B. F. MAYO.

WORK CLAMP.

APPLICATION FILED JUNE 9, 1910.

1,174,750.

Patented Mar. 7, 1916.

5 SHEETS—SHEET 1.

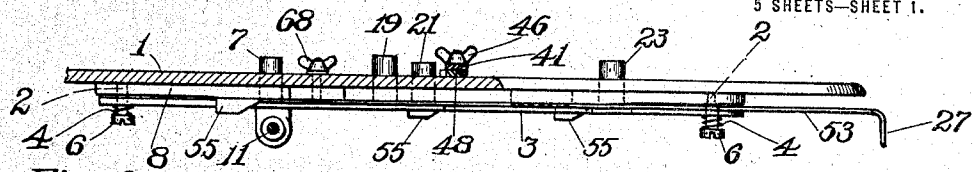


Fig. 6.

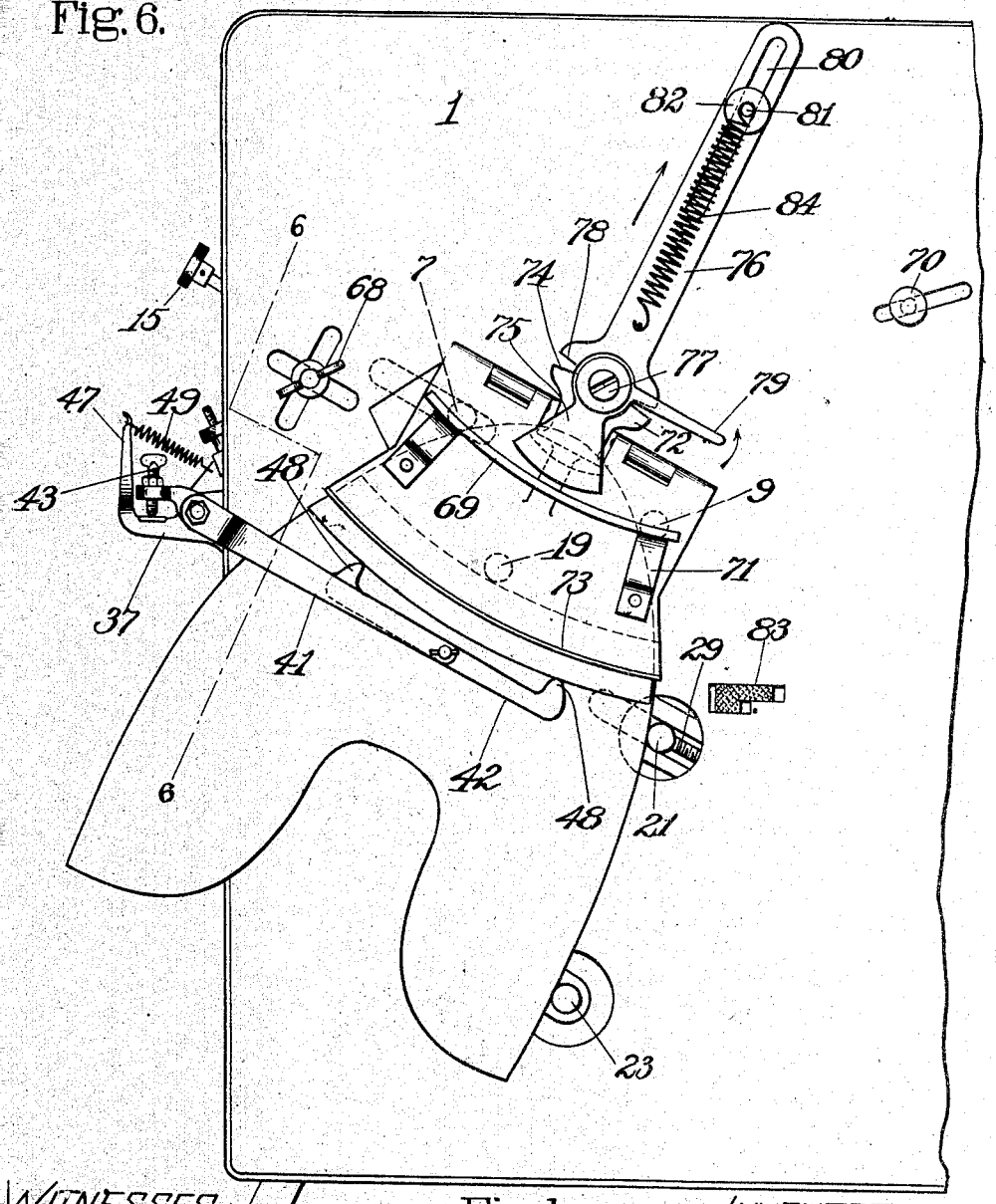


Fig. 1

WITNESSES:

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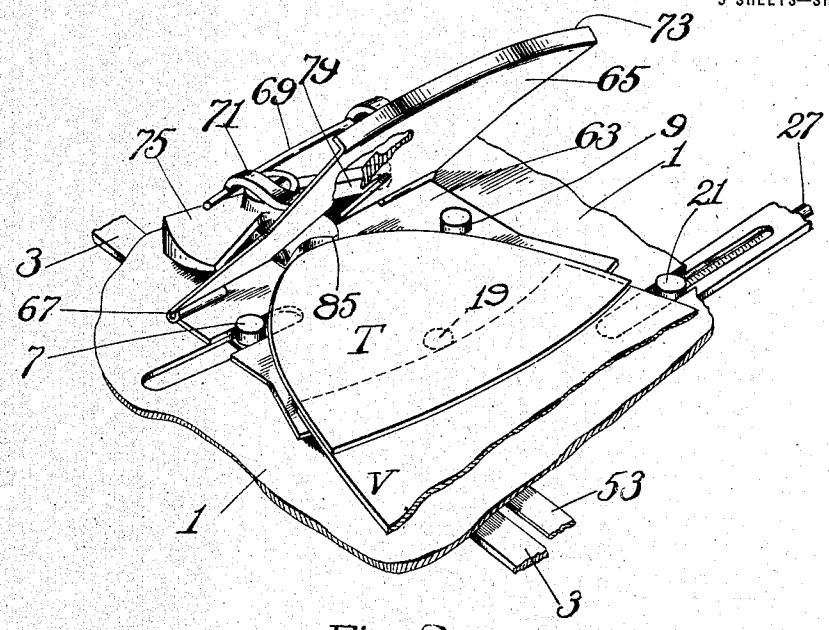


Fig. 2.

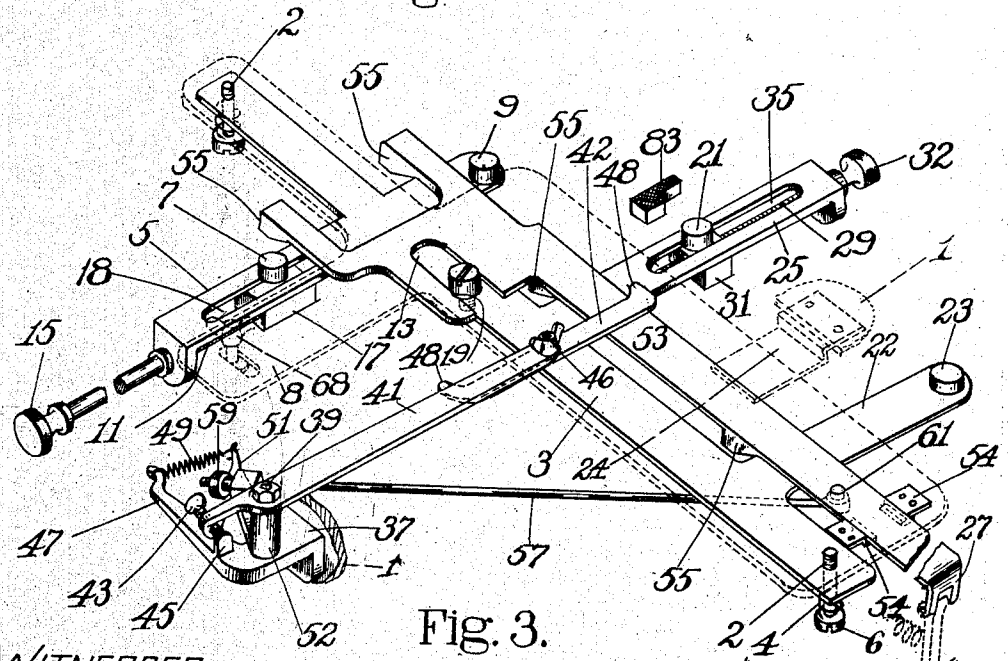


Fig. 3.

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5 SHEETS—SHEET 3.

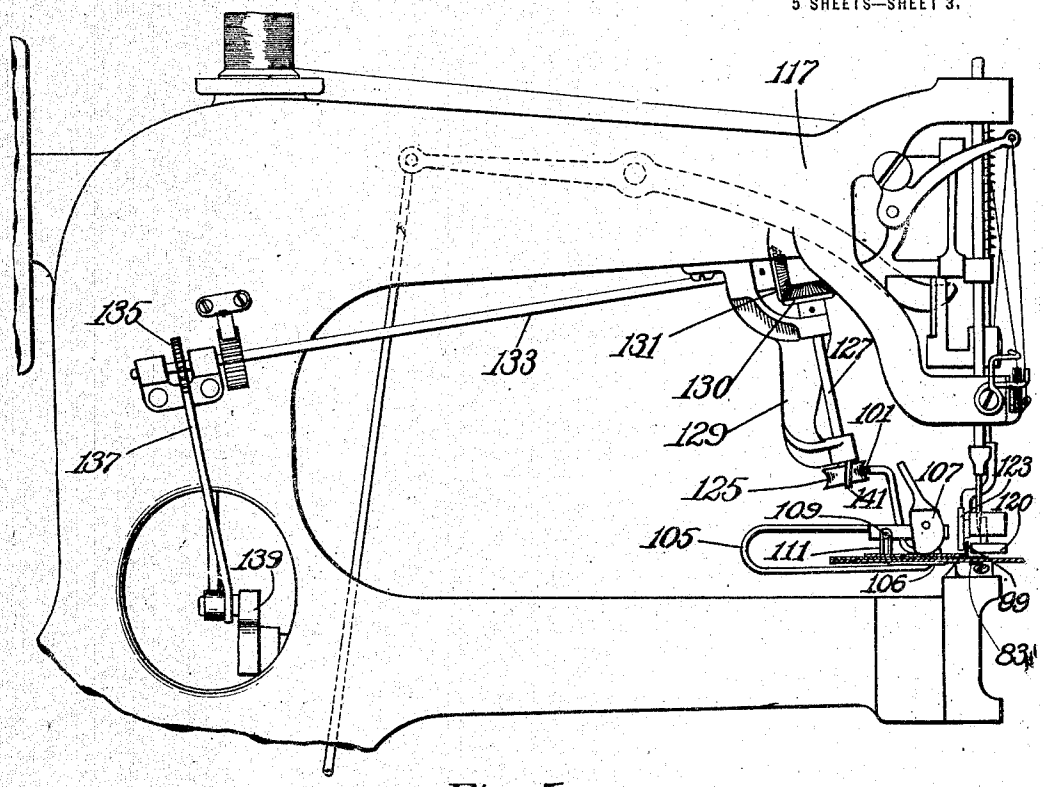


Fig. 5

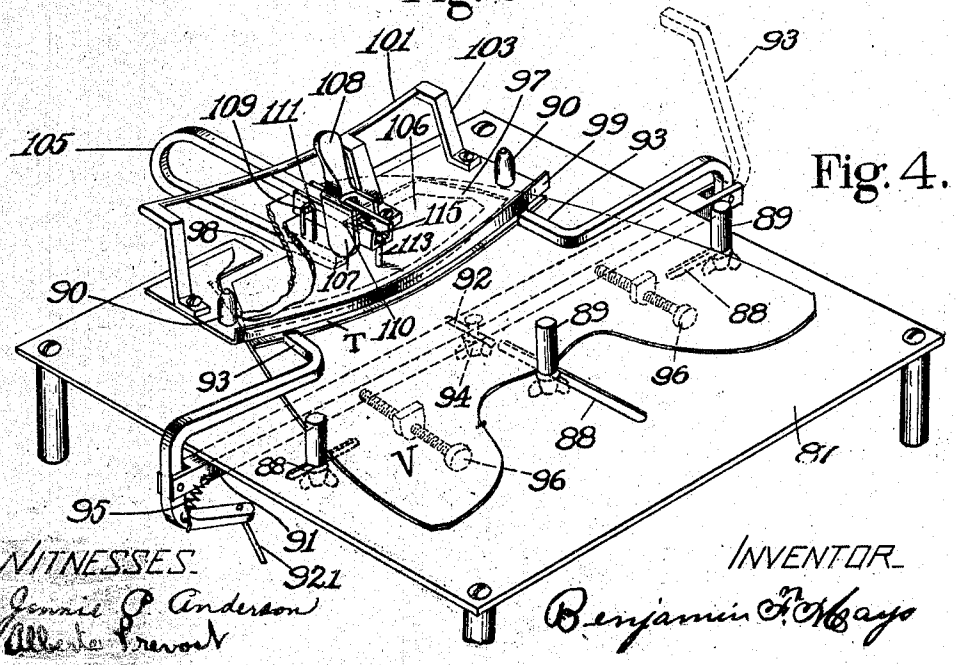


Fig. 4.

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5 SHEETS—SHEET 4.

Fig. 7.

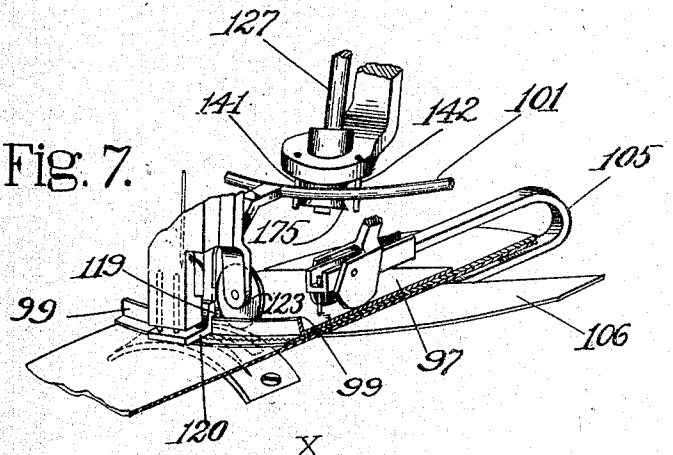
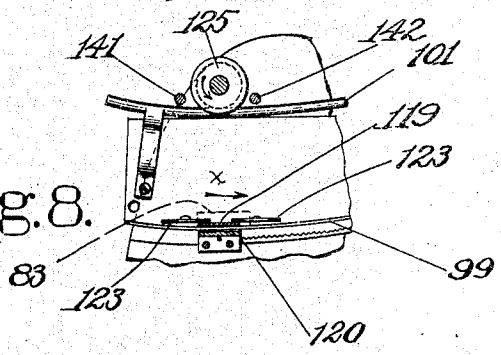


Fig. 8.



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5 SHEETS—SHEET 5.

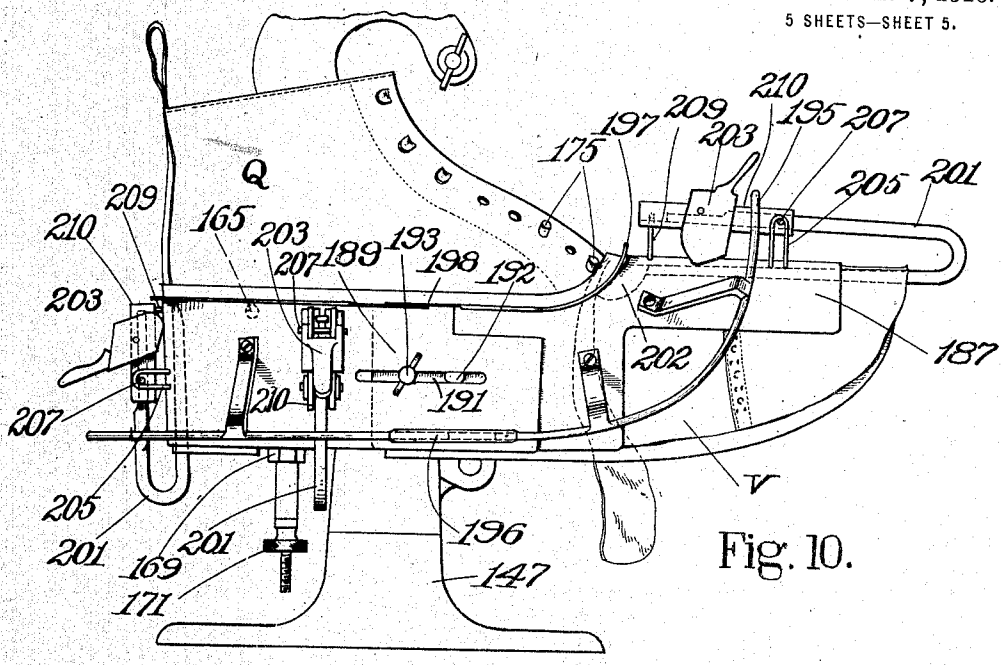


Fig. 10.

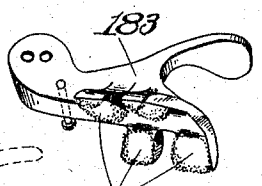


Fig. 13.

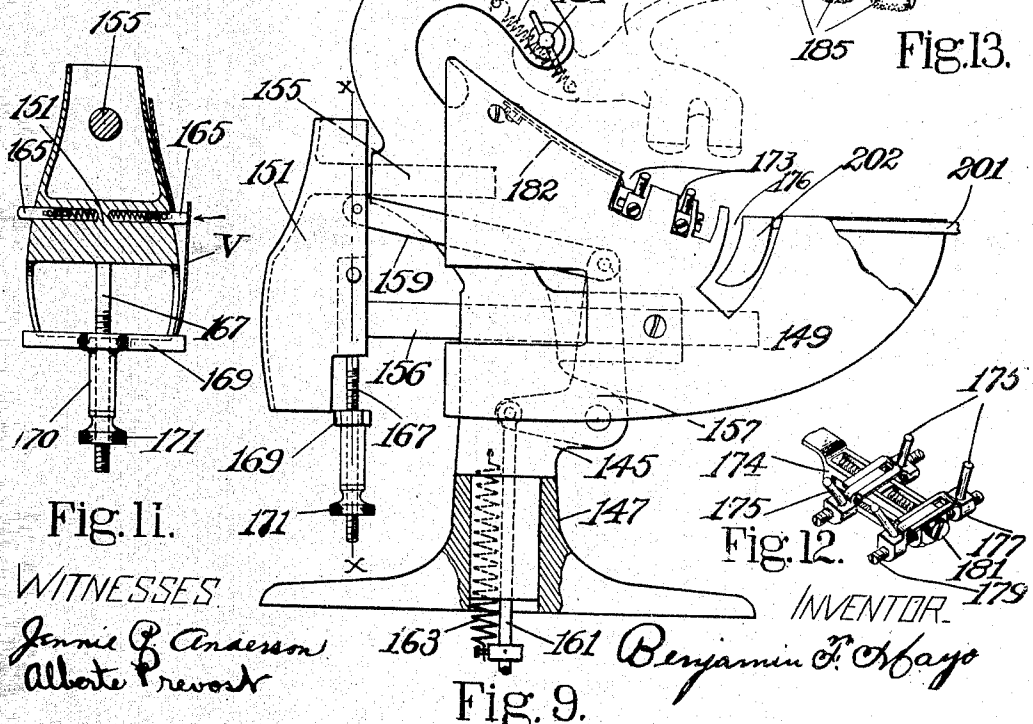


Fig. 11.

Fig. 12.

Fig. 9.

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UNITED STATES PATENT OFFICE.

BENJAMIN F. MAYO, OF SALEM, MASSACHUSETTS.

WORK-CLAMP.

1,174,750. Specification of Letters Patent. Patented Mar. 7, 1916.

Application filed June 9, 1910. Serial No. 565,962.

To all whom it may concern:

Be it known that I, BENJAMIN F. MAYO, a citizen of the United States, residing at Salem, in the county of Essex and State of Massachusetts, have invented certain Improvements in Work-Clamps, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to work positioning and holding devices, and especially to devices of this character which are designed to facilitate the arrangement of two or more pieces of material in appropriate position for being secured together by a line of stitches, or other fastenings, and for reliably holding them in such position during the securing operation.

Where it is proposed to fasten together two or more pieces of material upon any suitable form of machine, as for instance a sewing machine, it is of importance, first, that the several parts which are to be connected shall be properly arranged relatively to each other; and second, that when the proper positions of the parts have been determined that they shall be maintained with certainty therein until after the securing operation has been completed, in order to insure accuracy in the location of the seams.

An important object of the invention is to insure the proper arrangement of the parts of a shoe upper in position for being subsequently connected by stitches, or other permanent fastenings, and after so arranging such parts to hold them firmly in assembled relation during the operation of the sewing, or other fastener-inserting machine, by which they are connected. In the several embodiments of the invention herein selected for illustration the mechanism for positioning and holding the work, and for feeding and guiding it relatively to the fastener-inserting mechanism is constructed especially for operation in connection with the parts of uppers for boots and shoes, and it is with reference to such articles that many features of the invention will doubtless be found to possess the greatest advantages; some features of the invention, however, are obviously of more general utility and the benefits following from their use for assembling and holding together the parts of other articles than boots and shoes will be apparent. For this reason certain of the claims hereinafter made do not limit the features and combinations to which they are directed to use in connection with the parts of boots and shoes.

Having in view this and other objects, an important feature of the present invention comprises means constructed and arranged for positioning, relatively, two or more parts of an upper to be fastened together, and for temporarily holding such parts as thus positioned during the fastening operation. Preferably, the positioning means referred to are adjustable in order to accommodate the parts of shoe uppers of varying sizes and styles, and, furthermore, in order to properly determine the relative positions that said parts shall occupy to each other before the temporary holding means clamps or otherwise holds them together.

Under one form of the invention, where the positioning means and the holding means are adapted for use in connection with vamps and toe-caps, such positioning means may consist of adjustable gage devices some of which are arranged to engage the edges of a vamp and others to engage an edge of a toe-cap, together with other, movably supported, gage devices having members to coöperate with another edge of the toe-cap; and the holding means may be in the form of a clamp having members to embrace the toe-cap and vamp, all of said parts being adapted for support upon a suitable work table and the adjustable gage devices referred to being arranged for movements to carry them out of the way of the clamp in order to avoid interference therewith as the clamp is moved to present the work to the securing mechanism.

Another feature which may be employed under one form of the invention consists in providing means for automatically carrying the clamped work away from the stitching mechanism of the machine and for unclamping the work at the completion of the sewing operation, in order that the operator may remove the finished work from the clamp and insert other pieces of material therein. The means selected for illustration for the performance of these functions comprises a yielding element, as a spring, which

is connected with the work clamp and its support in such manner as to be under tension during the sewing operation, and an abutment located in the path of a cam lever for operating the clamp. The construction and arrangement of these parts are such that when the guiding device carried by the clamp member, before referred to, escapes from a slot through which it travels in the presser-foot, the said yielding element pulls the clamped work away from the sewing mechanism, and the cam lever comes in contact with the abutment which causes the cam to be operated so as to release the work.

Under another form of the invention, where the positioning means and holding means are for use in connection with the vamps and quarters of shoes, an adjustable form may be employed whose construction adapts it to support these parts, and in connection therewith, I preferably use a carrier having a series of adjustable gage pins to project through the eyeleted openings of the quarters, the lowermost of the pins serving to position the rear edge of the front of the vamp, while the lower edges of the sides of the vamp are supported by an adjustable member which serves to position the upper edges of the vamp relatively to the lower edges of the quarters to which they are to be connected. Other pins projecting from the sides of the form serve to sustain the lower edges of the quarters. In the operation of this embodiment of the invention the parts of the upper are first positioned by the devices referred to, and are then held in such position, preparatory to being sewed together, by a removable clamp which is constructed to be taken from the form and applied to a sewing, or other suitable machine, where the assembled parts of the upper will be joined by a permanent line of fastenings.

Another important feature of the invention lies in the provision of means for accurately feeding and guiding the clamped parts of the work relatively to the fastening mechanism in order that the fastenings shall be placed in a predetermined position with relation to the edges of the work. This feature of the invention preferably comprises two guiding devices to be carried by one of the clamping members, one of which may act solely as a guide, and the other as a combined guide and feeding member. Where a sewing machine is employed to secure the parts of the work to each other, one of the guiding devices referred to may be arranged to enter and coöperate with a slot or guideway between two adjacent parts of the presser-foot, and the other guiding device may be operatively arranged in connection with a suitable feeding mechanism, as a wheel which is preferably to be driven from the power mechanism of the sewing machine. The peripheral speed of this wheel is sufficient to impart to the guiding device feeding movements which will be faster than those imparted to the work by the ordinary feed-foot of the machine, whereby the clamped work is fed with a tendency to rotate about a center located approximately, at the point where the needle enters the work. A directing and checking device, which may be a pin or equivalent form of abutment, is located to the rear of the feeding wheel and near the guiding device upon which the wheel acts, and said parts are so constructed and arranged that when the speed imparted to the clamp by the feeding wheel is sufficiently greater than that imparted to the work by the feed-foot of the machine to cause the work to move away from its correct line of travel, the said guiding device will press against the directing pin and its engaging pressure with the feeding wheel will be temporarily relieved. This serves to automatically control the feeding of the clamped work relatively to the stitch-forming mechanism, and causes the work to always travel in a direction which will be determined by the shape of the guiding device located in coöperative relation with the presser-foot.

Other features of the invention, including important details of construction and combinations of parts, will be hereinafter more particularly described and claimed.

In the drawings, Figure 1 illustrates, in plan, a portion of a sewing machine work table having applied thereto a form of positioning and holding mechanism, contemplated by the present invention, together with a vamp and toe-cap, the view showing only such parts of the mechanism as appear above the table. Fig. 2 is a detail view showing, in perspective, the gage pins and clamp, with part of a vamp and a toe-cap arranged in position to be clamped together. Fig. 3 is a perspective view of positioning devices for a vamp and a toe-cap and the operating mechanism therefor, as said parts appear when removed from the work-table. Fig. 4 shows, in perspective, a modified form of positioning and clamping mechanism for vamps and toe-caps. Fig. 5 shows, in side elevation, certain parts of a "cylinder" vamp sewing machine provided with feeding and guiding devices to coöperate with some of the forms of work-clamping mechanism contemplated by the present invention, together with a clamping mechanism and the work held thereby in position for sewing. Fig. 6 is a sectional view on the line 6—6, Fig. 1. Fig. 7 is a detail view showing in perspective certain parts illustrated in Fig. 5. Fig. 8 is a sectional plan view of certain parts illustrated in Fig. 7. Fig. 9 is a view in side elevation, partly

sectional, of a modified construction, showing a form for positioning a whole or cylindrical vamp and quarters. Fig. 10 is a view in side elevation of the form shown in Fig. 9, with the parts of a shoe upper located thereon, and showing also the clamping devices as they appear when holding a vamp and quarters in position for sewing. Fig. 11 is a view in cross-section on the line x—x, Fig. 9. Fig. 12 is a detail view, showing in perspective the gage pins for locating the rear edge of the front part of a vamp. Fig. 13 is a detail view, showing a clamp for holding the uppers of button and other shoes.

Referring to Figs. 1, 2 and 3, the numeral 1 indicates a suitable support, as the work-plate of a sewing machine constructed for securing together the parts of uppers for boots and shoes, and 83 the feed-dog of such machine, which projects through the usual slot therefor in the work-plate.

A plate, 8, shown in Fig. 6, and by dotted lines in Fig. 3, is located below the work-plate and supported therefrom by any suitable means permitting lateral adjustment as, for instance, a bracket, 24, and a bolt having threaded thereon a winged nut, 68, the bolt passing through angularly arranged slots, formed in the work-plate 1, and the plate 8, respectively, (see Fig. 1). A frame, 3, below the plate 8, is secured thereto by means permitting the frame to yield downwardly relatively to the plate, as by the screws, 2, having heads 6, and springs, 4, which are arranged between said heads and the frame. The frame is provided with a transverse arm, 5, which near one end carries a fixed pin, 9, and near its opposite end is slotted, at 18, to receive an adjustable pin, 7. The pin 7, is supported upon a block 17, which may be internally threaded to engage an externally threaded rod, 11, turning freely in the arm 5, and provided at its outer extremity with a peripherally roughened disk, 15, to constitute a handle for turning said rod to move the block 17, and thereby adjust the pin 7, along the slot 18. The frame 3 also carries a fixed pin, 19, located intermediate the pins, 7 and 9, a fixed pin, 23, located upon an arm 22, and an adjustable pin, 21, which is movable in a slot 35, formed in an arm 25. A threaded rod 29, turning freely in the arm 25, engages an internal thread in a block, 31, supporting the pin 21, and is provided at its outer end with an externally roughened disk 32, to constitute a handle, whereby the rod may be turned to effect adjustments of the pin 21 in the slot 35. The pins, 7, 9, 19, 21 and 23, which are for determining the positions of a vamp and toe-cap, as will be hereinafter described, normally project slightly above the work-plate 1, through openings formed therein, the openings for the pins 7 and 21 being in the form of slots which register with the slots 18 and 35, respectively, whereby to permit the necessary adjustments of these pins to position relatively vamps and toe-caps and to accommodate vamps and toe-caps of different sizes. In positioning short vamps the pin 19 will be employed to coöperate with the front edge of the vamp as indicated in Fig. 2, but in case a full length vamp is being positioned the pin 19 may be removed from the frame 3, and to this end the pin may have a threaded shank to detachably engage a threaded aperture in the frame, as indicated by dotted lines in Fig. 3.

Arranged above the frame 3, and lying between the same and the plate 8, is a bar 53, hereinafter referred to as the depressor bar. The depressor bar may be forked at its rear end, and is preferably provided on its lower surface with a plurality of inclined, or cam-shaped, projections 55, to engage the several arms 5, 22 and 25, of the frame 3, and with a slot, 13, to accommodate the pin 19, and at its forward end with a handle 27, or with a treadle-operating connection comprising a bell-crank lever and rod, as shown by dotted lines. A pair of supporting brackets, 54, having off-set flanges to receive and form guideways for the depressor bar, may be secured beneath the work-plate 1, in order that said bar may be capable of free sliding movements relatively to the frame 3, as will be described hereinafter.

Below the work-plate 1, and suitably secured to a depending ear or flange, or other fixed part thereon, is a bracket, 37, from which projects a stud, 39, to form a pivotal support for an arm, 41, having adjustably secured to its outer end through a screw and winged nut, 46, a gage bar, 42, which at its ends is provided with the projections, 48, 48, adapted for engagement with the rear edge of a toe-cap. The adjustable connection of the gage bar 42 with its supporting arm permits the projections 48 to be properly positioned to accord with the different angles presented by the rear edges of the toe-caps for rights and lefts, in shoes made on crooked lasts. The opposite end of the arm 41, is extended beyond the stud 39, and provided with a threaded opening to receive a stop-screw 43, which is arranged to coöperate with a lug 45, projecting from the bracket 37, and to thereby adjustably limit the movements of the arm on the stud 39. An arm 51, projecting from a sleeve 52, or other rigid connection with the arm 41, is provided with a perforated boss to receive a rod, 57, having at its inner end a thread to which is applied an adjustable thumb-nut, 59, to bear upon the boss, the rod 57 being pivotally connected at its outer end to the depressor bar by a stud or pin, 61.

The extremity of the arm 51 is connected,

preferably through a spring, 49, or other yielding element, with an extension 47, of the bracket 37, the spring acting normally to hold the end of the stop-screw 43, against the lug 45.

The numeral 83 indicates the feed dog of the sewing machine, which is illustrated in Figs. 1 and 3 with a view to showing its location relatively to the devices for determining the position of the vamp and the toe-cap prior to the sewing operation. By reference to these views, it will also be seen that of the parts so far described, the plate 8, the frame 3 carrying the gage-pins and their adjusting devices, and the depressor bar 53, are located beneath the work-plate, while the swinging arm 41 and gage bar 42 are located above the work-plate.

The numeral 63 indicates the lower, and 65 the upper member of a clamp, said members being, in the embodiment of the invention shown in Figs. 1 and 2 of the drawings, connected at their rear edges by a hinge 67. The lower clamp member is designed to rest upon the work-plate, or other support, and is provided with openings to permit the passage of the pins 7, 9 and 19, the opening for the pin 7, being in the form of a slot, as shown, in order to permit the necessary adjustments of this pin. Said member may also, as shown in Fig. 2, be provided with an end gage 85, to coöperate with the pins 7, 9, in determining the position of a toe-cap. The upper clamping member, in the form of the invention being described, preferably has secured thereon suitable brackets, 71, to support a curved guide 69, shown in the form of a bar, and at a point forward of this bar the member carries a second guide, 73, herein shown as being formed by turning up a flange upon the curved rear edge of the member. These guides are shown as curved on arcs of circles of different radii, but which are generated from a common center located preferably at a point on the work-plate a suitable distance in front of the clamp, and about which the clamp carrying the work swings when the work is being fed to the stitch-forming mechanism. In Fig. 1 the lower member of the clamp is shown as having a forwardly extending boss, 72, formed with stop-shoulders, 74, to be connected for a limited amount of pivotal movement with an arm 76, by a screw-stud, 77. The arm 76, is formed with shoulders, 78, to coöperate with the shoulders 74, and with a slot, 80, to receive a stud, 81, projecting rigidly from the work-plate and carrying a washer 82, for confining the arm 76 thereto. A spring, 84, which is attached at one end to the forward part of the arm, and at its other end to the stud 81, acts with a normal tendency to draw the arm and clamp in the direction of the arrow, Fig. 1, for purposes to be hereinafter fully explained. A cam 75, having a handle 79 projecting rigidly at a suitable angle thereto, is pivotally sustained upon the stud 77. The construction of this cam is such that when it is turned in a direction to engage the upper clamp member, as shown in Fig. 1, said member will be moved forcibly into engagement with the lower member, or with a vamp and toe-cap located between the members in order to hold such parts in position to be stitched together; and when the cam is turned in the opposite direction, as shown in Fig. 2, the upper clamp member will be free to move away from the lower clamp member, and the work may be removed therefrom. A stud 70, which is mounted for a suitable amount of adjustment in a slot provided in the work-plate, as shown, is designed to serve as an abutment for the handle 79 of the cam to cause the cam to turn for automatically releasing the work from the clamp at the completion of the sewing operation.

Fig. 2 shows the upper member of the clamp in raised position above the lower member to permit a vamp and a toe-cap to be inserted therebetween. In positioning said parts, with the construction described, the vamp V is first located properly by means of the pins 19, 21 and 23, and the toe-cap T is then placed on the vamp and located between the pins 7, 9, and the gage projections 48, the carrying arm 41 swinging forward under the influence of the spring 49 upon release of the handle 27, or the treadle connection with the bar 53, and thereby causing said projections to engage the rear edge of the toe-cap. The handle 79 may then be turned in a direction to cause the cam to force the upper clamping member toward the lower member and clamp the vamp and toe-cap firmly together in correct position for the sewing operation. The depressor bar 53, is then moved in a rearward direction which causes the cams 55 to depress the frame 3, and the positioning pins are carried thereby below the surface of the work-plate 1, which also swings the arm 41 and gage bar 42 to the rear, so that said parts are out of the way and cannot interfere with the operation of feeding the clamped work to the stitching mechanism of the machine. The downward movement imparted to the frame 3 compresses to a slight degree the springs 4, which react and restore the frame to its former position when the depressor bar is moved reversely preparatory to the insertion of another vamp and toe-cap between the clamping members.

Referring to Fig. 4, which shows a modified construction of the positioning and holding devices for a vamp and toe-cap where such devices are carried by a support independent of the sewing machine, a work table, 87, is formed with slots, 88,

to receive the shanks of the pins 89, upon which may be threaded winged clamping-nuts, as shown in dotted lines, for securing such pins adjustably in position upon the table. The two outer pins 89 are arranged to engage the side edges of a vamp, while the central pin engages the throat and thereby determines its position, the adjustments afforded by the slots enabling the pins to be positioned for vamps of different sizes, as well as for enabling a vamp to be properly positioned relatively to a toe-cap. The pins 90, which also project above the work-table, are arranged for coöperation with the side edges of a toe-cap and a vamp, and if so desired these pins might be adjusted in like manner and for the same purposes as the pins 89. A supporting bar 91 is located below the work-table and sustained therefrom, preferably by means permitting adjustment, such as a bolt, 94, movable in a slot 92 in the table, and having threaded thereto a winged clamping nut, as shown by dotted lines. The ends of the bar are illustrated as forked to receive the movable gage arms 93, which are pivoted to the bar, and springs 95, or other yielding means, connect the gage arms and bar and serve to normally hold the gage arms elevated above the table, as indicated by dotted lines, in order to permit the introduction and removal of the work. The gage arms are shown as being first bent so as to extend toward each other and transversely of the vamp which is positioned between the pins 89, and then bent at their ends in a forward direction to coöperate with the rear edge of the toe-cap which is being positioned relatively to the vamp. A rod 921, is provided to connect the lower ends of the gage arms with a treadle or similar operating device, whereby the gage arms can be moved from inoperative to operative position, in a manner which will be obvious without further description. The bolt 94 affords a pivotal connection for the bar 91 with the work-table whereby said bar may swing laterally in either direction to position the gages 93 in accordance with the different angles to the median line presented by the rear edge of the toe caps for right and left vamps, respectively, in shoes made on crooked lasts. Set screws, 96, which are in threaded engagement with posts projecting from the under surface of the work table, serve to position the bar at the proper inclination and to hold the bar and gages in any pre-determined relation to the rear edge of a toe-cap, according to its "swing". In the case of a vamp and toe-cap for a shoe which will be made on a straight last, where the rear edge of the toe-cap lies substantially at right angles to the median line, the adjustment of the bar 91 on its pivot by the set screws will be such as locate and hold the bar rigidly in position to accord with the rear edge of such toe-cap. The clamp, under this embodiment of the invention, comprises a curved spring bar, 105, whose lower limb carries a curved plate, 106, preferably formed of resilient material, as sheet steel, and arranged with its concave side uppermost, as shown in Fig. 7, and a plate 97, to coöperate therewith. The plate 97 supports two suitably spaced staples, 111, only one of which is shown, and a pin 113. A grooved head, 115, is located between the staples and provided with projecting pins, 109, which are guided between the limbs of the staples, and with a longitudinal slot to receive the pin 113, as shown. By this construction the slotted head 115, is loosely confined to the plate, 97, in a manner to permit it to move vertically in relation thereto. A cam, 107, having an operating handle, 108, is pivotally connected with the head 115, by a pin, 110, which passes transversely through the central groove in the head and serves the two-fold purpose of connecting the cam to the head and forming an abutment or stop for the end of the upper limb of the spring bar, 105, when the same is inserted in the groove of the head, the end of the bar being formed with a shoulder to coöperate with said pivot, as shown by dotted lines in Fig. 4. The work-table 87 is preferably formed with a slot or opening 98 to permit the plate 106 to pass therethrough in removing the clamped work from the table. The rear edge of the plate 97, is preferably bent upwardly to form a guiding flange, 99, and brackets, 103, are rigidly secured to the plate and support a curved guide bar, 101, which is located a suitable distance in front of the flange 99. The plate is also provided with openings to receive the pins 90 in order that it may be placed thereover after the proper relative positions of the vamp and toe-cap have been determined by the gage pins 89 and 90, and the gage arms 93. In the operation of the construction now being described, the gages 93 being in raised position, a vamp is laid on the work-table and located properly thereon by the pins 89 and 90, and the gages 93 are lowered to the position shown in Fig. 4. A toe-cap is then placed over the vamp, its side edges are located between the pins 90, and its rear edge against the ends of the gages 93. The spring bar is then placed in position with the plate 106 beneath the vamp and the upper limb of the bar in the groove of the head 115 with its shoulder abutting against the pivot pin 110. The handle of the cam 107 may now be turned which clamps the vamp and toe-cap between the plates 97 and 106, the latter yielding and becoming flattened under the pressure, and the parts thus being held by a yielding pressure in their

proper relations to be subsequently united by the stitching mechanism of the sewing machine.

Referring to Figs. 5, 7 and 8, which represent certain parts of a cylinder vamp sewing machine constructed for uniting vamps and toe-caps, the head 117, is provided with the usual stitching mechanism including a reciprocating needle bar, a thread supply and tension mechanism, a presser-foot, and a feed-dog, and with certain additional devices especially designed for guiding and feeding the clamping devices holding a vamp and toe-cap which have been previously positioned for sewing, as above described. The presser-foot comprises two parts, 119, 120, which are so spaced apart as to provide a slot or guideway, as shown, for receiving and guiding the flange on the upper clamp member, and two anti-friction wheels, 123, are preferably rotatably supported from brackets rigid with the head, and arranged on opposite sides of said slot in position to bear upon said clamp member and to assist in guiding it. To the rear of this presser-foot the head of the machine supports a bracket 129, provided with bearings for a shaft 127, which at one end has fast thereon a grooved feed roll, 125, and at its opposite end carries a bevel gear 130, meshing with a bevel gear 131, fast on a shaft 133, mounted in bearings sustained in suitable manner from said head. Two pins, 141 and 142, are supported from the bracket 129 and extend adjacent to the periphery of the roll 125, as best shown in Figs. 7 and 8. The shaft 133 is designed to be rotated through any suitable devices operatively connected with the power shaft of the machine, and in the present instance I have shown for this purpose a ratchet 135, fast on the shaft 133, to which a step-by-step movement is imparted by a pawl 137, which may be reciprocated by a crank arm 139, secured to the main shaft, or other rotating part. This mechanism is arranged to rotate the feed roll 125 at a sufficient speed to impart feeding movements to the work which will be faster than the feeding movements imparted thereto by the feed-dog 83.

In the operation of sewing together a vamp and toe-cap which have been previously assembled and clamped in proper relation by the devices shown in Figs. 1, 2 and 3, it is to be observed that in Fig. 1 the parts occupy a position slightly removed laterally from the stitching mechanism. When the depressor bar is moved to the rear to withdraw the pins carried by the frame 3 from the path of the work, and to swing the arm 41 and gage bar 42, back and out of the way, the operator pulls the clamp toward him, slightly stretching the spring 84, and introduces the end of the flange 73, in the slot between the members 119 and 120 of the presser-foot, as shown in Fig. 8, and places the guide bar 69 in engagement with the feed roll 125. The work is then fed through the machine by the combined action of the feed-dog 83, and the roll 125, and is guided by the flange 73 and the bar 69, the clamp being caused to swing about the stud 81 as a center, and the seam produced by the stitching mechanism following a curve which is parallel with the rear edge of the toe-cap. The action of the feed roll on the bar 73 tends to keep the bar in sliding contact with the pin 141, owing to the fact that the roll feeds faster than the feed-foot and thereby tends to rotate the clamped work in the direction of the arrow X, Fig. 8, about a center located, approximately, at the point where the needle enters the work, such action being permitted by the pivotal connection, 77, between the clamp and the arm 76, Fig. 1. If the feeding movement imparted by the roll 125 increases beyond that desired to properly feed the work, the bar 101 will be forced against the pin 141 with sufficient pressure to cause the bar to be lifted slightly from the groove in the feed roll, thereby permitting the roll to slip on the bar, and retarding the movement of the latter until the action of the feed dog again causes a reëngagement of these parts and the normal feeding operation thereof is resumed. The clamp and work are thus caused to move in a predetermined line, and any tendency of these parts to depart from this line will be automatically corrected in the manner described. When the end of the seam is reached, the flange 73 will escape from the slot in the presser-foot, and the spring 84 will automatically move the clamped work out of the way of the stitching mechanism, in such movement causing the handle 79 to come in contact with the stud 70, to thereby unlock the clamp and release the work. The clamp may then be moved to the position shown in Fig. 1, preparatory to assembling and clamping together another vamp and toe-cap.

The work clamping devices shown in Fig. 4 are to be guided and fed through the sewing machine in the same manner as in form just described, the flange 99 being first introduced in the slot between the parts of the presser-foot and the bar 101 located in the groove of the feed roll, as clearly shown in Figs. 5, 7 and 8, where these parts appear in the positions which they occupy during the formation of a seam to unite a vamp and toe-cap.

Referring to Figs. 9 to 13, inclusive, which illustrate an embodiment of the invention designed for positioning and holding together a cylinder vamp and quarters, the base or pedestal 147, supports a form

comprising a fore-part, 149, and a heel part, 151, said parts being preferably rotatably supported on the base. The heel part is shown as being provided with guide rods 155, 156, to slidingly engage suitable ways in the fore-part and thereby permit longitudinal adjustments of the heel part, and a bell-crank lever, 157, having one end connected by a link, 159, with the heel part and its other arm connected by a rod, 161, or the like, with a treadle, serve as a means for moving the heel part rearwardly. The heel part is moved forwardly by any suitable means, as, for instance, a spring 163, which may be connected at one end to the rod 161, and at its other end to a fixed point on the bore part, as shown. At suitable points in the sides of the heel part, openings are formed to slidably receive the pins 165, which are normally projected beyond the surface thereof by yielding means, as springs. An externally threaded rod, 167, is rigidly connected with the heel part and projects downwardly therefrom, and a bar 169 having a sleeved-extension, 170, to fit said rod, is arranged below the heel part and adjustably sustained relatively thereto by a thumb-nut 171, which is in threaded engagement with the rod. The fore part is formed with openings, 173, through which project positioning pins, 175, carried by transversely slidable blocks, 177, which are arranged for adjustment in a frame, 174, by the reversely threaded screws, 179. This frame is shown as being provided with an extension, 182, which may be attached to the fore part by a screw, as shown by dotted lines in Fig. 9. The fore part may also be formed or provided with an arm, 153, to whose extremity is connected by a clamping bolt, 184, a clamp 183, carrying spaced arms, 185, covered with some soft material and adapted for engagement with the lower front portion of the quarters of a button boot or shoe to hold the same in position on the form. The clamping members 187 and 189 are arranged to be placed over the parts of the form, and the shape of these members is such that they will snugly fit over a vamp placed on the form, as shown in Fig. 10. In order that the clamp members may be capable of longitudinal adjustment to accommodate vamps of different sizes, their ends are arranged to overlap at a point located preferably about midway of the form, and one of the members is provided with slots, 191, and the other member with clamping bolts 193, to enter the slots and with winged nuts engaging the bolts, whereby the members may be held in their different positions of adjustment. A stud 192, extending from a point near each end portion of the member carrying the clamping bolts, and respectively entering the slots 191, serve, in connection with the bolts 193, to maintain the two members of the clamp in parallelism during such adjustments. The clamp members are preferably provided with brackets, or other suitable supports for a guide bar 195, which is divided at a suitable point and has its ends connected by a telescopic or similar sliding joint, 196, and a guiding flange, 197, which is similarly divided and has its ends arranged to overlap, as shown at 198, is also supported from the members, the flange being preferably located, approximately, at the uppermost edge of the members, as will be seen in Fig. 10. The described constructions of the bar 195 and flange 197 permit longitudinal relative movements of these parts as the clamp members upon which they are carried are being adjusted, without disturbing their relation to said members, and in a manner that will be readily understood. A plurality of spring bars 201, having substantially the form of the spring bars 105 heretofore described, are arranged to cooperate with the clamp members 187, and 189, in holding the vamp and quarters in position to be sewed together after they have been assembled on the form. These bars are each constructed at one end for detachable engagement with a slotted head, 210, which is held and guided in proper relation to the clamp member by a pin, 209, extending from said member and entering a slot or opening in the head, and by other pins, 207, projecting laterally from opposite sides of the head, and movable between the arms of staple-shaped guides 205, supported by the clamp member. A cam 203, is connected pivotally with the head and constructed and arranged for engagement with the clamp member to force the lower limb of the spring bar against certain parts of the vamp and quarters in order to clamp them firmly between the limb of the bar and the clamp member. Preferably, a spring bar carrying a cam as described is located at the center of the fore part, at the center of the heel part, and upon opposite sides of the vamp between the ends thereof, in order to clamp the vamp and quarters to each other at suitably spaced points, as shown in Fig. 10. The spring bar which is located at the fore part is shown as having its lower limb provided with a bearing plate 202, which is designed to engage the lower extremities of the extreme front edges of the quarters, and to coöperate with the rear edge of the clamp member 187 at this point in clamping the vamp and quarters tightly together. To accommodate this plate, the form is constructed with the opening 176, as shown in Fig. 9.

In the operation of assembling and clamping together a vamp and quarters with the devices comprehended in this embodiment of the invention, the parts of a

shoe quarter are placed on the form with their lower edges resting on the pins 165, and the pins 175 are inserted in eyelet holes near the lower front edges of the quarters, as shown in Fig. 10, which properly locates the quarters on the form. The rod 161 is then depressed to the desired degree by a foot treadle, or other suitable means, which, through the described connections, moves the heel part of the form to the rear sufficiently to straighten the quarters and smooth out all the wrinkles. A vamp, with the rear or heel portion sewed up, is then placed over the quarters and positioned on the form with its lower edges resting upon the bar 169, (see Fig. 11), and the operator pulls the vamp at the toe in a forward direction to straighten out the vamp, particularly along the upper edge. Prior to this step in the assembling operation the quarters were supported upon the pins 165 which served to locate their lower edges properly with respect to the upper edges of the vamp in order to provide the proper amount of overlap. The act of pulling forward the vamp at the toe causes the vamp to hug the sides of the form tightly and forces the pins 165 in against their springs, whereby the overlapped portions of the vamp and quarters are permitted to contact with each other in the proper relation. The clamping members 187, 189, are then placed over the vamp and quarters as shown in Fig. 10, the spring bars 201 are inserted in position, and the cams 203 operated to tightly clamp the vamp and quarters between the lower limbs of the spring bars and said members, the operator turning the form on its base during such operations in order to present the same in the most convenient position for the several described manipulations. It will be observed that the ends of the inner limbs of the spring bars and the adjacent coöperating edge of the clamping members clamp together the overlapped edges of the vamp and quarters after these parts are properly positioned on the form. All of these parts of the clamp, together with the work, may then be removed from the form, which is provided with suitable vertical openings to permit the free passage of the bars 201 therefrom in an upward direction. The work as thus positioned and held together is now ready for application to the sewing, or other fastening inserting machine, whose construction and mode of operation in connection with this embodiment of the invention may be substantially like that described for the forms of positioning and clamping devices illustrated in Figs. 1, 2, 3 and 4 of the drawings.

No specific claim is made herein to the construction illustrated in Figs. 9 to 13, inclusive, as the same is claimed in a divisional application filed September 19, 1914, Ser. No. 862,204.

Where the positioning and clamping devices are used in connection with vamps of button shoes, the quarters may be buttoned at the lower portion thereof, the pins 175, inserted in the ends of a suitable number of the button holes, the clamp 183 lowered into a position to properly engage the upper and hold it, and a spring 220, (see Fig. 9) having one end secured to the arm 153 and its other end secured to the clamp at a suitable point beyond the bolt 184, may be employed to hold the clamp raised above the form, or in clamping position upon the upper, as desired.

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

1. In a device of the class described, the combination with a work support, of means constructed and arranged to determine, preparatory to a securing operation, relative positions of parts of a shoe upper having edge portions overlapped in substantial parallelism and having body portions extending in opposite directions from the overlapped edge portions, and means for holding said parts of the shoe upper with their edge portions in said overlapped relation during the securing operation.

2. In a device of the class described, the combination with a work support, of gages for determining the relative positions of a vamp and toe-cap preparatory to securing said parts together, and means for holding said parts in assembled relation arranged for movement to present said parts to a securing mechanism.

3. In a device of the class described, the combination of a work support, gages coöperating therewith and arranged to determine the relative positions of a vamp and a toe-cap, and a clamp associated therewith for holding the vamp and toe-cap in assembled relation during the operation of securing said parts together on a machine.

4. In a device of the class described, the combination of a work support, gages arranged to determine the relative positions of a vamp and a toe-cap, means associated therewith for holding the vamp and toe-cap in assembled relation during the operation of securing said parts together on a machine, and means carried by said holding means for guiding the work relatively to the securing mechanism.

5. The combination with means for arranging a plurality of pieces of material in position to be secured together, of means for holding said material in such relation during the securing operation, and means for automatically releasing the material

from the holding means at the completion of the securing operation.

6. In a device of the class described, the combination of a work support, devices for determining the relative positions of a plurality of pieces of material, means associated therewith for clamping the material together and movable over said support as the material is fed to a securing mechanism, and mechanism for removing said devices from the path of said means.

7. In a device of the class described, the combination of a work support, gage devices arranged to engage the edges of a plurality of pieces of material and determine their relative positions, and a clamp also sustained by said work support and arranged for operation to hold together the pieces of material whose relative positions have been determined by said gage devices.

8. In a device of the class described, the combination of a work support, gages constructed and arranged to determine the position of a plurality of parts of a shoe upper with their edges in overlapped relation prior to being secured together by a line of fastenings, and a clamp constructed and arranged to act upon the parts of the upper after they are assembled and to hold them together during the securing operation.

9. In a device of the class described, the combination of a work support, adjustable gages arranged to determine the position of a plurality of pieces of material with their edges in overlapped relation prior to being secured together by a line of fastenings, and a clamp constructed and arranged to act upon the pieces of material after they are assembled and to hold them together during the securing operation.

10. The combination of a work support, gages arranged to determine the relative positions of a plurality of pieces of material, a clamp for holding said material in assembled relation and arranged for movement relatively to a securing mechanism, and means for removing said gages from the path of said clamp.

11. The combination of a work support, movable gages arranged for coöperating with the side edges of a vamp and a toe-cap, and with the rear edge of said toe-cap, respectively, and a clamp for engaging the vamp and toe-cap when positioned by said gages, said clamp being movable with the work away from the gages to enable the work to be presented to a securing mechanism.

12. The combination of a work support, movable gages arranged for coöperation with the side edges of a vamp and toe-cap, and with the rear edge of said toe-cap, respectively, a clamp for holding the vamp and toe-cap together and movable in a path to present said parts to a securing mechanism, and means for withdrawing said gages from operative position after the vamp and toe-cap have been assembled.

13. The combination with a work support, of a plurality of gages adapted for relatively positioning pieces of sheet material thereon that are to be united by a seam, said gages being arranged for movement whereby they may be projected above the surface of the work support or be withdrawn therefrom, and means for simultaneously moving all of said gages into or out of operative relation.

14. The combination with a work support, of a yieldingly sustained frame carrying gages which normally project above the work support, and controlling means for said frame arranged to cause the withdrawal of the gages from operative position.

15. The combination of a work support, a plate, a frame yieldingly supported from said plate and carrying gages to normally project above the work support, and means for depressing said plate to cause the withdrawal of the gages from operative position.

16. The combination of a work support, a frame yieldingly sustained therefrom and carrying gages to normally project above the work support, and a member provided with devices to act on said frame and arranged for movement to cause the gages to be withdrawn from operative position.

17. The combination of a work support, a frame, carrying gages to normally project above the work support, said gages being arranged to determine the relative positions of a vamp and toe-cap, and means permitting adjustment of the gages.

18. The combination of a work support, a frame yieldingly sustained therefrom and carrying gages to normally project above the work support, and a member arranged above said frame and provided with cams to act thereon, whereby movement of said member will depress the frame and cause the gages to be withdrawn.

19. The combination with a work support, of gages to coöperate with the side edge of a vamp and a toe-cap, and a gage to coöperate with the rear edge of the toe-cap arranged for movements into and out of operative position.

20. The combination with a work support, of gages to coöperate with the side edge of a vamp and a toe-cap and arranged to be withdrawn below the work support, a gage to coöperate with the rear edge of the toe-cap and arranged to swing rearwardly to clear the work, and means for simultaneously operating said gages.

21. The combination with a work support, of means to coöperate with the side edge of a vamp and a toe-cap and means to

coöperate with the rear edge of the toe-cap to position said parts, said means being movable into and out of operative position, and a clamp arranged to hold the work together after it is positioned and movable to present it to a securing mechanism.

22. The combination of a work support, a frame carrying side gages to normally project above the work support, a pivotally supported arm arranged above the work support and carrying a back gage, a reciprocating member, and means whereby the movement of said member simultaneously causes the depression of said frame and the movement of said arm to remove the gages from the path of the work.

23. In a device of the class described, the combination of a work support, a frame movably sustained therefrom and carrying gages to project above the work support and coöperate with the side edges of a vamp and toe-cap, an arm supported for swinging movements above the work support and carrying a gage to coöperate with the rear edge of the toe-cap, a bar below said work support having cams to engage said frame, a connection between said arm and bar, and means permitting the operation of said bar to cause a depression of the frame and a backward movement of the arm whereby said gages are removed from the path of the work.

24. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, gage devices and means for moving said gage devices toward and from operative position.

25. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, an arm carrying gage devices, yielding means for moving said arm into operative position, and manually-controllable means for moving said arm out of operative position.

26. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, gage devices arranged for movements into and out of operative position, means for moving said gage devices into operative position, and means for adjustably limiting the extent of said movement.

27. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, an arm carrying gage devices and arranged for movements into and out of operative position, yielding means for moving said arm into operative position, and means for adjustably limiting the extent of said movement.

28. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, gage devices, yielding means for moving said gage devices into operative position, means for adjustably limiting the extent of said movement, and manually-controllable means for moving said gage devices out of operative position.

29. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, a support, an abutment thereon, an arm pivoted to the support and carrying gage devices on one side of its pivot and an adjustable stop device on the other side thereof arranged to contact with said abutment, yielding means acting on said arm to hold the stop device against the abutment, and manually-controllable means to move the arm in opposition to said yielding means.

30. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, an arm movable toward and from operative position, and a gage device connected therewith by means permitting adjustment to agree with the rear edges of toe-caps presenting different angles to the median line of the shoe.

31. In a device of the class described, means for determining the position of the rear edge of a toe-cap comprising, in combination, an arm movable toward and from operative position, and a gage carrying projections to engage the toe-cap and secured adjustably to the arm to conform with the desired angles to the median line presented by the rear edges of different toe-caps.

32. In a device of the class described, the combination with means constructed and arranged for determining, preliminary to a sewing operation, relative positions of parts of a shoe upper having edge portions overlapped in substantial parallelism and having body portions extending in opposite directions from the overlapping edge portions, of a clamp arranged to engage said upper parts while they occupy the relation determined by said positioning means.

33. In a device of the class described, the combination with means constructed to determine the relative positions of parts of a shoe upper preliminary to the operation of uniting said parts by a line of fastenings, of a clamp for the assembled work, fastening mechanism, and means associated therewith and arranged to coöperate with said clamp in feeding the work relatively to said mechanism.

34. In a device of the class described, the combination of a work support, means for positioning the work, a clamp for holding the work, and means connecting said work

support and clamp arranged to permit the clamp to move from said positioning means to a fastening mechanism.

35. In a device of the class described, the combination of a work support, means for positioning the work, a clamp for holding the work provided with a curved guide, and means for supporting the clamp for pivotal movement about a center corresponding with that from which the curve of said guide is generated.

36. In a device of the class described, the combination of a work support, a clamp for holding the work provided with a curved guide, means for supporting the clamp for pivotal movement about a center corresponding with that from which the curve of said guide is generated, and a fastening mechanism provided with a way to receive said guide.

37. In a device of the class described, the combination of a work support, a fastening mechanism, a clamp constructed to engage and hold the work when positioned and arranged for movement to present it to the fastening mechanism, and means to automatically release the work from said clamp at the end of the fastening operation.

38. In a device of the class described, the combination of a work support, a fastening mechanism, a clamp constructed to engage and hold the work when positioned and arranged for movement to present it to the fastening mechanism, and means for automatically moving the clamped work away from the fastening mechanism at the completion of the fastening operation.

39. In a device of the class described, the combination of a work support, a fastening mechanism, a clamp constructed to engage and hold the work when positioned and arranged for movement to present it to the fastening mechanism, and means for automatically moving the clamped work away from the fastening mechanism and for releasing the work from the clamp at the completion of the fastening operation.

40. In a device of the class described, the combination of a work support, a fastening mechanism, a clamp constructed to engage and hold the work when positioned, pivotal means connecting said clamp with the work support to enable it to carry the work toward and from said mechanism, a yielding device to move the clamp away from said mechanism at the completion of the fastening operation, and means for releasing the work from the clamp during such movement.

41. In a device of the class described, the combination of a work support, a fastening mechanism provided with a guideway, a clamp to engage the guideway and comprising two relatively movable members and a pivoted cam having an extension, an arm connected with said clamp and provided with a slot, a stud sustained by the work support and entering said slot, yielding means connecting said arm and stud, and an abutment located in the path of said extension, the parts being so arranged that when the clamp escapes from the guideway as the work is being fed to said mechanism the yielding means will cause the cam extension to engage the stud and rotate the cam to release the work.

42. In a device of the class described, the combination with sewing mechanism, of a presser-foot having a guide, a clamp for holding the work having means to coöperate with said guide in directing the work, and means for feeding the clamped work.

43. In a device of the class described, the combination with fastening mechanism, of holding means for the work, and means acting on the work and other means acting on said holding means for feeding the work relatively to said mechanism.

44. In a device of the class described, the combination with fastening mechanism, of a clamp for holding in assembled relation the parts to be united by said mechanism, means acting on the clamp and other means acting on the work for feeding the work, and devices for guiding the clamp relatively to said mechanism at a plurality of points.

45. In a device of the class described, the combination of mechanism for operating upon the work, a clamp for holding the work, devices for guiding the work in a predetermined line, feeding means to act on the work, feeding means to act on the clamp constructed to impart a different rate of movement thereto from that of the first-named feeding means, and means acting automatically to maintain the proper ratio between said feeding movements whereby the work is fed in said predetermined line.

46. In a device of the class described, the combination with fastening mechanism provided with a guide, of a clamp for holding the work having means coöperating with said guide, means acting on the clamp for feeding the work, and a governing device acting automatically to control the speed at which the clamp is moved by said means and thereby to cause the work to be fed in a predetermined line.

47. In a device of the class described, the combination with fastening mechanism provided with a guide, of a clamp for holding the work having guiding means to coöperate with said guide, means for feeding the work at a plurality of points, and a governing device acting automatically to cause the work to be fed in a predetermined line.

48. In a device of the class described, the combination of a mechanism for operating upon work, a guide associated therewith, a

clamp for holding the work having a cooperating guide and a bar, feeding means to act on the work, a feeding means to act on said bar and impart thereto a different speed from that which said feeding means imparts to the work, and a governing device to automatically control the feeding movements of one of said feeding means whereby the work is caused to be fed to said mechanism on a line determined by said coöperating guides.

49. In a device of the class described, the combination of stitch-forming mechanism, a guideway associated therewith, a clamp for holding the work having a flange to enter said guideway and a bar, said flange and bar being formed on curves generated from a common center, feeding means to act on the work, a feed roll to act on said bar and impart thereto a greater speed than said feeding means imparts to the work, and a governing device to automatically control the feeding movements of said roll whereby the work is caused to be fed to the stitch-forming mechanism on a line determined by the shape of said flange.

50. In an apparatus of the class described, the combination of mechanism for operating upon work, a guide associated therewith, a clamp for holding the work having a member to coöperate with said guide and another guide member, feeding means to act on the work, feeding means to act on said other guiding member and impart thereto a different speed than said feeding means imparts to the work, and a device located between said second feeding means and other guiding member, said parts being so arranged that an undue increase in speed of the feeding movements of said second member will force the said other guiding means against said device and lift the second member from its coöperating guiding means.

51. In a device of the class described, the combination with sewing mechanism, of a presser-foot having a guide, a clamp for holding the work having means to coöperate with said guide in directing the work.

52. In a device of the class described, the combination of fastening mechanism, a clamp for holding the work, devices for guiding the work in a predetermined line, feeding means to act on the work, feeding means to act on the clamp constructed to impart faster movements thereto than those of the first-named feeding means, and means acting automatically to maintain the proper ratio between said feeding movements whereby the work is fed in said predetermined line.

53. In an apparatus of the class described, a clamp for holding the work, devices for guiding the work in a predetermined course, feeding means to act on the work and other feeding means to act on the clamp and constructed and arranged to tend to impart to said work and said clamp different rates of feeding movement and means for maintaining automatically the proper ratio between the feeding movements on the work and clamp whereby the work is caused to be advanced in the predetermined course.

54. In a device of the class described, the combination of a stitch forming mechanism, a guideway associated therewith, a clamp for holding the work having a curved flange to enter said guideway and a curved bar, feeding means to act on the work, a feed roll to act on said bar and impart thereto a greater speed than said feeding means imparts to the work, and a governing device to automatically control the feeding movements of said roll whereby the work is caused to be fed to the stitch-forming mechanism on a line determined by the shape of said flange.

55. In a device of the class described, the combination of stitch-forming mechanism, a guideway associated therewith, a clamp for holding the work having a curved flange to enter said guideway and a curved bar, feeding means to act on the work, a feed roll to act on said bar and impart thereto a greater speed than said feeding means imparts to the work, and pins located between said roll and bar, said parts being so arranged that an undue increase in speed of the feeding movements of said roll will force the bar against one of the pins and lift the bar from the roll.

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

BENJAMIN F. MAYO.

Witnesses:

JENNIE P. ANDERSON,

ALBERTE PREVOST.