K. ENGEL.

MACHINE FOR USE IN THE MANUFACTURE OF BOOTS AND SHOES.

APPLICATION FILED APR. 20, 1908.

1,142,557.

Patented June 8, 1915.

5 SHEETS—SHEET 1.

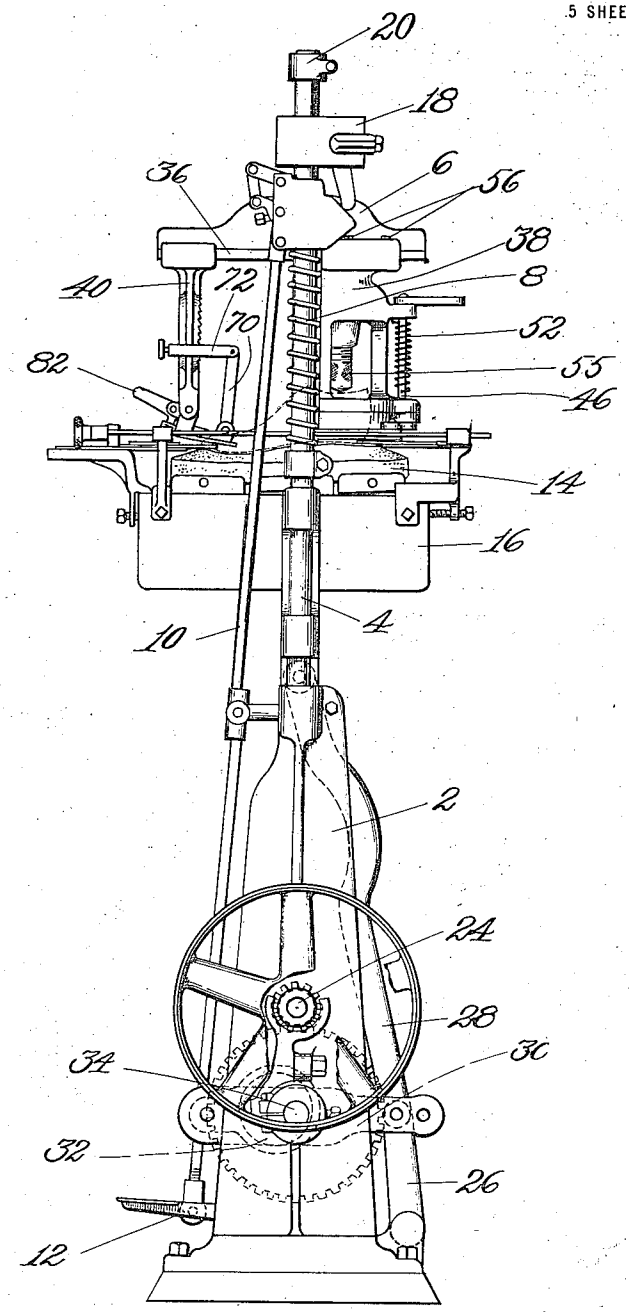

Fig. 1.

WITNESSES.

Edith C. Holbrook

Elizabeth C. Coupe

INVENTOR.

Karl Engel

By his Attorney,

Nelson W. Morrand

K. ENGEL.

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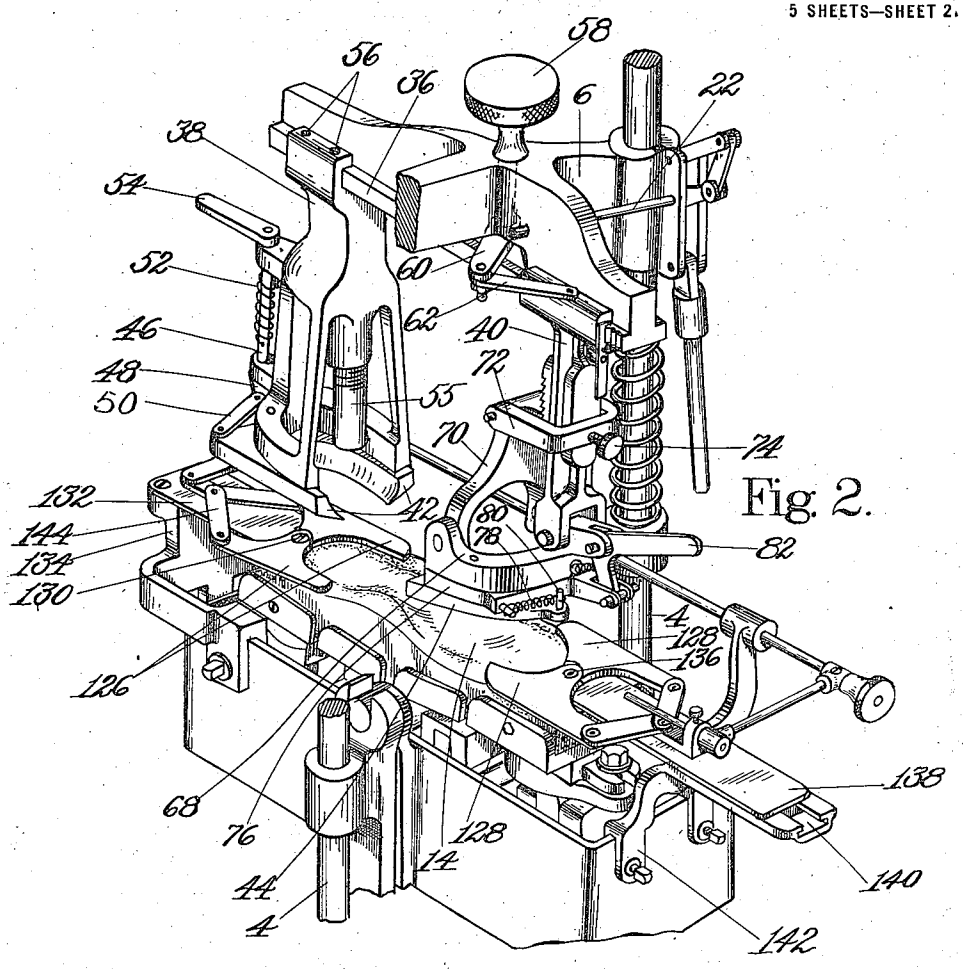

Fig. 2.

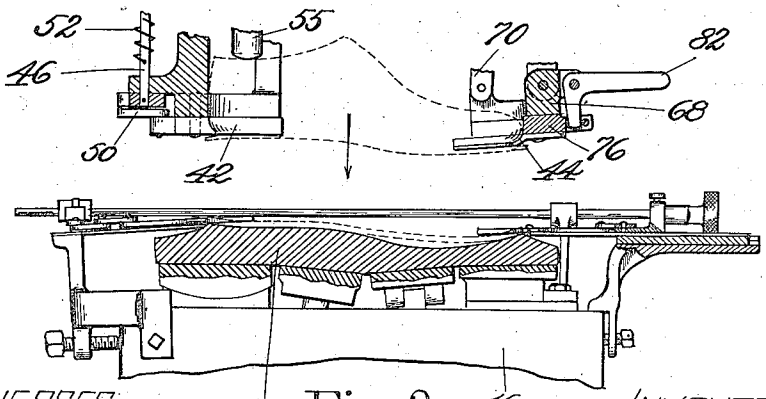

Fig. 3.

WITNESSES:

Edith C. Hallbrook

Elizabeth C. Coupe

INVENTOR.

Karl Engel

By his Attorney

Nelson Monroe

K. ENGEL.

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5 SHEETS—SHEET 3.

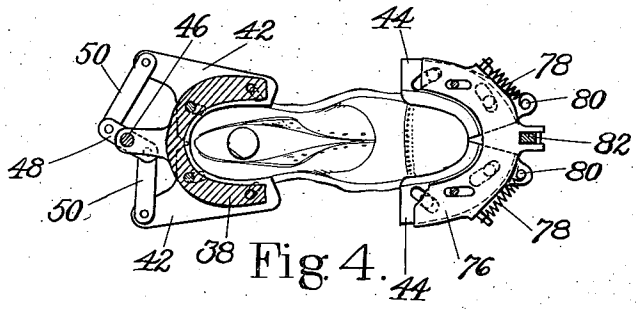

Fig. 4.

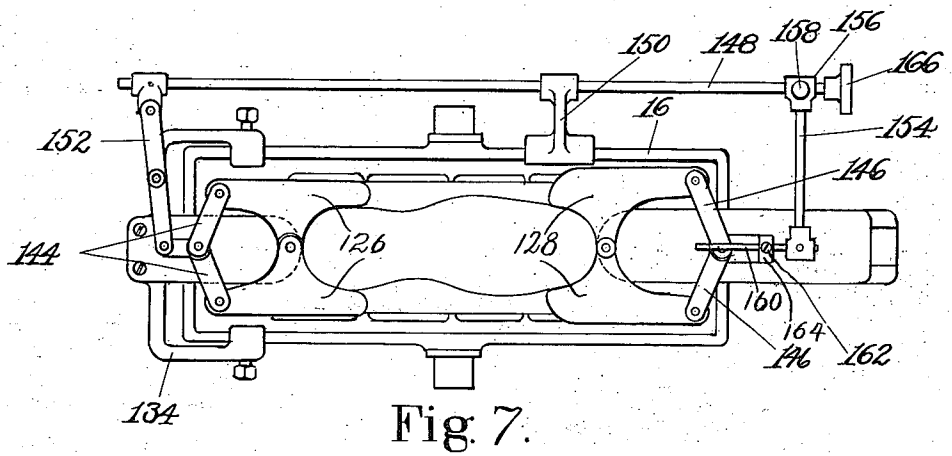

Fig. 7.

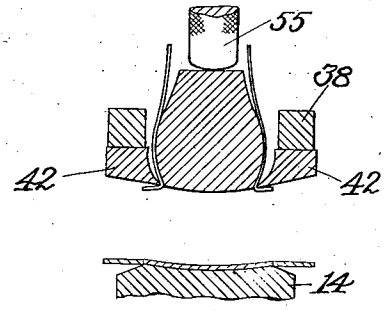

Fig. 5.

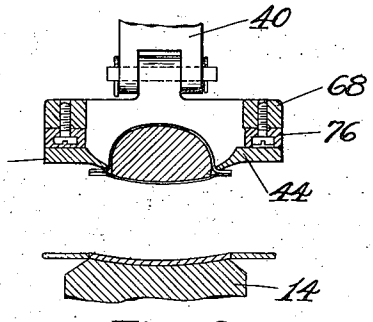

Fig. 6.

WITNESSES:

Edith C. Holbrook

Elizabeth C. Coupe

INVENTOR.

Karl Engel

By his Attorney,

Nelson Morrad

K. ENGEL.

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1,142,557. Patented June 8, 1915.

5 SHEETS—SHEET 4.

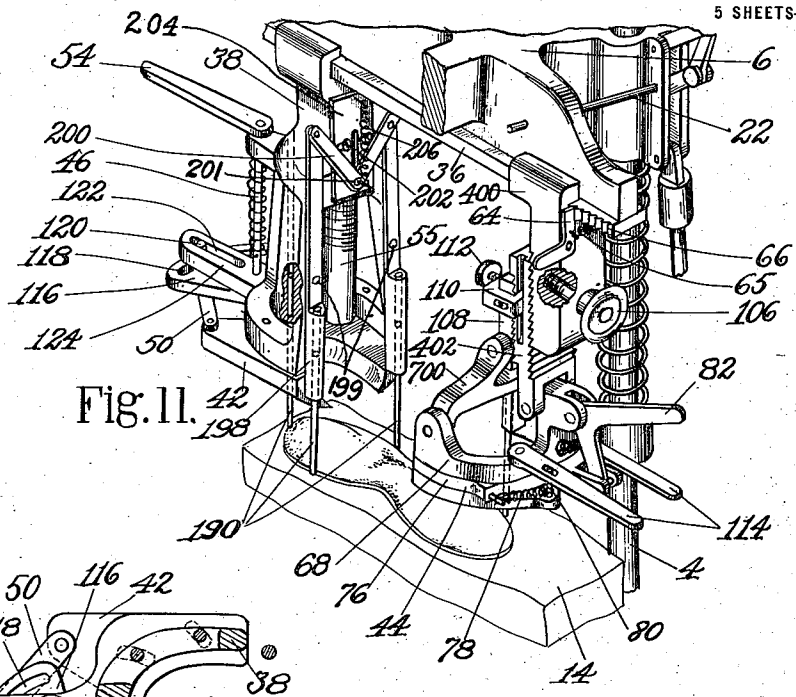

Fig. 11.

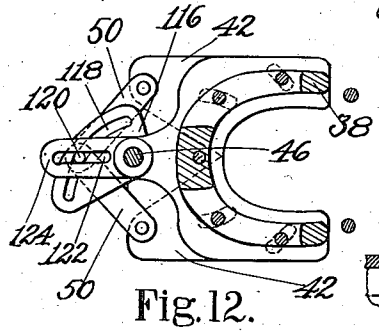

Fig. 12.

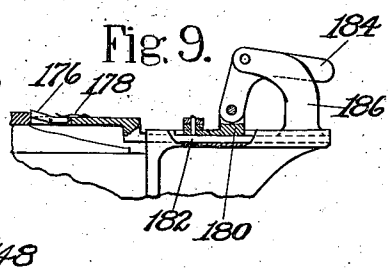

Fig. 9.

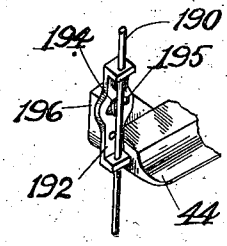

Fig. 13.

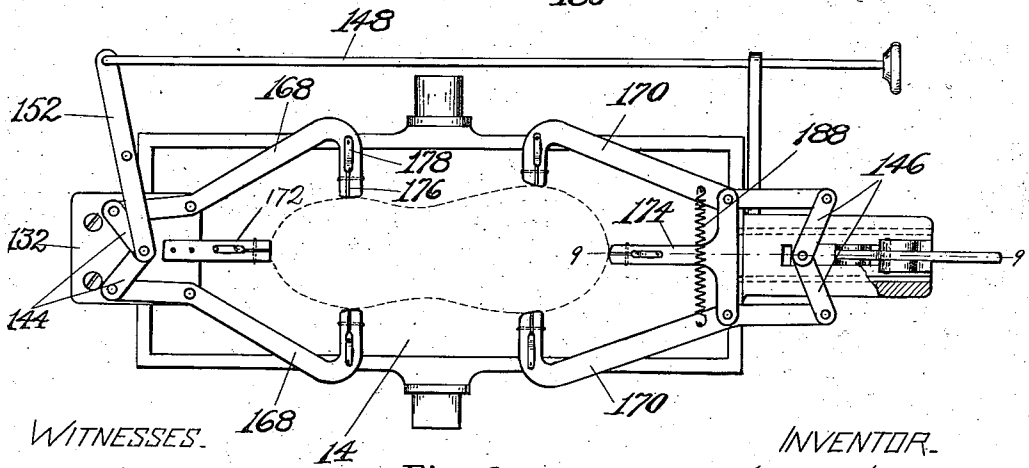

Fig. 8.

WITNESSES.

Edith C. Hollrook

Elizabeth C. Corey

INVENTOR.

Karl Engel

By his Attorney,

Nelson M. Conrad

K. ENGEL.

MACHINE FOR USE IN THE MANUFACTURE OF BOOTS AND SHOES.

APPLICATION FILED APR. 20, 1908.

1,142,557.

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5 SHEETS—SHEET 5.

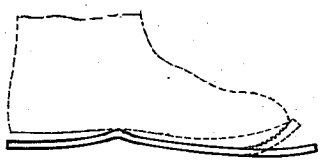

Fig. 14.

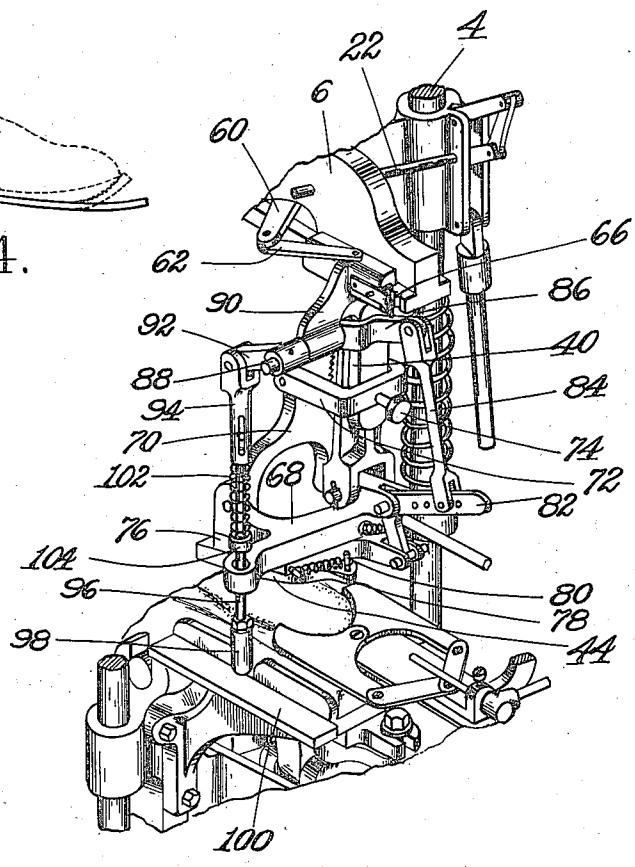

Fig. 10.

WITNESSES:

Edith C. Hallcook

Elizabeth C. Coupe

INVENTOR.

Karl Engel

By his Attorney

Nelson W. Morrow

UNITED STATES PATENT OFFICE.

KARL ENGEL, OF REVERE, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR USE IN THE MANUFACTURE OF BOOTS AND SHOES.

1,142,557. Specification of Letters Patent. Patented June 8, 1915.

Application filed April 20, 1908. Serial No. 428,123.

To all whom it may concern:

Be it known that I, KARL ENGEL, a subject of the Emperor of Germany, residing at Revere, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain Improvements in Machines for Use in the Manufacture of Boots and Shoes, 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 machines used in boot or shoe manufacture for locating and temporarily securing in desired relation to each other, parts of the boots or shoes.

The invention relates particularly to so-called sole laying machines which operate to place or to press, or both to place and to press, the outersole upon the innersole or upper, or upon both, in proper position to receive the permanent fastenings. In the greater number of such machines in common use, the shoe to which the sole is to be applied is supported upon a last which, in turn, is supported upon a jack, the jack comprising usually a last pin to enter the last pin hole in the heel part of the last and a toe rest or saddle to support the forward part of the last, sole laying means being provided by which pressure may be exerted upon the sole to cause it to be united by the cement, with which it or the shoe has previously been provided, to parts of the innersole or upper.

In the before-mentioned machines in which the shoe or lasted upper and insole is supported upon a jack provided with a last pin and a toe rest, the sole laying means operates to press the sole against those parts of the shoe only which are backed by the last. Such sole laying is satisfactory enough upon shoes which have no sole attaching portions lying outside the bottom edge of the last, but upon such shoes as do have portions lying outside the bottom edge of the last, for example, Goodyear welt shoes and stitch-down shoes, such sole laying is frequently unsatisfactory. This is usually due to the fact that the welt or the outturned flange is not pressed upon the sole sufficiently to cause it to adhere to the sole, and therefore if a tight joint is desired a separate welt laying operation must be performed. Furthermore, laying of the welt or flange upon the sole in such a way that adhesion of the welt or flange to the sole close to the line of the crease between the upper and welt or flange is not insured is apt to be unsatisfactory, especially in the region of the shank, since the appearance of the shoe depends much upon proper laying of the welt or flange throughout both its width and its length, and in the stitch-down shoes especially the fit of the shoe and the comfort of the wearer depend much upon the flange being so laid that the stitching may follow the proper line. In the laying of the soles of both Goodyear and stitch-down shoes, difficulty is frequently experienced in so laying the welt or flange in the shank region that the shank will keep its lasted shape and that the stitching may come in close enough to the last to permit close trimming of the sole edge in this region.

In the type of stitch-down shoes made in accordance with the method of my Letters Patent No. 931,851, granted August 24, 1909, the upper is molded into substantially its lasted shape, and an insole is attached before the last is inserted. In the molding process, a crease is formed between the flange and upper about the toe portion of the upper and also about the heel portion. This crease adds much to the appearance of the shoes, and also to the comfort of the wearer, and it is therefore desirable that it be maintained in the finished shoe. If the sole be laid upon a shoe of this type by an ordinary sole laying machine in which the laying pressure is exerted almost exclusively upon that part of the shoe lying over the bottom of the last, the crease is usually partially stretched out and the flange attaches itself too far out toward the edge of the sole, thus detracting both from the appearance and from the fit of the shoe. Furthermore the insertion of the last preparatory to the sole laying and sole attaching operations also tends to stretch out the crease formed in molding. If the crease is not maintained, restored or reformed during the sole laying operation, it cannot be successfully restored or reformed during any of the subsequent operations because the depth of the crease is dependent primarily upon the relative positions of the flange and upper, and when the flange is

once fixed in position, as by attachment to the sole, the upper being incapable of movement relatively to it, the depth of the crease is also fixed.

In view of the foregoing facts, it will be seen that the most advantageous time to determine the proper relative positions of the sole attaching flange, both with respect to the sole and with respect to the upper, is during the sole laying operation. This is especially true in the case of stitch-down shoes made in accordance with the method of my Letters Patent above identified and is true only in a different degree of other shoes having sole attaching flanges.

In addition to other objects, the invention aims to provide a sole laying and upper conforming machine which will obviate the difficulties hereinbefore pointed out. With this end in view the invention is herein shown as embodied in a sole laying machine having provision for supporting the sole attaching flange of the shoe at certain points, or throughout its extent, against the pressure of the sole during the sole laying operation. The particular portions of the flange for which support will be most useful will depend obviously upon several considerations, among which are the characteristics of those parts of the upper which are adjacent to the flange.

In the preferred embodiment of the invention, means is provided for supporting the flange at the toe, and also at the heel. Preferably the means for supporting the flange has also other functions. In the illustrated embodiment of the invention, the means for supporting the flange is preferably constructed, not only to support the flange, especially at its inner side near the bottom of the crease between the flange and upper, but also to bring this crease into proper relation to the last and to the sole, and, if its depth should have been diminished during the preceding operations, to make it again of the desired depth. Furthermore the means for supporting the flange has preferably an additional function partaking somewhat of the nature of lasting. This additional function, in the preferred embodiment of the invention, comprises stretching the upper tightly over the forepart of the last and fitting the upper closely to the last in the region of the shank, the latter operation incidentally causing a lengthwise stretching of the upper. Preferably the means for supporting the flange is so constructed that its length may be automatically contracted during the sole laying operation whereby it performs a further novel function partaking of the nature of lasting, namely, the automatic stretching of the upper over the toe and heel ends of the last during the sole laying operation.

By the expression "means for supporting the flange" used in the foregoing statement is meant any means which will serve to cause the flange and sole to be pressed together during the sole laying operation. It is obvious that the pressure may be brought about by moving the flange supporting means toward the sole supporting means or vice versa, or by movement of both means toward each other, and it is further obvious that it is not essential to this feature of the invention that the flange supporting means be above the sole supporting means, although there are advantages incident to the illustrated relative location of these means which will appear from the following detailed description.

Among the advantages of the illustrated relative location of the flange supporting means and the sole supporting means is this, that it permits the convenient employment of a further important feature of the invention, namely, the sole positioning means. In the usual method of sole laying, the sole is pressed upon the bottom of the shoe by hand before the shoe is placed in the sole laying machine. In practice, the operator bends the sole to the approximate curvature of the under side of the forepart of the last before applying the sole to the shoe. I have discovered, by experiment, that one result of the foregoing method of sole laying is that it requires for its successful employment a sole about a half size larger than is actually required by the shoe to which it is to be attached. If, however, the sole left in substantially a flat condition in the forepart, be accurately positioned upon a sole supporting device and then applied to the shoe by a relative movement of the shoe support or jack and the sole support, the different parts of the sole will be successively attached to the shoe and there will be no crowding together of parts of the sole confined between two parts previously attached. Furthermore, there will be less crowding together of the inner surface of the sole and more stretching of the outer surface than takes place with the preliminary bending practiced with the usual method of sole laying. By the method of this invention, therefore, the full bottom covering capacity of the sole may be utilized, and material saving may be effected in sole leather.

A further advantage of the sole laying method of this invention is that it overcomes the tendency of the sole to turn up more at the toe end after the shoe has been worn. This tendency is especially undesirable in children's shoes and yet it is most apt to assert itself in these shoes, since it is the practice in buying shoes for a child to allow for the growth of the foot. It can readily be seen that deformity of the toes will be produced if the toe end of the sole turns up to any great extent.

In the usual method of sole laying above referred to in which the sole is first placed upon the bottom of the shoe by hand, the inability of the operator to determine by his eye the proper location of the sole upon the shoe necessitates the employment of a sole large enough to compensate for any misplacement by the operator. The margin usually allowed for this purpose is considerable and must be afterward trimmed off in the trimming operation. It will therefore be seen that a further advantage of the employment of sole positioning means in accordance with the present invention is that it permits the sole to be cut approximately to its final size before it is laid. The waste of material which takes place in the subsequent trimming operations is therefore reduced to a minimum.

In the preferred embodiment of the invention, the sole positioning means is arranged to position a sole resting upon the sole support and is readily adjustable to different sizes of soles, including soles of different widths as well as soles of different lengths. Furthermore the sole positioning means is so constructed and arranged that in all adjustments it will position the sole properly with respect to the shoe support or jack, and thus insure proper location of the sole upon the shoe.

The feature of the illustrated machine pointed out in the preceding paragraph contributes to the carrying out of a further object of the present invention, namely, the provision of a machine adapted to operate efficiently upon a comparatively wide range of sizes of shoes. An important feature of the illustrated preferred embodiment of the invention is its adaptability for such operation. As hereinbefore pointed out, the means for positioning the sole is preferably adapted for use with soles of varying widths and lengths. The means for supporting the sole attaching flange is also preferably adapted for use with correspondingly varying sizes of shoes. For convenience of adjustment and for insuring a maintenance of the proper relationship of the flange supporting and the sole positioning means, the size adjustments in both means are made relatively to fixed portions of said means, the fixed portions of the two means bearing a fixed relation to each other. It will be noted that in two of the illustrated embodiments of the invention the means for supporting the flange and the means for positioning the sole, each comprises a pair of jaws for the heel end of the shoe or sole, and a pair of jaws for the toe end. The jaws of each pair are preferably connected to insure simultaneous movement whereby their position with respect to each other may be varied without disturbing the location of a predetermined line passing through the heel and the toe jaws, which line may for convenience be called the axial line of the sole.

In the illustrated preferred embodiment of the invention, however, in which for sole positioning jaws have been substituted positioning pins which yield into or through the support for the shoe supporting jaws during the sole laying operation or through parts carried by said jaws whereby they are automatically adjusted with said jaws, there is provided for the toe end of the sole means for positioning only one side of the sole. This construction facilitates the placing of the sole within the positioning means but does not interfere with the maintenance of the proper location of the axial line of the sole. It will be understood that the invention embraces not only the omission of positioning means for one side of the toe end of the sole, but also the omission of positioning means for one side of the heel end of the sole. It will be obvious also that a successful positioning means may be constructed in which only one end and one side of the sole are engaged by the positioning means. It will be further obvious that this principle of construction may be employed also with the above-described positioning means in which jaws instead of pins are used.

It will be noted from the following detailed description that the flange supporting jaws and the mounts upon which they are sustained embody, in their construction, many important features of novelty, and that some of these features of novelty contribute to the successful carrying out of objects of the invention already enumerated, and that other features contribute to other objects to be hereinafter referred to, or which may be apparent from a consideration of both the manner and the results of the operation of the machine.

It will be noted especially that a further object of the present invention is the provision of a machine adaptable not only to shoes of varying horizontal dimensions or characteristics but also to shoes of varying vertical dimensions or characteristics, for example to shoes of varying pitch at the toe, or to shoes lasted over lasts of varying depth at the forepart, as spring heel shoes and shoes having ordinary heels.

Furthermore, an important object of the invention is the provision of means for automatically restoring or reforming the crease between the flange and upper, hereinbefore referred to, during the sole laying operation. In the preferred embodiment of the invention, this last-named means includes preferably the flange supporting means. Since the flange supporting means must enter the crease between the flange and the upper in order to perform properly its crease restoring or reforming function as well as its

flange laying function, advantage is taken of this fact to cause the flange supporting means to constitute also a means for supporting the shoe during the sole laying operation.

It is usually desirable that there be more resistance to vertical displacement of the last in the shoe, or of the shoe and last together, than would be afforded by the flange supporting means operating in the manner just described, and therefore in the preferred embodiment means is provided also, preferably at the heel, for positively preventing the last from moving upwardly relatively to the flange supporting means, beyond a certain point, and it will therefore be noted from an inspection of the illustrated preferred embodiment that a further object of the present invention is the provision of a shoe support or jack for a sole laying machine which will dispense with the necessity for employing a last pin and yet which will support the last against vertical as well as against horizontal displacement.

It will also be noted from an inspection of its illustrated preferred embodiment that another object of the invention is the provision of shoe supporting means for sole laying machines which will not only support the last against the pressure of the sole during the sole laying operation, but which will also support the sole attaching flange against such pressure and which, in addition, will be quickly and readily adjustable to lasts of varying vertical dimensions as well as of varying horizontal dimensions.

A further object of the invention, which is of especial importance in the manufacture of stitch-down shoes of the type disclosed in my co-pending application hereinbefore referred to, is the provision of means for insuring the maintenance of the proper size length of the shoe during the sole-laying operation. In the manufacture of shoes in accordance with the method of my said co-pending application, a last is not inserted until after the insole has been attached to the upper. To facilitate the ready insertion of the last, I employ, instead of the usual last over which an upper is lasted, what is known as a "filler." A filler differs in its construction from an ordinary last in that the heel end is rounded off so that it may be easily inserted into the shoe. It will be seen, therefore, that a last of this type will not afford such support to the upper in the region of the crease around the heel end of the upper as will prevent this crease from being forced in, provided the flange supporting means is free to contract its length during the sole laying operation, thereby shortening the upper and making the shoe of a different size from that intended. In order that the creases at both the heel and toe ends of the sole may be restored or reformed during the sole laying operation without varying the size length of the shoe, provision is made, in the preferred embodiment of the invention, for locking the support for the flange supporting means in its proper size adjustment, and for causing to be imparted to the flange supporting means a crease restoring movement of predetermined amount. It will thus be seen that the inner side of the crease at the heel end of the shoe and the inner side of the crease at the toe end of the shoe will be spaced apart a predetermined distance, and that this distance will correspond exactly to the size length of the shoe.

In the accompanying drawings,—Figure 1 is a side elevation of a machine embodying one form of the invention of this application; Fig. 2 is a perspective view upon a larger scale of the shoe supporting and sole positioning mechanisms; Fig. 3 is a detail view showing in longitudinal section the shoe supporting and sole positioning mechanisms in operative position, a shoe and a sole being indicated in dotted lies in the respective mechanisms; Fig. 4 is a plan view, partly in section, of the shoe supporting mechanism; Fig. 5 is a detail section showing the operation of the machine at the heel end of a shoe; Fig. 6 is a detail section showing the operation of the machine at the toe end of the shoe; Fig. 7 is a plan of one form of sole positioning mechanism; Fig. 8 is a plan of another form of sole positioning mechanism; Fig. 9 is a detail vertical section of the forward end of the mechanism shown in Fig. 8; Fig. 10 is a perspective view of the end of the machine which operates upon the toe end of a shoe, showing this end provided with automatic crease restoring mechanism; Fig. 11 is a view similar to Fig. 2 of a preferred form of the invention; Fig. 12 is a plan view with parts shown in section of the heel clamping jaws, and the mechanism for operating said jaws; Fig. 13 is a detail view of the sole positioning pin mounted upon one of the toe clamping jaws, shown in Fig. 11; and Fig. 14 is a view showing the saving in sole material effected by the method of this application.

The general type of sole laying machine to which the improvements of this invention are shown as applied is that disclosed in the patent to C. E. Holland, 362,447, May 3, 1887. The illustrated machine contains also improvements disclosed in the patents to W. S. Hamm, 375,549, Dec. 27, 1887; H. A. Davenport, 781,636, Feb. 7, 1905 and G. H. Gifford, No. 694,367, March 4, 1902. Reference may be had to the patents cited for a more detailed description of parts illustrated but not completely described in this application.

The following parts of the illustrated mechanism are substantially those disclosed

in the patents cited: The base 2, vertical guide rods 4, cross-head 6, movable on said guide rods and supported on springs 8 which tend to keep it normally in its uppermost position, the rods 10 connected to the treadle 12 for depressing the cross-head 6 to bring the shoe held by the shoe supporting mechanism carried by said head down into contact with or into proximity to the pressing pad 14 in the pad holder or frame 16, the clutch collars 18 for locking the cross-head in its depressed position, the stop collars 20 for limiting the upward movement of the cross-head, the mechanism actuated by a handle connected to the rock-shaft 22 for releasing the clutch collars 18, and the mechanism actuated from the shaft 24 comprising a toggle 26, 28, straightened or broken by an arm 30 moved by an eccentric 32 upon a shaft 34 geared to shaft 24 for raising and lowering the pressing pad holder or frame 16 to produce or to remove the sole laying pressure.

Carried upon flanges or guides 36 upon the cross-head are standards or supports 38 and 40 for the shoe and flange supporting jaws 42, 42 and 44, 44 respectively, the jaws 42, 42 being constructed to support the heel end of a shoe and the jaws 44, 44 being constructed to support the toe end.

In the form of the invention shown in Fig. 2, the vertical rock-shaft 46 mounted in lugs upon the back of the heel standard has at its lower end a cross-arm 48 connected by links 50, 50 to the jaws 42, 42 whereby the said jaws may be simultaneously moved apart or toward each other. It will be noted that the pivots of the jaws 42, 42 comprise pins traveling in slots so arranged that the jaws turn about a center lying in their inner edges at the point where said edges contact, whereby the continuity of said edges is uninterrupted during movement of the jaws. A spring 52 surrounding the rock-shaft 46 holds the jaws yieldingly at their inner limits of movement, and a handle 54 upon the upper end of said rock-shaft affords provision for positive movement of the jaws by the operator either toward or away from each other.

The support 38 is shaped above the heel clamping jaws to receive the heel part of the last and the upper of the shoe, and mounted in the support directly above the heel part of the last is an adjustable abutment 55 against which the crown of the last bears during the sole laying operation, the adjustment of the abutment serving to adapt it for use with lasts of different vertical dimensions, so that the bottom of the last may be maintained in proper relation to the under side of the heel clamping jaws during the sole laying operation. The support 38 is preferably fixed upon the cross-head, as, for example, by set screws 56 engaging the flanges 36, and adjustment of the shoe supporting mechanism for various lengths of shoes is preferably effected by a movement of the support or standard 40. Such adjustment may be effected conveniently by mechanism comprising a knurled knob 58, the stem of which is mounted to turn in the cross-head 6 and has at its lower end a rigid arm 60 connected by a link 62 to the support 40, said support being slidably mounted upon the flanges or guides 36.

Means is preferably provided for locking the support 40 in its adjusted position, the provision of such means being especially desirable in the illustrated embodiment of the invention in view of the provision of means for restoring the crease between the flange and upper. The locking means illustrated comprises a pawl 64 pivoted upon the support 40 and bent to provide a handle to be grasped by the operator in unlocking the support from its guide, the said pawl being moved by a spring 65 normally into engagement with ratchet teeth 66 formed upon one of the guides 36.

The ratchet teeth 66 are so inclined that they cause the pawl 64 to lock the support 40 against movement away from the support 38. The support or standard 40 is forked at its lower end and a U-shaped carrier frame 68 is pivotally connected with the support at this end by a pin passing through the fork members of the support and an upwardly projecting portion of the forward end of said carrier frame. The frame 68 is supported at its rear end by a yoke 70, the yoke 70 having upon its front face teeth which are adapted to coöperate with corresponding teeth upon the rear face of the support 40 to aid in locking the yoke 70 in different vertical adjustments.

Movement of the yoke 70 up and down the support 40 varies the inclination of the frame 68 and thereby adapts the toe clamping jaws 44 to lasts of varying spring. The teeth upon the yoke 70 are held in mesh with those upon the support 40 when the yoke has been given its desired vertical adjustment, by means of a strap or clamping member 72 embracing the support 40 and pivotally connected to the upper end of the yoke 70, the strap 72 being provided with a set screw 74, arranged to engage a clamping face upon the front side of the member 40 and to draw the yoke 70 toward the support 40.

The carrier frame 68 has upon its under side a jaw-carrying slide plate 76 mounted upon the frame 68 with provision for a limited sliding movement relative thereto, as shown in Fig. 4. The jaws 44, 44, which receive the toe part of the shoe to be operated upon, are pivoted upon the slide plate 76 in such manner that they turn about a center coinciding substantially with the

point of contact of their inner edges, as shown in Fig. 4. The continuity of the inner edges of the jaws is thus unbroken for different adjustments. Springs 78, each connected at one end to a vertically extending pin upon the forward extension of the jaw 44 and at its other end to a pin on the slide 76, tend to keep the jaws 44 at their inner limits of movement.

It will be seen from an inspection of Figs. 5 and 6 especially, that the jaws are preferably so shaped in cross-section that they may enter the crease between the upper and the sole attaching flange of a shoe, and that they will cause the greatest pressure to be exerted upon the flange during the sole laying operation at or near the bottom of said crease. An important function of the toe jaws, and preferably also of the heel jaws, is that of restoring to, and maintaining at, proper depth the said crease between the sole attaching flange and the upper.

In the form of the invention illustrated in Fig. 2 and also in Fig. 11, the toe jaws are moved rearwardly to cause their tapered edges to enter or restore the crease between the sole attaching flange of an upper after the shoe has been placed between the heel and toe jaws, and this movement in the forms shown in the said two figures is effected by an angle lever 82 pivoted between forwardly extending ears and the frame 68, one arm of the lever serving as a handle for the operator and the other arm being pivotally connected to the slide 76.

In Fig. 10 is shown means for automatically effecting the rearward movement of the jaws 44. This means comprises, as shown, a link 84 connected at one end to the operating arm of the angle lever 82 which, in this construction, has been provided with a series of openings to permit connection at different distances from its pivot. At its other end the said link 84 is connected to a forwardly extending arm 86 rigid with a rock-shaft 88 having its bearings in a bracket 90 on the support or standard 40. A rearwardly extending arm 92 on said rock-shaft carries pivotally connected with it a tubular member 94 in which slides a rod 96 having an adjustable foot 98 adapted to engage a stop plate 100 carried by a bracket bolted to the pressing pad carrier 16. A spring 102, surrounding the rod 96 and engaging at one end a collar 104 upon said rod and at its other end engaging the lower end of the tubular member 94 serves to transmit to the member 94, and through it and its connections to the jaw-carrying slide 76, the pressure produced by the contact of foot 98 with the plate 100 upon the upward movement of the carrier 16 during the sole laying operation.

The preferred form of the invention illustrated especially in Figs. 11, 12 and 13 differs from that just described in that an additional vertical adjustment has been provided for the toe clamping jaws and that both the movement of the heel clamping jaws and the means for moving said jaws have been modified. Furthermore, means has been provided for separating the toe clamping jaws to permit the ready insertion of the toe of the shoe. The additional vertical adjustment of the toe clamping jaws which is intended primarily to adapt them to lasts of varying depth in the fore part, for example, to lasts for spring heel shoes, and also to lasts for shoes having ordinary heels, is provided for by making the support or standard which carries that part of the shoe supporting mechanism which operates upon the toe in two parts adjustable relatively to each other. The said support or standard comprises a part 400 mounted upon the guides 36 in the same manner that the part 40 is mounted, and a part 402, the rear face of the part 400 being provided with teeth which are adapted to engage corresponding teeth upon the front face of the part 402, the two parts being held in their various adjustments by a set screw 106 passing through the member 400 and screwed into the member 402. The yoke 700, which corresponds to the yoke 70 in the construction shown in Fig. 2, is pivotally connected at its upper end to a block 108 having teeth upon its front face engaging corresponding teeth upon the rear face of the part 402.

The block 108 carries a clamp member 110 which surrounds the block 108 on three sides and is provided with lugs which travel in grooves in the sides of the part 402. A set screw 112, mounted in the clamp member 110 and engaging the block 108 is adapted to press the teeth of the block 108 into locking engagement with the teeth on the part 402. Levers 114, pivoted upon the frame 68 and provided with slots which receive the vertical pins 80 upon the forward extensions of the jaws 44, constitute convenient means by which the operator may separate the jaws against the tension of the springs 78.

It will be seen from an inspection of Figs. 4 and 12 that in both of the illustrated forms of the invention the heel clamping jaws are pivoted so that they turn about a center in their inner edge at the back and that therefore the movement of the jaws toward each other is especially emphasized at the forward ends, whereby they serve to force the upper in tight over the last in the region of the shank. It is especially desirable that the heel clamping jaws clamp the shoe comparatively firmly, both for convenience in placing the shoe in proper position in its support and also in order that the upper may be held in the position to which it has been drawn by the movement of the

jaws toward each other until the sole has been laid. For these reasons, in the preferred embodiment of the invention means has been provided for moving the jaws positively in both directions and for locking them in any position to which they have been moved.

The illustrated means comprises a plate 116 rigidly attached to the lower end of the rock-shaft 46 and provided with a cam slot 118 which receives a vertically extended pivot pin 120 connecting the links 50 which operate the heel clamping jaws 42. Simultaneous and equal movement of the jaws is provided for by confining the pivot pin 120 in a longitudinal slot 122 in a central rearward extension 124 of the lower part of the support 38.

Rotation of the rock-shaft 46 by means of the handle 54 will cause the pivot pin 120 to be moved forwardly or rearwardly in the slot 122 according to the direction of rotation of the rock-shaft, thereby moving the jaws 42 toward or away from each other. It will be seen from an examination of Fig. 12 that the shape of the cam slot 118 is such that pressure upon the jaws 42 will not serve to rotate the plate 116, through the transmission of this pressure by the links 50 and pivot pin 120 to the sides of the slot 118. The jaws will therefore remain in any position to which they may be moved by turning the handle 54 except in so far as the spring 52 surrounding the rock-shaft 46, by giving to the rock-shaft a normal tendency to turn in the direction to cause the jaws to move toward each other, imparts to the jaws a corresponding tendency. The jaws will, however, be locked against movement caused by pressure brought to bear directly upon them.

Of means for positioning the sole for the sole laying operation there are shown in the accompanying drawings three forms, that shown in Figs. 11, 12 and 13 being a preferred form.

In Figs. 1, 2, 3, 7 and 10 is shown a sole positioning mechanism comprising a pair of jaws 126, 126 for the heel end of a sole and a pair of jaws 128, 128 for the toe end of the sole. The jaws 126 are pivoted at 130 upon a plate 132 attached to a bracket 134 clamped to the pressing pad support 16. The jaws 126 extend forward over and rest upon the pressing pad 14 and are formed of comparatively thin material, so that they do not interfere with the action of the pressing pad in pressing the sole upon the shoe.

The jaws 128 for the toe end of the sole are pivoted at 136 upon a slide plate 138 having a portion fitting into a dove-tailed guide 140 upon a bracket 142 clamped to the pressing pad support 16. The jaws 126 for the heel end of the sole are preferably fixed so far as movement longitudinally of the sole is concerned, so that they bear a fixed relation to the heel clamping jaws of the shoe supporting mechanism. The jaws 128 for the toe end of the sole, as indicated in the foregoing description, are preferably adjustable longitudinally of the pressing pad to adapt them to different lengths of soles.

Means is preferably provided for insuring equal opening and closing movements of the jaws of each pair in order to insure the maintenance of a predetermined and comparatively fixed line through the jaws which may be called, as hereinbefore suggested, the axial line of the sole. Such equal movements may be insured conveniently by a construction like that shown comprising links 144 for the heel jaws, each link being pivotally connected at one end to a jaw and at its other end having a pivot common with the other link. Similar links 146 for the toe jaws are similarly arranged. Connections are preferably provided so that both pairs of jaws may be operated from the same end of the machine. The illustrated means for operating the heel jaws comprises a rod 148 supported in and guided by a bracket 150 clamped to the pressing pad support 16 and connected at its rear end to one end of a lever 152 pivoted upon the bracket 134, said lever being linked at its other end to the common pivot of the jaws 144. A crosshead 154 having at its outer end a T joint which constitutes a sleeve 156 surrounding the rod 148 and which may be clamped to said rod by a set screw 158 has at its inner end a similar T joint in which is clamped a rod 160 parallel to the rod 148. The rod 160 may be clamped also by a set screw 162 in an upstanding portion on the slide 164 which carries the common pivot for the links 146.

When the machine is operating successively upon soles of the same length, the rod 148 may be clamped to the rod 154 and the rod 160 may be clamped to the upstanding portion of the slide 164, and thus the heel jaws and the toe jaws may be simultaneously opened and closed by the operator, a knob 166 upon the end of the rod 148 being provided for convenient manipulation of this mechanism. If, however, the machine is operating successively upon soles varying considerably in length, it is usually more convenient to leave unclamped either the rod 154 and the rod 148 or the rod 160 and the slide 164. The heel jaws and toe jaws may then be opened and closed separately, and the toe jaws may be readily moved to adapt them for the varying lengths of soles.

The construction just described illustrates one of the simplest forms in which this feature of the invention may be embodied, but a construction which has many advantages over the one just described is one in which the pivot or pivots for the jaws will lie outside the field of operation of the shoe sup-

porting mechanism. Such an embodiment of this feature of the invention is that illustrated in Figs. 8 and 9, and also that illustrated in Figs. 11, 12 and 13. The sole positioning mechanism illustrated in Figs. 8 and 9 comprises jaws 168, 168 and 170, 170 having inwardly extending fingers for engaging the sides of the heel end of the sole and the toe end of the sole respectively, and gage members 172 and 174 stationary relatively to the jaws for engaging the heel and toe ends of the sole respectively.

In order that the portions of the jaws and of the gage members which come within the range of operation of the shoe supporting mechanism may be thin enough not to interfere with the operation of this mechanism, and at the same time may be thick enough properly to locate the sole, the inwardly extending fingers of the jaws and the gage members have been provided at their ends which contact with the edge of the sole with pivoted fingers 176 operating in slots in the jaws and gage members, these fingers being bent on their pivots so that springs 178 pressing upon their ends remote from the edge of the shoe tend to keep their forward ends above the upper surfaces of the jaws and gage members. The springs which bear upon the remote ends of the fingers 176 yield and permit the sole engaging end of the fingers to be pushed down into the slots as the jaws of the shoe supporting mechanism come into engagement therewith during the sole laying operation.

The jaws 168, 168 are separately pivoted upon the plate 132, but are connected by links 144 to a common pivot in the same manner as the jaws 126 of the sole positioning mechanism hereinbefore described. The jaws 168 may also be operated from the forward end of the machine by a rod 148 connected to one end of a lever 152, the other end of which is connected to the common pivot of the links 144, as in the case of the jaws 126, 126 hereinbefore described. The jaws 170 are also separately pivoted but connected by links 146 to a common pivot in the same manner as the jaws 128 of the mechanism hereinbefore described, the common pivot 128 being carried upon a slide 180 movable on the slide 182 which carries the jaws 170 and permits their movement longitudinally of the pad 14 to adapt them to different lengths of soles. An angle lever 184 fulcrumed upon an upstanding portion 186 on the slide 182 affords means by which the operator can separate the jaws 170 against the tension of the spring 188 which tends normally to move them toward each other.

The sole positioning mechanism shown in Figs. 11, 12 and 13, which constitutes the preferred embodiment of this feature of the invention, comprises pins 190 mounted to slide vertically through tubular openings in the upper supporting mechanism. In the preferred form of the invention, a pin is provided for engagement with the rear edge of the heel end of the sole, and a pin for each side of the heel end of the sole. At the toe end of the sole there is preferably only one pin provided, and that is arranged to engage the side of the toe end of the sole away from the operator. This arrangement permits convenient placement of the sole between the pins which normally rest upon the pressing pad 14, being held upon the pad by the action of gravity. The pin for the toe end of the sole slides vertically through a pin guide 192 pivoted upon an extension 196 of one of the jaws 44 in such manner that it may turn in a plane extending lengthwise of the shoe. The pin guide 192 is mounted to turn in a plane extending lengthwise of the shoe in order that its proper position may be maintained when the jaws 44 are adjusted to lasts of different spring and is provided with a curved slot 195 in which travels a set screw 194 by which it may be secured in different angular adjustments. The pin is thus moved with the toe clamping jaw and is therefore automatically adjusted for varying sizes of soles as the jaw is adjusted for varying sizes of shoes. Since the jaws 44, under the action of the springs 78, adapt themselves to shoes of different sizes, it will be seen that, when a shoe is presented to the shoe supporting means of the machine, both said shoe supporting means and the sole locating means adapt themselves to the shoe. The pin which engages the rear edge of the heel end of the sole is guided in a tubular opening in the support or standard 38 and is therefore fixed, so far as movement longitudinally of the sole is concerned.

The pins which engage the side edges of the heel end of the sole are carried in pin guides 198 pivoted at 199 upon the forward face of the support or standard 38 at some distance above the forward ends of the jaws 42. To insure simultaneous and equal movement of these last-mentioned pins toward and from each other, the extended upper ends of the guides 198 are connected by links 200 of equal length having a common pivot 201 which travels in a slot 202 in a plate 204 which is adjustable laterally upon the support 38 to adapt the pins for soles, the heel ends of which are offset more or less to one side of a normal axial line. A spring 206 connected at one end to the support 38 and at its other end to the common pivot of the links 200 gives to the pins 190 which engage the side edges of the heel end of the sole a tendency to move toward each other, this movement of the links being limit-

ed by the engagement of the pivot 201 with the upper end of the slot 202.

It will be understood that the invention is not limited to the illustrated arrangements of pins, particularly at the toe end of the sole.

Fig. 11 as hereinbefore stated illustrates simply a preferred form of the invention.

It will be noted from an inspection of Figs. 11, 12 and 13 that one of the advantages of the preferred embodiment of the invention is that the sole is properly positioned at all times even though it should have been placed in the machine with a considerable curvature or even though it should receive during the sole laying operation such curvature.

In Fig. 14 is illustrated the saving in the length of sole required for the successful employment of the method of sole laying of this application over that required for the successful employment of the ordinary method of sole laying. It will be noted from an inspection of this figure that whereas the preliminary curving of the sole to fit it to the under side of the shoe practiced with the ordinary method of sole laying tends to wrinkle up the inside of the sole, which is the flesh side of the leather, and therefore more spongy than the outside, thereby appreciably shortening the surface which is to engage the under side of the shoe without stretching the outer surface, by the method of this application the curving of the sole takes place along a line lying between the inner and outer surfaces, and the full bottom covering capacity of the inner surface of the sole is utilized. Inasmuch as there is more or less elasticity in a sole, this curving of the sole during the sole laying operation leaves in the sole as laid a tendency to bend back to its flat condition, which tendency, as hereinbefore pointed out, is desirable in most shoes and especially in children's shoes.

The operation of the hereinbefore described machine is as follows: The cross-head 6 being in its uppermost position, the shoe upon which the sole is to be laid is inserted from below between the heel clamping jaws 42 and is brought up against the abutment 55 which is adjusted by turning in its socket until its lower end bears against the crown of the last when the bottom of the last lies substantially in the plane of the under side of the jaws 42.

The spring 52 surrounding rock-shaft 46 imparts to the jaws a normal tendency to move into clamping relation to each other, and as the shoe is moved into such relation to the jaws that the jaws may enter the crease at the heel end the spring 52 causes the jaws to adjust themselves automatically to the size of the shoe and to clamp the shoe sufficiently to hold it during the movement of the toe clamping jaws into operative position. Either at this time or after the shoe has been adjusted at both its heel and toe ends in the shoe supporting means the operator preferably grips the handle 54 and moves the jaws positively toward each other, thereby tightening the upper over the last, especially in the region of the shank, and when the preferred embodiment of the invention is employed the jaws will remain locked in the position to which they have been moved by the operator. The support 40 for the toe clamping jaws is now moved along the guides 36 until the jaws 44 enter the crease at the toe end of the shoe, the ratchet teeth 66, as hereinbefore described, being so inclined that the support may move freely in the direction to contract the distance between the heel and toe clamping jaws, and the pawl 64 locks the support 40 in its adjusted position with the jaws in operative position in the crease at the toe. The sole which is to be laid upon the shoe is placed in position upon the pad 14 either before or after the placing of the shoe in the shoe supporting means, although when the preferred embodiment of the invention is utilized the sole is preferably placed upon the pad after the shoe has been placed in its supporting means, inasmuch as the adjustment of the pin for positioning the toe end of the sole takes place simultaneously with the adjustment of the shoe supporting means. The pins 190 which engage the sides of the sole at the heel end of the shoe being yieldingly pressed toward each other, the sole is simply thrust between these pins and up against the pin which is intended to engage the heel end of the sole and against the pin which engages the side of the sole at the toe end. The spring 206 keeps the opposed side engaging pins in engagement with the side edges of the sole throughout the sole laying operation.

When either of the first described two forms of sole positioning mechanism is employed, the sole is kept substantially in its flat condition in order that the positioning means may readily engage its edge. This condition is obviously not so essential to the successful employment of the sole positioning means illustrated in the preferred embodiment of the invention.

The sole having been adjusted by its positioning means in proper transverse relation to the shoe in the shoe supporting means, the cross-head 6 is moved down by the treadle 12 until the under side of the shoe comes nearly or quite into contact with the sole upon the pad 14, and the shaft 24 is then set in motion by any suitable starting and stopping mechanism, not shown, thereby causing the toggle 26, 28 to be straight-

ened and the pressing pad support 16 to be moved upward pressing the sole upon the pad 14 firmly against the shoe held in the shoe supporting means, the clutch collars 18 locking the head 6 firmly against the upward pressure of the pad 14.

When the form of the invention illustrated in Fig. 10 is employed, as the pressing pad support 16 moves upward to press the sole upon the shoe, the plate 100 carried by said support will raise the foot 98 and, through its connections with the lever 82, will cause the jaw-carrying slide 76 to move rearwardly, thereby forcing the toe clamping jaws 44 firmly into the crease about the toe of the shoe. Inasmuch as the heel clamping jaws are relatively fixed, this movement of the toe clamping jaws will tend to move the last and shoe bodily rearwardly, thereby causing a relative movement of the heel clamping jaws and the upper of the shoe, by which a restoration of the crease at the heel end of the shoe is effected simultaneously with the restoration of the crease at the toe end of the shoe. It will be seen furthermore that this contraction of the distance between the heel and toe clamping jaws also tends to stretch the upper tightly over the heel and toe ends of the last, and such automatic and simultaneous stretching of the upper to conform it to the last is an important feature of this invention. When the form of the invention illustrated in the other figures of the drawings is employed, this crease restoring operation of the jaws may be performed by the operator either before or during the sole laying operation by simply bearing down upon the handle part of the lever 82.

As hereinbefore pointed out, in the manufacture of stitch-down shoes in accordance with the method of my Letters Patent No. 931,851 above identified, the upper is molded substantially to its desired shape, and the insole is attached before the last is inserted. The last is then driven lengthwise into the shoe and, since a comparatively flexible insole is usually employed, the insertion of the last causes the insole to bulge down somewhat below the outturned flange of the upper. This is not objectionable, when the outsole is laid by a machine of this type and, in fact, it is advisable to so form the upper in the preliminary operations that such bulging will take place, since it contributes to the successful carrying out of an important object of this invention, namely, the stretching of the upper transversely of the last during the sole laying operation.

It will be seen from the foregoing description that when the toe clamping jaws are adjusted in proper position about the toe end of a shoe so that they enter the crease between the flange and the upper and support both the flange and the upper against the upward pressure of the sole that as the sole is pressed upwardly by the pad 14 it will force the last up into the upper, thereby stretching the upper tightly to the last about the forepart.

It will be noted that these last-mentioned features of the invention may be utilized to advantage in the performance of several of the steps of a novel method of lasting, and it will be further noted from the foregoing description and from the illustration that there are disclosed in this application a number of improvements in the art of making shoes which cannot properly be claimed herein. Some of these improvements have been made the subject-matter of my co-pending application Ser. No. 429,013, filed April 24, 1908.

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

1. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation constructed to adapt itself automatically to shoes of varying width.

2. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe during the sole laying operation adjustable to shoes of varying sole pitch.

3. In a machine of the class described, the combination with sole laying means, of means adjustable to shoes of different sizes for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, said means constituting also means for carrying the shoe right side up during the relative movements of said supporting means and said sole laying means.

4. In a machine of the class described, the combination with sole laying means, of means comprising a pair of toe clamping jaws and a pair of heel clamping jaws for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, said pairs of jaws being relatively adjustable toward and away from each other in order to operate upon shoes of different lengths.

5. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, comprising jaws mounted to turn about a center lying in the inner edge of said jaws whereby the continuity of said edge is uninterrupted for various adjustments of said jaws.

6. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, comprising clamping jaws normally pressed yieldingly into clamping relation to each other.

7. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation comprising a pair of clamping jaws normally pressed yieldingly into clamping relation to each other, and means for moving said jaws positively into or out of clamping relation to each other.

8. In a machine of the class described, the combination with sole laying means, of means forming a continuous support for the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation and comprising a pair of clamping jaws constructed to move into various shoe clamping relations to each other without disturbing the continuity of the support, and means for moving said jaws positively into shoe clamping relation to each other and locking them in such relation.

9. In a machine of the class described, the combination with sole laying means, of shde supporting means comprising independent pairs of jaws shaped along their inner edges to fit closely the lower edge of the shoe about the heel and about the toe respectively and normally pressed yieldingly into clamping relation to each other, and shaped in transverse section to fit the upper in the crease between the sole attaching flange and the upper, said jaws being arranged for relative bodily movement longitudinally of the shoe.

10. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means movable in substantially the plane of the sole attaching flange and operating during the sole laying operation to insure the maintenance of a crease of desired depth between said flange and the upper.

11. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means moving in substantially the plane of the sole attaching flange during the sole laying operation for restoring to proper depth the crease between said flange and the upper, said means operating to maintain the said depth of the crease during the sole laying operation.

12. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means operating in the crease between the sole attaching flange and the upper during the sole laying operation for automatically reforming said crease, if distorted, and for maintaining a crease of predetermined depth.

13. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation comprising a pair of clamping jaws and a support for said jaws movable with said jaws longitudinally of the shoe during the sole laying operation.

14. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, comprising a pair of clamping jaws and a support for said jaws movable with said jaws longitudinally of the shoe, and means for automatically moving said support during the sole laying operation.

15. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, comprising a member which enters the crease between the flange and upper at the heel end of the sole and another member which enters the crease between the flange and upper at the toe end of the sole, and means for contracting the distance between these two members during the sole laying operation, said members being arranged for relative bodily movement toward and away from each other along the same straight line.

16. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, comprising a member which enters the crease between the flange and upper at the heel end of the sole and another member which enters the crease between the flange and upper at the toe end of the sole, and automatic means for contracting the distance between these two members during the sole laying operation.

17. In a machine of the class described, the combination with sole laying means, of shoe supporting means comprising heel clamping jaws and toe clamping jaws, and means for automatically moving one of said pairs of jaws toward the other during the sole laying operation.

18. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means moving in substantially the plane of the sole attaching flange during the sole laying operation for restoring to proper depth the crease be-

tween said flange and the upper, said means operating to maintain the said depth of the crease during the sole laying operation, and means for insuring during the sole laying operation a predetermined spacing apart of the creases at the toe and heel ends of the shoe.

19. In a machine of the class described, the combination with sole laying means, of means adjustable to shoes of different lengths and widths for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, and means for locking the flange supporting means in its shoe length adjustment.

20. In a machine of the class described, the combination with sole laying means, of means automatically adjustable to shoes of different sizes for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, and means for locking the flange supporting means in its heel width adjustment.

21. In a machine of the class described, the combination with sole laying means, of means adjustable to shoes of different sizes for supporting the sole attaching flange of a shoe against the pressure of a sole during the sole laying operation, said means comprising stationary means for supporting the flange about the heel and movable means for supporting the flange about the toe, means for locking said heel flange supporting means in its heel width adjustment and means for locking said toe flange supporting means in its shoe length adjustment.

22. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, and means bearing upon the crown of the last at substantially one point, about which the last is free to rock, for positioning and maintaining the bottom of the last carried by said shoe in predetermined relation to said flange supporting means.

23. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation, and means bearing upon the crown of the last at substantially one point, about which the last is free to rock, and adjustable to engage with lasts of varying vertical dimensions, to position the bottom of the last carried by the shoe in predetermined relation to said flange supporting means.

24. In a machine of the class described, the combination with sole laying means, of means for supporting the sole attaching flange of a shoe against the pressure of the sole during the sole laying operation comprising a pair of clamping jaws for the heel end of the shoe and an adjustable abutment against which the crown of the last bears during the sole laying operation.

25. In a machine of the class described, the combination with sole laying means and shoe supporting means constructed and arranged to operate upon shoes of various sizes, of means arranged to engage and position in the sole laying means a sole of a size adapted to the particular shoe which is being operated upon, said means operating to maintain the sole in proper relation to the shoe during the sole laying operation.

26. In a machine of the class described, the combination with sole supporting means and shoe supporting means constructed and arranged to operate upon shoes of various sizes, and means for effecting a relative movement of said two means to cause a sole to be laid upon a shoe supported by said shoe supporting means, of means for engaging and positioning upon said sole supporting means in proper transverse relation to the shoe carried by said shoe supporting means a sole of a size suited to the particular shoe which is being operated upon.

27. In a machine of the class described, the combination with sole supporting means and shoe supporting means movable relatively to each other to effect a sole laying operation, of means carried by one of said before-mentioned means and operating upon the sole carried by said sole supporting means for engaging and positioning upon said sole supporting means in proper transverse relation to the shoe carried by said shoe supporting means a sole of a size suited to the particular shoe which is being operated upon.

28. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means for positioning the sole operating to maintain the sole in proper relation to the shoe during the sole laying operation, said means comprising members extending between the sole laying means and the shoe supporting means and yielding into one of said means during the sole laying operation.

29. In a machine of the class described, the combination with sole supporting means and shoe supporting means, relatively movable to effect a sole laying operation, of sole positioning pins carried in guides in said shoe supporting means and resting normally upon said sole supporting means, said pins being arranged to yield into the guides in said shoe supporting means during the sole laying operation.

30. In a machine of the class described, the combination with sole laying means and shoe supporting means adjustable to shoes

of varying size, of sole positioning means constructed and arranged to be adjusted through said shoe supporting means to adapt it to soles of varying lateral dimensions.

31. In a machine of the class described, the combination with sole laying means and shoe supporting means, of sole positioning means, said shoe supporting means and sole positioning means being constructed and arranged to adapt themselves simultaneously to shoes of varying lateral dimensions upon the presentation of the shoes.

32. A sole laying machine comprising sole laying means, and sole positioning means constructed and arranged to adapt itself to soles of varying lateral dimensions as the work is presented to the machine.

33. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means for positioning the sole in the sole laying means operating to maintain the sole in proper relation to the shoe throughout the sole laying operation, said means being adjustable to soles of varying extension on the two sides of the axial line of the sole.

34. In a machine of the class described, the combination with sole laying means, of automatic means arranged to operate during the sole laying operation to stretch the upper tightly over the last.

35. In a machine of the class described, the combination with sole laying means, of means operating during the sole laying operation for stretching the upper tightly over the last.

36. In a machine of the class described, the combination with sole laying means, of shoe supporting means constructed and arranged to effect automatically both a stretching of the upper to produce a close fit lengthwise of the last and a stretching of the upper to produce a close fit about the last transversely of its length.

37. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means operating simultaneously upon opposite sides of the shoe during the sole laying operation to engage the shoe stock in the crease between the sole attaching flange and upper and to force the stock inwardly to tighten it at the front ends of the heel seat relatively to the upper in the shank and to place the said flange in proper position to receive the sole.

38. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means arranged to engage the shoe in the crease between the sole attaching flange and the upper and constructed to bring the sole attaching flange into and maintain it in proper relation to the sole during the sole laying operation, and means to cause said shoe engaging means to tighten the upper in the shank and to maintain it in tightened condition while the sole is being laid.

39. In a machine of the class described, the combination with sole laying means, of means for automatically stretching the upper over one end of the last during the sole laying operation.

40. In a machine of the class described, the combination with sole laying means, of means for automatically and simultaneously stretching the upper over the heel and toe ends of the last during the sole laying operation.

41. In a machine of the class described, the combination with sole laying means, of shoe supporting means constructed and arranged to stretch the upper automatically over the toe end of the last during the sole laying operation.

42. In a machine of the class described, the combination with sole laying means, of shoe supporting means, and means for automatically contracting said shoe supporting means to effect a stretching of the upper over the heel and toe ends of the last during the sole laying operation.

43. In a machine of the class described, the combination with sole laying means and shoe supporting means, of means for positioning the sole upon the sole laying means during the sole laying operation comprising centering jaws for the heel end of the sole and centering jaws for the toe end of the sole, said jaws being movable with the sole laying means during the sole laying operation, and means for simultaneously opening and closing said heel and toe jaws.

44. In a machine of the class described, the combination with sole supporting means and shoe supporting means movable relatively to each other to effect a sole laying operation, of means for positioning said sole during said sole laying operation comprising pivoted sole centering jaws located upon said sole supporting means, but having their pivots lying outside the range of operation of said shoe supporting means.

45. A sole laying machine, comprising, in combination, sole pressing means and means for positioning the sole upon said sole pressing means automatically adjusted by the presentation of the shoe to the machine.

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

KARL ENGEL.

Witnesses:
H. DORSEY SPENCER,
FREDERICK L. EDMANDS.