Feb. 16, 1954 J. P. ENOS 2,669,202

WORK-JOGGING ATTACHMENT FOR SEWING MACHINES

Filed July 5, 1951 3 Sheets-Sheet 1

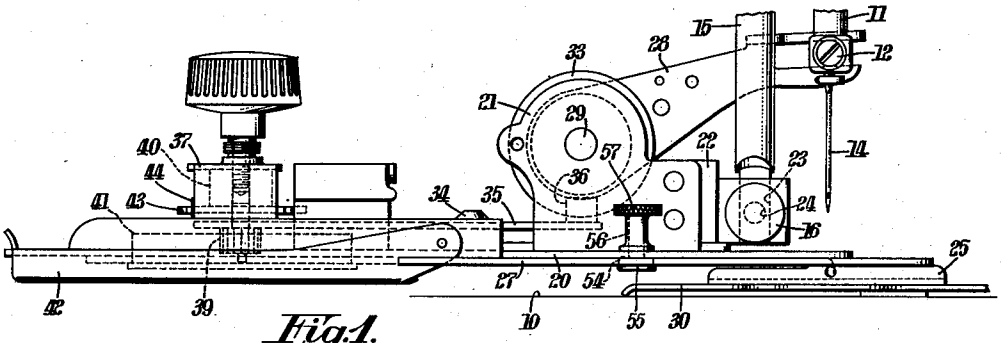


Fig. 1.

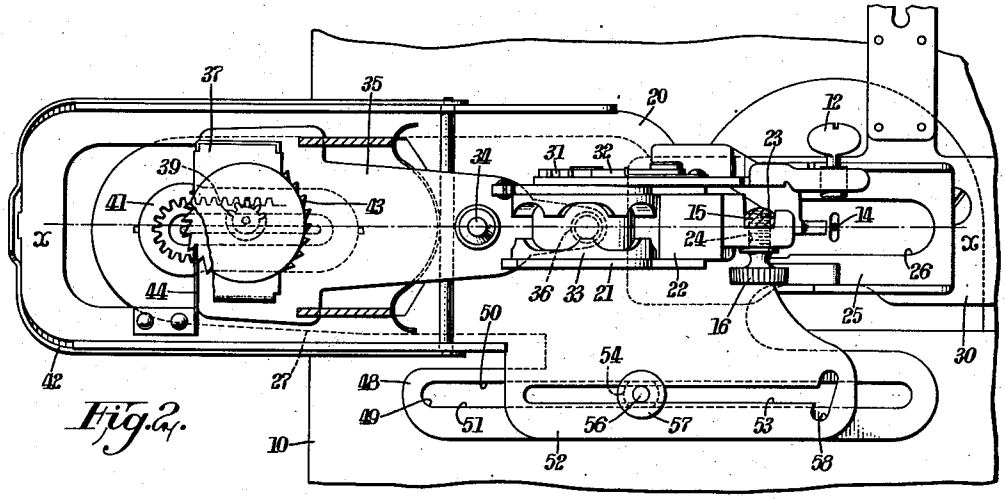


Fig. 2.

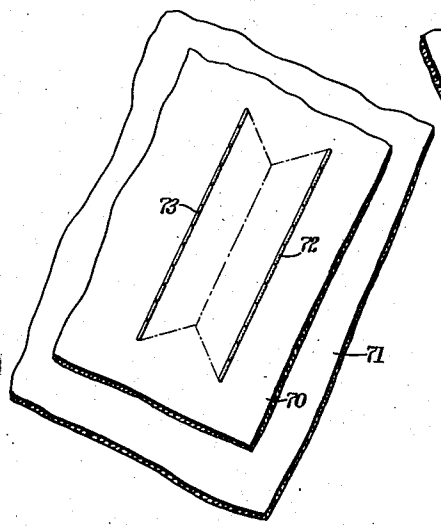


Fig. 6.

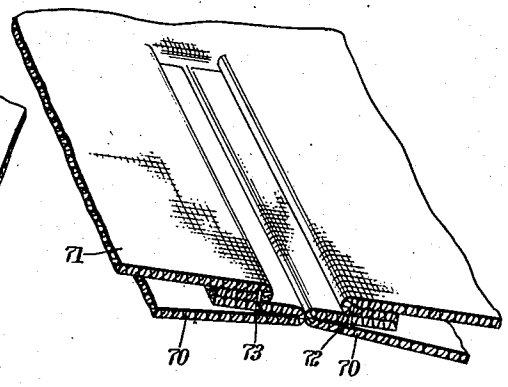


Fig. 7.

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WORK-JOGGING ATTACHMENT FOR SEWING MACHINES

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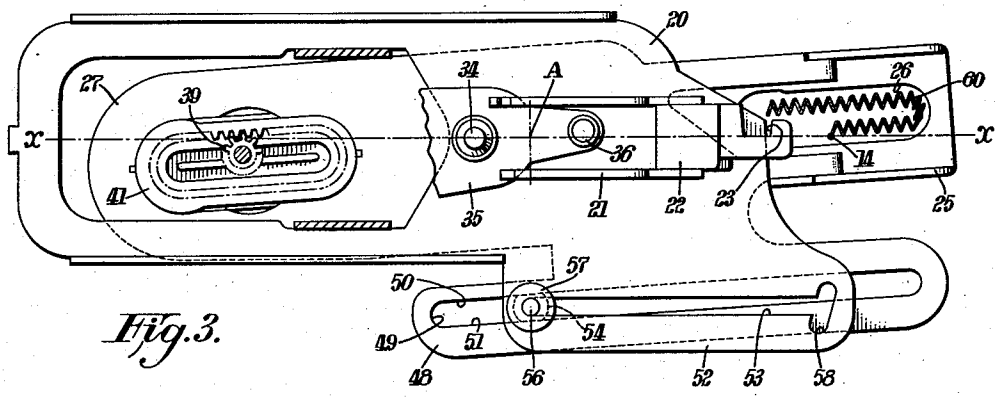


Fig. 3.

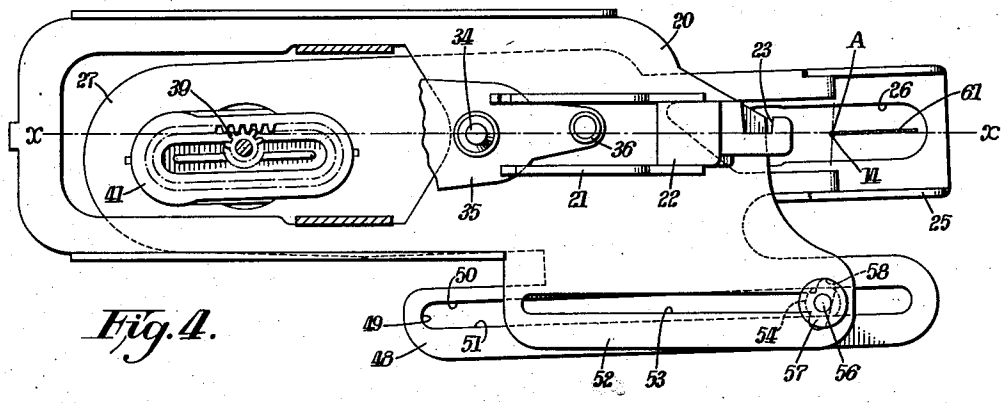


Fig. 4.

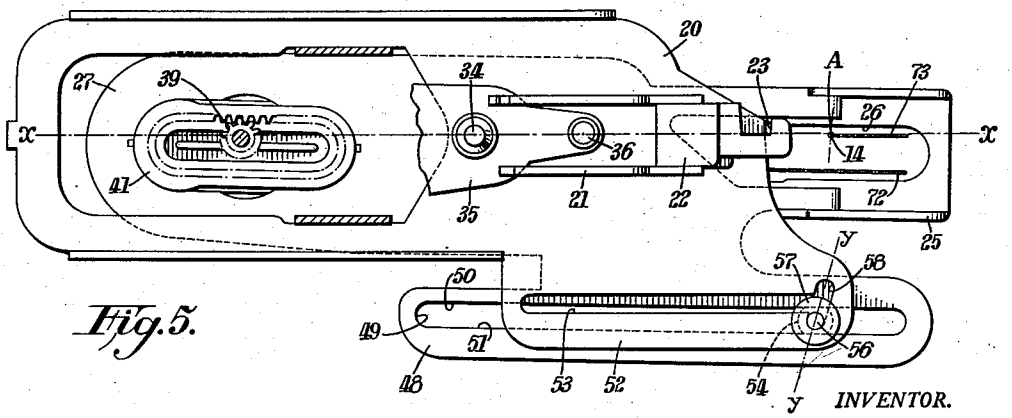


Fig. 5.

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WORK-JOGGING ATTACHMENT FOR SEWING MACHINES

Filed July 5, 1951 3 Sheets-Sheet 3

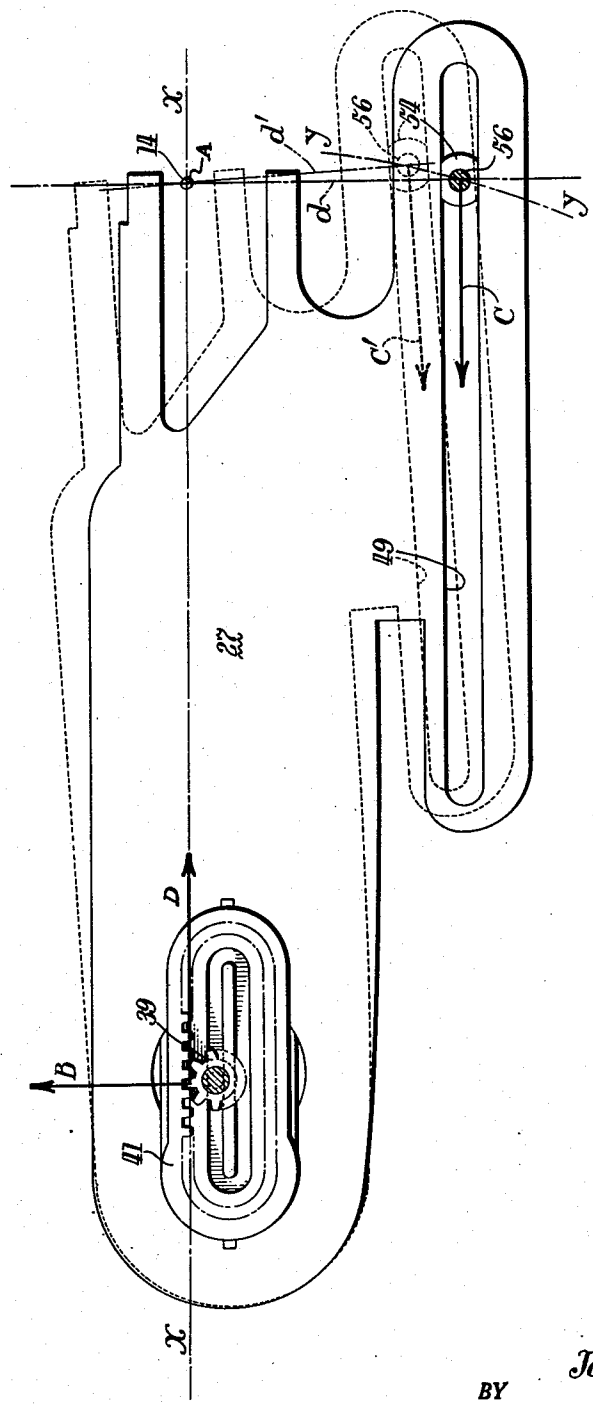


Fig. 8.

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Patented Feb. 16, 1954 2,669,202

UNITED STATES PATENT OFFICE

2,669,202

WORK-JOGGING ATTACHMENT FOR SEWING MACHINES

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Application July 5, 1951, Serial No. 235,287

8 Claims. (Cl. 112—77)

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This invention relates to work-jogging attachments for sewing machines, and more particularly to a new and improved bight regulating means therefor.

Work-jogging attachments of the type to which this invention is applicable, comprise generally devices for holding and presenting the work to the needle, together with mechanism for moving or jogging the work-holding devices to effect a patern of stitches. Whether the resulting stitch pattern be a closed one, as in the case of a buttonhole, or a continuous one as in hemstitching, the term "bight" is used herein to designate stitch-by-stitch work movement laterally of the general progress of the work. Thus in a buttonhole, the amplitude of the zigzag stitches along each side represents the "bight."

Work-jogging attachments are primarily used with family type sewing machines, in which use the attribute of versatility ranks high in importance. An object of the present invention is to provide a bight regulating structure for a work-jogging attachment which not only encompasses the usual range of bight sizes but also includes a position in which no bight occurs, in which position a straight tack of stitches may be formed. Thus, by means of the instant invention, the usefulness and versatility of a work-jogging attachment will be enhanced, since in addition to the normal purpose for which the attachment is designed, straight tacks may be produced having the appearance as if made by an organized tacking machine. Such tacks are useful, for instance, to attach straps, to reenforce the corners of pocket openings, and the like.

In addition, it is an object of this invention to provide a mechanism whereby the lateral position of the work holding devices may be accurately controlled so that two or more parallel tacks may be produced. This feature, when applied to a buttonhole atachment, provides an attachment which is especially well suited for the initial stitching operations involved in the preparation of bound buttonholes, by a usual method which will be described in detail hereinafter.

In the accompanying drawings, a preferred embodiment of the invention is illustrated in connection with a buttonhole attachment of the type disclosed in the N. T. Almquist Patent No. 2,482,607, September 20, 1949. As will appear, however, the scope of the invention is not limited to use with a buttonhole attachment.

In the drawings:

Fig. 1 is a side elevational view of a buttonhole attachment having my invention applied thereto and with portions of a sewing machine fragmentarily illustrated.

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Fig. 2 is a top plan view, partly in section, of the buttonhole attachment shown in Fig. 1.

Figs. 3, 4 and 5 are top plan views, partly in section and each illustrating a portion of the buttonhole attachment with the bight adjustment set differently in each figure, and including an illustration in each figure of the stitch pattern which is obtainable with the particular bight setting shown; Fig. 3 illustrating a bight adjustment in the usual buttonhole range, Fig. 4 illustrating the zero bight adjustment, and Fig. 5 illustrating the lateral offset position which is obtainable in the zero bight position of adjustment.

Fig. 6 is a perspective view of a portion of a garment to which a patch has been secured by means of a buttonhole attachment having my invention applied thereto as the initial step in the manufacture of a bound buttonhole.

Fig. 7 is a perspective view of a part of the completed bound buttonhole.

Fig. 8 is an enlarged top plan view of the presser-foot shank illustrating diagrammatically the motion imparted at any one instant to the presser-shank during operation of the attachment and showing, in dashed lines, an alternate position of adjustment, which position is exaggerated in the interest of clarity.

The buttonhole attachment with which the novel bight regulating means is associated in the preferred embodiment is illustrated in Figs. 1 and 2 in operative position on a sewing machine. The sewing machine, which is illustrated fragmentarily in the drawings, is of usual construction including a work-supporting plate 10 and a bracket-arm (not shown) which overhangs the work-supporting plate. Slidably journaled in the bracket-arm is a vertically reciprocating needle-bar 11 provided at its free extremity with a needle-clamping screw 12 by which a needle 14 may be secured thereto. Also journaled in the bracket-arm is a presser-bar 15, the free end of which is drilled and tapped to accommodate a thumb screw 16 which serves in ordinary stitching operations to secure a presser-foot to the presser-bar.

The illustrated buttonhole attachment, similar to that disclosed in the above mentioned Almquist patent, is supported by the presser-bar and utilizes the reciprocatory motion of the needle-bar to effect work-shifting movement. To this end, the attachment is provided with a frame including a flat horizontal base-plate 20, a U-shaped pattern-cam supporting bracket 21 and a

block 22 in which is formed a presser-bar accommodating seat 23 and a clearance aperture for the thumb screw 16 by which the attachment frame may be securely fastened to the presser-bar.

The attachment is provided with a work-engaging presser-foot 25 formed with an elongated opening 26 within which the buttonhole pattern of stitches is formed. The presser-foot is pivotally supported on the forward extremity of a flat, substantially horizontal, shank 27 which is disposed to underlie the base-plate 20 of the attachment frame, as is illustrated clearly in Figs. 3, 4 and 5.

With the button hole attachment which is illustrated in the drawings, there is provided an actuating mechanism which is carried by the attachment frame and which is driven by the vertically reciprocatory movements of the needle-bar so as to impart movement to the work-engaging presser-foot. Since the usual feed mechanism of the sewing machine is not used and, in fact, may be detrimental to proper work-shifting by the button hole attachment, a feed cover plate 30 is secured in position between the work-supporting plate 10 and the attachment presser-foot 25.

The actuating mechanism of the attachment does not shift the presser-foot directly, but rather it is arranged to impart movement to the presser shank 27 at a point spaced from the presser-foot 25. A connection is provided between the attachment frame and the presser-foot shank by which movements of the presser-foot may be controlled. This invention is primarily concerned with the control connection, however, the actuating mechanism now will be described in sufficient detail to enable a person skilled in the art to comprehend the invention.

An actuating lever 28 is freely journaled on a stud-shaft 29 disposed between the upstanding arms of the attachment frame bracket 21. The lever 28 at its free end is bifurcated and arranged to engage the needle clamp screw 12 so that an oscillatory movement is imparted to the lever by the reciprocatory needle-bar. By means of a ratchet 31 and a pawl 32, the oscillatory movement of the actuating lever imparts step-by-step turning movement to the stud-shaft and to a barrel pattern-cam 33 secured thereto.

Carried by a vertical pivot-pin 34, which is secured to the frame-base substantially on the longitudinal center-line x—x thereof, is a horizontally swinging lever 35. The lever 35 carries at its forward extremity a roller-follower 36 which enters and tracks the groove of the barrel pattern-cam. The opposite extremity of the lever 35 is provided with a bridge portion 37 which is spaced above the lever 35 and, together with the lever, rotatably supports a hub portion 40 of a ratchet wheel 43 on a vertical axis. At the lower extremity of the ratchet-wheel hub 40 beneath the lever 35, a pinion 39 is fixed coaxially with the ratchet wheel 43 and adapted to mesh with a closed elongated pattern rack 41 which is replaceably secured in the shank 27 and maintained in position by the pivoted bottom plate 42 of the attachment frame.

The ratchet wheel 43 engages a spring pawl 44 which is carried by the frame, whereby the side-to-side movements of the lever 35 which are imparted by the pattern barrel cam 33, cause step-by-step turning movements of the pinion 39.

Thus by means of the operative engagement between the pinion 39 of the actuating mechanism and the pattern rack 41 of the presser-foot shank, the side-to-side movements of the lever 35 impart to the presser-foot shank similar stitch-by-stitch lateral movements perpendicular to a longitudinal axis of the frame indicated by line x—x, Fig. 2, while the ratchet-controlled turning movements of the pinion shaft cause the pinion to track the pattern rack, thus imparting longitudinal movements to the presser-foot shank.

In order that the lateral movements of the presser-foot may be controlled, an adjustable connection is provided between the attachment frame and the presser-foot shank by means of which a pivotal axis is determined for turning movements of the presser shank in response to lateral movements of the pattern rack.

The connection is designed to provide for a wide range of adjustment of the position of the shank pivotal axis including a position in which the pivotal axis corresponds with the axis of needle reciprocation, in which position it will be understood, the attachment will produce a stitch pattern having no bight, i. e., a straight tack having in-line stitches.

To this end, the presser-shank is formed with an outwardly protruding portion 48 formed with a slot 49 which defines opposed-guiding surfaces 50 and 51 disposed parallel to the length of the pattern rack and which protrude forwardly to a point opposite the forward portion of the presser-foot opening 26. Overlying the extended portion 48 of the presser-shank is a lateral extension 52 of the attachment frame base 20. The frame base extension is provided with a slot 53 which is disposed substantially parallel to the longitudinal center-line x—x of the frame base and which extends forwardly to a point opposite the needle axis.

A block 54 is slidably confined between the guiding surfaces 50 and 51 in the presser-shank. The slide-block is formed at its lower end with an enlarged head portion 55, Fig. 1, and at its upper extremity with a reduced threaded portion 56 which extends upwardly through the slot 53 in the frame base extension. The threaded portion accommodates a thumb nut 57, by which the slide-block may be adjustably clamped in any desired position along the slot 53, and since the slide-block is of a greater thickness than the lateral extension 48 of the presser-shank, the shank is always slidably pivoted to the frame base by the slide-block.

In the drawings, Fig. 3 illustrates the relationship of parts when the slide-block is positioned in the rearward portion of the slot 53, resulting in a stitch pattern 60 having a substantially wide bight. Fig. 4 illustrates the straight tack stitch pattern 61 produced when the slide-block is adjusted to its extreme forward position in which no bight is produced. These figures also show that the slide-block does not in itself form the pivotal axis for the presser-shank, but rather that the slide-block together with the actuating mechanism determine a pivotal axis A which always occurs substantially along the longitudinal centerline x—x of the attachment frame and at a point opposite the position of the slide-block. Thus, in the position of bight adjustment illustrated in Fig. 3, the pivotal axis for the shank 27 is disposed on the longitudinal frame centerline indicated by the line x—x and part way between the pinion 39 and the needle 14 so that for each lateral movement imparted

to the shank by the pinion 39, a lateral movement in the opposite direction is imparted to the presser-foot, the proportion, of course, depending on the position of the slide-block 54 and the corresponding position of the axis of shank turning movement A. As illustrated in Fig. 4, the slide-block is positioned opposite the needle axis so that the axis of turning movements of the shank corersponds with the needle axis and no bight results.

As illustrated in Fig. 5, an additional feature of the present invention is the provision of a transverse slot 58 which intersects the forward extremity of the longitudinal slot 53 in the frame base 20. In the preferred embodiment, the transverse slot 58 is disposed on an arc shown by the dashed line y—y of Fig. 5, the center of curvature of the arc coincides substantially with the point of engagement between the pinion 39 of the actuating mechanism and the pattern rack 41 of the presser-foot shank. By this construction, when the slide-block 54 is in extreme forward position of adjustment in which a straight tack is formed, the shank 27 may be shifted laterally so as to shift the position of the work and consequently the position of the straight tack bodily in a lateral direction. Since the slot 58 is disposed on an arc about the point of contact between the actuating mechanism and the presser-shank as its center, the shank 27, when shifted from one lateral position to another, causes parallel straight tacks of equal length to be made with each of the tacks terminating on a common right line.

The specification thus far has dealt primarily with a description of the structural provisions of the preferred embodiment. The manner in which the above described arrangement of parts operates to locate the axis of turning movement of the presser-shank at the axis of the needle to produce a straight line of stitches will now be described.

As shown in Fig. 8, the motion transmitted to the presser-foot shank by the pinion 39 may be resolved into two components, one component D in a direction parallel to the longitudinal axis x—x of the attachment frame, i. e., toward and away from the needle by virtue of the tracking of the length of the pattern rack by the pinion, and another component B laterally of the attachment axis x—x due to oscillation of the pinion 39 and also due to tracking of the pinion about the ends of the pattern rack.

Since the slot 49, as stated above, is parallel to the length of the pattern rack and consequently is parallel to the direction of the longitudinal component D, this component results in translatory movement of the presser-foot shank.

The lateral movements imparted to the shank by the pinion 39, since they are relatively small in comparison with the length of the attachment, occur in a direction B substantially perpendicular to the axis of the attachment frame. In response to lateral movement B of the driving connection, the presser-foot shank is constrained at the control connection between block 54 and slot 49 to move in the direction of the slot, i. e., substantially parallel to the longitudinal axis of the frame as indicated by the arrow C in Fig. 8. In accordance with kinematic principles, when the direction of motion of two points on a member are known, the axis of turning movement of the member is located at the intersection of two lines each passing through one of the points and disposed perpendicular to the direction of motion of that respective point. In Fig. 8 such a perpendicular through the point of engagement of the pinion 39 and the rack 41 substantially coincides with the frame axis x—x while the line d represents such a line drawn through the control connection. When the block 54 is clamped at the forward extremity of the slot 53 in the attachment frame as is shown in Fig. 8, the line d intersects the axis x—x of the attachment at a point A substantially coincident with the axis of the needle 14, and, therefore, the presser-foot shank pivots about the axis of the needle and only the translatory motion of the presser-shank is reflected in the resulting straight line of stitches produced.

As stated previously in the specification, provision is made for shifting the slide-block 54 with respect to the attachment frame in a direction transversely of the slot 49 in the presser-foot shank 27. Since the shank embraces the slide-block 54, the shank, the presser-foot, and any work gripped thereby is likewise shifted with respect to the needle as illustrated in dotted lines in Fig. 8, thus making it possible to produce spaced groups of stitches. Since the pinion 39 and the actuating mechanism are not shifted with the presser-shank, the direction of components D and B of motion imparted to the presser-shank in the shifted position remain unchanged and the line perpendicular to the lateral motion and through the point of engagement of the pinion 39 and the rack 41 remains substantially coincident with the frame axis x—x. The direction of motion between the block 54 and slot 49, however, changes considerably as indicated by C'. The block 54, therefore, when it is shifted in a direction transversely of the slot 49 must also be shifted along the slot 49 so that in the new position the line d' through the block and perpendicular to the slot 49 will intersect the axis of the needle 14 and the frame axis x—x as before. The path on the frame extension 52 along which the block 54 must be shifted to maintain this relation of parts is an arc y—y having its center of curvature substantially at the point of engagement of the pinion 39 and the pattern rack 41. Since in the preferred embodiment the radius of curvature of the arc y—y is large, it will be appreciated that the path could be made straight and tangent to the arc without introducing appreciable error within the limits of the relatively small seam spacing adjustments required.

Referring again to Fig. 5 of the preferred embodiment, the lateral spacing between successive tacks may be effected by loosening the thumb nut 57 so that the slide-block 54, the threaded stud 56 and the thumb nut 57 are released from clamped relation with the frame base extension 52. The transverse slot 58 in the frame base extension 52 is formed to provide clearance for the stud 56 so that when the thumb nut 57 is loosened, the presser-foot shank 27 may be shifted laterally carrying with it the presser-foot 25 and the stud 56 which shifts along the slot 58. Consequently, the maximum lateral spacing between any two parallel lines of stitches thus formed is limited by the length of the lateral slot 58. Fig. 5 illustrates an arrangement of parts in which stud 56 is positioned at one extremity of the slot 58 in which position the line of stitches 73 will be produced. Also illustrated in Fig. 5 is a line of stitches 72 which corresponds to that which will be produced should the parts be shifted to a position in which the stud 56 is disposed at the opposite extremity of the slot 58. The illustrated

lines of stitches 72 and 73, therefore, represent the maximum lateral spacing which may be obtained with the illustrated construction. Since by means of the thumb nut 57 the parts may be clamped together with the stud 56 disposed at any selected point along the transverse slot 58, it is possible within limits to obtain any desired lateral spacing of the lines of stitches by simply loosening the thumb nut 59 after one line of stitches has been formed, shifting the presser-foot the desired lateral amount, and tightening the thumb nut. Further operation of the attachment will produce the second line of stitches at the desired spacing. It will be apparent that the scope of the instant invention is sufficiently broad to encompass not only the specific thumb nut clamp device of the preferred embodiment but also any equivalent clamp means for selectively securing the slide-block 54 to the frame 20 along the path *y—y*.

This arrangement of parallel tacks is particularly advantageous in the production of bound buttonholes by the usual method in which, as illustrated in Figs. 6 and 7, a patch of piping fabric 70 is first secured to a body fabric 71 by parallel lines of stitches 72 and 73. The fabrics are then slashed between the lines of stitches, as indicated by dot and dash lines in Fig. 6. The patch is pushed through the slot and folded so as to be visible through the resulting opening as illustrated in Fig. 7. With this method, the first step, that of securing the patch to the body fabric, is of primary importance as to the appearance, location, and the strength of the resulting buttonhole. Should the lines of stitches be wavy or of different lengths, or offset one from the other longitudinally, the defect will be readily apparent in the finished product. The instant invention as applied to a buttonhole attachment provides a means for producing parallel straight tacks which are flawlessly accurate, and by which consistently square and straight sided bound buttonholes, identical in size one with another may be produced.

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

1. In a work-jogging attachment for a sewing machine having a reciprocatory needle, an attachment frame having a longitudinal centerline which intersects the needle path of reciprocation, a work-engaging presser-foot and a presser-foot shank, mechanism carried by said frame and actuated by said sewing machine for imparting movements in a direction crosswise of said longitudinal centerline to a point on said presser-foot shank which is spaced from said presser-foot substantially along said longitudinal centerline, a bight controlling connection between said frame and said shank comprising opposed rectilinear guiding surfaces formed on said presser-shank substantially parallel to said attachment centerline, a block supported on said attachment frame and arranged to extend between said guiding surfaces, and a clamp effective to secure said block to said frame on a line which intersects the needle path and is perpendicular to said guiding surfaces.

2. In a work-jogging attachment for a sewing machine having a reciprocatory needle, an attachment frame, a foot adapted to engage the work adjacent the path of reciprocation of the needle, and a shank supporting said foot, means for slidingly pivoting said shank to said frame on a pivotal axis substantially coincident with said needle path and comprising an actuating mechanism carried by said frame and arranged in operative engagement with said shank at a point which is spaced from said needle path, said actuating mechanism adapted to impart movements in a closed path to said shank at said point of engagement, and a slidingly pivotal connection between said frame and said shank at a point spaced from said needle path, the point of engagement of said actuating mechanism with said presser-foot shank and the slidingly pivotal connection between said frame and said shank being disposed on mutually perpendicular lines which intersect at said needle path.

3. In a work-jogging attachment for a sewing machine having a reciprocatory needle, an attachment frame, a foot adapted to engage the work adjacent the path of reciprocation of the needle, and a shank supporting said foot, means for slidingly pivoting said shank relative to said frame about a pivotal axis substantially coincident with said needle path and comprising an actuating mechanism carried by said frame and arranged in operative engagement with said shank at a point which is spaced from said needle path, said actuating mechanism adapted to impart longitudinal movements to said shank substantially along a line between said point of engagement and said needle path and also lateral movements crosswise of said line, and a slidingly pivotal connection between said frame and said shank at a point spaced from said needle path, said connection comprising opposed guiding surfaces formed on said shank parallel to the direction of longitudinal movements thereof, a block carried by said frame and slidably arranged between said guiding surfaces to determine a point along said line of longitudinal movement about which the shank will oscillate in response to said lateral movements imparted by the actuating mechanism, and a clamp effective to secure said block to said frame on a line which intersects said needle path and is perpendicular to said line of longitudinal movement.

4. In a work-jogging attachment for a sewing machine having a reciprocatory needle, an attachment frame having a longitudinal centerline which intersects the needle path of reciprocation, a work-engaging presser-foot, a presser-foot shank, presser-foot shifting mechanism carried by said frame and operatively engaging said shank at a point which is spaced from the presser-foot, a bight-controlling connection between said frame and said presser-foot shank comprising a slide-block, opposed slide-block accommodating guide surfaces on said presser-foot shank, a manually operable clamp associated with said slide-block, said frame formed with a clamp-accommodating slot arranged parallel to the longitudinal centerline of said frame and terminating at one extremity at a point laterally opposite the path of needle reciprocation, said slot extremity formed with a transversely enlarged portion which provides for lateral adjustment of the position of said work-engaging presser-foot when the slide-block clamp is shifted along the transversely enlarged portion of said slot.

5. In a work-jogging attachment for a sewing machine having a reciprocatory needle, an attachment frame having a longitudinal centerline which intersects the needle path, a work-engaging presser-foot, a presser-foot shank, presser-foot shifting mechanism carried by said frame and operatively engaging said shank at a point which is spaced from the presser-foot, a bight-controlling connection between said frame and said

presser-foot shank comprising a slide-block, opposed slide-block accommodating guide surfaces on said presser-foot shank, a manually operable clamp associated with said slide-block, said frame formed with a clamp-accommodating slot arranged parallel to the longitudinal centerline of said frame and terminating at one extremity at a point laterally opposite the path of needle reciprocation, said slot extremity being formed with an arcuate transversely arranged portion of which the center of curvature corresponds substantially with the point of engagement of said presser-foot shifting mechanism with said shank, said arcuate slot providing for lateral adjustment of the position of said work-engaging presser-foot when the slide-block clamp is shifted along said arcuate slot.

6. In a work-jogging attachment for a sewing machine having a needle and an endwise reciprocating needle-bar, an attachment frame member, a work-engaging presser-foot, a presser-foot shank member, needle-bar actuated mechanism carried by said attachment frame member and operatively connected to impart movement in a closed path to a point on said presser-foot shank member remote from said presser-foot, one of said members being provided with substantially straight and parallel guide surfaces spaced from said point of operative connection between said actuating mechanism and said shank, and means slidingly pivoting said shank member relative to said frame member about a pivotal axis substantially coincident with the path of said needle, comprising a control element, said guide surfaces slidingly embracing said control element, manually releasable means interconnecting said control element with the other of said members in a selective one of a limited range of positions each on a line substantially perpendicular to the guide surfaces and intersecting the axis of said needle.

7. In a work-jogging attachment for a sewing machine having a needle and an endwise reciprocating needle-bar, an attachment frame, a work-engaging presser-foot, a presser-foot shank, a needle-bar actuated mechanism carried by said attachment frame and operatively connected to impart movement in a closed path to a point on said presser-foot shank remote from said presser-foot, and means slidingly pivoting said

presser-foot shank relative to said attachment frame about a pivotal axis substantially coincident with the path of said needle, comprising a control element, said presser-foot shank formed with a slot spaced from said point of operative connection between said actuating mechanism and said shank, said slot slidably embracing said control element, and manually releasable means interconnecting said control element with said attachment frame in a selective one of a limited range of positions each on a line substantially perpendicular to the slot and intersecting the axis of said needle.

8. In a work-jogging attachment for a sewing machine having a reciprocatory needle, an attachment frame, a work-engaging presser-foot, a presser-foot shank, actuating mechanism carried by said frame and operatively connected with said presser-foot shank at a point which is spaced from said presser-foot, a control connection between said attachment frame and said presser-foot shank defining with said actuating mechanism connection a pivotal axis for turning movements of said presser-foot shank which coincide substantially with the axis of said needle, said control connection comprising a slide-block, a substantially straight slot formed in said presser-foot shank slidingly embracing said slide-block substantially at the point of intersection along the slot of a line perpendicular to the slot and passing through the axis of the needle, an arcuate surface formed on said attachment frame having a center of curvature substantially coincident with the point of connection of said actuating mechanism with said presser-foot shank, a frame engaging element carried by said slide-block, and manually releasable clamp means associated with said frame engaging element for securing said slide-block in any selected one of a plurality of positions along said arcuate frame surface.

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