E. B. ALLEN.

THREAD CUTTING AND NIPPING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED DEC. 1, 1917.

1,369,371.

Patented Feb. 22, 1921.

4 SHEETS—SHEET 1.

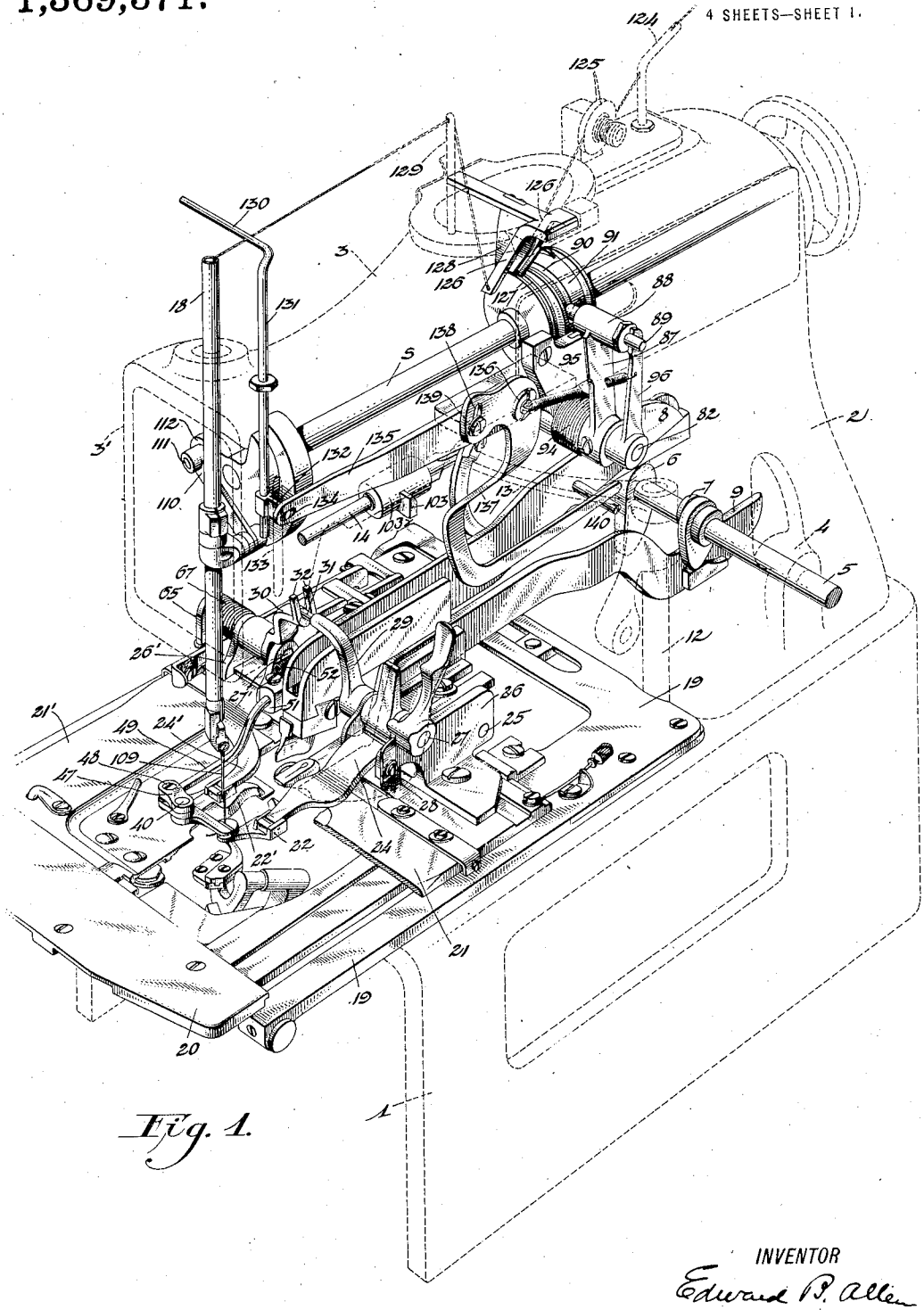


Fig. 1.

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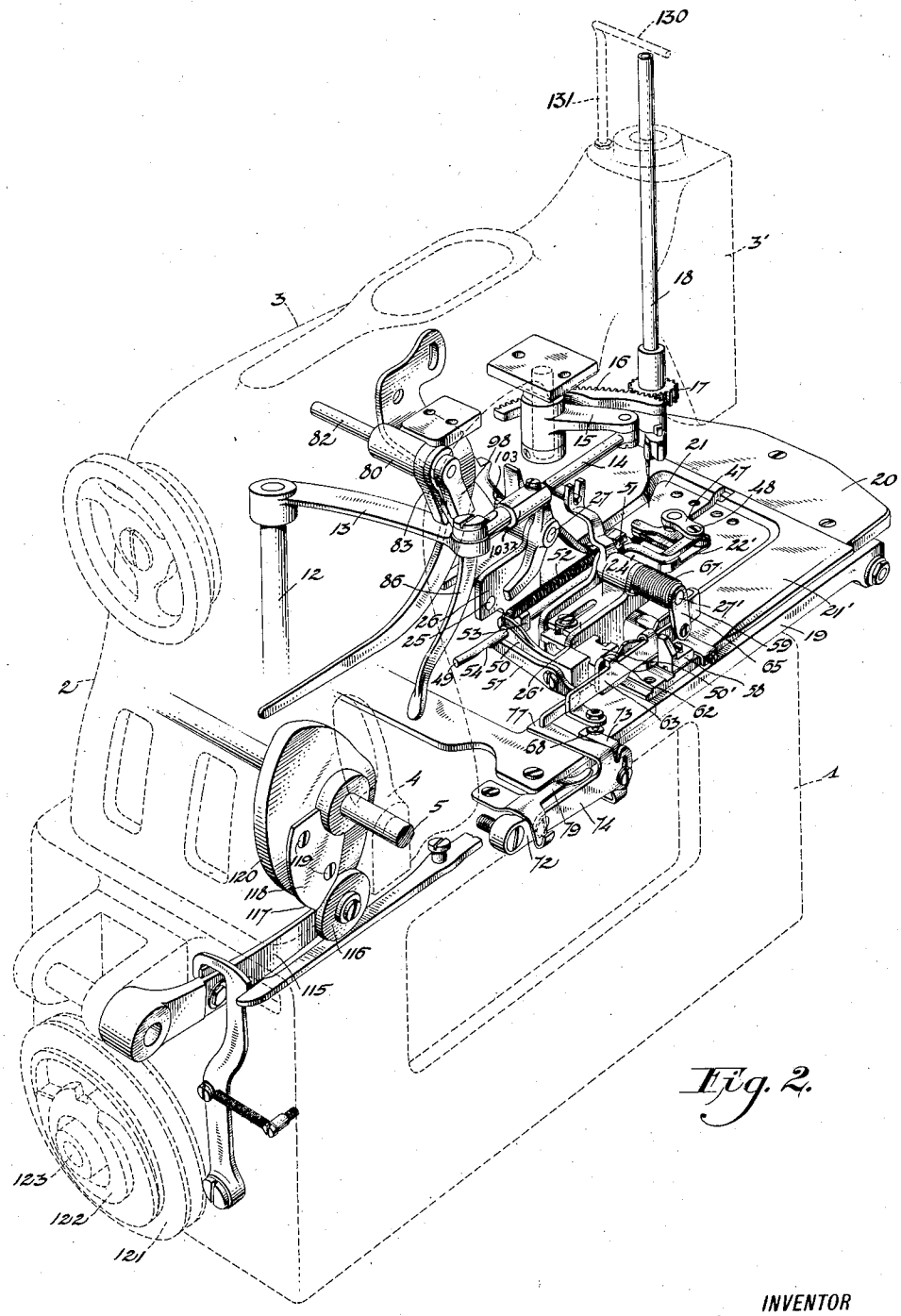


Fig. 2.

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Fig. 3.

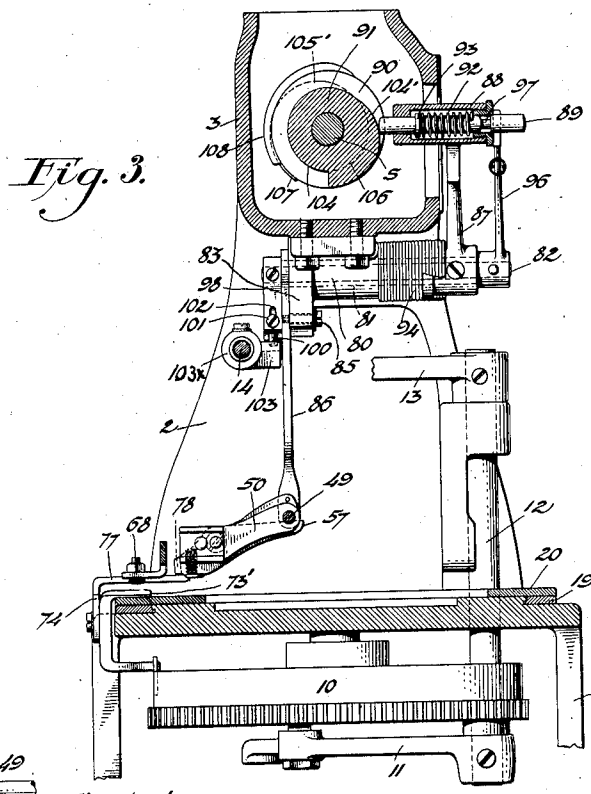


Fig. 4c.

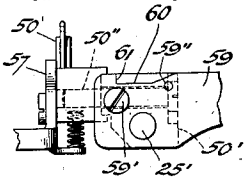


Fig. 3a.

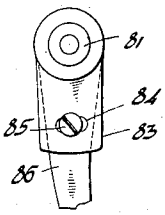


Fig. 4b.

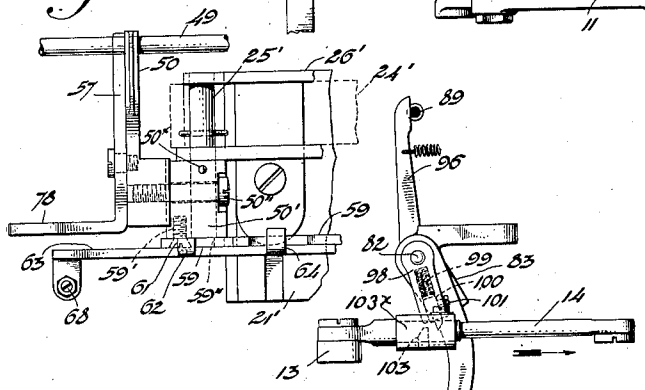


Fig. 4a.

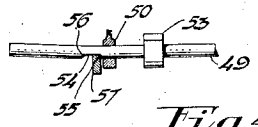
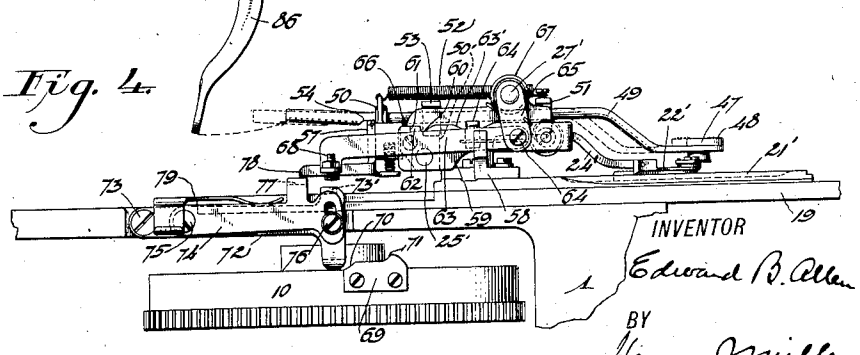


Fig. 4.



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Fig. 6.

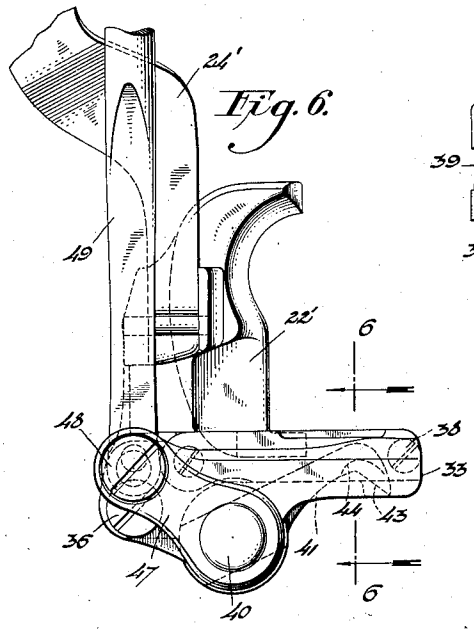


Fig. 7.

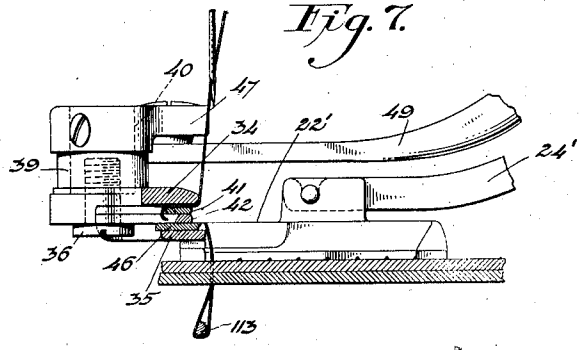


Fig. 8.

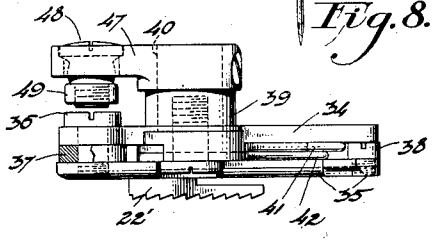


Fig. 5.

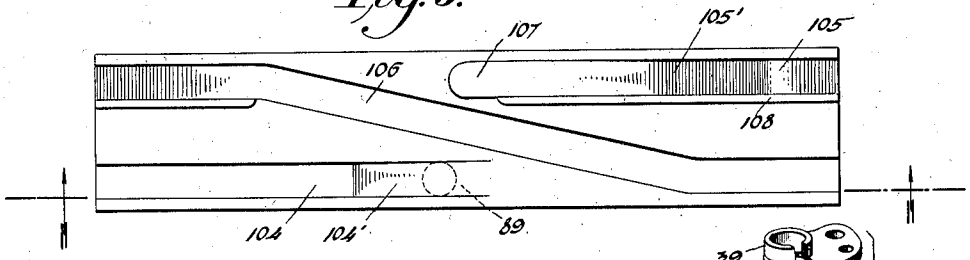
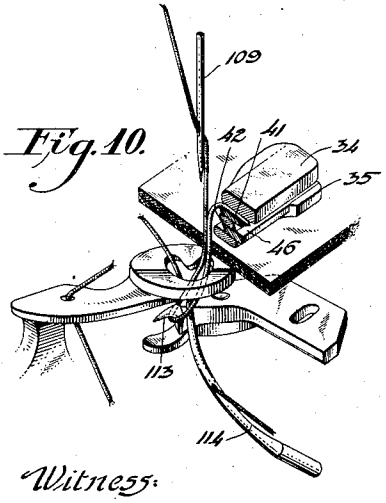


Fig. 10.



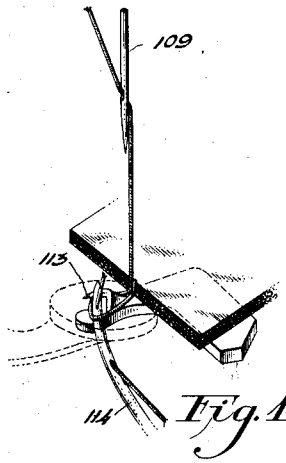
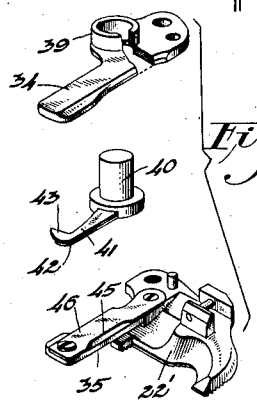


Fig. 11.

Fig. 9.



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UNITED STATES PATENT OFFICE.

EDWARD B. ALLEN, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF NEW JERSEY.

THREAD CUTTING AND NIPPING MECHANISM FOR SEWING-MACHINES.

1,369,371. Specification of Letters Patent. Patented Feb. 22, 1921.

Application filed December 1, 1917. Serial No. 204,842.

To all whom it may concern:

Be it known that I, EDWARD B. ALLEN, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Thread Cutting and Nipping Mechanisms for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to thread-cutting and nipping mechanism for sewing machines, more particularly of the buttonhole type such as disclosed in my copending application Serial No. 17,595, filed March 29, 1915.

It has heretofore been customary at the completion of a buttonhole stitching operation to cut the thread by hand between the eye of the needle and the work and permit the free end of thread, leading from the needle-eye, to hang loosely at the beginning of a new stitching operation. While it is possible to sew under this condition, the result is unsatisfactory as the free end of the needle-thread is not under control and is apt to stick out from the work more or less at the beginning of the sewing. If too short an end of thread is left hanging from the needle-eye, skipped stitches will result and if too long an end is left hanging from the needle-eye it will project above the work and may be caught up in the succeeding stitch-forming cycles by the stitch-forming instrumentalities and result in imperfect and unsightly sewing. In either case where the end of the thread is allowed to hang loosely from the needle-eye, the first few stitches, particularly the first and second, will be improperly set and will present a loose baggy appearance contrasting unfavorably with the succeeding properly set stitches.

In certain prior constructions the needle-thread is held nipped at the upper side of the work prior to stitching, and is released during the formation of the initial stitches by the movement of the work-holder relatively to the machine frame. As this motion of the work-holder is extremely slow and minute, as compared with the motion of the needle and other stitch-forming instrumentalities, there is great difficulty in accurately timing the release of the needle-thread so that the needle-thread end will invariably be drawn down to the same position relative to the upper surface of the work. This difficulty is increased by reason of the intermittent or jerky character of the motion of the work-holder, making it impossible to provide for the release of the needle-thread end during the period of the stitch-forming cycle when the work-holder is stationary. Further than this, the slight amount of lost motion invariably appearing between the work-holder and the feeding mechanism permits overthrow of the work-holder, particularly since the machine is likely to be subjected to occasional jarring while on the bench. Although these constructions include a fine adjustment for changing the time of release of the needle-thread, it has been found impossible by reason of the foregoing to so adjust the devices as to secure uniformity of results under practical operating conditions.

An object of the invention is to provide a sewing machine, particularly a buttonhole sewing machine, with improved mechanism which will operate to produce uniformly finished seams or buttonholes having properly set beginning and ending stitches and having no visible thread ends sticking up above the upper side of the work.

More particularly, the invention has for an object to provide means for holding the beginning end of the needle-thread under positive control during the first portion of the first stitch-forming cycle and releasing said thread-end invariably at the correct predetermined time for it to be drawn down to a practically invisible position, preferably flush with the upper side of the work, by stitch-forming or other thread-handling instrumentalities.

In its preferred form, the invention is embodied in a machine provided with a work-holder comprising a lower member and an upper member in the form of a pivotally mounted clamping foot provided with a recess parallel with the work-engaging face of the foot. Within this recess is preferably disposed a combined nipping- and cutting-blade operative, respectively, in conjunction with the upper and lower walls of said recess. The combined thread-nipping and-cutting blade is preferably mounted upon a pivot sustained by the clamping foot and receives its operative thread-nipping and-severing movement from a suitable spring, in opposition to which it is retracted at the proper instant to release the nipped needle-

thread end by means of a cam-controlled tappet-arm. The blade above referred to is maintained in retracted position by means of a suitable latch which is disengaged at the close of a buttonhole producing cycle to permit said blade to cut and nip the needle-thread under the influence of its actuating spring. The cam-controlled tappet-arm is timed to retract the cutting- and nipping-blade to release the nipped needle-thread end preferably as the needle is rising after its initial descent and, in the present instance, after the needle-loop has been seized by the loop-taker and presented to the lower curved needle which in the present machine rises through the buttonhole slit. The release of the needle-thread is timed to occur at a point in the cycle when the needle-thread is substantially taut and in the present instance such that the subsequent thread absorbing action of the stitch-forming instrumentalities is just sufficient to pull down the released thread end to an inconspicuous or practically invisible position, preferably substantially flush with the upper surface of the work.

The invention is shown as embodied in an eyelet-end buttonhole cutting and stitching machine constructed substantially in accordance with the disclosure in my said copending application Serial No. 17,595. Figures 1 and 2 are perspective views of a machine embodying the invention. Fig. 3 is a vertical section through the bracket-arm and bed of the machine looking toward the supporting standard. Fig. 3ª is a detail view of a portion of the mechanism shown in Fig. 3. Fig. 4 is a fragmentary side elevation of a portion of the mechanism as seen from the left side of Fig. 3. Fig. 4ª is a detail view of the cutter- and nipper-actuating slide-bar and latching means therefor. Figs. 4ᵇ and 4ᶜ are detail views of portions of the mechanism shown in Fig. 4. Fig. 5 is a development of the cam which effects the properly timed release of the nipper. Fig. 6 is a top plan view of one of the upper work-clamping members or feet and parts carried thereby. Fig. 7 is a side elevation of the same, partly in section, on the line 6—6, Fig. 6. Fig. 8 is a front elevation of the same. Fig. 9 is a disassembled perspective view of the same. Fig. 10 is a perspective view of the parts closely adjacent the stitching point at the beginning of a stitching cycle before the needle-thread end is released. Fig. 11 is a similar view at a slightly later stage in the stitch-forming cycle after the nipped end of the needle-thread has been drawn down to final position.

The machine frame is shown as constructed with the usual hollow-base 1 from the rear end of which rises the standard 2 carrying the overhanging tubular bracket-arm 3 terminating in the head 3′. Within suitable bearings 4 is journaled the transverse cutter-shaft 5 disposed in the lower portion of the standard 2. As fully disclosed in my Patent No. 1,048,786, of December 31, 1912, a suitable clutch device is provided for connecting the cutter-shaft 5 with a source of power for a single rotation in each button hole producing cycle. The cutter-shaft 5 is provided with suitable cams 6 and 7 for imparting tilting movements to the cutter-levers 8 and 9. Mounted within the base 1 is the usual feed-wheel 10 which imparts the well known lateral and longitudinal components of motion to the work-holder as more fully described in my said copending application Serial No. 17,595. This feed-wheel also acts through the usual follower arm 11, vertical shaft 12, arm 13, and link 14 to rock the bellcrank-lever 15, one arm of which is formed with a gear segment 16 meshing with the pinion 17 to rotate the tubular needle-bar 18 in stitching around the eyelet end of a buttonhole and to reversely rotate the needle-bar to its original position at the end of the sewing operation in the usual manner.

The present work-holder is constructed and operated substantially in accordance with the disclosure in my copending application, Serial No. 180,737, filed July 16, 1917, and comprises the longitudinally traveling slide-plate 19 supporting the cross-slide plate or carrier 20 which sustains the reciprocally movable lower clamp-plates 21, 21′ affording lower work-engaging jaws and supporting the work under the pressure of the clamping feet 22, 22′ affording the upper work-engaging jaws. The feet 22, 22′ are pivotally connected in a manner well known with the forward ends of the spring clamp-arms 24, 24′ having fixed to their rearward ends by the usual fulcrum pins 25, 25′ which are journaled to rock in the bearing blocks 26, 26′ secured upon the respective clamp-plates 21, 21′. Mounted within suitable bearings in the blocks 26, 26′ are the alined rock-shafts 27, 27′ each provided with a cam acting on its respective clamp-arms 24, 24′ in opposition to the usual clamp-lifting springs, one of which is shown at 28. The rock-shafts are connected together for movement in unison by means of the upwardly extending arms 29 and 30, the one being provided with a pin 31 embraced by the fork 32 of the other.

The present thread-cutting and- nipping implements are in many respects similar to those disclosed in my said copending application Serial No. 17,595 and are mounted upon an extension 33 of the clamping foot 22′. Referring to Figs. 6 to 9 inclusive, the extension 33 will be seen to include the slightly resilient upper and lower bars 34 and 35, rigidly secured together by the

screw 36 and held in spaced relation by means of the washer 37 and spacing screw-head 38. Journaled within an upwardly extending bearing-boss 39 on the bar 34 is a pin 40 in the recessed lower end face of which is secured the shanks of the overlapping blade-sections 41 and 42 constituting a compound thread-nipping and- cutting blade. The outer end-portion of the blade-section 41 is formed with an edge-portion 43 inclined abruptly outwardly from the adjacent edge-portion to afford an angle for guiding the thread to the nipping point. The edge of the cutting section 42 of the compound thread-nipping and- cutting blade is formed beneath the aforesaid angle with a concaved cutting edge 44 which shears the thread against the edge 45 of the ledger-blade 46 let into the upper side of the bar 35. The compound blade 41, 42 is adapted to move within and substantially fill the space between the bars 34 and 35; the nipping blade 41 coacting with the lower wall of the upper bar 34 in nipping the thread. While the nipping and cutting elements are preferably constructed in separate sections to facilitate their manufacture and maintenance in operative condition, it is evident that the blade need not be made in separable sections nor the elements referred to be relatively positioned and connected for operative movement in unison as herein represented.

To operate the nipping and cutting elements, the pin 40 has secured to its upper end the crank-arm 47 whose apertured extremity is loosely entered by the screw-pin 48 threaded into the forward end of the cutter-rod 49 which extends rearwardly alongside the clamp-bearing block 26′ and passes loosely through the apertured extremity of the supporting arm 50 fixed to the rear side of the block 50′ by a screw 50″. The block 50′ is fixed to the fulcrum-pin 25′ by the pin 50×. Surrounding the rod 49 is a collar 51 to which is secured one end of a tension spring 52 the opposite end of which is anchored to said arm 50. A stop-collar 53 secured to the rod 49 is adapted to strike the arm 50 and arrest the rearward or cutter- and nipper-closing movement of the rod 49 under the influence of the spring 52.

The rod 49 is formed at its under side near its rearward end with a notch 54 affording an abrupt shoulder 55 and an inclined shoulder 56. This notch is adapted to be entered by the extremity of an upwardly spring-pressed latch-lever arm 57 to detain the cutter and nipper elements in their retracted or open position. Secured to the side of the block 50′ by the screw 59′ and steady pin 59″ is the plate 59 having its upper edge-portion notched at 60 to afford a stop-shoulder 61 engaged by the overhanging lip 62 of the downwardly spring-pressed latch-bar 63 pivoted at 64 to the crank-arm 65 fixed to the clamp-closing rock-shaft 27′. The lip 62, when engaged with the shoulder 61, detains the work-clamping feet in closed or lowered position and, when the latch-bar 63 is elevated, the shafts 27 and 27′ are free to turn as the clamping feet spring upwardly to release the work. The block 58 serves as a stop to arrest the movement of the crank-arm 65 as the work is released. A second overhanging lip 64 on the latch-bar 63 coöperates with the inclined edge-portion 63′ of the fixed plate 59 to control the vertical position of the bar 63 during the clamp-closing movement of the shaft 27′ and insures that the lip 62 will not strike the rear end of the plate 59 but will first contact with the upper edge-portion 66 of said plate before dropping into the notch 60. The spring 67 surrounding the shaft 27′ urges said shaft to clamp-opening position. The latch-bar 63 carries at its rearward end a vertically adjustable abutment screw 68.

Secured to the feed-wheel 10 is a cam-plate 69 having a cutter tripping rise 70 and a clamp-opening rise 71 which act in succession at the close of a buttonhole-producing cycle to impart a two-stage lifting movement to the arm 72 pivoted at 73 to the bed 1. The arm 72 has an extension 73′ underlying the abutment-screw 68 and carries a cutter-tripping arm 74 pivoted to the arm 72 at 75 and having its forward slotted end entered by a screw 76 threaded into the arm 72 to permit adjustment of the arm 74 relatively to the arm 72. The arm 74 has an extension 77 underlying the tail-piece 78 of the latch-lever 57 which detains the cutting and nipping implements in retracted position. The arm 74 and abutment-screw 68 are preferably so adjusted that the cam-rise 70 will effect the release of the cutting and nipping elements after which the action of the rise 71 will effect the opening of the work-clamps. The leaf-spring 79 maintains the arm 72 in lowered position.

In the present embodiment of the invention the following mechanism is provided to effect the automatic release of the thread-nipper:—

Secured to the under side of the bracket-arm 3 is a bearing boss 80 in which is journaled a tubular shaft 81 through which extends a longer solid shaft 82. Formed at one end of the tubular shaft 81 is a short depending arm 83 formed with an arcuate slot 84 entered by a screw 85 threaded into the tappet-arm 86 whose upper end surrounds the shaft 81. The lower end of the tappet-arm 86 is, flattened to engage the rearward end of the rod 49 and push it from dotted to full line position, Fig. 4. Secured to the other end of the tubular-shaft 81 is an upwardly extending arm 87 formed at its

upper end with a boss 88 apertured to receive a cam-follower in the form of a plunger-pin 89 whose inner end may be engaged by the groove 90 in the cam-cylinder 91 mounted within the bracket-arm 3 upon the needle-driving shaft *s*. The aperture in the boss 88 is enlarged to receive an expansion-spring 92 which surrounds the pin 89 and at one end bears against a collar 93 on said pin to force the latter yieldingly into the cam-groove 90. A coiled spring 94 urges the arm 87 toward the abutment block 95 secured to the side of the bracket-arm 3.

The plunger-pin 89 may be detained in retracted position or out of engagement with the cam-cylinder 91 by means of the spring-actuated latch-arm 96 whose upper extremity is adapted to enter the notch 97 in said pin 89. The latch-arm 96 is pinned to one end of the solid shaft 82 whose opposite end has secured thereto a depending arm 98 bored out to receive a coiled spring 99 and a pin 100 having a beveled lower extremity and prevented from turning in the arm 98 by means of the screw 101 threaded into said pin 100 through an elongated aperture 102 in the side of said arm.

The plunger-pin 89 is released and permitted to enter the cam-groove 90 through the action of a lateral projection 103 on a collar $103^{\times}$ fixed to the link 14 which is moved forwardly or in the direction of the arrow, Fig. 4, to effect the customary return rotation of the needle-bar to initial position at the close of a buttonhole-producing cycle. During such movement of the link 14, the projection 103 strikes the pin 100 and rocks the shaft 82 thereby releasing the plunger-pin 89.

The groove 90 of the cam-cylinder 91 is cut with spaced beginning and ending dwell-producing portions 104 and 105, respectively, and an inclined portion 106 adapted to shift the plunger-pin 89 rearwardly of the bracket-arm to open the thread-nipper at the desired time after the machine is started. At the beginning and ending ends of the groove 90 are formed ejecting inclines 104′ and 105′, the latter of which terminates in a raised surface 107 which ejects the pin 89 thereby permitting the latch 96 to snap into the notch 97 in said pin and hold it in retracted position with its inner end spaced slightly from the cam-cylinder. The flange 108 formed on the cam-cylinder and paralleling the ending dwell-producing portion 105 serves to prevent lateral return movement of the pin 89 and arm 87 under the influence of the spring 94 until the pin has been fully ejected from the cam-groove and latched in ejected position.

The stitch-forming mechanism of the machine represented in the drawings is substantially the same as that of my Patent No. 1,162,207, of November 30, 1915, as is also the means for turning the same in the stitching of the eyelet-end of the buttonhole. The upper reciprocating needle 109 is carried by the hollow needle-bar 18 which is driven by means of the usual pitman connection 110 with the crank-pin 111 on the crank-arm 112 carried by the rotary needle-bar operating shaft *s*. The needle 109 forms the depth stitches in the customary manner and presents its loops below the work to the looper 113 which carries them into position to be entered by the usual lower curved and eye-pointed needle 114, as shown in Fig. 10. The needle 114 forms the over-edge stitches as it rises through the buttonhole slit and presents its loops to the needle 109.

The present machine is preferably equipped with the usual stop-motion mechanism constructed substantially in accordance with that of my said Patent No. 1,048,786, and including the usual stop-lever shifting arm 115 carrying at its extremity the anti-friction roll 116 adapted to be engaged by the eccentric outer operative edge 117 of the cam-plate 118 secured by screws 119 to the face of the usual cam-wheel 120 which in machines of the present type is commonly employed for shifting the fulcrum-block for the buttonhole cutting levers 8 and 9 from retracted to cutting position. The present stop-mechanism also includes the usual loose belt-wheel 121 and clutch-ring 122 which serves in a manner well known to clutch said belt-wheel to the lower main-shaft 123 to start the machine when the arm 115 is forced downwardly.

The upper thread traverses its usual course from the supply, through the guide-post 124 and tension device 125, thence through the usual apertured guide-elements, one of which is shown at 126, which present the thread to the spaced rotary take-up disks 127 between which the usual cast-off plate 128 is disposed. The thread then leads through the aperture at the top of the post 129 and forwardly to the hollow needle-bar 18 through which the thread descends to the needle 109. Movable across the lead of the thread from the post 129 to the needle-bar 18 is a lateral extension 130 of a pull-off rod 131 slidably mounted in the head 3′ and carrying an extension-piece 132 which projects outwardly through a slot 133 in said head 3′ and into the slot 134 in the forward extremity of the arm 135 pivoted at 136 to the side of the bracket-arm 3. A lever 137 is also pivoted to the bracket-arm at 136 and comprises a forwardly extending short arm having a slot 138 entered by a screw 139 threaded into the arm 135 for the purpose of permitting adjustment of said arm 135 relatively to the lever 137. The downwardly and rearwardly extended arm of the lever 137 is disposed above a lateral pin 140

carried by the cutter-lever 8 and serving when said cutter-lever is tilted to draw down the pull-off bar 131 and measure the desired length of needle-thread from the supply.

In the operation of the present machine, which embodies the invention in its preferred form, and beginning at a point in a buttonhole-producing cycle after the machine has been started and is stitching down the first side of the buttonhole, the plunger-pin 89 is detained by the latch-arm 96 in retracted position and the arm 87 is held against the abutment 95 by the spring 94, thereby detaining the tappet-arm 86 in retracted position, as shown in Fig. 4. The nipping and cutting elements 41 and 42 are detained in retracted or open position by the engagement of the latch 57 with the shoulder 55 of the notched cutter-rod 49, as shown in Figs. 4 and 4ª. The clamps are closed upon the work and latched as shown in Fig. 4.

As the stitch-forming mechanism is rotated in stitching around the eyelet-end of the buttonhole, the link 14 is retracted in opposition to the arrow, Fig. 4, so that the lug 103 is caused to ride past the beveled extremity of the yielding pin 100 and assume the position shown in dotted lines in said figure. After the stitching has progressed down the second side and to one end of the buttonhole, the stitching action of the stitch-forming instrumentalities is arrested and the further rotation of the feed-cam 10 carries the cam-rise 70 into engagement with the tripping lever 72 to trip the latch 57 thereby releasing the cutter-rod 49 which snaps rearwardly under the influence of the spring 52 and causes the cutting and nipping implements 42 and 41 to sever and nip the needle-thread as shown in Fig. 7; the needle-thread being around the looper 113 when cut. Further movement of the feed-wheel causes the cam-rise 71 to effect the second stage of the upward movement of the lever 72 to lift the latch-bar 73 and open the work-clamps. As the work is removed or shifted to a new position, the cut end of the needle-thread leading around the looper to the last stitch will be drawn down below the upper surface of the work.

As the stitch-forming mechanism is reversely rotated to initial position at the close of the buttonhole-producing cycle, the projection 103 moving in the direction of the arrow, Fig. 4, strikes the pin 100 and rocks the shaft 82 to withdraw the latch-arm 96 from the notch 97 in the plunger-rod 89 thereby permitting the spring 92 to force said pin into engagement with the beginning end of the then stationary cam-groove 90, as shown in Figs. 3 and 5.

When the machine is restarted after new work has been inserted, the cutter-levers 8 and 9 are advanced during the single rotation of the cutter-shaft to cut the buttonhole slit, thereby drawing down the pull-off bar 130 and measuring the required length of slack-thread from the supply. The straight needle 109 first rises from the position shown in Fig. 1 to the top of its stroke and then descends, preferably skipping the first loop of the curved needle as disclosed in the application of E. B. Allen and B. F. Crosby, Serial No. 106,761, filed June 30, 1916. As the needle rises, the looper 113 seizes the needle-loop and presents it to the curved needle, as shown in Fig. 10, while the straight needle rises from the work. In the present instance, at about the time the rising needle-bar 110 and other thread-handling instrumentalities have absorbed the measured amount of slack needle-thread and said needle-thread is substantially taut, the inclined portion 106 of the cam-grooves 90 has acted upon the plunger-pin 89 to rock the tappet-arm 86 causing it to strike the rod 49 and rapidly shift said rod forwardly to release the nipped end of the needle-thread loop. The latch 57 snaps into the notch forming the shoulder 55 of the rod 49 and detains the nipper in open position. In the present instance, the still rising needle-bar, the take-up and possibly the looper all act more or less to absorb sufficient needle-thread to draw down the beginning end thereof to a practically invisible position preferably substantially flush with the upper surface of the work, as shown in Fig. 11.

Preferably during the second revolution of the needle-bar driving-shaft *s*, the ejecting incline 105′ of the cam-cylinder 91 acts to force the plunger-pin 89 to inoperative position after which said pin snaps over the end of the flange 108 and permits return of the arm 87 and parts connected thereto to initial position.

Although preferable, it is not necessary to release the initial thread-end during the first reciprocation of the needle as it has been found by experiment that, when the pull is exerted upon the thread leading from the needle to the work, the essential requirement is that the beginning end of the needle-thread be released before enough stitches have been formed to so grip the needle-thread that it cannot be drawn down by the thread-absorbing action of the stitch-forming or other thread-handling or thread-engaging instrumentalities. It has been found that if the thread is not released before the completion of approximately four stitches it will be gripped so tight by the stitches already formed that it cannot be drawn down by a pull on the thread leading from the needle to the last stitch formed.

The construction and arrangement of the

various parts are obviously susceptible of material modification without departure from the invention.

Having thus set forth the nature of the invention, what I claim herein is:—

1. In a sewing machine, in combination, stitch-forming mechanism, a work-holder, feeding mechanism for producing relative movement between the stitch-forming mechanism and work-holder to sew around a buttonhole, means above the work for holding the free end of the needle-thread during the initial descent of the needle, means independent of said feeding mechanism for causing said thread-holding means to release the free end of the needle-thread after the initial descent of the needle, and means for drawing down the released thread-end to an inconspicuous position.

2. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, a work-support, feeding mechanism for producing step-by-step relative stitch-spacing movement between the stitch-forming mechanism and work-support to sew around a buttonhole, nipping mechanism disposed above said work-support for holding the beginning end of the needle-thread throughout the initial descent of the needle, a power operated tappet distinct from the work-support and feeding mechanism for striking said nipping mechanism to effect the release of the needle-thread end, and mechanism constructed and arranged to draw down said needle-thread end to a practically invisible position.

3. In a sewing machine, in combination, stitch-forming and feeding mechanisms, means above the work for holding the free end of the needle-thread during the initial descent of the needle, a rotary cam operating continuously during the sewing, and means independent of said feeding mechanism and actuated by said rotary cam for effecting the release of the nipped needle thread end before the stitching has progressed far enough to prevent the drawing down of the said thread end by the thread-absorbing action of the stitch-forming mechanism.

4. In a sewing machine, the combination of stitch-forming mechanism including a reciprocating needle, of a thread-nipper for holding the free end of the needle-thread during the initial descent of the needle, a rotary cam performing one rotation for each reciprocation of the needle, and automatic throw-out means actuated by said cam for causing said thread-nipper to release the needle-thread during the formation of substantially the first stitch, whereby said thread end may be accurately drawn down to a predetermined position by a pull upon the thread leading from the needle to the work.

5. In a sewing machine, the combination with stitch-forming instrumentalities including a reciprocating needle, a loop-taker, a tension device, and thread-handling means adapted to take up and control the needle-thread during the formation of stitches and pull thread from the supply through said tension device, of nipping mechanism for holding the free end of the needle-thread at the beginning of a sewing operation, and automatic power-operated means inactive during the major portion of the stitching operation and acting when thrown into operation to strike said nipping mechanism and effect the release of the free end of the needle-thread at the correct instant of time after the first descent of the needle and during the formation of the first stitch when said thread-handling means have sufficient remaining thread absorbing action to draw down the beginning end of the needle-thread to a practically invisible position.

6. In a sewing machine, the combination with stitch-forming mechanism including a reciprocating needle, means for holding the beginning end of the needle-thread during the initial descent of the needle, reciprocating pull-off means inactive during the sewing and operating to render a measured length of slack-thread available at the beginning of a sewing operation, and means for effecting the release of the nipped needle-thread end in time for it to be drawn down to a practically invisible position.

7. In a buttonhole sewing machine, in combination, stitch-forming mechanism, buttonhole cutting mechanism, means for holding the free end of the needle-thread during the initial descent of the needle, means actuated by the buttonhole cutting mechanism for measuring a length of thread from the supply, and means for effecting the release of the nipped needle-thread end before the stitching has progressed far enough to prevent the drawing down of said thread end by the thread-absorbing action of the stitch-forming mechanism.

8. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle, a work-holder, feeding mechanism for producing relative movements between said stitch-forming mechanism and work-holder, a thread-nipper located above the work for holding the free end of the needle-thread during the initial descent of the needle, a cam making a plurality of rotations for each buttonhole producing cycle and means actuated by said cam for opening said thread-nipper during the formation of the initial stitch to release the needle-thread in time for the stitch-forming mechanism to draw down the free end of said needle-thread to an inconspicuous position.

9. In a sewing machine, in combination, sewing mechanism including a reciprocating needle, complemental loop-taking means, a

shaft making a plurality of revolutions while the stitch-forming mechanism is in operation, a thread-nipper for holding the beginning end of the needle-thread at the upper side of the work during the initial descent of the needle, an actuator carried by said shaft, and automatic throw-out connections between said actuator and said nipper for opening the latter at a time during the formation of the first stitch such that the stitch-forming mechanism will act to draw down the free end of the needle-thread to an inconspicuous position during the tightening of the first stitch.

10. In a sewing machine, in combination, stitch-forming mechanism including a reciprocating needle and complemental loop-taking means, a shaft rotating continuously during the sewing, a thread-nipper for holding the beginning end of the needle-thread above the work during the initial descent of the needle, an actuator carried by said shaft, an actuated element stationary during the major portion of the sewing operation and means for establishing operative connections between said actuator and actuated element to transmit motion to said nipper and release the latter during the formation of the initial stitches.

11. In a buttonhole sewing machine, in combination, stitch-forming mechanism including a reciprocating needle-bar carrying a needle, a main-shaft for the stitch-forming mechanism, mechanism for rotating said needle-bar in stitching around the eyelet-end of a buttonhole and for reversely rotating said needle-bar at the end of a button-hole-stitching operation, a thread-nipper for holding the beginning end of the needle-thread, mechanism connected with said main-shaft for opening said thread-nipper after the initial descent of the needle, means for disconnecting said nipper-opening mechanism from the main-shaft after the nipper has been opened, and devices controlled by said needle-bar-rotating mechanism for reconnecting the nipper-opening mechanism with the main-shaft at the end of a buttonhole producing cycle.

12. In a buttonhole sewing machine, in combination, a stitch-forming mechanism including a reciprocating needle, a needle-driving shaft, a thread-nipper for holding the beginning end of the needle-thread, and mechanism operated by said shaft for opening said thread-nipper, said mechanism including a cam, a cam-follower, and automatic means for disconnecting the latter from the cam after the nipper has been opened.

13. In a buttonhole sewing machine, in combination, a stitch-forming mechanism including a reciprocating needle, a needle-driving shaft, a thread-nipper for holding the beginning end of the needle-thread, and mechanism operated by said shaft for opening said thread-nipper, said mechanism including a spring-pressed cam-follower, a cam having a follower ejecting incline, and a latch for detaining said follower in ejected position.

14. In a buttonhole sewing machine, in combination, a frame including a bed and an overhanging bracket-arm, stitch-forming mechanism incorporated in said frame and including a reciprocating needle, a needle-driving shaft, a thread-nipper for holding the beginning end of the needle-thread, and mechanism operated by said shaft for opening said thread-nipper, said mechanism including a nipper-opening lever fulcrumed on the bracket arm, an actuating member on the needle-driving shaft, operative connections between said nipper-opening lever and actuating member, and means for automatically rendering said connections ineffective after the nipper has been opened.

15. In a sewing machine, in combination, sewing mechanism, a carrier, reciprocally movable clamp-plates mounted on said carrier, clamp-arms mounted on said clamp-plates, clamping feet pivotally mounted on said clamp-arms, thread-nipping and severing devices mounted on one of said clamping feet, and actuating means constructed and timed to cause said devices to nip and sever the needle-thread at the completion of a stitching operation and to release the nipped needle-thread during the formation of the initial stitches of the ensuing stitching operation, whereby the released end of needle-thread will be drawn down to an inconspicuous position by the thread absorbing action of the sewing mechanism.

16. In a sewing machine, in combination, a frame including a bed and an overhanging bracket-arm, stitch-forming mechanism including a reciprocating needle, a work-holder, feeding mechanism for producing relative movements between said stitch-forming mechanism and work-holder, a thread-nipper located above the work for holding the free end of the needle-thread during the initial descent of the needle, and power operated means carried by the bracket-arm for opening said thread-nipper during the formation of the initial stitch to release the needle-thread.

In testimony whereof, I have signed my name to this specification.

EDWARD B. ALLEN.