

UNITED STATES PATENT OFFICE.

WM. CLEVELAND HICKS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **32,064**, dated April 16, 1861.

To all whom it may concern:

Be it known that I, WILLIAM CLEVELAND HICKS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Controlling the Needle-Thread in Sewing-Machines; and I do hereby declare that the following is a full and clear description of the same, reference being had to the accompanying drawings, which form part of this specification.

My invention, which is applicable to machines using two threads and employing a needle and shuttle, also to other kinds of sewing-machines, relates to loosening and tightening the needle-thread at different periods in the formation of each stitch between the spool and the seam being sewed, and is distinct from or operates in addition to the ordinary or any suitable regular tension device, the function of which is mainly or merely to regulate the draft on the needle-thread as it is drawn from the spool; and my invention more particularly relates to or consists in an improvement upon that method of controlling the needle-thread which was secured to me by Letters Patent bearing date the 8th day of November, 1859, and in which the needle-thread was first drawn upwardly from the cloth during the ascent of the needle-bar or its equivalent, and by the motion of the same, then held at rest until the needle-eye was at or near the material to be sewed, and afterward disengaged or allowed to hang loose, and which combined action in the manner described gave a distinctive character to my invention from or as compared with other previous methods of controlling the needle-thread, one or more of which employed a spring-bar actuated by the needle-stock and yielding when the needle-eye approached the material to be sewed.

Prior to describing my present improvement I would observe that to prevent kinking, breaking of the needle-thread, give proper run or slack of said thread when the loop is being formed for the passage of the filling-thread or interlacing of the stitches, and to secure the drawing up of the needle-thread to tighten the stitches, peculiar actions on or of the needle-thread at particular periods in the double stroke of the needle are absolutely necessary. Passage of the needle-thread through an eye in the needle-bar, so as to make the needle-bar

in its entire descent from "slack" and in its succeeding ascent draw up the thread to tighten the stitch, only partially and very imperfectly meets the requirements necessary in practice, and is almost certain to produce more or less "kinking." Nor do the various devices which have before been used for action in concert with such operation of the needle-bar on the needle-thread, and which have been applied to keep up or away the loose thread during the greater portion of the descent of the needle-bar, obviate this and other difficulties. But little inferior, too, are the objections which apply to those controllers where the thread is passed, not through the needle-bar, but through an independent bar or wire or spring, said wire or spring having motion imparted to it and by it to the thread, and generally remaining still while the needle descends until the eye is near the cloth, and caused to be loosened or depressed while the eye passes through and below the cloth, and as the needle commences its ascent the spring simultaneously rising until arrested by the stop, and remaining stationary during the closing portion of the needle's ascending stroke. Such controllers draw up the needle-thread with a greater speed than that of the needle-bar. They present a stiff spring to be operated upon alike, whatever the nature or thickness of the fabric being sewed, and, whatever the quality of thread, stout or fine, cause the same friction and use the same power, whether light or heavy goods are being sewed, and always consume more power than is necessary to draw up the stitch. These and other defects were obviated by the method of controlling the needle-thread patented to me on the 8th day of November, 1859, and in which the only point where power was necessary to draw up the stitch was that of the highest in the stroke of the needle-bar, after which the controller remains stationary till the needle-eye in its descent nearly reached the cloth, when said controller was gradually moved downward and toward or a little in advance of the closing downward stroke of the needle, suddenly dropped, and left the needle-thread slack, free from all restraint, and doing away with strain in the needle-eye, likewise said controller exercising no drawing-up action upon the needle-thread during the early part of the ascent of

the needle, nor until the needle-bar was concluding its upward stroke, when, as the latter was being finished, the stitch was drawn tight. On such method, then, of controlling the needle-thread my present invention is an improvement, and it differs from the former not only as regards the means employed, but also in certain peculiarities of its action, including a novel intermediary tension effect which it produces on the needle-thread, while in its general action it resembles the method I have already referred to as patented to me. The intermediary tension effect produced by my improvement, as above alluded to, implies, includes, or involves, when the needle-thread is acted upon as in my former patented method, a slight loosening of the thread as the needle commences its descent, so as to relieve the thread from strain, and so as to form slack which will prevent the needle, if a fine one, from being drawn or bent from its path, as is apt to be the case when the thread is tight, by the angle given to the thread and pull upon the needle by the feed of the cloth across the path of the needle each stitch that is made.

In the accompanying drawings my invention is shown as applied to a double-thread or eye-pointed needle and shuttle sewing-machine, the general construction and action of which it is not necessary here to very particularly describe.

Figure 1 represents a side elevation of the machine; Fig. 2, a front view of the same in part, and Figs. 3 and 4 diagrams in illustration of the action of my improved controller.

B represents the table or platform of the machine, and A a neck which projects over said table to hold the perpendicular needle-bar *c*, in which is fastened a needle, N. The needle-bar is caused to vibrate vertically by an angular lever concealed and passing down behind a shaft, *m*, to a roll in a cam, which is driven in the frame B by a treadle and crank worked by the foot, or which may be otherwise driven. The shuttle is vibrated by a similar lever lying horizontally and operated by the cam and a roll. The action of the needle, shuttle, and feed is similar to that of machines in common use. I shall therefore only describe in detail my invention.

The controller may be said to consist of but two leading parts or contrivances, though other details may of course be added, and in its operation it necessarily embraces peculiarities of construction which invest it with the character of a more complicated mechanism, free, however, from the friction, liability to derangement, and wear of such. It is, in fact, here illustrated in a form which is devoid of all wear and friction, and employs no machinery the springing of which affects the thread, and no springs to get out of order. The one part, D, is attached to the needle-carrier or other equivalently-moving portion of the machine, and may assume the form of a lateral arm or bracket projecting from the needle-bar near its top and extending over and down the neck or trunk

A at its one side, so as to play up and down with the needle-bar at a suitable distance from the side of the neck A. This moving arm or bracket D has its vertical elbow made with a slot, *a*, the one side of which nearest the goose-neck is shaped to form an inclined plane, *b*, the slope of which as the parts are here arranged is away in an upward direction from the side of the neck or trunk A. Said slotted elbow is also provided at its bottom with a wire or other saddle, *c*, sloping in a downward direction toward the neck or trunk A, and of a certain width relatively to the other leading but stationary part, E, of the controller, so as to embrace the latter, for a purpose hereinafter described. The stationary part E of the controller is or may be a simple inclined plane projecting from the side of the goose-neck A, its slope lying away in an upward direction from the side of the neck, and being formed with a shoulder, shelf, or step, *d*, at its top. It is also shown slotted, so as to receive within it the angular side *b* of the reciprocating arm, D. The needle-thread passes from the bobbin R round the tension-regulator W, up through an eye, *e*, projecting from the goose-neck, through the slot *a* of the reciprocating arm of the controller, and down in front through another projecting eye, *f*, in the goose-neck to the needle *n*. From this description and inspection of the drawings it will readily be seen that as the needle-bar ascends the reciprocating arm D of the controller carries the slack thread along with it, exerting no force, however, to tighten the stitch till approaching the termination of its upward stroke. In such ascent the tendency produced by the stationary angle-piece E and angular lifting-saddle *c* on the thread is to incline it from the goose neck or trunk A, the stationary angle-piece E drawing the thread away from the perpendicular, so that when the vibrating arm D and needle-bar with which it moves reach the highest point of their upward stroke the needle-thread slips or is slid off the rear portion of wire saddle *c* onto the shelf or shoulder *d* of the stationary incline E. This taking up of the slack of the needle-thread, however, to secure the tightening of the stitch is only one function of the controller.

As the needle-bar and reciprocating arm D commence their descent the needle-thread is left supported on the shelf *d*, where it was lodged, as described, and at this point—that is, the commencement of the downstroke of the needle—a temporary and slight relaxation is given to the tension of the needle-thread, and which I denominate an “intermediary” tension, by the retiring of the wire saddle *c* from contact with or partial support of the thread, and the sole support of the latter on the shelf *d*, which, being narrower than the saddle *c*, causes a certain diminution in the tension or a slight falling or loosening of the needle-thread. This prevents undue strain on the needle and needle-thread and keeps the needle, if a fine one, from being bent or drawn

to one side by the feed of the cloth the length or distance of a stitch, and which movement of the cloth necessarily gives an angular or lateral direction to the needle-thread between the needle-eye and the material being sewed, but the effect of which, as regards strain on the needle-eye or undue draft on the needle-thread, is obviated by the intermediary tension effect of the controller I have just described. Such relaxation in the tension of the needle-thread is, as already mentioned, only temporary at the point, and for the purpose or purposes specified; and as the needle-bar and reciprocating arm D continue their descent, and until the needle-eye nearly reaches the cloth, the needle-thread is held supported at a proper tension on the shelf *d* of the incline E, which avoids all kinking of the thread as it is brought down to the cloth; but as the needle-eye enters or just before it enters the material the inclined side *b* of the reciprocating arm D comes into play and pushes off the needle-thread from the shelf *d* and causes said thread to drop or hang loose, free from all restraint, and gives to it that slack which is necessary on the needle-thread being drawn through the cloth for the easy and certain formation of its loop on the under side of the cloth for the shuttle, with its filling thread, to pass through. On the ascent of the needle again the same action takes place as before, the controller at first gently lifting the needle-thread and tightening its pull toward the close, and leaving it on the shelf *d* to be subjected to intermediary tension as the needle commences its descent, and after a suitable interval, or as the needle nearly reaches the material, to be abruptly and loosely cast off, as hereinbefore fully described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method, substantially as herein described, of controlling the needle-thread in sewing-machines by causing the controller during the whole of its ascent to act as a take-up to said thread, then leaving it suspended on a stationary independent rest, and afterward, and as the needle-eye enters or is about entering the cloth, casting off the needle-thread, so

as to make it hang freely or loose during the concluding portion of the downstroke of the needle. This I claim in contradistinction to the drawing up of the needle-thread only at the concluding part of the upward stroke of the needle, as in the method previously patented to me, as herein referred to.

2. The employment of an intermediary tension on the needle-thread as the needle-bar commences its descent by a temporary relaxation in the tension at said period, essentially as and for the purpose or purposes herein mentioned.

3. The combination of a reciprocating take-up and cast-off to the needle-thread, having a constant motion in unison with that of the needle-bar, and stationary independent rest or support for the needle-thread, to retain it free from motion or action by the controller during the early portion of the downward stroke of the needle, essentially as specified.

4. Constructing the stationary independent rest and lifting-saddle of the controller so that the needle-thread in being drawn up will be urged away from or to one side of its perpendicular travel in line with the needle, and so that on the moving portion of the controller completing its upward stroke, or thereabout, the needle-thread will spring and slide itself from off the lifting-saddle onto the stationary rest, substantially as herein described.

5. Constructing the lifting-saddle of the controller of greater width than the independent rest on which the thread is left suspended at the end of the upward stroke of the needle-bar, for the purposes specified.

6. Providing the moving portion of the controller with an inclined plane at its one side to act as a cast-off to the needle-thread from off its independent rest, essentially as herein set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

WM. CLEVELAND HICKS.

Witnesses:

JOSEPH GAVETT,
ALBERT W. BROWN.