

A. BOYD.
SEWING MACHINE PULL-OFF.
APPLICATION FILED MAR. 25, 1911.

1,021,399.

Patented Mar. 26, 1912.

2 SHEETS-SHEET 1.

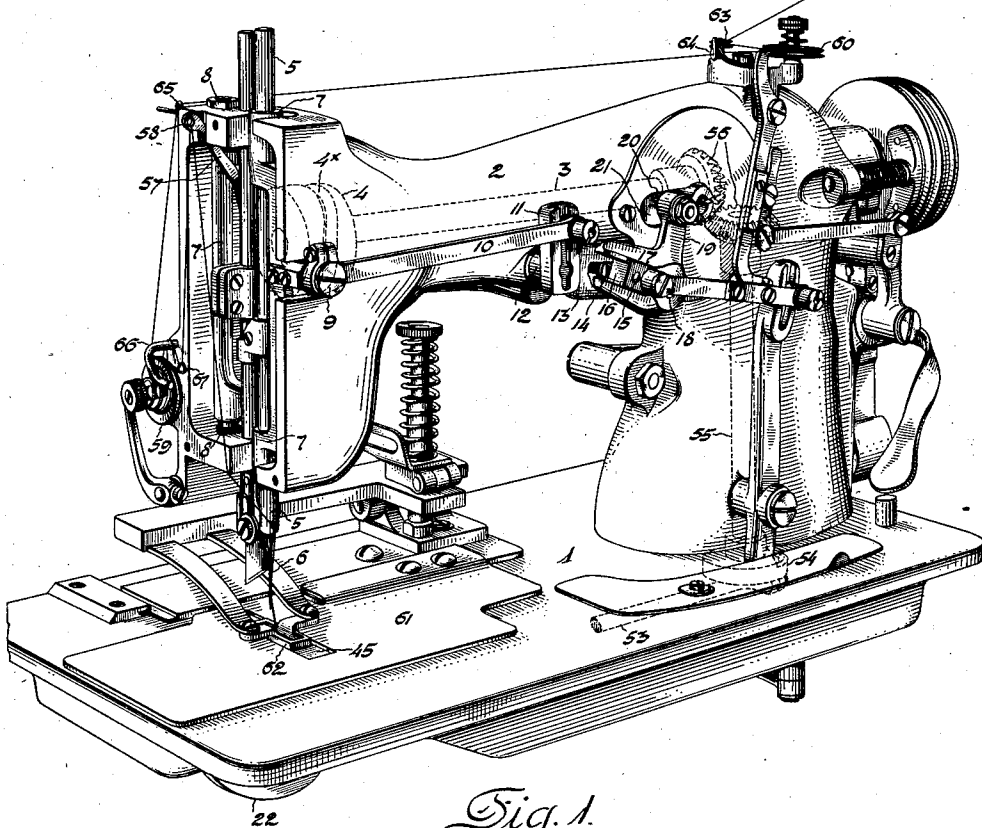


Fig. 1.

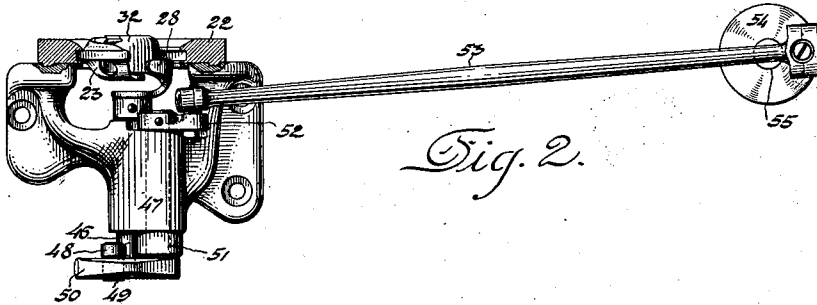


Fig. 2.

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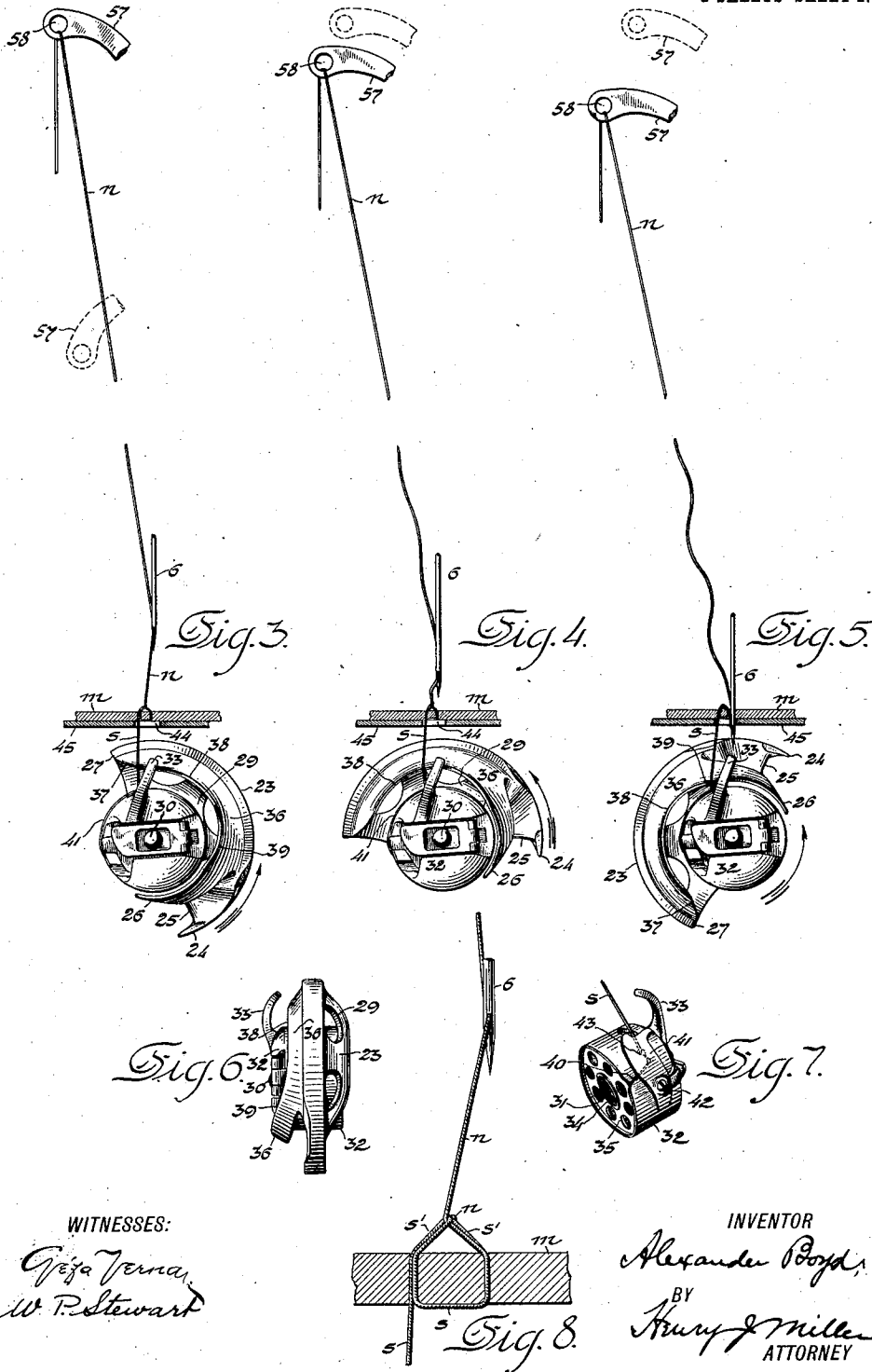
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UNITED STATES PATENT OFFICE.

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SEWING-MACHINE PULL-OFF.

1,021,399.

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To all whom it may concern:

Be it known that I, ALEXANDER BOYD, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Sewing-Machine Pull-Offs, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates more particularly to an improvement in sewing machines of that type provided with a laterally jogging needle and a complementary lower-thread carrying loop-taker adapted to produce, in conjunction with suitable upper-thread take-up and tension devices, a purl-stitch overseam in which loops of lower thread are drawn up through the fabric by the needle-thread and interlocked with the same upon the upper face of the fabric in a line intermediate the needle punctures. In such machines, after the setting of each stitch, and preparatory to the descent of the needle through the work, the take-up descends slightly to slacken the needle-thread, and it has been customary to draw off a supply of lower thread for the succeeding stitch throughout the period beginning with the setting of the stitch and the succeeding descent of the needle to nearly its lowest position. As the continued pull upon the lower thread while the needle-thread was slackened acted to partially draw down the previously formed lower-thread loop so as to dislodge the position of its interlock with the needle-thread, it has heretofore been necessary to make the needle-thread tension sufficiently strong to enable the take-up to not only draw up through the work the last formed loop of under thread, but to reset the interlock of the previously formed loop of lower thread with the needle-thread in order to produce a uniform purl in the overseam.

The present invention has for its object to provide for the pulling off of the lower thread in such manner that the interlock of the previous loop of lower thread with the needle-thread would not be disturbed while the latter is slackened for descent of the needle through the work. By this means, the tension upon the upper thread may be adjusted suitably for setting each stitch as it is formed without provision for any action whatever upon the previously formed stitch.

With this class of machines, as heretofore constructed, it has been necessary to employ a grade of thread superior to what would have been required for the finished overseam, in order that it should have the requisite strength to withstand the strain imposed upon it in the double stitch-setting operation. According to the present improvement, the pull upon the threads for this class of stitching is little more than that imposed thereon in producing the so-called "whipstitch" overseam in which the interlock of the upper and lower threads is disposed in the body of the fabric, and therefore a much lower grade of thread may be employed, with a corresponding saving in cost.

The present invention comprises, in conjunction with upper-thread stitch-setting means including take-up and tension devices, a lower-thread pull-off which is ineffective during the period of each stitch-forming operation between the previous stitch-setting action and the penetration of the work by the needle, but acting thereafter while the needle continues to descend in drawing off the lower-thread supply for the succeeding stitch.

The pull-off is preferably constructed and operated to perform its function in two distinct stages, the first occurring during the stitch-setting action and while the needle-thread is taut, and the second taking place after the needle-eye has descended below the upper face of the work, an intermediate inactive stage being provided in which the lower thread is merely maintained taut but is not subjected to any active pull. The descent of the needle-eye through the work serves to draw taut that portion of the needle-thread between the same and the interlock with the previous lower-thread loop and the bending of the needle-thread over the upper edge of the new needle puncture and its confinement between the same and the needle serves to produce a sufficient resistance upon the needle-thread to resist the subsequent pull thereon imposed by the action of the lower-thread pull-off so as to prevent disturbance of the last-made interlock.

In its preferred embodiment, the present improvement is applied to a straight button-hole stitching machine constructed in accordance with the United States patents to

E. B. Allen No. 856,617, of June 11, 1907 and No. 857,145, of June 18, 1907, the oscillating shuttle carrying the lower thread being provided with a pull-off flange having two active thread-engaging portions and an intermediate inactive thread-engaging portion adapted merely to hold the shuttle-thread taut between the initial and final pull-off actions of said flange thereon.

In the accompanying drawings, Figure 1 is a perspective view of a straight-button-hole machine embodying the present improvements, and Fig. 2 an under side view of the shuttle mechanism thereof. Figs. 3, 4 and 5 are views representing the take-up arm and shuttle in different operative positions to illustrate respectively the initial, intermediate and final periods of engagement of the shuttle-thread with the pull-off flange. Fig. 6 is an edge view of the shuttle, and Fig. 7 a perspective view of the thread-case. Fig. 8 is an enlarged sectional view illustrating the formation of the purl-stitch overseam.

The machine is constructed with a frame comprising the usual bed-plate 1 and bracket-arm 2 in which is journaled the main-shaft 3 carrying at its forward end the take-up cam-cylinder 4 having the usual operative connection with the reciprocating needle-bar 5 carrying the eye-pointed needle 6 and mounted in the laterally jogging needle-frame 7 which is pivoted upon bearing centers 8 and carries a stud 9 connected by the pitman 10 with the rocking arm 11 fulcrumed at 12 upon the bracket-arm. The arm 11 has connected therewith a forked arm 13 entered by a slide-block 14 journaled upon the pin 15 carrying the slide-block 16 which is embraced by the forked arm 17 of a bell-crank fulcrumed at 18 and having an arm 19 carrying the roller-stud 20 entering an actuating cam-groove in a cam-wheel 21 (a portion only of which is represented in Fig. 1) having a suitable operative connection with the main-shaft.

Mounted in the shuttle-race 22 beneath the bed-plate is the oscillating shuttle 23 formed with the loop-seizing point or beak 24, throat 25, cast-off member 26 and heel 27 engaged by one extremity of the oscillating driver 28 whose opposite extremity engages the throat 25. The body of the shuttle is formed with a central cavity 29 from the bottom of which projects an axial pin 30 concentric with its periphery upon which is mounted the tubular stud 31 of the cylindrical thread-case 32 provided in its outer end with the upwardly extending holding arm 33 whose engagement with a stationary part of the machine prevents the thread-case from turning with the shuttle. The thread-case has journaled upon its central stud 31 the central sleeve 34 of the bobbin 35 containing the mass of lower thread.

Partially overhanging the cavity 29 of the shuttle is the inwardly extending pull-off flange 36 having a thread-engaging edge with an active portion 37 extending from the heel of the shuttle a short distance toward the point and eccentrically to the periphery of the shuttle and the thread-case, an adjacent inactive concentric portion 38 extending for some distance therefrom toward the shuttle-point, and a second active eccentric portion 39 adjoining the concentric portion and extending inwardly and forwardly toward the closed outer end of the thread-case and merging into the cast-off member 26. The lower thread is passed from the bobbin through the threading slit 40 beneath the tension spring 41, secured upon the periphery of the thread-case by means of the screw 42, and thence through the orifice 43 and intermediate the free outer end of the tension spring and the periphery of the thread-case and is thence led upwardly through the elongated needle-aperture 44 of the throat-plate 45 to the work. The lead of the lower-thread is such, therefore, that it is engaged and laterally deflected by the operative edge of the pull-off flange 36 soon after the shuttle begins its retractive movement after a loop-casting operation, and the bending of the shuttle-thread by this means causes the drawing of a supply of the same from the bobbin beneath the tension-plate 41.

The shuttle-driver 28 is fixed upon a short rock-shaft 46 journaled in a bracket 47 secured to the under side of the bed-plate and provided with a lateral crank-arm 48 carrying a stud 49 embraced by a forked arm 50 upon the intermediate rock-shaft 51 which carries a crank-arm 52 connected by means of the pitman 53 with the crank-disk 54 fixed to the lower end of the upright shaft 55 which is connected by means of a pair of bevel-gears 56 with the main-shaft 3. The vibratory take-up arm 57 having the usual thread-eye 58, is mounted within the head of the bracket-arm and is actuated in a wellknown manner by means of a stud entering the peripheral groove 4' of the cam-cylinder 4. In Figs. 4 and 5 I have indicated in dotted lines the extreme upper position of the take-up arm 57 and have represented in full lines in contrast therewith the lower positions of the take-up arm corresponding with the conditions of engagement of the portions 38 and 39 of the shuttle-thread pull-off flange 36 respectively; and in Fig. 3 the extreme lower position of the take-up lever is represented in dotted lines and the extreme upper position in full lines.

Upon the head of the bracket-arm is mounted the usual main needle-thread tension device 59 whose action upon the upper thread is augmented in the stitching of the

sides of the buttonhole by means of the automatically controlled auxiliary tension device 60 mounted upon the rearward end of the bracket-arm.

5 The work is held in a wellknown form of traveling work-holder 61 having a spring-pressed rectangular clamping foot 62 normally pressing the work upon the stationary throat-plate 45. Suitable longitudinal feeding movements and side-shift movements are imparted to the work-holder by any usual or suitable means.

10 In threading the machine, the needle-thread is led through the tension guide-member 63 and the auxiliary tension 60, and thence through the guide-eyes 64 and 65 downwardly through the main tension 59 and over the guard-pin 66 through the eye of the slack thread-controller spring 67, from which it passes upwardly through the eye 58 of the take-up arm 57 and downwardly to the needle-eye.

15 The material *m* having been inserted in the work-holder and the clamping foot lowered to clamp the work upon the throat-plate, the needle makes a descent, and in rising presents a loop of the needle-thread *n* which is seized by the point of the shuttle and carried around to cast-off position, from which it is drawn over the then upwardly inclined member 26 by means of the take-up, being thereby cast over the thread-case, and, in being drawn up, embracing the shuttle-thread *s* leading from the thread-case. As the take-up continues to rise, it draws the needle-thread loop, extending from the interlock of the previous stitch to the needle-eye, upwardly entirely through the material *m* and bends the shuttle-thread into a loop *s'* which is also drawn upwardly to a position above the fabric and intermediate the two lines of needle punctures, as represented in Fig. 8.

20 During the final rising movement of the take-up to set the stitch as described, the shuttle has commenced its retractive movement, and the pull-off flange 36 performs the first stage of its operative movement, as represented in Fig. 3, by engagement of the eccentric portion 37 with the shuttle-thread, this action ceasing simultaneously with the initial traverse of the concentric pull-off portion 39 with the thread as the take-up arm begins to descend to slacken the needle-thread preparatory to the succeeding puncture of the work by the needle. The shuttle-thread remains in contact with the concentric portion 38 of the pull-off flange, as represented in Fig. 4, until the needle descends sufficiently to bring its eye beneath the face of the work *m*, when it is engaged by the second eccentric portion 39 of the pull-off flange, which exerts a final pulling action upon the shuttle-thread, as represented in Fig. 5. As before indicated, the taut needle-

thread leading from the purl through the work to the needle-eye affords sufficient resistance to effectively anchor the shuttle-thread loop embracing the same so that the extra shuttle-thread is necessarily drawn from the bobbin through the lower-thread tension device 41 without disturbing the last formed shuttle-thread loop.

70 By the means above described, the final setting of each stitch is accomplished by a single action of the take-up before beginning the formation of a succeeding stitch, and this is effected with a much lighter needle-thread tension than has been required heretofore while insuring the production of a more uniform purl at the center of the overseam. As the needle-thread may be manipulated according to the present improvement with a moderate degree of tension, it follows that the shuttle-thread is subjected to less strain in the setting of the stitch, which is another advantage of the present improvement. The reduction in the tension of the threads insures not only against breakage in the production of the overseam stitches but avoids the puckering of the work, especially in connection with thin goods, which has frequently occurred heretofore with the strong tensions such as were required in the production of a purled overseam.

75 The lower-thread pull-off and its actuating means are shown and described herein in their simplest and preferred embodiment, but it is evident that in connection with other types of stitch-forming mechanism they would be designed for performing their functions substantially as hereinbefore described. It is therefore evident that the present improvement is susceptible of very considerable variation in construction within the scope of the present invention.

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

1. In a sewing machine, the combination with a laterally jogging needle and needle-thread take-up and tension devices, of a loop-taker coöperating with said needle and carrying an under-thread, an under-thread pull-off, and means for actuating said pull-off to draw off under-thread after the action of said take-up and subsequent to the entrance of the needle into the work, the pull-off being ineffective during the initial descent of the needle subsequent to the take-up action.

2. In a sewing machine, the combination with a laterally jogging needle and stitch-setting means acting upon the needle-thread, of a loop-taker coöperating with said needle and carrying an under-thread, an under-thread pull-off, and means for imparting to the pull-off a two-stage action to draw off portions of the lower thread respectively during the stitch-setting operation and after the subsequent entrance of the needle into

the work, with an intermediate ineffective period.

3. In a sewing machine, the combination with a laterally jogging needle and stitch-setting means acting upon the needle-thread, of a loop-taker coöperating with said needle and carrying an under-thread, and an under-thread pull-off connected to and movable simultaneously with said loop-taker and constructed with two active thread-engaging portions and an intermediate inactive portion.

4. In a sewing machine, the combination with a laterally jogging needle, and stitch-setting means acting upon the needle-thread, of a circularly-moving under-thread carrying loop-taker constructed with a central thread-cavity and with an adjacent pull-off flange having two eccentric thread-engaging portions and an intermediate concentric thread-engaging portion, and actuating means for said loop-taker.

5. In a sewing machine, the combination with a laterally jogging needle, a loop-taker coöperating therewith, a needle-thread tension device, a take-up device, and actuating means for the take-up device whereby the latter is caused to draw up the needle-thread to set the stitches and to slacken the needle-thread preparatory to

the puncturing of the work by the needle and seizure of the needle-thread loops by the loop-taker, of an under-thread pull-off adapted to draw off a supply of under thread for a succeeding stitch while the needle-thread is taut but ineffective while the needle-thread is slackened.

6. A sewing machine loop-taker comprising a body having a peripheral loop-seizing beak, a thread-cavity for supporting axially therein for relative circular movement a thread-case carrying a lower-thread, and an adjacent pull-off flange having two eccentric thread-engaging portions and an intermediate concentric portion.

7. A sewing machine loop-taker comprising a body having a loop-seizing beak and a thread-cavity to accommodate a lower thread, and a pull-off member carried by said loop-taker and having two active thread-engaging portions and an intermediate inactive portion.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALEXANDER BOYD.

Witnesses:

H. J. MILLER,

H. A. KORNEMANN, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."