

(No Model.)

3 Sheets—Sheet 1.

G. S. HILL.
SEWING MACHINE.

No. 548,877.

Patented Oct. 29, 1895.

Fig. 1.

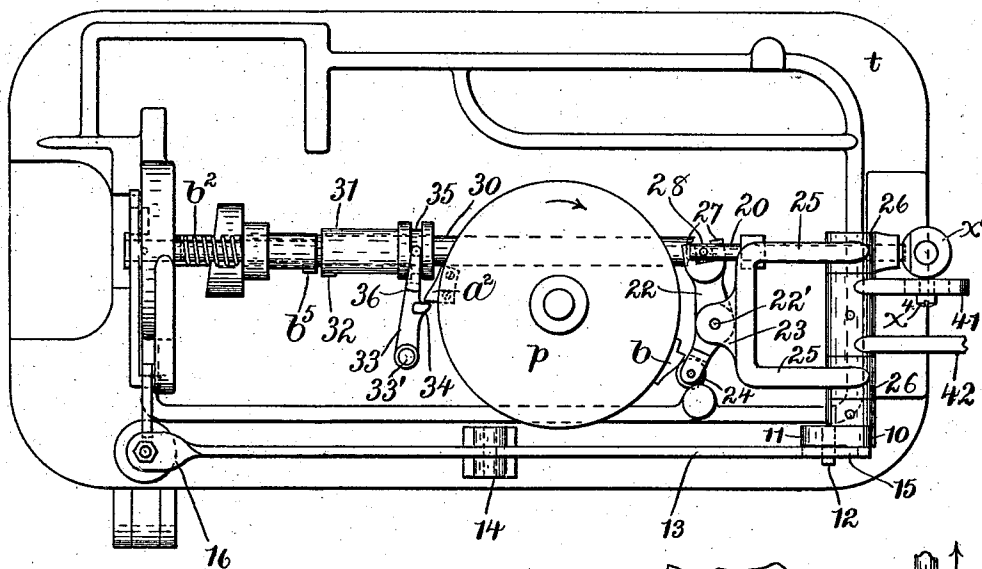


Fig. 2.

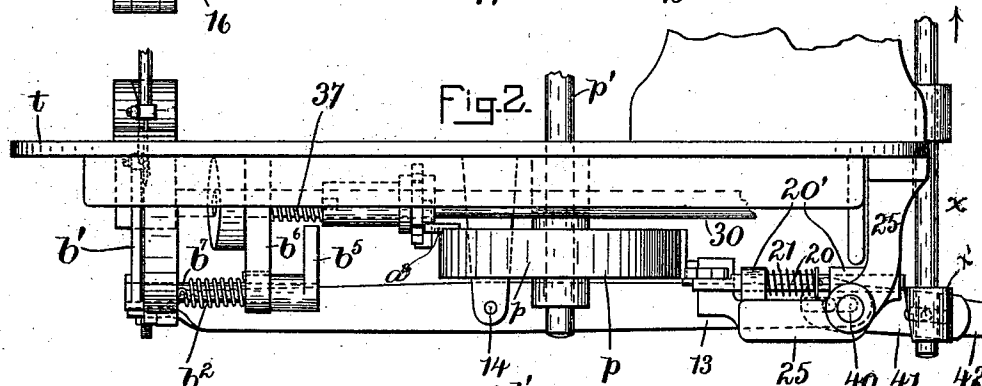


Fig. 3.

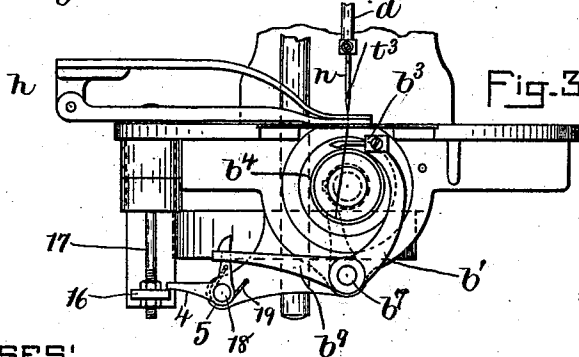
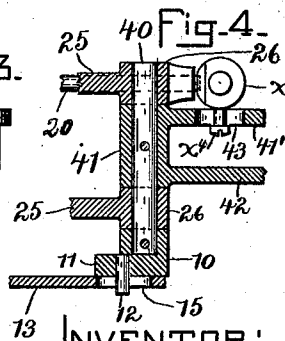


Fig. 4.



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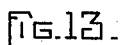
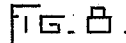
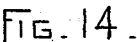
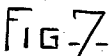
3 Sheets—Sheet 2.

No. 548,877.

Patented Oct. 29, 1895.



Fig. 6



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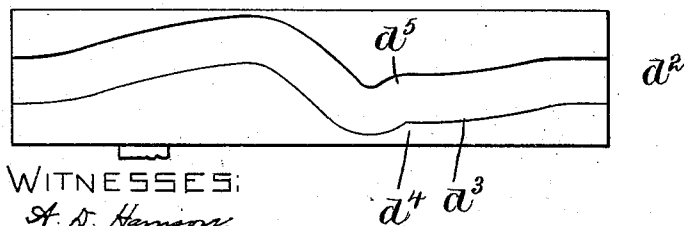
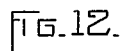
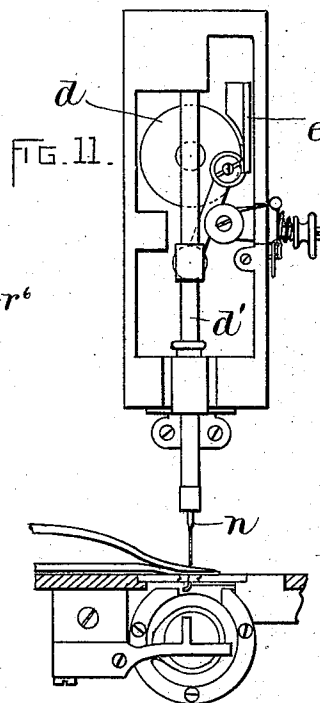
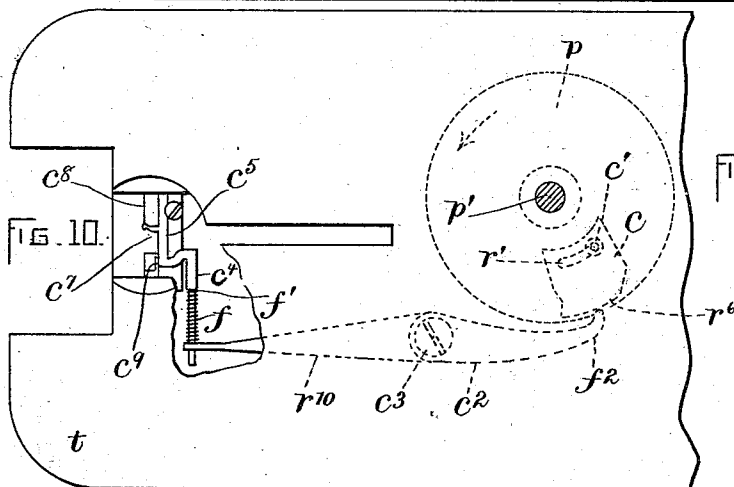
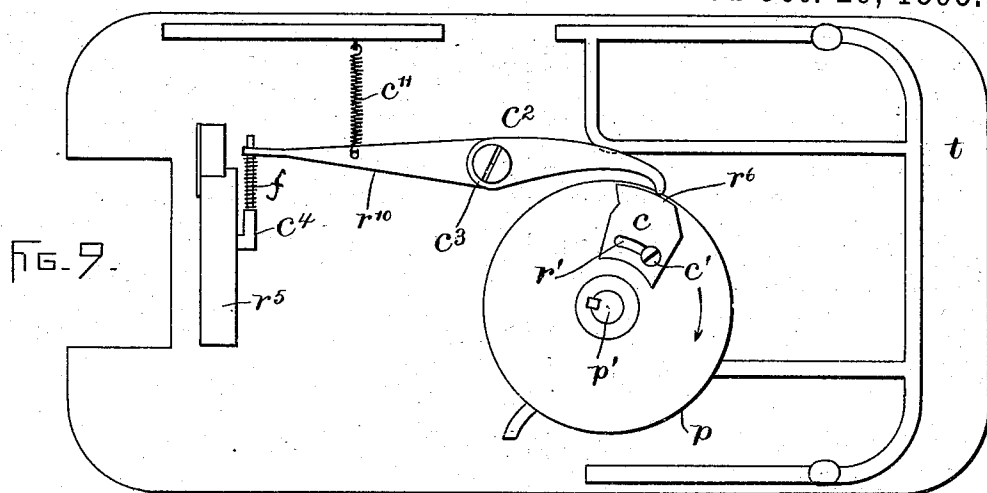
(No Model.)

3 Sheets—Sheet 3.

G. S. HILL.
SEWING MACHINE.

No. 548,877.

Patented Oct. 29, 1895.



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UNITED STATES PATENT OFFICE.

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TO JAMES H. MURRAY, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 548,877, dated October 29, 1895.

Application filed November 30, 1894. Serial No. 530,297. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. HILL, of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Thread-Cutting Attachments for Sewing-Machines, of which the following is a specification.

This invention relates to an improvement in automatic thread-cutting attachments for sewing-machines; and it consists in the novel features of construction and arrangement of parts hereinafter fully described in the specification, illustrated in the drawings, and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this application, in which like characters indicate like parts wherever they occur.

Figure 1 is a view of the bottom of a sewing-machine, showing a part of my invention applied thereto. Fig. 2 is a side elevation of the bed-plate of a sewing-machine, showing my invention connected thereto. Fig. 3 is a front view of a portion of a sewing-machine, showing a part of my invention applied thereto. Figs. 4 and 5 represent details. Fig. 6 is a side elevation of a machine embodying my invention. This view is taken from the opposite side of the machine from that shown in Fig. 2. Fig. 7 is a detail of the take-up and its operating-cam. Fig. 8 is a detail of the thread-nipper. Figs. 9 and 10 are respectively views of the bottom and top of the bed-plate of the machine, showing the mechanism attached thereto for operating the thread-nipper. Fig. 11 is a detail showing the wheel that operates the take-up and also the needle-bar. Fig. 12 is a view of the cam on the take-up wheel developed. Fig. 13 is a diagrammatic view showing the position of the thread-loop, the fabric, and the nipper-arm when the cut end of the thread is nipped. Fig. 14 is a detailed view showing the devices connecting rod 17 to the cloth-clamping devices.

I have for convenience shown my invention applied to a machine of the class shown in my Patent No. 529,491.

My invention is particularly adapted for machines for working buttonholes or for bar-ring and tacking, although it may be applied

to any machine without departing from the scope of my invention; which includes a cutting attachment made up of a thread-cutter for cutting the needle-thread below the work, means for slackening the needle-thread before each stitch, and a thread nipping and pulling device to hold the end of the needle-thread at the beginning of a new buttonhole or bar or tack and pull the same down through the work. I am thus enabled to automatically complete the bar or buttonhole without waste of thread and with both ends of the needle-thread—to wit, at the beginning and end of the bar or buttonhole on the reverse side of the goods—a set of advantages that will at once commend themselves to those skilled in the art without further description.

The overhanging arm a^2 , the horizontal main shaft a' , the vertical shaft p' , driven by the main shaft, the cam-wheels n' and p on said vertical shaft, the work-holder h , the connections between the same and the cam-wheels n' and p , and the general form and arrangement of the machine are the same as in my former patent, hereinbefore referred to, and are only included here in order to show the connection of my invention therewith.

Referring now to Sheet 1, on the front end of a shaft b^7 , mounted in suitable supports on the under side of the machine, is secured a bell-crank lever b' , provided at the extremity of one of its arms with a thread-cutting knife b^8 . A helical spring b^2 is mounted on this shaft, having one end secured to said shaft and its opposite end secured in a support or lug b^6 , projecting from the bed-plate t of the machine. At its rear end said shaft is provided with a finger or projection b^5 . A horizontally-sliding bolt 20 is mounted in suitable bearings 20' on a frame 25 at the rear of the machine. At one end this bolt is arranged to engage a collar x' on a vertically-movable rod x , which controls a belt shipping and stopping device x^2 . A helical spring 21 is mounted upon the bolt 20 in such a manner as to press said bolt normally outward for engagement with the collar x' . Upon the wheel p are two wipers a and b , that may be integral with said wheel or secured thereon, adjust-

ably or otherwise. These wipers are located on the wheel *p* about one hundred and eighty degrees apart, the wheel *p* rotating in the direction indicated by the arrow. The wiper *a* is arranged to strike a projection 34 upon a lever 33, pivoted at one end at 33', and operate said lever just before the wiper *b* engages the roller 24 on one end of a lever 22, pivoted between its ends at 22' to ears 23, extending from a frame 25, which is attached to the bed-plate *t* of the machine-bed, and is provided with bearings 26 for a shaft 40. The end of the lever 22 adjacent to the bolt 20 is forked, as at 27, and in this fork a pin 28 from the bolt 20 extends, whereby motion may be communicated to said rod by said lever.

In the drawings the wiper *a* is shown as attached to the upper face of the wheel *p*, and a shaft 30 and its accessories are shown as located above said wheel, while the wiper *b* is shown as integral with the periphery of said wheel and the bolt 20 is shown as located below the said wheel. Manifestly this arrangement could be reversed or variously modified without departing from the scope of my invention. Upon a shaft 30, suitably supported below the bed of the machine and above the wheel *p*, and to which motion is imparted by the shaft *p'* by means of connections not shown, since they form no part of this invention, being clearly shown and described in my patent hereinbefore referred to, is a sleeve 31, constructed and arranged to rotate with said shaft, but to have a sliding movement thereon. This sleeve is formed with a finger 32 at one end and with a grooved flange 35 at the other end, which loosely fits the forked end 36 of the lever 33. Upon the shaft 30 and between the sleeve 31 and the lug *b*⁶, which forms a bearing for the shafts *b*⁷ and 30, is arranged a helical spring 37, which yieldingly presses the sleeve 31 to the right in Fig. 1 in a direction away from the needle end of the machine. The arrangement of parts is such that the fingers *b*⁵ and 32 are normally out of engagement by reason of the spring 37; but when the sleeve 31 is forced against the tension of the spring 37 toward the needle end of the machine the finger 32 will engage the finger *b*⁵ and turn the shaft *b*⁷.

Rigidly mounted upon the shaft 40 is a sleeve 41, having two integral arms 41' and 42, the latter serving as a means to which a treadle (not shown) or other means for operating the arm 42 can be attached. The arm 41' is provided with a slot 43, into which extends a pin *x*⁴ on the lug *x'*, whereby motion may be imparted to the rod *x* by means of the arm 41'. Upon the end of the shaft 40, opposite the location of the rod 20, is rigidly secured a boss 10, having an arm 11, provided with a pin 12. A lever 13, pivoted intermediate its ends at 14, is provided with a slot 15, into which the pin 12 projects. By this arrangement the end 16 of the lever 13 can be raised and lowered by turning the shaft 40. The end 16 of the

lever 13 is secured to a vertically-movable rod 17, connected to the arm *h*³ of the work-holder *h*. This work-holder *h* is composed of the bottom member or base *h'* and a top member *h*², pivoted between the ears *h*⁴ on the bottom member. An arm *h*³, connected to the member *h*², extends between the ears *h*⁴ and over a portion of the member *h'*, and preferably in a recess in the latter, and is connected to the end of a rod 17, so that the member *h*² may be moved up and down by a like movement of the rod 17 to respectively unclamp and clamp the goods. Mounted in suitable bearings and parallel with the shaft *b*⁷ and between said shaft and the end 16 of the lever 13 is a shaft 18, having mounted thereon a bell-crank lever 5, one arm 4 of which is arranged to rest upon the end 16 of the arm 13, while the other arm 6 of said lever is formed with a hook 7, arranged to be engaged by a projection *b*¹⁰ on the arm *b*⁹ of the lever *b'*. A spring 19 is connected to the lever 5 in such a way as to press the hook 7 into engagement with the projection *b*¹⁰.

The operation of the portion of my invention herein described is as follows: When the machine is idle, the wipers *a* and *b* are immediately past the ends of the levers 22 and 33 and the knife *b*⁸ to the right of the position shown in Fig. 3 and clear of the needle-thread *t*³. By pulling down upon the arm 42 to start the machine the shaft 40 will be rocked, pulling down the rod *x* and permitting the end of the bolt 20 to engage the upper edge of the lug *x'*. This motion of the shaft 40 lowers the end 16 of the lever 13 and the rod 17, thus bringing the member *h* of the work-holder upon the goods and the hook 7 into position to be engaged by the projection *b*¹⁰ when the lever *b'* is operated. The wheel *p* is timed to make one revolution during the working of a button hole or a bar, &c. When the last stitch is being made, and while the loop is over the shuttle *b*⁴, the wiper *a* strikes the projection 34 and crowds the sleeve 31 toward the needle end of the machine. This motion is sufficient to bring the fingers 32 and *b*⁵ into engagement, which throws the knife *b*⁸ into the loop, as shown in Fig. 3, where it is held by the projection *b*¹⁰ on the arm *b*⁹, being forced down over and under the hook 7 of the arm 6. Immediately the wiper *b* strikes the roller 24 upon the lever 22, withdrawing the end of the bolt 20 from the lug *x'*, permitting the rod *x* to be forced downward by the spring *x*⁵ to stop the machine. This movement of the rod *x* turns the shaft 40, which in turn operates the lever 13, forcing the end 16 thereof upward to unclamp the goods by means of the rod 17, the arm *h*³, and the member *h*² and at the same time raising the arm 4 of the lever 5 and turning the arm 6 and hook 7 out of engagement with the projection *b*¹⁰, when, by means of the spring *b*², the lever *b'* will be turned upon the shaft *b*⁷ and the knife *b*⁸ drawn suddenly through the loop of the

needle-thread, which at this time is tightly drawn about the shank of said knife, thereby cutting the needle-thread and leaving the end of the thread below the work.

5 Referring now to Sheets 2 and 3, and particularly to Figs. 6, 7, 11, and 12, e is a take-up pivoted at e' in the casing, as is usual, and provided at one end with a thread-eye e^2 and at its opposite end with a roller e^3 , which is
10 arranged to run in a cam-groove d^2 of a wheel d , that operates both the needle-bar d' and the take-up. It is desirable to have the thread slackened when the thread is cut to prevent breaking the needle and to prevent the thread
15 from flying out of the needle after being cut. The take-up rises and falls with the needle, the thread being cut when the needle is at its highest point, and in order to slack the thread at this time I form the cam-groove d^2 with a
20 projection d^4 on one side and a corresponding depression d^5 on the opposite side, the projection d^4 being on the side of the wheel d next the needle-bar. By this construction the end of the take-up is dropped suddenly
25 for a short distance and then is held stationary while the thread is being cut by means of a straight part d^3 of the groove d^2 that immediately follows the projection d^4 . By this arrangement it will be seen that the thread
30 is automatically slackened before the thread is cut, and by having this slackening done by means of the formation of the cam-groove d^2 in the wheel d the slackening of the thread can be timed to the movements of the needle-bar without intermediate or complicated
35 mechanism. Moreover, by having the thread slackened at each rotation of the wheel d I am enabled to arrange the wipers a and b to cut any particular stitch.

40 Referring to Figs 8, 9, and 10, adjustably secured on the wheel p by means of a screw c' and a slot r' , is a wiper c . A lever c^2 , pivoted upon a stud c^3 , secured to the bed-plate t of the machine, has the end of one of its
45 arms arranged to be engaged by the wiper c , while the end of the other arm is loosely mounted upon a rod c^4 , connected to the thread-nipping bar c^5 , mounted to slide in a suitable support r^5 , secured to the bed-plate
50 of the machine just in the rear of the throat-plate. Any suitable means may be employed to support and guide the bar c^5 . This bar c^5 has a movement transverse to the bed of the machine and is provided on the side opposite
55 the rod c^4 with a finger c^7 , that extends across a space immediately in the rear of the space in which the needle n plays. This finger has a notch r to engage the needle-thread and pull the cut end down through the work upon
60 the beginning of a bar or buttonhole. The path of movement of the finger c^7 is between two stops c^8 and c^9 . A helical spring f is mounted upon the rod c^4 between the end of the lever c^2 and a shoulder f' on said rod.
65 The thread-nipper is designed to nip and hold the cut end of the needle-thread, while the

loop of the first stitch is spread, to hold said end for one or more stitches and then in returning to its normal or idle position to draw the cut end of the needle thread that would
70 ordinarily remain on the upper or finished side of the work down through the work, thus forming a bar automatically with the end of the needle-thread at the beginning and end
75 of the bar or buttonhole on the reverse side of the work.

The operation of the nipping part of the thread-cutting attachment is as follows: The wiper c is set to engage the end f^2 of the lever c^2 at the beginning of the bar or buttonhole
80 and force the finger c^7 , which normally rests against the stop c^9 , against the stop c^8 after the needle has made the first puncture in the goods and while the loop of the needle-thread is spread over the shuttle, as shown in Fig. 85
13, where n represents the needle, t^3 the needle-thread, t^4 the loop, c^7 the finger of the bar c^5 , t^6 the fabric or goods, and t^5 the cut end of the needle-thread that remains on the upper
90 or finished side of the fabric when the needle makes its first puncture in the goods. It will be observed that as the finger is moved toward and against the stop c^8 it will catch and nip the right or inside or cut end of the needle-thread and hold it against said stop. 95
(See Fig. 8.) Now as the loop is cast off from the shuttle and the thread drawn up by the take-up it draws the left-hand or outside part of the loop (see Fig. 13) in the notch r
100 on the side of the finger c^7 opposite to that where the end t^5 is held. The wiper c is provided with a surface r^6 sufficiently extended to operate the lever and hold the thread during one or more stitches. As the wheel p
105 continues to rotate, the end t^2 leaves the wiper and is drawn suddenly inward toward the shaft p' by a spring c'' , attached to the arm r^{10} of said lever and to some stationary part of the machine. As the finger c^7 returns to its inoperative position against the stop c^9 , it
110 draws the end of the needle-thread t^5 down through the work, since the regular thread t^3 is intact and formed in a stitch or stitches and cannot yield. The spring f on the rod c^4 allows the arm r^{10} to hold the finger c^7 yield-
115 ingly against the stop c^8 and thus prevent cutting the thread or any liability of breaking the several parts of the attachment.

What I claim as my invention is as follows:

1. In a sewing machine, in combination, a
120 needle and complemental stitch-forming mechanism, a needle-thread cutting device, a thread-nipping device, both located below the work plate, and a thread-slackening device, substantially as and for the purpose set forth. 125

2. In a sewing machine, in combination, a
130 needle, and complemental stitch-forming mechanism, and a thread-nipping device arranged below the work and means for automatically operating said device to nip the end
of the needle-thread and to hold the same during one or more stitches, and then to automati-

cally draw said end down through the work, substantially as and for the purpose set forth.

3. In a sewing machine, in combination, a main shaft (*a'*) a needle, and complemental
5 stitch forming mechanism, a take-up, a cam-wheel on said shaft (*a'*) arranged to operate said needle and take-up and to drop the take-up suddenly a short distance and then hold it stationary a brief length of time in advance
10 of each descent of the needle, substantially as and for the purpose set forth.

4. In a sewing machine, in combination, a thread-nipping bar provided with a thread-nipping finger and a rod, a pivoted lever having one end yieldingly mounted upon said
15 rod, and means for operating the other end of said lever a predetermined distance at a predetermined time, substantially as and for the purpose set forth.

5. In a sewing machine, in combination, a sliding bar arranged below the work, a thread-nipping finger and a rod upon said bar, a pivoted lever having one end yieldingly
20 mounted upon said rod, a rotary wheel, a wiper on said wheel having a predetermined actuating surface, and means for yieldingly holding the end (*f*²) of said lever in engagement with said wiper, substantially as and for the purpose set forth.

6. In a sewing machine, in combination, a sliding bar (*c*⁵) arranged below the work, a finger (*c*⁷) upon said bar having a notch (*f*³), a rod (*c*⁴) upon said bar, a pivoted lever having one end loosely mounted upon said rod, a
30 spring interposed between the end of said lever and a shoulder on said rod, a rotary wheel having a wiper for engagement with the other end of said lever for operating said lever in one direction and a spring for operating said lever in the opposite direction, substantially as and for the purpose set forth.
40

7. In a sewing machine, in combination, a thread-cutting knife arranged below the work,

a wheel provided with a wiper (*a*), connections between said wiper and knife for operating said knife in one direction, retaining means for holding the knife in said operated position, a wiper (*b*) upon said wheel, and connections between said wiper and said retaining means for operating the latter to release the knife, and a spring for returning said knife to its normal position, substantially as and for the purpose set forth.

8. In a sewing machine, in combination, a shaft (*b*⁷) operated in one direction by a spring (*b*²), a lever mounted upon one end of said shaft having a knife at one end and a projection (*b*¹⁰) at the other end, a wheel (*p*) provided with wipers (*a*) and (*b*), connections between said wiper (*a*) and the shaft (*b*⁷) for setting said knife in the loop of a stitch, a latching means for retaining said knife in its operated position, and connections between said wiper (*b*) and said latching means for operating the latter, substantially as and for the purpose set forth.

9. In a sewing machine, in combination, a thread-cutting knife-lever actuated by a spring in one direction, a catch for said lever, a wheel provided with wipers (*a*) and (*b*), connections including the lever 33 and the sleeve 31 between the wiper (*a*) and said knife lever for engaging the latter with said catch, and connections including the lever 22 and the bolt 20 between said wiper (*b*) and said catch
7 for releasing the latter, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 28th day of 8 November, A. D. 1894.

GEORGE S. HILL.

Witnesses:

WILLIAM QUINBY,
A. D. HARRISON.