No. 692,210. Patented Jan. 28, 1902.

F. W. OSTROM.

BUTTONHOLE SEWING MACHINE.

(Application filed Feb. 21, 1900. Renewed Nov. 5, 1901.)

(No Model.) 3 Sheets—Sheet 1.

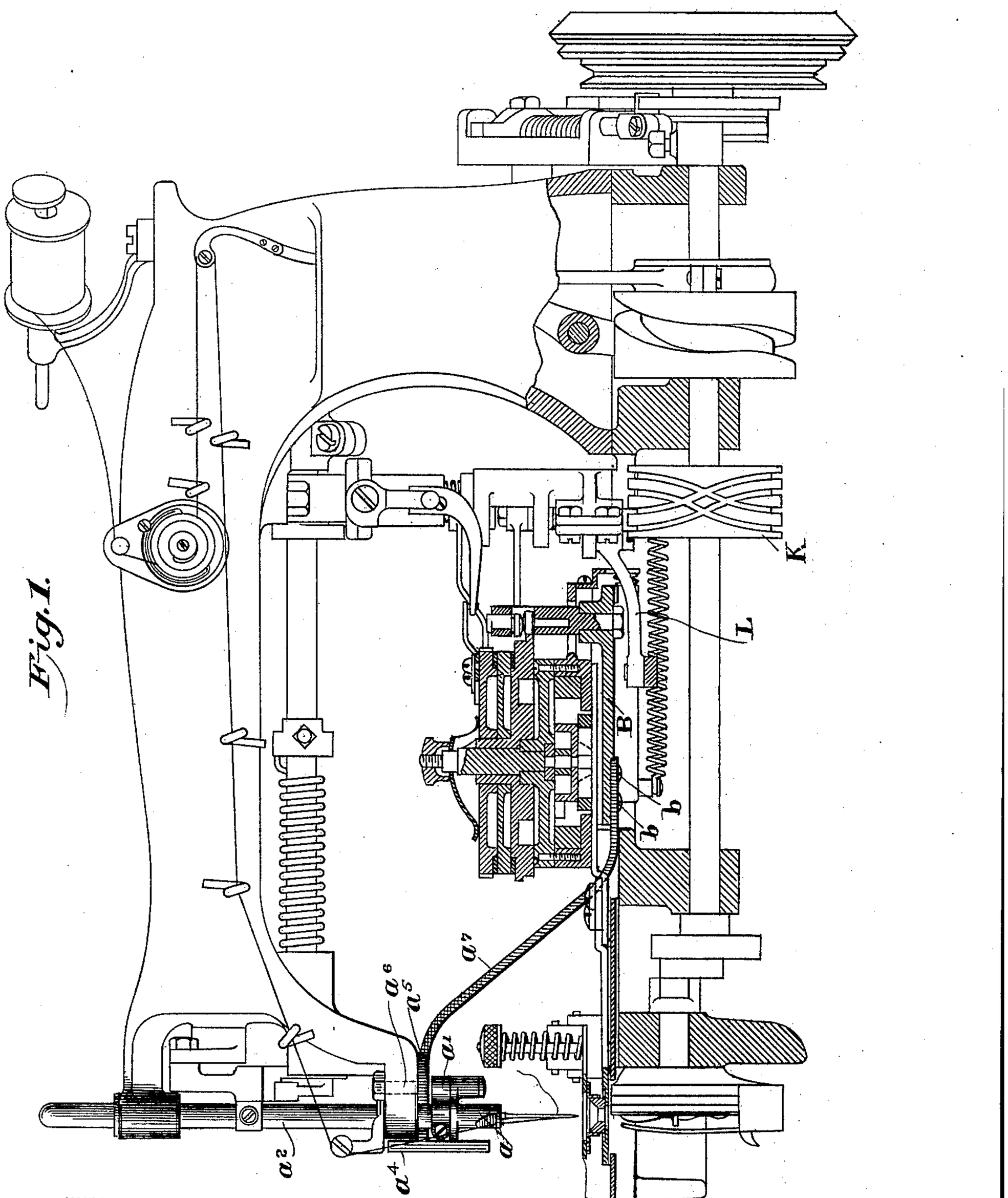

Fig. 1.

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Fig. 4.

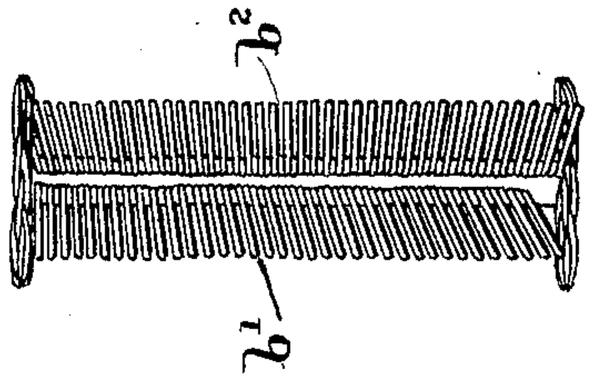

Fig. 3.

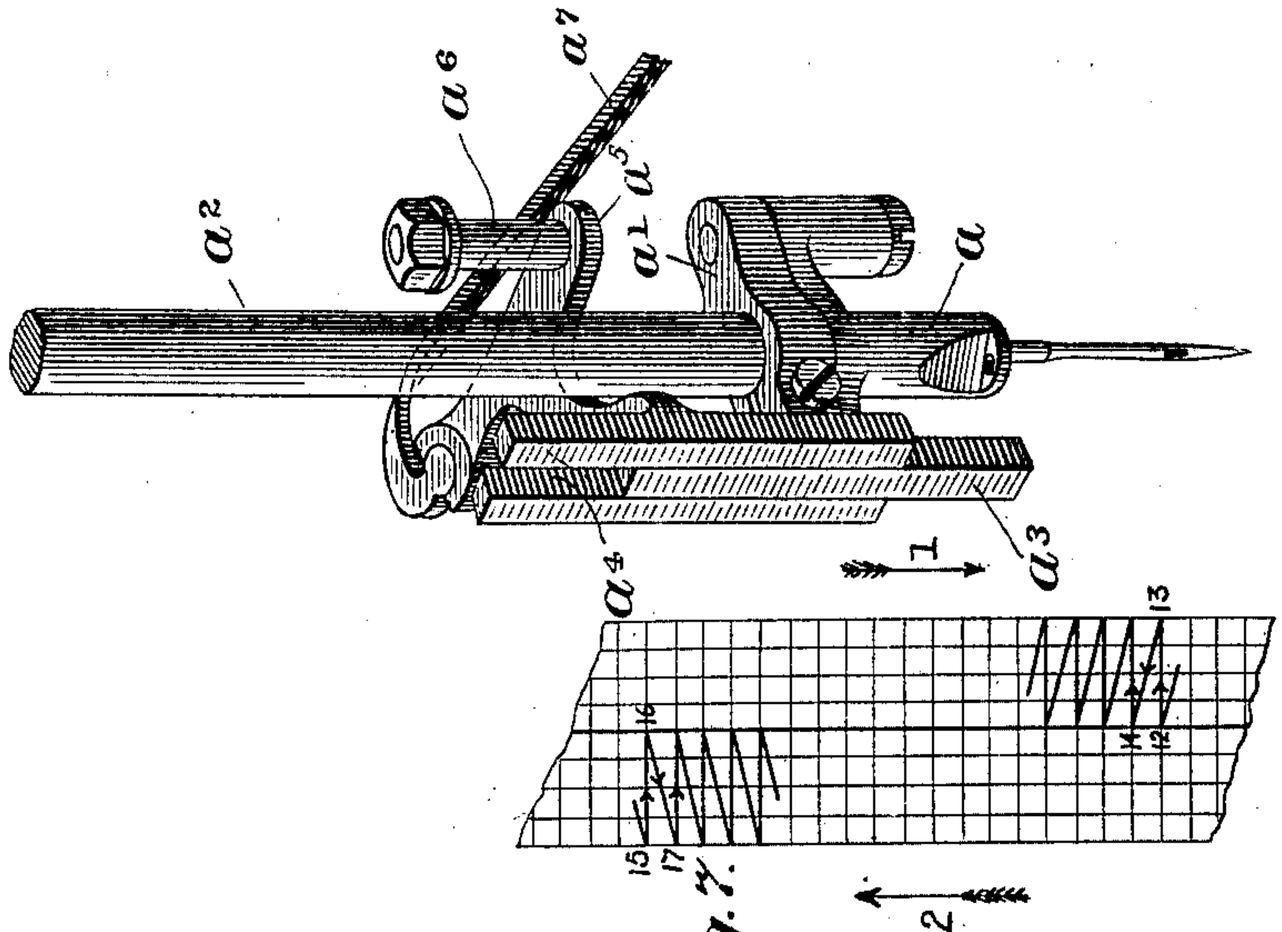

Fig. 2.

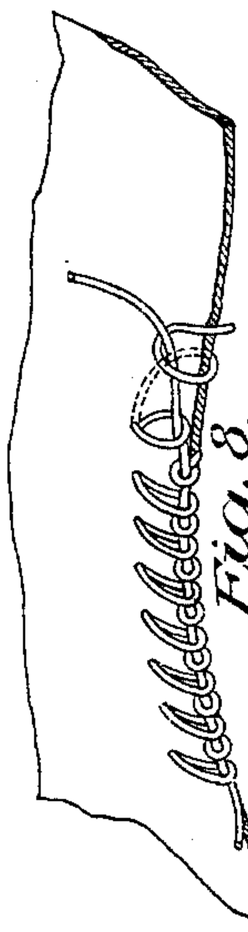

Fig. 8.

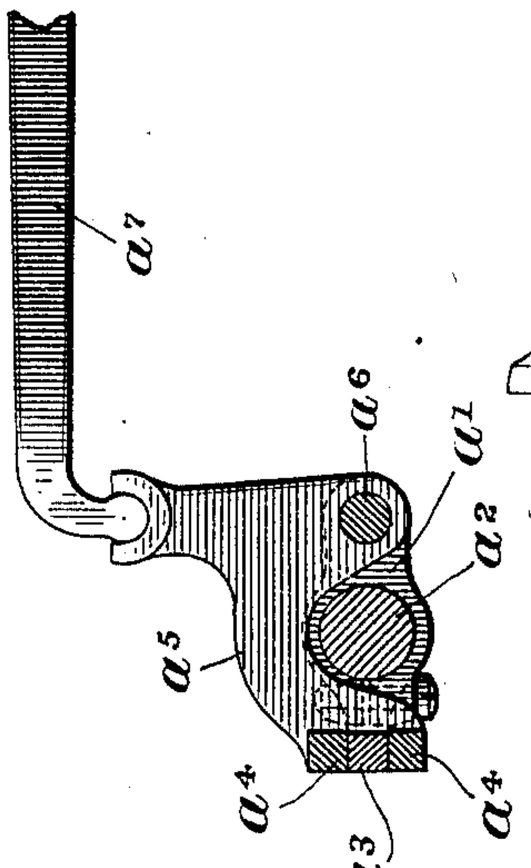

Fig. 7.

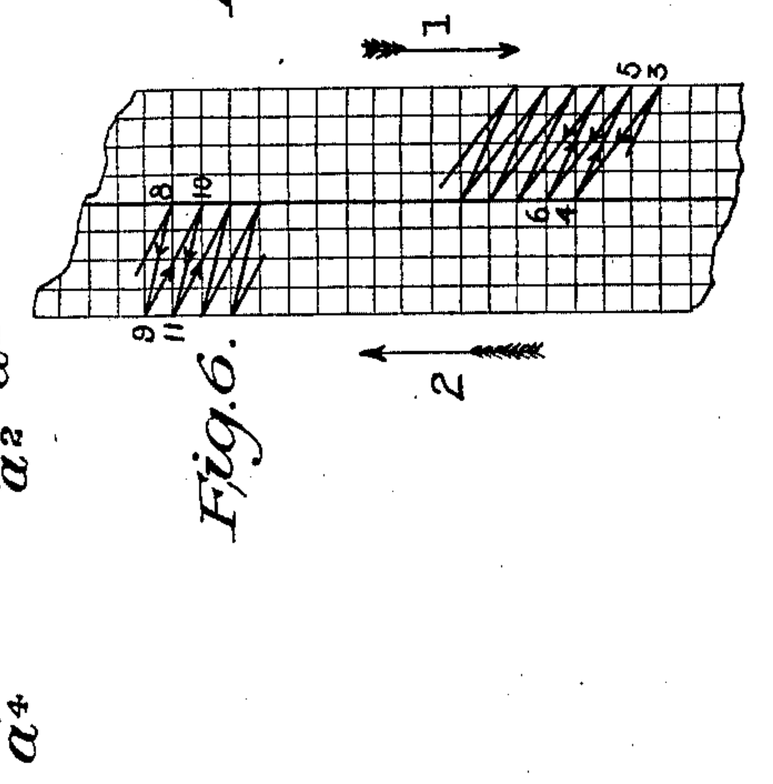

Fig. 6.

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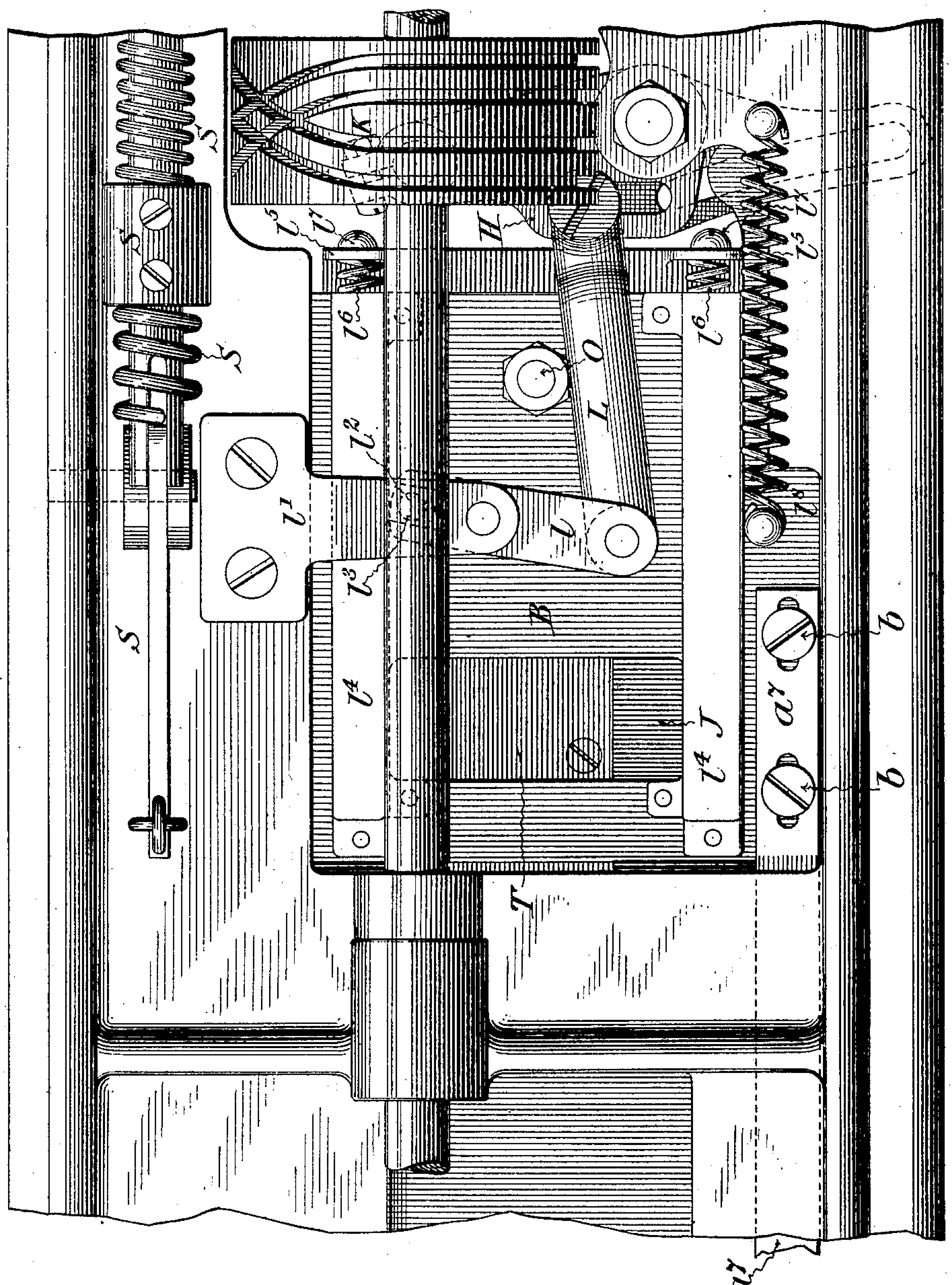
Fig. 5.



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UNITED STATES PATENT OFFICE.

FREELAND W. OSTROM, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO WHEELER & WILSON MANUFACTURING COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 692,210, dated January 28, 1902.

Application filed February 21, 1900. Renewed November 5, 1901. Serial No. 81,226. (No model.)

To all whom it may concern:

Be it known that I, FREELAND W. OSTROM, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Improvement in Buttonhole-Sewing Machines, of which the following is a full, clear, and exact description.

My invention relates to buttonhole-sewing machines, and has for its object to improve the appearance of the side overseaming and to produce a stronger and better-appearing bar at the ends of the buttonhole with less liability of injury to the material and to lessen the liability of breakage of the needle-thread while placing the barring-stitches.

In practice it has been found undesirable to give to the material a slight lengthwise-feed movement when forming a squared bar consisting, substantially, of short bar-stitches—such as is illustrated and described in my concurrent case A, filed February 21, 1900, Serial No. 6,107—as such movement, no matter how slight, tends to give to the bar a rounded rather than the desired square appearance. For durability and superiority of finish it is desirable to slightly spread the bar-stitches.

In the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a sectional side elevation. Fig. 2 is a plan view of a portion of the needle-vibrating mechanism. Fig. 3 is a perspective view of the needle-holder and its vibrating mechanism. Fig. 4 is a view illustrating a buttonhole, the left-hand half of which shows an evil to be corrected by my invention and the right-hand half shows the correction. Fig. 5 is a bottom plan view of parts of the actuating mechanism; Fig. 6, a view illustrating portions of overseaming as accomplished by the employment of a needle having vertical movements in first one and then the other of two vertical lines; Fig. 7, a view illustrating portions of overseaming as accomplished by the employment of a needle having vertical movements in a fixed line only. Fig. 8 illustrates the laying of the purl of the stitch adjacent to the cut edge of the material.

The stitch-forming mechanism, the stop-motion mechanism, the cutter mechanism, and the cloth-clamp T and cloth-clamp-actuating mechanism, including the switch-cam K, connection L, and vibrating lever H, may be and are here shown as the same in construction and operation as corresponding parts in my concurrent case referred to, with the exception of the necessary changes in construction to give to the needle vertical movements alternately in one and the other of two vertical lines during the entire cycle of feed movement necessary for the overseaming and barring of the buttonhole. Other features common to the two cases are the connection of the device L with the lower slide-frame B through a lever l, pivoted to a bracket l' and coacting with the slide-block l^2, which is mounted on the pin l^3 on said slide-frame; also, the pockets l^4 l^4, inclosing springs l^6 l^6, which bear against a stop l^5, secured to the upper slide-frame by screws l^7; also, the cross-slide J, the stop-motion elements S, and the lost-motion take-up spring l^8, which is secured to the under side of the slide-frame by one end and to the machine-frame by the other end.

The variations peculiar to this present invention consist in providing the needle with a holder a, the latter suitably fulcrumed to a collar a', secured to the usual needle-bar a^2, the needle-holder a being provided with a guiding-tongue a^3, and said tongue through the action of the needle-bar being given vertical movement in a guideway a^4 in a lever a^5, which is pivoted to the overhanging arm at a^6. The lever a^5 is operatively connected with the lower slide-frame B through the connecting-link a^7, secured to the lower slide-frame B by the screws b b and at its upper or opposite end operatively connected with the vibrating lever a^5, as shown in Figs. 2 and 3.

From the foregoing it will be understood that vibratory movements are transmitted from the switch-cam K through connection L, the lower slide-frame B, connection a^7, vibrating lever a^5, needle-bar collar a', and needle-holder a, causing the vertical movement of the needle to take place alternately in one

and the other of two vertical lines substantially at right angles with the length of the buttonhole during the cycle of feed movement necessary for the overseaming and barring of the buttonhole and that vibratory movements are transmitted from the switch-cam K through the connection L and lower slide-frame B to the cloth holding and feeding clamp.

Referring to Fig. 4 and bearing in mind that the buttonhole-slit is cut substantially at the beginning of the overseaming, it will be noticed that as the feed advances the side overseam-stitches b' become oblique to a line transverse to the length of the buttonhole, and this defect in appearance of the side overseaming is the result of the employment of a needle moving continuously in a fixed vertical line, as in ordinary sewing-machines. The drawing together of the purl of the stitches on the inner cut edge of the material is due to the heavy tension of the needle-thread, while the preservation of the uniform spacing of the depth-stitches results from the anchorage of such depth-stitches in the material instead of on the inner cut edge thereof. The employment of a needle which moves alternately in one and the other of two vertical lines, as illustrated and described herein, largely overcomes the undesirable appearance of the side overseaming of the buttonhole, since the piercing of the material in the formation of the depth-stitch is back or in the rear of the position of the needle in the formation of the edge-stitch relative to the line of stitching, and such difference is gradually taken up by the crowding of the purl or edge stitches on the inner cut edge of the material as the overseaming progresses, effecting when employing a substantially coarse feed an appearance in finish far superior to the finish effected by the employment of a needle which moves continuously in a fixed vertical line, as will be understood by a comparison of the position of the overseam-stitches on the side b^2 with that of the side b', Fig. 4.

Referring to Fig. 6, supposing the needle to be actuated to pierce the material at 3, as when making a depth-stitch at the right of the buttonhole, the next subsequent descent of the needle through the material would be at 4 for the formation of an edge-stitch, the angle of overseam-stitch being effected by a lateral movement of the needle in the direction indicated by the arrow 2 and a feed movement of the material in the direction indicated by the arrow 1 in connection with a movement of the material transverse to its lengthwise-feed movement, which latter movement alternates with each descent of the needle during the entire stitching of the buttonhole, the succeeding descent of the needle through the material being at 5 effected by a lateral movement of the needle in the direction indicated by the arrow 1, there being no feed movement at this time, but the feed movement in the direction of arrow 1 occurring when overseaming the right-hand side of the buttonhole and between the formation of first a depth-stitch and then an edge-stitch, the descent of the needle next following at 6 consequent upon a lateral movement of the needle and feed movement of the material same as when placing the overseam-stitch made by the descent of the needle at 4.

Referring to Figs. 6 and 7, the material is illustrated as unprovided with the usual buttonhole-slit, so as to illustrate the position of the edge and depth stitches as if both the edge and depth stitches were anchored in the material, while in Fig. 4 the material is illustrated as provided with a buttonhole-slit in which the edge-stitches are located and are free to crowd together relatively to the depth-stitches, which are anchored in the material, this crowding being due to the use of a strong upper tension, which is necessary for the production of a purl-stitch.

In the production of a purl-stitch it is to be understood that sufficient tension is to be given the needle-thread to draw sufficient thread from the bobbin for an entire overseam-stitch and that such bobbin-thread must be drawn through the puncture made by the needle at the depth-stitch, causing the needle-thread to act simply as a cord to lock together the successive overseam-stitches at the cut edge of the buttonhole-slit, as shown in Fig. 8. This tension of the needle-thread when employed in connection with the overseaming of a buttonhole cut at substantially the commencement of the overseaming will cause the interlocking of the needle and bobbin threads to occur at a point farthest from the depth-stitch, which is on the inner cut edge of the material. In the formation of the edge-stitch the bobbin-thread is simply drawn in line with the preceding stitches and is not subjected to the friction consequent upon the drawing of such thread through the puncture at the depth-stitch.

Referring to the side overseaming b^2, Fig. 4, the relative length of the feed lengthwise of the buttonhole, the number of overseam stitches employed, and the extent of the vibration of the needle illustrate a distribution of the overseam-stitches which gives to such stitches an angle oblique to the length of the buttonhole at the beginning and finishing of the side b^2, gradually decreasing in obliquity toward the transverse center of the buttonhole. Such oblique distribution of the stitches might or might not be the result of actual operation, as such uniformity of conditions would depend upon the relative length of the buttonhole, number of stitches employed, and extent of needle vibration, it being understood that in actual practice there would be made such relative adjustments of needle actuation, number of stitches employed, and length of buttonhole as would effect the best results.

The foregoing illustrates the positioning of

the respective edge and depth stitches when the material is being fed in the direction indicated by the arrow 1, it being understood that Fig. 6, in connection with its descriptive matter, is simply illustrative and that the relative adjustments of feed movements, extent of lateral movements of the needle, and the transverse movements of the material are subject to adjustment dependent upon the nature of the production desired.

For the purpose of illustration the edge-stitches 4, 6, 8, and 10 are positioned as if anchored in the material in like manner as the depth-stitches instead of upon the cut edge of the material, as is illustrated by Fig. 8. Fig. 8 also illustrates the formation of the purl of the stitch by the employment of an exceedingly heavy needle-thread tension, causing the locking of the bobbin and needle threads on the cut edge of the material. The overseaming of the second or last side of the buttonhole will be understood by supposing the needle to pass through the material at 8 for the formation of an edge-stitch. The stitch next subsequent would be placed at 9 through the movement of the material transverse to its lengthwise movement effected by a lateral movement of the needle and a feed movement of the material in the direction indicated by the arrow 2. The stitch-forming mechanism having formed the stitch 9, the succeeding stitch is formed at 10, effected by a lateral movement of the needle in the direction indicated by the arrow 1, there being no feed movement of the material lengthwise of the buttonhole during the last-mentioned lateral movement of the needle. The stitch next subsequent is designated by 11 and is formed and positioned under like conditions of movements of needle and material as in the formation and positioning of stitch 9. From an inspection of Fig. 6 it will be observed that the angle of the overseam-stitches is greater when overseaming the right-hand side of the buttonhole than when overseaming the opposite or left-hand side. This difference in the angle of the stitch is due to the change in the direction of feed movement relatively to the movement of the material transverse to its lengthwise-feed movements. Referring to the overseaming of the right-hand side of the buttonhole, the feed of the material in the direction indicated by the arrow 1 occurs between the formation of a depth-stitch and an edge-stitch, at the same time there being a lateral movement of the needle in an opposite direction, while in the overseaming of the left-hand side the lengthwise feed of the material occurs between the formation of an edge-stitch and a depth-stitch, the lateral movement of the needle being in the same direction and causing in the one instance an angle of overseam-stitch equal to a lateral movement of the needle plus a feed movement, while in the second instance an angle of stitch equal to a lateral movement of the needle minus a feed movement.

In explanation of the inequality of angle of overseam-stitch it is to be noted that it is not in the nature of buttonhole-sewing machine constructions (wherein the material is fed in opposite directions for the overseaming of the complemental sides of the buttonhole and wherein the step-by-step feed movements occur alternately with the formation of each overseam-stitch instead of each lock-stitch) to effect a like condition of step-feed movement relatively to the formation of a depth or edge stitch. On the one side the step-feed movement occurs, as has been previously stated, between first a depth-stitch and then an edge-stitch, while such step-feed movement occurs between first an edge-stitch and then a deep-stitch when overseaming the second or opposite side of the buttonhole. Consequently when employing a needle having vertical movements in a fixed line only there is a similar condition of inequality.

Referring to Fig. 7, (wherein the needle has vertical movements in a fixed line only,) it will be understood that when overseaming the right-hand side of the buttonhole, supposing the needle to have first formed the edge-stitch 12, the next subsequent descent of the needle will be at 13, followed by a descent at 14, while in overseaming the second or opposite side, supposing the depth-stitch 15 the first to be formed, the succeeding stitch will be at 16, followed by the formation of the stitch 17. Comparing the overseam-stitches last referred to with those of Fig. 6, (wherein the needle has vertical movements in first one and then the other of two vertical lines,) it will be observed that in the former, Fig. 7, when overseaming the right-hand side the edge-stitch is formed (relatively to the line of overseaming) one stitch in advance of the depth-stitch, whereas in Fig. 6, same side, the edge-stitch is formed three stitches in advance of the depth-stitch. Referring to Fig. 7, left-hand side, the edge-stitch is formed (relatively to the line of overseaming) one stitch in rear of the depth-stitch, while in Fig. 6, same side, the edge-stitch is formed two stitches in advance of the depth-stitch.

From the foregoing it will be understood that the depth-stitch, Fig. 6, at the commencement of the overseaming of each side of the buttonhole is placed (relatively to the line of overseaming) to the rear of the edge-stitch, which materially helps to remedy the difficulty incident to the crowding of the edge-stitches when overseaming the cut edge of a buttonhole.

Referring to Fig. 8, the purl consists of the loop occasioned by the interlocking of the bobbin and needle threads. If the needle-thread is given sufficient tension to draw from the bobbin-thread enough to form an entire overseam-stitch, the upper or needle thread acts simply as a cord to lock together the successive overseam-stitches, making the line of the needle-thread the purl-line, which if the buttonhole-slit is cut before the overseaming

is caused to lie along the inner cut edge of the material.

It is evident from an understanding of the construction and operation of my improved mechanism that the barring-stitches can be slightly distributed lengthwise of the buttonhole without giving to the bar a rounded appearance, and, further, that a slight spreading of the stitches makes less liable the breaking of the upper or needle thread, for the reason that it distributes the needle-punctures over a greater surface of the material. The number of stitches entering into the formation of the bars may be varied at pleasure within the adjustments of which the machine is capable, and for purposes of illustration only I have shown these bars as composed of a considerable number of overlaid stitches. I do not, however, limit my invention to the number of stitches employed.

What I claim is—

1. In a buttonhole-sewing machine, the combination of a cloth-feeding mechanism a cloth-clamp and means for continuously vibrating said cloth-clamp alternately with the descents of the needle, a needle, means to reciprocate said needle, and means to impart a continuous vibration to said needle throughout the entire cycle of movements for stitching the buttonhole, substantially as described.

2. In a buttonhole-sewing machine, a cloth-feeding mechanism, means for continuously vibrating said cloth-feeding mechanism alternately with the descent of the needle-bar, a stitch-forming mechanism including a reciprocating needle, a vibratory holder for said needle, and means for imparting continuous vibration to said holder throughout the cycle of movements necessary to complete the stitching of the buttonhole, substantially as described.

3. In a buttonhole-sewing machine, a stitch-forming mechanism, cloth-feeding mechanism including a cloth-clamp and actuating mechanism therefor including a switch-cam, and connections between the switch-cam and cloth-clamp for vibrating the material under the needle, the stitch-forming mechanism including a needle and means for continuously vibrating the needle substantially at right angles to the vibration of the cloth-clamp, to place the successive overseam-stitches slightly oblique to the line of vibration of the cloth-clamp, substantially as described.

4. In a buttonhole-sewing machine, a feed mechanism, a cloth-holding clamp, actuating mechanism for said clamp including a switch-cam and suitable connections between said cam and clamp for vibrating and thereby properly positioning the material for the formation of the edge and depth stitches, in combination with stitch-forming mechanism including a needle, and means to impart to said needle vertical movements in first one and then the other of two vertical lines during the cycle of feed movements and vibratory movements necessary to complete the stitching of a buttonhole, substantially as described.

In testimony whereof I have hereunto set my hand this 17th day of February, A. D. 1900.

FREELAND W. OSTROM.

Witnesses:

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E. A. FINCKEL.