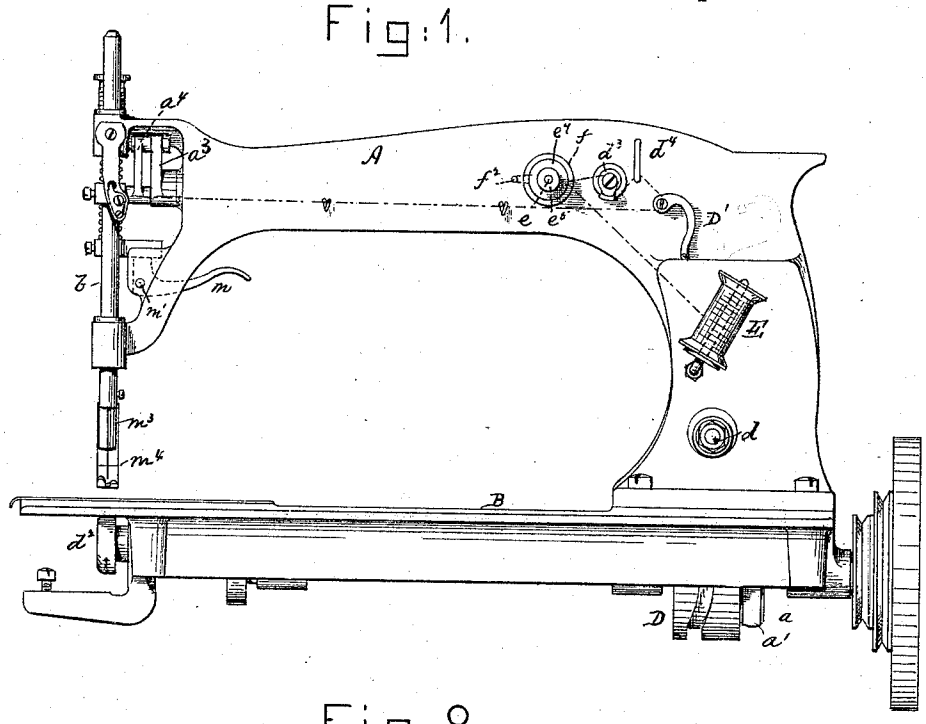
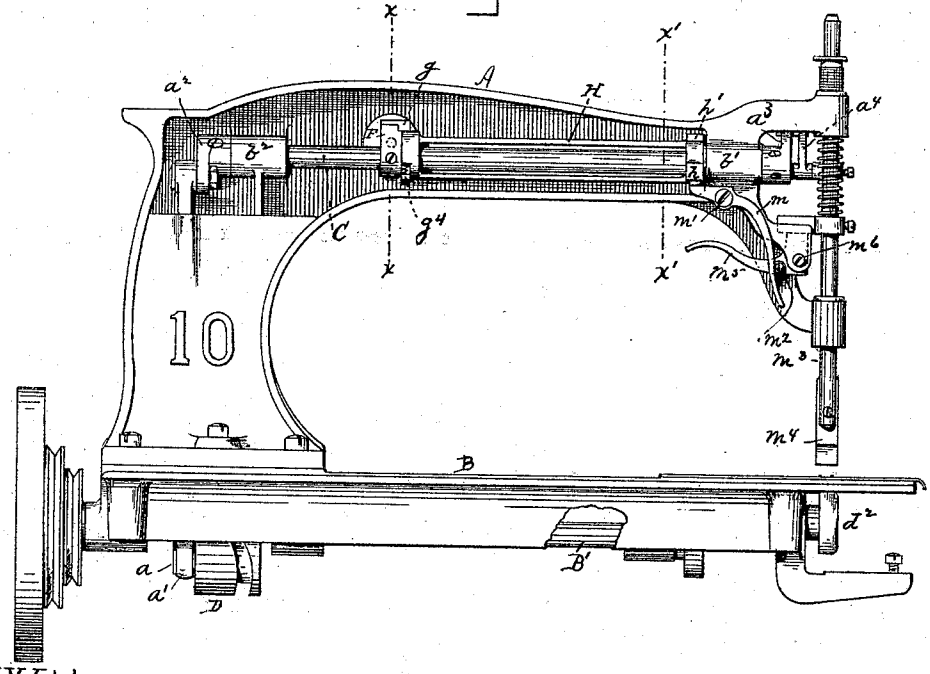


Fig: 2.



Witnesses.
Louis H. Baker
Geo. E. Lincoln

Inventors.
Geo. H. Dimond
Wilbur F. Dial

N. PETERS, Photo-Lithographer, Washington, D. C.

(Model.) 2 Sheets—Sheet 2.

G. H. DIMOND & W. F. DIAL.

AUTOMATIC TENSION FOR SEWING MACHINES.

No. 305,438. Patented Sept. 23, 1884.

Fig: 3.

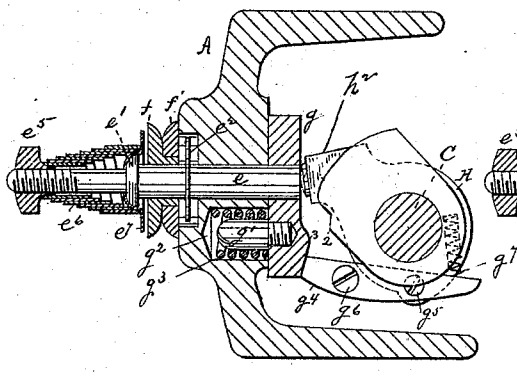


Fig: 4.

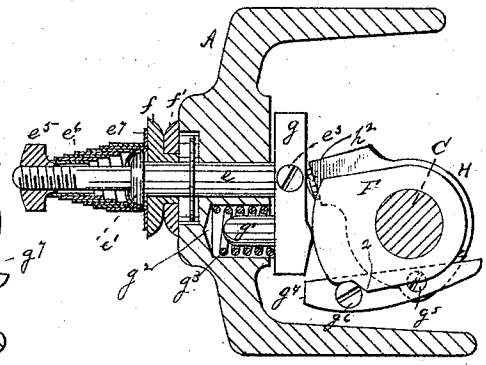


Fig: 5.

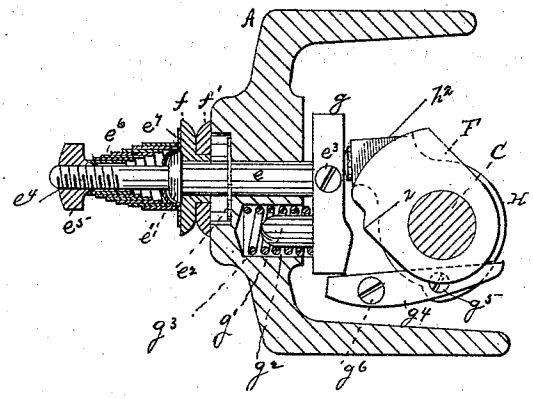


Fig: 6.

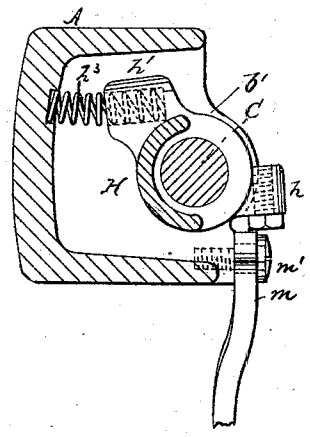
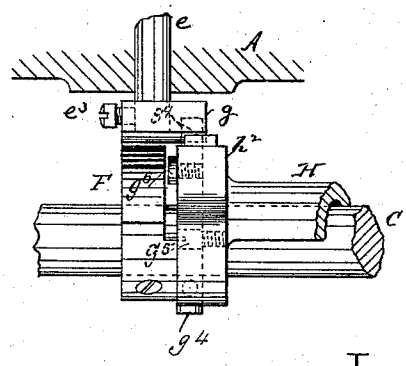


Fig: 7.



Witnesses.

Louis H. Baker

Geo E. Lincoln

Inventors

George H. Dimond

Wilbur F. Dial

UNITED STATES PATENT OFFICE.

GEORGE H. DIMOND AND WILBUR F. DIAL, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

AUTOMATIC TENSION FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 305,438, dated September 23, 1884.

Application filed December 14, 1883. (Model.)

To all whom it may concern:

Be it known that we, GEORGE H. DIMOND and WILBUR F. DIAL, of Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Automatic Tensions for Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to that class of tension mechanism which is adapted to automatically hold and release the needle-thread, allowing only a quantity thereof sufficient to form a stitch to be drawn from the tension device and spool by the take-up at each revolution of the main shaft of the machine. Means are herein provided to release the needle-thread from the tension device at the will of the operator, such means co-operating with the lever used to lift the presser-bar and foot, so that while the presser-foot is raised to remove from or place under it the work, the needle-thread may be freely drawn through the tension device and eye of the needle.

Figure 1, in side elevation, represents a sewing-machine, to which the invention to be herein described is applied; Fig. 2, an opposite side view of Fig. 1; Figs. 3, 4, and 5 are enlarged sectional details of the devices in the line x x, Fig. 2, the said figures showing the parts in different positions during the oscillation of the needle-bar-actuating rock-shaft. Fig. 6 is an enlarged sectional detail on the line x' x', Fig. 2; and Fig. 7 is a partial section and plan view of parts shown in Fig. 5.

In this our invention we employ a tension device composed, essentially, of one or more disks or plates, a spindle provided between its ends with a fixed collar, a shoe or block at the inner end of the spindle, two springs, and a chambered washer, one of the said springs being placed at one and the other at the opposite side of the said collar, one spring acting to draw the inner side of the said collar against the said disks or plates, while the other spring acts to force the said chambered washer against the said disks whenever the said washer is not pushed by the said collar and spindle back away from the said disks or plates. The shoe or block attached to the spindle is adapted to be struck by a cam on the needle-bar-operating shaft, it moving the said spindle in opposition to that one of its springs which is effective to grasp the needle-thread positively, as will be described. The lifting of the presser-foot through a system of levers, one of which is made as a partial sleeve, moves the spindle and relieves the disks or plates from the pressure of both of the said springs, at which time the needle-thread is free to be drawn from or past the disks and from the spool without tension. The arm A, bed B, rotating shaft B′, eccentric a, eccentric-strap a', arm a^2, needle-bar-actuating rock-shaft C, arm a^3, link a^4, needle-bar b, bearings b' b^2 for the shaft C, the cam-hub D, take-up lever D′, pivoted at d, and the rotating hook d^2, slack-controller d^3, eye d^4, and stud f^2, are common to the Wheeler & Wilson machine, so need not be herein further described. The needle-thread shown in dotted lines, Fig. 1, is taken from spool E across between the disks or plates f f' of the tension device; then partially about the stud f^2, back between the said disks f f', over the thread-controller d^3, and wire-eye d^4, and through an eye in the take-up lever D′, and thence through usual guide eyes or devices to and through the eye of the needle. The disk f' is shown as placed upon the hub of the disk f, and the latter is placed upon a spindle, e, provided with a fixed collar, e', and an oil stop or check, e^2, the said spindle having attached to it, by screw e^3, so as to form part of it, a shoe or block, g. The spindle e is provided with a screw-thread, e^4, which receives a nut, e^5, and between the said nut and the outer side of the collar e' is placed a spring, e^6, and a chambered washer, e^7, concaved at its side next the collar e' for a depth in excess of the thickness of the said collar. The face of the washer e^7, where extended beyond the collar e', receives against one side of it the spring e^6, so that when the collar and washer are not in direct contact, the rear side or face of the said washer will rest against the disk f and act to force it against the disk f', it in turn resting against the arm A, and the needle-thread will be held under a constant, but greater or less degree of tension, the force of which will be measured by the adjustment

of the spring e^6. The shoe or block g has a pin or projection, g', which enters a recess or chamber, g^2, in the frame part A, where it is surrounded by a suitable spring, g^3, (preferably a rather stiff spiral spring,) the sole purpose and normal tendency of which is to force the said shoe or block toward the cam F, fast on the shaft C, and draw the spindle e in the same direction, so that the rear side of the collar e', fixed thereto, will act against the disk f, to cause the thread between it and the disk f' to be held by a tension augmented by the strength of the spring g^3, so long as the cam F does not touch the shoe or block g, or the latter is not held back away from the said cam by the catch-lever g^4, pivoted at g^5 on the sleeve H, to be described, which, with its attached lugs, constitute a lever. When the force of the spring g^3 is effectual on the disks or plates $f f'$, the needle-thread between them will be positively clamped, so that it cannot be drawn from the spool by the take-up lever D′ or by other means. The oscillating shaft C is herein made the fulcrum for the sleeve H, provided at its front end, next the bearing b', with two lugs, h h', and at its other end, next the cam F, with a lug, h^2. The lug h' is acted upon by a suitable spring, h^3, so as to normally hold the lug h against the short arm of the tension-releasing lever m, having its fulcrum at m' on the frame part A, so that when the said lever m is turned upon its fulcrum m', as will be described, during the lifting of the presser-foot bar m^3 and presser-foot m^4, the sleeve H will be turned and the lug h^2 will act against the shoe or block g, as in Fig. 3, and cause it and the spindle e to be moved away from the shaft C for a sufficient distance to completely remove the collar e' from the disk or plate f and force the said collar against the washer e^7, causing its removal from the disks or plates $f f'$, thus leaving the needle-thread between the said disks or plates $f f'$ free from all tension, in order that it may at such time be drawn freely from the tension device and spool through the eye of the needle, as is customary when the work is to be removed from or work is to be supplied under the presser-foot. The tension-releasing lever m, having its fulcrum at m', is acted upon by a roll or stud, m^2, on the usual presser-bar lifting-lever m^5, having its fulcrum at m^6, so that when the said lever m^5 is turned, as in Figs. 1 and 2, the roll or stud m^2 will act on the lever m and cause it to turn the sleeve, as shown in Figs. 1 and 3. The catch-lever g^4, pivoted on the sleeve H at g^5, and provided with a pin or projection, g^6, is acted upon by a spring, g^7, (shown best in Fig. 3,) the normal tendency of which is to hold the lever g^4 in the position with relation to the said sleeve as represented in Fig. 3, the said catch-lever flying up at the rear of the block g whenever it is pressed fully back by the sleeve H, as in Fig. 3. The length of the lever g^4 and its pivotal point are such with relation to the block g and cam F that the spring g^7 is permitted to fully operate the lever g^4 only when the block g is pushed fully back away from the shaft C by the lug h^2, such movement of the said block causing the spindle to be moved far enough to remove the collar e' from the disks or plates, and cause the said collar, acting on the washer e^7, to remove it from the said disks or plates $f f'$, to thus release them from all pressure and leave the needle-thread entirely free to be drawn from the tension device and spool, such being done only when the presser-foot is lifted for the removal of the work from or its insertion under the presser-foot. Should the presser-bar be lowered and the lug h^2 be turned away from the block g, the catch-lever g^4, occupying the position as shown in Fig. 3, will retain the disks or plates $f f'$ from acting to hold or obstruct the free rendering of the needle-thread between them; but as soon as the machine is started to commence sewing, the cam F, in moving from its highest position downward into its lowest position, Fig. 4, will strike the pin or projection g^6 of the catch-lever g^4 and remove the end of the same from contact with the block g, permitting the spring g^3 to act and force the said block against the said cam then in its lowest position, and the disks $f f'$ will be forced together by a pressure due to the spring e^6, the tension then produced by the said spring being that which is to be the minimum tension upon the needle-thread when sewing, such tension being effectual in keeping the needle-thread sufficiently taut to be carried properly about the usual disk-bobbin in the rotating hook. As the cam F thereafter ascends from its lowest position, the catch-lever g^4, having been relieved from holding the block g, the catch-lever will strike against the lower end of the block, as in Fig. 5, and will not again act to hold the block until the latter has been fully moved backward by the lug h^2, when the presser-foot is again fully lifted, and, as the corner 2 at the lower end of the acting-face of the cam F passes the high point 3 of the block g, the full force of the spring g^3 will act to draw the collar e' against the disks or plates $f f'$ and clamp or grip the needle-thread positively. Assuming the position of the parts to be as in Figs. 1 and 3, with the presser-foot lifted and the needle-bar in its highest position, the disks or plates $f f'$ will be free from the pressure of both springs e^6 g^3. In this condition the material or work to be stitched will be placed under the presser-foot m^4, and the latter will be lowered thereon, and, as is customary, the end of the needle-thread beyond the eye of the needle will be drawn backward away from the operator, and will be held between the presser-foot and the said material. Lowering the presser-foot will relieve the block g from the pressure against it of the lug h^2, the spring h^3 then being free to act to partly rotate the sleeve H; but the catch-lever g^4 will, by its spring g^7, still be held up against

and retain the block till the cam F positively disengages it. If the machine is now turned in the proper direction, the cam F and the needle bar will begin to descend, and the upper end of the take-up lever D′ will begin to move backward or away from the tension disks or plates *f f′*, and as the thread at the sewing-point is held under the presser-foot the said take-up lever will draw the thread from the direction of the least resistance, which will be from the spool, until the eye of the needle arrives substantially at the throat-plate, and the take-up lever arrives nearly to the limit of the first part of its backward stroke, such movement drawing from the spool all the thread which is required for the next stitch. The needle-bar and needle then further descend, while the loop of needle-thread is taken by the usual rotating hook, and when in its lower position the cam F in its descent strikes the projecting pin g^6 on the catch-lever g^4 and removes the end of said catch-lever from the block *g*, which permits the same, under the action of the spring g^3, to move toward the cam F, then in its lowest position, and consequently the block *g* can move toward the shaft C only far enough to permit the collar *e′* on the spindle to release the washer e^7, the collar *e′* at such time not acting upon the disk *f*, but occupying a position, as shown in Fig. 4, the pressure due to the spring e^6 being then thrown upon the washer e^7 and the disks or plates *f f′*, and therefore the needle-thread will be subjected to but its minimum tension, or will only be checked, not gripped and held positively, while the take-up lever moves to give up slack thread to the hook, it then acting to draw the loop of needle-thread down and about the usual bobbin. The take-up lever having been thus moved to give up sufficient thread to form a loop, the cam F, on rising, retires from the block *g*, allowing the spring g^3 to come into action to move the spindle *e* and collar *e′* and effect the positive grip of the needle-thread, while the take-up lever D′ is again moved backward. Just before the take-up lever commences to be moved backward a second time to draw up the loop the needle-bar has risen far enough and the cam F high enough to release the block *g*, thus permitting the spindle *e* to be moved to clamp the thread, and the thread is so held clamped until the take-up lever has nearly completed its backward movement, at which time the descent of the needle-bar and cam F causes the latter to again strike the block *g*, thus releasing the needle-thread just as the take-up lever is completing its movement, such release of the needle-thread, while the take-up lever travels over about three-sixteenths of an inch, permitting the needle-thread to render freely from the disks and spool. By the use of the catch-lever the take-up lever is enabled, during the formation of the first stitch, to draw from the spool sufficient thread for such stitch before the thread is positively clamped.

It is obvious that the spring g^3 might be placed directly upon the spindle *e*. The disks or plates *f f′* do not necessarily rotate, but merely act to produce friction on the needle-thread between them, and while we prefer to use two disks or plates we desire it to be understood that the disk *f′* might be omitted, the inner side of the disk *f* then resting opposite or with its face upon the arm A.

We claim—

1. In a sewing-machine, a tension disk or plate, a chambered washer, a spindle provided with a collar, a spring pressing the washer against the disk or plate when the latter is not held back by the said collar, and a second spring acting to force the spindle and collar against the disk or plate, and the latter against the needle-thread, combined with a cam and a shoe or block interposed between the cam and spindle and acted upon directly by the cam, substantially as described.

2. In a sewing-machine, a tension disk or plate, a chambered washer, a spindle provided with a collar, a spring pressing the said washer against the disk or plate when the latter is not held back by the said collar, and a second spring acting to force the spindle and collar against the disk or plate and the latter against the needle-thread, combined with a cam, a block interposed between the spindle and cam, and a sleeve co-operating with the block, and feeding and stitch-forming mechanisms, substantially as and for the purpose described.

3. In a tension mechanism, the disks or plates, the spindle *e*, and a spring, g^3, to move it to clamp the disks or plates together, and a catch to hold the spindle and relieve the disks or plates from the tension due to the said spring, combined with means to release the said catch from the spindle as the needle-bar descends to draw thread for a first stitch, substantially as described.

4. The spindle, its collar, the chambered washer and spring e^6, and the disks or plates operated upon by the said washer, combined with a spring, g^3, and with means to move the said spindle in a direction opposite its movement due to the pressure of the latter spring, substantially as described.

5. The lever *m*, adapted to be actuated by the usual presser-bar-lifting lever, and the sleeve or lever H, provided with lugs, as described, combined with a tension mechanism, whereby the lifting of the presser-bar acts to turn the said sleeve and causes the disk *f* of the tension mechanism to be relieved from its hold upon the needle-thread, substantially as described.

6. The sleeve or lever H and the catch-lever g^4, pivoted upon it, and spring to move it, combined with the block and spindle and disks, the said catch-lever, by the movement of the said sleeve, being put in position to act upon and hold the block and spindle, as described.

7. In a tension mechanism, a tension disk or plate, a chambered washer, and a spindle

provided with a collar, combined with two springs, one of which is adapted to press the said washer against the disk or plate when the latter is not held back by the said collar, the other spring acting to force the spindle and collar against the disk or plate and the latter against the needle-thread, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE H. DIMOND.
WILBUR F. DIAL.

Witnesses:
LOUIS H. BAKER,
GEO. E. LINCOLN.