To all whom it may concern:

Be it known that I, JOHN W. DARLEY, JR., a citizen of the United States, residing in Baltimore city and State of Maryland, have invented certain new and useful Improvements in Thread-Cutting Mechanism for Button-Sewing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to thread cutting mechanism for button sewing machines, this application being a division of my former application, filed May 25, 1904, Serial No. 208,728.

The object of my invention is to provide means, in a button sewing machine, wherein a button is sewed to a fabric by a neck of thread, and the thread wound around the neck of thread connecting the button with the fabric and knotted, whereby the thread at the close of the operation of sewing on a button will be severed, and the severed end firmly held until the thread is to be used for sewing on the next button.

With this object in view, my invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a bottom plan view of one end of a button sewing machine showing the thread cutting mechanism. Fig. 2 is an end elevation of the parts shown in Fig. 5. Figs. 3 and 4 are perspective views of the casting shown in the top left hand corner of Fig. 5. Fig. 5 is a bottom plan view of the trimmer for the shuttle thread, shown in the position it assumes during the operation of the sewing mechanism. Fig. 6 is a similar view showing the parts in the position assumed during the winding operation, and Fig. 7 is a similar view of the same parts in the position they assume just before the shuttle thread is severed. Fig. 8 is a sectional view of the bed plate of the machine showing the pedal operated mechanism and related parts. Fig. 9 is a partial plan view of the power applying and trip mechanisms of the knot tying mechanism. Fig. 10 is a partial end elevation of the machine showing some of the power applying and controlling mechanisms. Fig. 11 is a bottom plan view of the machine, some of the parts being omitted. Fig. 12 is a perspective view of one of the parts detached, and Fig. 13 is a top plan view of the parts shown in Fig. 6.

The sewing and winding mechanism are fully described in my application above referred to.

Fig. 1 represents the shaft for driving the sewing mechanism, which shaft, by means of the gear wheels d, e and f, drives the rotary shuttle in the case g with a variable motion, these parts being mounted beneath the bed plate b of the machine. On the shaft 60 is mounted a casting 630 provided with a keyway 631, in which a spline fixed to said shaft slides, thus determining the angular position of said casting on said shaft. The longitudinal position of said casting on said shaft is determined by means of a bolt 637 provided with a tightening handle 638 which works in a slot in the bed plate (not shown), so that the casting 630 can be clamped in either of two positions, in one of which the knife for the shuttle thread is operative, and in the other of which the knife is thrown out of action. When the parts are in the position in which the knife is operative, the slot 636 in the casting 630 is in engagement with the ball 637. This ball 637 is carried near the end of the arm 639 of a bell crank lever, which arm is provided with an extension 638. In this extension is mounted a screw 640, the head of which forms a shoulder, and around the body of this screw is coiled a spring 644, one end of which engages a pin 645, and the other a pin 643. The pin 643 is fastened to the underside of the arm 644 of the main bell crank lever, and the pin 642 is attached to one arm 645 of another bell crank lever, the angle of which is pivoted on the pin 646 carried by the arm 644, which pin is retained in place by the nut 647. This bell crank lever has its other arm 648 formed to sever and hold the shuttle thread 649. It is formed with a V-shaped slot 630, 651 representing the sharpened severing edge of the knife. This edge 651 is not sharpened on both sides, but is only sharpened on the edge next the throat plate, the other side being designed to catch and hold the shuttle thread. The lower extension 652 is not sharpened, and is for the purpose of discharging one end of one thread before severing a fresh one. The arm 645 is provided with a slightly curved face 653 for cooper...
ation with the corners 654 and 655 of the pawl 656. The pawl 656 is mounted above the arm 644 on a screw 657 fastened in the throat plate. A spring 658, passing around a screw 659 and pin 660 secured to the throat plate, bears against the heel of said pawl, normally holding the same against the pin 661, which limits its movement in one direction. The lever arm 644 is pivoted to the bed plate 4 of the machine by means of a screw 662, and a nut 663 and collar 664 are provided to keep said arm in the proper position in relation to the bed plate. Above the arm 648, which carries the knife edge, is a spring cutting plate 665 provided with a cutting edge 666. This cutting spring plate is carried by a screw 667 passing through the arm 664 and held in place by a nut 668. The head of the screw is shown at 699, and it passes through a perforation in the cutting spring plate 665, through a washer 670, approximately the thickness of the knife arm 648, and through a perforation in the holding spring plate 671, which is "wrought" on its upper side.

The cutting knife 665 and the spring holding plate 671 are held in position by the screw 667 and also by another screw 672 fastened by a nut 673. The head of this screw is shown at 674 and it passes through the knife arm 665, a distance washer 675, and through a perforation in the holding plate 671. The spring knife arm 665, and the spring holding arm 671 are therefore firmly held in fixed position relatively to the arm 644, and the knife arm 648 plays between them.

In order to operate and control the above described instrumentalities the following means are provided: The shaft 60 is revolu-
mously mounted in the bearings 60a, 60b and 60c and near the bearings 60b is pinned to said shaft a lever 69. On the inner end of this lever is pivoted a pawl 62\(^4\) carrying near the top a screw 62\(^a\). The pawl is also provided with an extension 62\(^2\) adapted to bear against the pin 69 mounted in the inner end of the lever 50. The lever 50 is mounted on the pin 45 which is carried in the lugs 46 and 47 attached to the frame of the machine, and its outer end is to be connected by a link 50\(^a\) with the pedal not shown. The lever 50 is provided with ratchet teeth 50\(^a\) which is revolu-
mously mounted on the shaft 83 and held in engagement with the ratchet teeth 50\(^b\) by the spring 82\(^a\). Mounted on the shaft 83 is a pawl 52\(^a\) which is limited in its movements by the stops 114 and the portion 89\(^b\) of the frame of the machine. A screw 82\(^a\) serves to regulate the movement of the pawl 50\(^b\) toward the ratchet teeth 50\(^b\). The pan 82 is moved into the position shown in Fig. 8 by the spring 122 which encircles the rod 121 and extends between the lug 124 of the lever 62 and the washer 123 which bears against the lever 120 of the pan 82. The pan 82 is slotted, as shown at 82\(^2\), and carries a slide 82\(^b\) in which is mounted a pin 82\(^c\) adapted to drop into the spaces of the screw 90. The slide 82\(^c\) is normally kept against the extension 79 of the sleeve 78 by a spring not shown. The sleeve 78 is longitudinally adjustable on the shaft 60 and can be locked in any position by a thumb nut, not shown. The sleeve 78 is locked against the framework of the machine, but leaves the shaft 60 free to revolve. The slide 82\(^c\) has a projection 82\(^d\) adapted to strike the screw 62\(^c\). On the shaft 60 near the bearing 60\(^b\) is mounted a collar 61\(^a\) adapted to be set in any circumferential position on the shaft 60 by the set screw 61\(^b\). One end of the spring 61 is introduced into a hole provided in one of the flat faces of the collar 61\(^b\), and the other end of said spring bears against a portion of the framework of the machine. A pin 61\(^c\) prevents the longitudinal displacement of said spring. Between the bearings 60\(^a\) and 60\(^c\) is mounted the collar portion 130 of a C lever 139, the former being rigidly attached to the shaft 60. The C lever carries a projection 235 for a purpose to hereinafter described. At the corner of the machine diagonally opposite the trimming mechanism is mounted a lever consisting of the bearing portion 319, which is revolu-
mously mounted on the pin 319\(^b\), the latter being supported in the lugs 319\(^c\) attached to the framework of the machine. This lever carries lugs 326 extending toward the trimmer end of the machine, and one lug 315 extends in the opposite direction. The lug 315 carries a pin 314 which fits loosely into the groove 307 on the clutch member 308 which is formed integ-
early with the gear wheel 306, the latter being constantly driven by any suitable source of power. Immediately adjacent the clutch member 308 is a clutch member 309 having the projection 310 on the side next to the clutch member 308, the projection 310 being struck by the projection 311 of the clutch member 308, when the latter is moved transversely to apply power to the knot tying mechanism. On the opposite side is provided the groove 312 adapted to coact with the pin 313 mounted in the lever 316. Between the lugs 326 is revolu-
mously mounted the cylindrical portion of a lever having the arms 323 and 325. The lever 323 is connected by the link 321 with one end of the spring 320. The coil portion of this spring is mounted on the bearing portion 328 of the main lever, and the other end of said spring bears against one of the lugs 319\(^c\). The spring 320 thus serves to keep the levers 323 and 533 and the main lever carrying the pin 314 in the positions shown in Fig. 9. The outer end of the lever 533 is connected
by the link 530 with one end of a lever 418 which is revolutely mounted on the part 418 of the frame of the knot tying mechanism, the latter not being illustrated.

421 is a cam which controls the knot tying mechanism, the latter being not shown, and said cam carries a projection 467 adapted to strike the free end of the lever 418.

The operation of my improved device is as follows: When the pedal attached to the link 50 is depressed, the lever 50 is moved into the position shown in Fig. 8 and is retained in that position by the coaction of the pawl 50 and the ratchet teeth 50 until released, as hereinafter described. When the lever 50 is moved into the position shown in Fig. 8, the pin 69, acting on the projection 60 of the pawl 62, moves the lever 62 into the position shown therein, and the lug 124 acting on the spring 122 moves the pan 82 into the position shown in Fig. 8, thus introducing the pin 82 into the appropriate recess of the pawl 62. The particular recess of the screw 90 into which the pin 82 is introduced is determined by the longitudinal position of the sleeve 78. The motion of the lever 62 into the position shown in Fig. 8 moves the C lever into the highest dotted position shown in Fig. 10.

This motion of the levers 62 and 129 starts the sewing mechanism in operation, and through the common shaft of these levers the casting 678 is operated, by which operation the arm 644 is moved into the position shown in Fig. 5. The ordinary sewing operation due to the interaction of the needle and shuttle then proceeds, and during the same the pin 82 is moved longitudinally by the screw 90 until the portion 82 of the slide 82 strikes the screw 62, thus releasing the pawl 62 from the pin 69 when the spring 61 causes a partial movement of revolution of the shaft 60 and moves the C lever into the next to the highest position shown dotted. This movement of the C lever will cause a shifting of the power translating devices, not shown, so that the power will be cut off from the sewing mechanism and applied to the winding mechanism. This movement of the C lever 129 is of course communicated to the casting 678. When the winding mechanism is thrown into operation, the arm 644 is thrown into the position shown in Fig. 6. The operation of winding the neck of thread securing the button to the fabric then proceeds, the C lever being prevented from dropping below the position just specified by the detent 226 which is attached to the frame of the machine in any approved manner and extends under the projection 226, thus supporting the C lever 129 during the winding operation. The winding operation then continues until a predetermined number of windings has been effected, when said detent is withdrawn from coaction with the projection 235, and the C lever drops to the lowest dotted line position. This movement of the C lever is also communicated to the casting 678 and the arm 644 assumes the position shown in Fig. 7. The C lever 129 is supported in the lowest dotted position by the roller 330 which is embraced between the projection 235 attached to the C lever 129 and the plate 239 attached to the framework of the machine. The operation of the knot tying mechanism then proceeds, the cam 421 being revolved by any suitable source of power transmitted through the gear 306 and the shaft 333 and worm 335. When the operation of the knot tying mechanism is completed a projection 467 on the cam 421 strikes the free end of the lever 418, thus pulling the rod 530, which effort is communicated to the levers 533 and 326, to the latter of which is attached the roller 330, thus the latter is moved from under the projection 235 attached to the C lever 129 and the latter is allowed to drop to the position shown by full lines in Fig. 10. This causes the end of the arm 645 to snap from the corner 655, thus allowing the knife to close, as shown in Fig. 5, but the other parts are in positions having a slight angular displacement about the pin 662 in a counter clockwise direction. When the C lever 129 drops from the lowest dotted line position to the full line position, the lug 124 pulls the rod 131, thus raising the pan 82 sufficiently to withdraw the pin 82 from the screw 90. This motion of the pan 82 causes the screw 82 to force the pawl 50 from engagement with the ratchet teeth 50, thus releasing the lever 50 and permitting its movement to the position shown in Fig. 10, which is the starting position.

All these positions of the mechanism and their operation are fully shown and described in my companion application above referred to.

In the position shown in Fig. 5, the end of the shuttle thread 649 is held between the holding spring plate 671 and the edge of the knife arm 648. When the mechanism has moved into the position shown in Fig. 6, that is, when the sewing operation is stopped, and the winding operation is started, the end of the arm 645 slips on the corner 654, releasing the thread 649, and tilting the knife arm 648 from the position shown in Fig. 5 to that shown in Fig. 6, which accomplishes the release of the thread 649 already referred to. As soon as the winding operation is completed, the arm 645 slips over the corner 654, whereupon the spring 641 throws the knife arm into the position shown in Fig. 7, which action, however, does not sever the thread 676, because the arm 645 strikes the corner 655, thus preventing the knife from completely closing...
The sharp snap from the corner 654 to the corner 655 is provided in order to insure the disengagement of the thread 649 from the device which hold it.

All these operations are fully described in my companion application above referred to.

As soon as the button has been snap to sowed on, the thread wound around the neck of thread securing the button to the fabric and knotted, the corner 655 passes over the end of the arm 655, and the knife carrying arm 648 falls with a sudden snap under the influence of the spring 641, thus severing the thread 676, but firmly holding the end leading to the shuttle, the apparatus then being ready for starting to sew on another button. If, for any purpose, it is desired to dispense with the operation of this knife, all that it is necessary to do is to slide the casting on the shaft 60 until the ball 637 is disengaged from the slot 636 in said casting.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a button sewing machine including starting mechanism and having a shuttle, means for severing the shuttle thread near the close of the operation of sewing on a button operated by said starting mechanism, and automatically operated means for holding the severed end of the thread which leads to the shuttle until the next sewing operation is completed, substantially as described.

2. In a sewing machine including a shuttle, the combination of the bed plate, means mounted on said bed plate for severing the shuttle thread, automatically operated means for holding the severed end of the shuttle thread, and means for adjusting said severing means to throw the same out of operation, substantially as described.

3. In a sewing machine including a shuttle, the combination of starting means, automatically operated stopping means, means for severing the shuttle thread adapted to be operated by said stopping means, and automatic means timed to operate simultaneously with the severing operation, and adapted to hold one end of the shuttle thread for any predetermined time.

4. In a button sewing machine, the combination of sewing mechanism including a shuttle, severing mechanism for severing the end of the shuttle thread, means for holding said severed end, and automatic means for operating said severing mechanism after a button has been completely sewed on, and means for moving said severing mechanism out of the path of said needle at the beginning of the sewing operation, substantially as described.

5. In a sewing machine including a shuttle, the combination of means for severing the shuttle thread, means for holding said severed end, sewing mechanism, means for starting said sewing mechanism into operation, and automatic means for operating said severing means when said starting means is brought back to the stopped position, substantially as described.

6. In a sewing machine including a shuttle, the combination of starting means, automatically operated stopping means, means for severing the shuttle thread adapted to be operated by said stopping means, and automatic means timed to operate simultaneously with the severing operation, and adapted to hold one end of the shuttle thread until said starting means has been operated, and said automatically operated stopping means has terminated the operation of the machine.

7. In a button sewing machine, means for severing the shuttle thread and gripping the end thereof leading to the bobbin, including a swinging lever, movable knife arms, and a roughened movable arm adapted to grip the free end of the shuttle thread between itself and one of the knife arms after the thread has been severed, substantially as described.

8. In a button sewing machine, means for severing the shuttle thread, including a movable lever, spring operated movable arms provided with knife edges and roughened portions, and a pawl provided with projections for engaging the operating means of said arms, whereby said shuttle thread is severed with a quick snap to disengage the loose end, and at the same time to hold the end leading to the bobbin, substantially as described.

9. In a button sewing machine, the combination of sewing mechanism, severing mechanism for the shuttle thread, means for starting the sewing mechanism, means locking said starting mechanism until the button has been completely sewed on, and means operated by the return of said starting means to its original position to operate the severing means for the shuttle thread, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

JOHN W. DARLEY, Jr.

Witnesses:

JOHN H. SANDLAS,
CHAS. H. NAUENHAHN.