A. L. RUSSELL.

GRIPPER MECHANISM FOR PULLING-OVER MACHINES.

APPLICATION FILED AUG. 29, 1910.

1,169,872.

Patented Feb. 1, 1916.

4 SHEETS—SHEET 1.

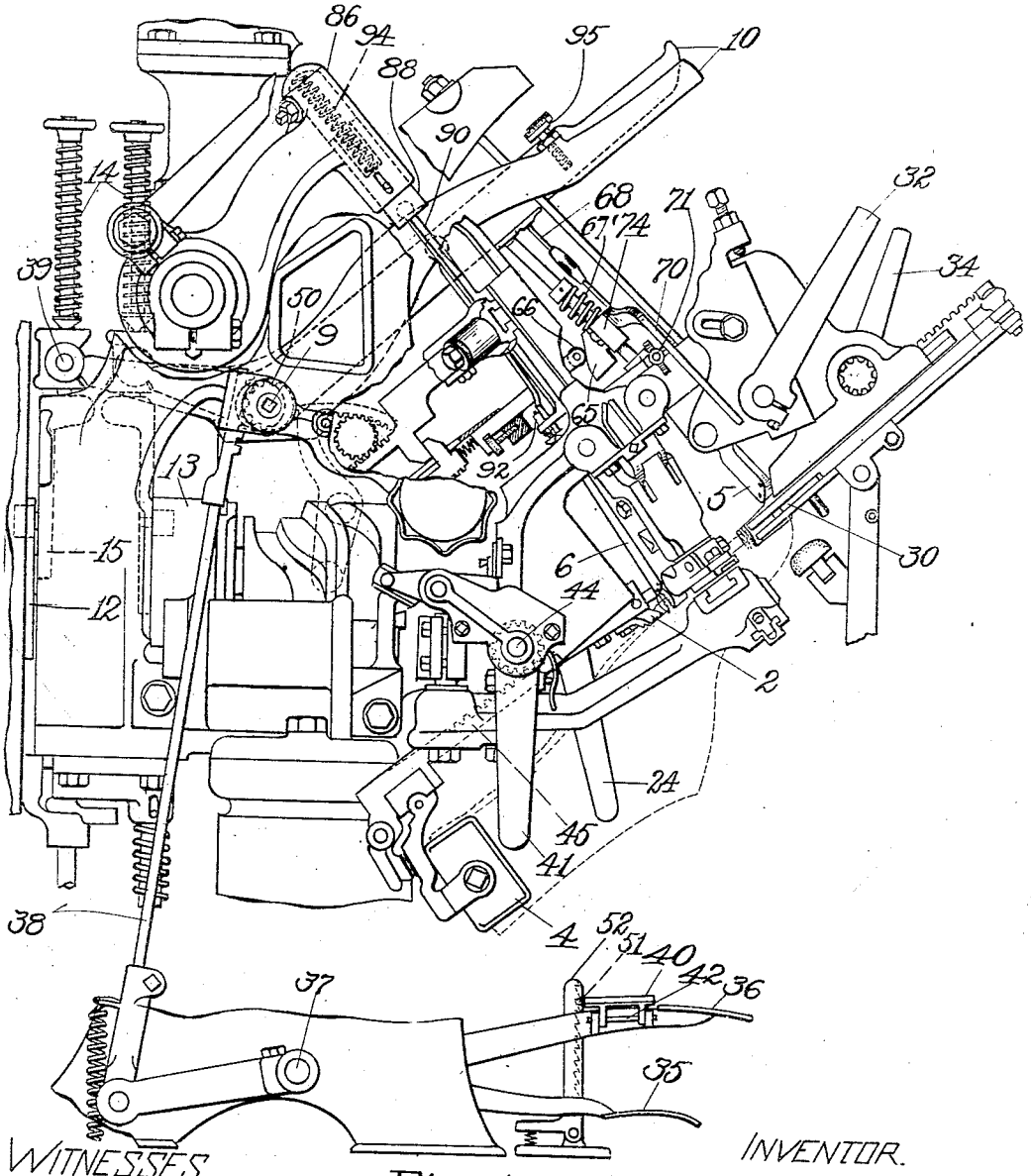

Fig. 1.

WITNESSES.

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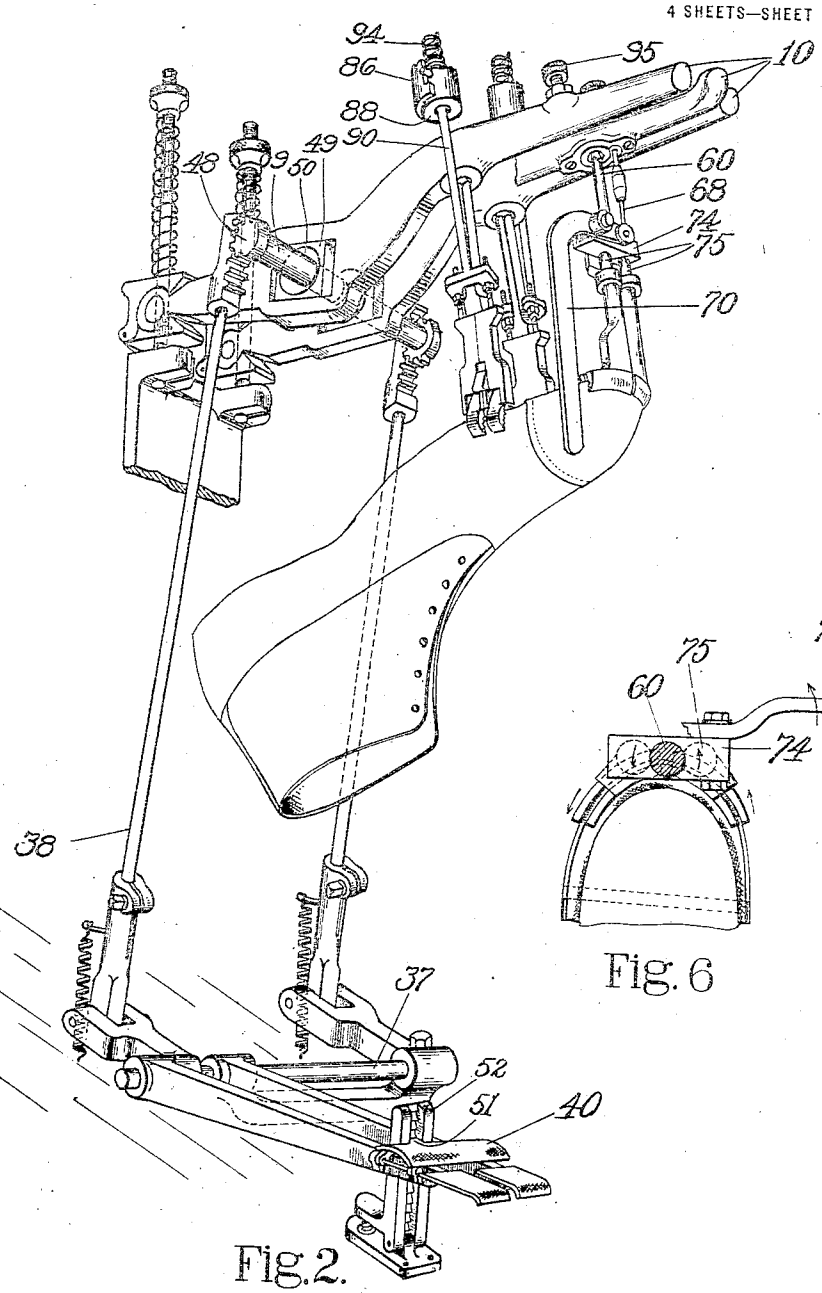

Fig. 2.

Fig. 6

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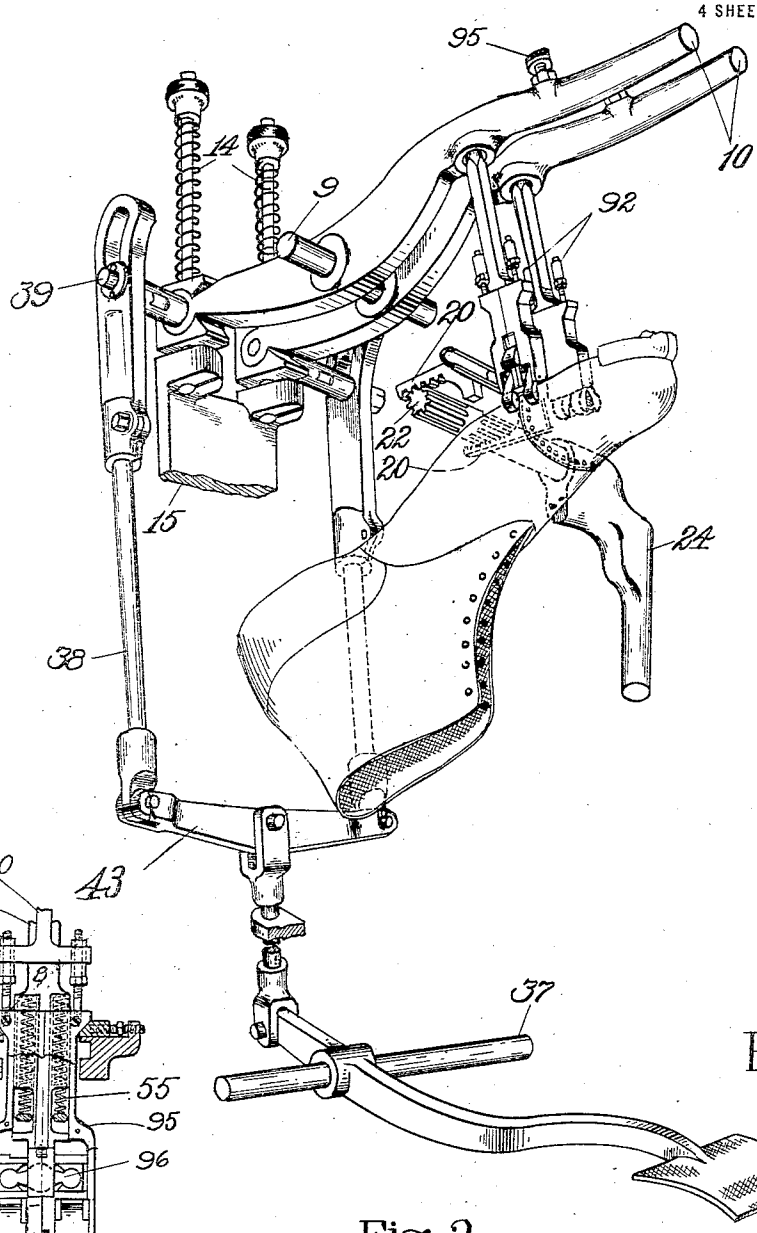

Fig. 3.

Fig. 7.

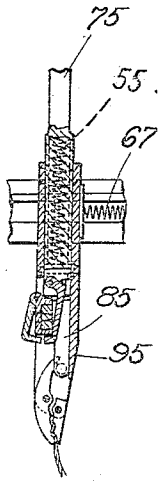

Fig. 8.

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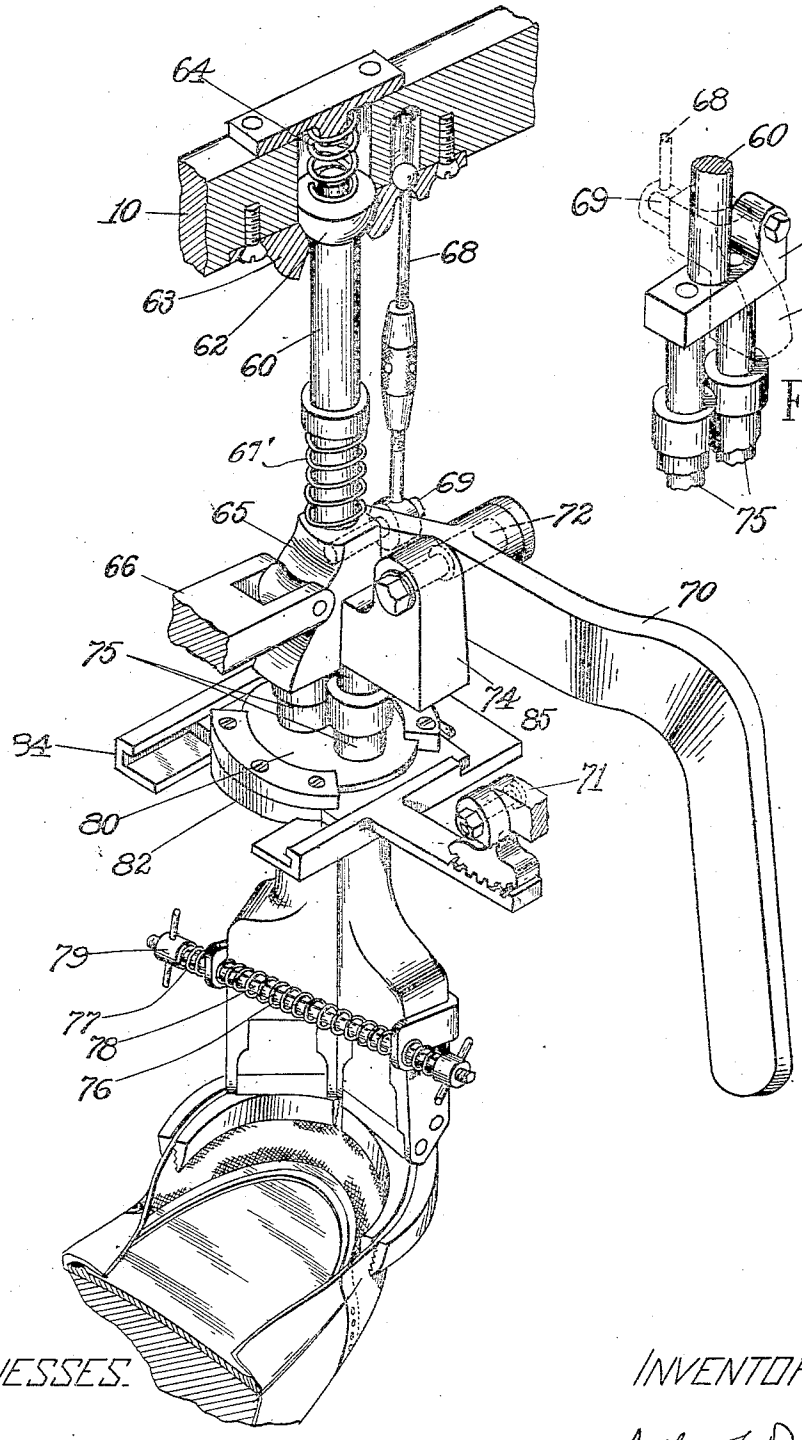

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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GRIPPER MECHANISM FOR PULLING-OVER MACHINES.

1,169,872. Specification of Letters Patent. **Patented Feb. 1, 1916.**

Application filed August 29, 1910. Serial No. 579,579.

To all whom it may concern.

Be it known that I, ARTHUR L. RUSSELL, a citizen of the United States, residing at Hyde Park, in the county of Norfolk and State of Massachusetts, have invented certain Improvements in Gripper Mechanisms for Pulling-Over Machines, 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 pulling-over machines and is herein illustrated as applied to a machine of the type shown in United States Letters Patent No. 1,029,387, granted June 11, 1912.

An object of this invention is to improve upper pulling mechanism in certain respects.

The machine shown in said patent comprises yieldingly actuated side grippers and toe grippers mounted upon operating levers, together with means for moving the side grippers relatively to adjust the upper lengthwise of the last for straightening the toe tip seam or re-positioning the pulled upper upon the last, this tip straightening adjustment being effected by a hand lever and connections to the two side grippers. An adjustment of the upper transversely of the last is effected as therein described by moving the handle ends of the side gripper operating levers in opposite directions, one upwardly and the other downwardly. It has been proposed to provide means connecting the side gripper levers with a foot treadle by means of which the front ends of the levers and the grippers carried thereon can lowered for relaxing the tension on the upper held by the side grippers while the tip straightening adjustment is being effected. This permits such adjustment to be made more easily and with less straining of the upper than would occur if the adjustment were made while the upper materials were tightly held in contact with the last. It is found that one of the yieldingly actuated side gripper operating levers is sometimes moved by the power operating mechanism of the machine into a different vertical position from that to which the lever on the other side of the machine is moved, because the upper stretches more on one side than on the other or is gripped lower on one side, or they may be moved into such different relative positions for transversely adjusting the upper prior to tip straightening.

A feature of this invention consists in providing tension relief mechanism by which two side grippers can be lowered together in any relative positions which they may occupy without disturbing such relative positions. In an illustrated embodiment of the invention equalizing means is arranged between a source of manual power and the gripper levers by which they may each be moved through the same distance from whatever similar or dissimilar position they may occupy. By this arrangement the tension on the pulled upper will be relaxed equally at the two sides of the shoe after which any required adjustment of the upper longitudinally around the last for tip straightening or transversely of the last may be effected. In the latter adjustment the equalizing means will be shifted and will insure the re-tensioning of the upper in its corrected position. The equalizing means may take the form of an equalizing bar with connections extending from suitable points on the two side gripper levers as, for example, the form of a cover plate loosely lying upon the forepart of two treadles each connected to a side gripper lever. With this arrangement pressure upon the cover plate will move both gripper levers together equally from whatever like or unlike position they may occupy with the pulled upper under tension. The ends of the treadles may advantageously be uncovered and adapted to be engaged and depressed by the heel of the foot having its forepart on the cover plate. By this arrangement the treadle connected with either side gripper lever may be depressed relatively to the treadle connected to the other side gripper lever whereby the side grippers can be moved relatively or in opposite directions vertically to effect shifting of the upper transversely about the last while the tension is relaxed. It should be noted that this transverse adjustment can be made without necessarily using the hands of the operator, his hands being free for other purposes as, for example, for manipulating the tip straightening lever to shift the upper lengthwise about the last, or the shoe rest lever with which the machine is equipped to move the last lengthwise in the relaxed upper. The connection between the treadle or

treadles and the side grippers may be located at the rear ends of the levers for lifting said ends against the tension of the usual springs through which said levers are actuated from the power shaft, or alternatively the treadle connections may extend to eccentric bearings on which the side gripper levers are fulcrumed and which are arranged to be controlled by the treadles to lower the fulcrums of the levers for relaxing the tension on the upper and to raise the fulcrums for restoring the tension on the upper. In this embodiment of the invention, the treadle will be normally locked in its depressed position and permitted to rise for relaxing tension and thereafter be depressed to restore tension and, if desired, this manually operated means may be employed to increase the tension beyond that which the power actuated mechanism originally produced.

A further feature of the invention is found in means for regulating the power actuated pull of the grippers. This feature of the invention is herein shown as embodied in mechanism for closing the grippers initially with a light grip which will be adequate to straighten the upper to the last and will then allow the upper to slip between the jaws until a predetermined point is reached in the gripper movement whereupon an additional closing of the jaws is effected to stop the slipping of the upper and insure that it shall be pulled and stretched during the remainder of the gripper movement.

As I am advised it is new to provide gripper operating mechanism by which to straighten an upper and then allow lost motion while the operating mechanism continues to move and thereafter to resume upper pulling action to tension the upper, whether or not said mechanism secures this result by operating as herein shown; to close a gripper lightly, move it through a portion of its stroke and then further close it for a further upper pulling movement. It is also new to seize an upper with force to pull it lightly until the resistance causes the upper to slip in the jaws, and thereafter tighten the grip on the upper and pull it firmly, with or without provision for predetermining the length of the final upper stretching portion of the gripper movement.

A novel feature of the invention is to be found in the illustrated embodiment of the foregoing in which mechanism is provided for closing a gripper in two steps which are separated by a portion of the pulling movement. As herein shown grippers of a known type heretofore employed in this machine are initially closed by the action of a lighter spring than that previously used and which is arranged to effect a relative movement of separation between the jaw carrier and an actuating bar. The arrangement is such that the carrier is held vertically stationary by the spring while the closing bar rises until the grip on the upper equals the force of the spring. The bar is then further lifted by the power mechanism of the machine and lifts with itself the carrier and the jaws to pull the seizer upper. It will be understood that the strength of the closing spring measures the force with which the grippers seize and hold the upper. In accordance with this feature of the invention provision is made for applying an additional jaw closing force at a predetermined point in the upper pulling movement, or updraw movement, to set the jaws hard against the upper, arrest any slipping which may have occurred, and insure a stretching of the upper during further updraw movement. This further movement may be predetermined in length to take a measured length of stretch out of the previously straightened or lightly tensioned upper. The additional jaw closing force is applied as a resistance to the upward movement of the gripper jaw carrier and causes, or tends to cause, the actuating bar to move with relation to said carrier and jaws and tighten the grip on the upper by a continuance of the initial jaw closing movement. This resistance is herein obtained from a supplemental closing spring which is arranged to be encountered by the carrier at a point in its movement which can be varied to cause final closing to occur earlier or later. The supplemental spring serves to tighten the jaws increasingly as the updraw movement proceeds and thus to compensate for or to equal the increasing strain on the upper tending to pull it out of the jaws. Advantageously a stop may be arranged adjustably to limit the updraw movement of the gripper lever, or all the gripper levers of the machine, for giving a measured length of stretching of the upper. It is desirable to cause the jaws to tighten immediately at the point selected for final gripping to take place in order that the slipping of the upper between the jaws shall be arrested with certainty. As a precaution to insure this result, pneumatic stops are herein shown as arranged in the path of the jaw carriers. These pneumatic stops serve not only to set the jaws tight upon the upper as soon as the jaw carriers encounter the stops but they serve the additional purpose of buffers to insure a gradual final pulling movement as the air escapes from the cylinders. Advantageously the springs and the pneumatic stops can be combined into one construction, the springs being inclosed in the stops. Advantageously the machine will be arranged to cause the grippers to assume a shoe receiving position low enough to insure ample opportunity for seizing short or scantily cut uppers, and preferably provision will be employed for

adjusting the shoe receiving position of the several pairs of grippers.

The invention as thus far described is herein applied to the side gripper mechanisms, although it may be applied to the toe gripper if desired.

Another important feature of the invention consists in provision for actuating the toe gripper to impart thereto an initial forward movement. Preferably a toe gripper is employed which is long and curved to grasp the upper at the opposite sides of the forepart as well as at the toe end of the shoe. In accordance with this feature of the invention the toe gripper is initially actuated lengthwise of the last with little or no updraw. By this movement the upper is first straightened out, and it may be tensioned, lengthwise over the last without being bent up over the toe end of the last. In so doing the upper is tightened about the rear portion of the last and, particularly if the long curved grippers are employed, is drafted forwardly along the whole length of each side edge. This occurs before the side grippers close upon the upper and serves to prepare the upper for the updraw and the overpulling in a way similar to that which is practised by many workmen who seize the upper with the fingers or with pincers and try to set the entire upper forwardly upon the last and then hold it in such condition while they present the shoe to the machine. Preferably the gripper actuating mechanism will be arranged to enable further, manual actuation of the toe gripper forwardly to be effected after the initial automatic actuation thereof. For this purpose the illustrated embodiment of this feature of the invention includes means for effecting automatically a forward movement of the curved toe gripper to strain the sides as well as the middle portion of the entire upper forwardly and devices wherethrough said means may be further actuated by the operator in the usual period of the machine's rest to move the toe gripper forwardly. Means is also provided which is connected with the long curved toe gripper by which said gripper may be moved rotatively or substantially in the direction of its curved length to adjust the upper about the toe portion of the last. This feature of the invention will preferably be embodied in a gripper which comprises a plurality of sections of which those on either side of the middle of the toe will be mounted for movement about a separate axis located on the adjacent side of the central axis about which all sections can turn as a whole. For some conditions of work the machine actuating mechanism may be arranged to delay the closing of the side grippers until after the first dwell in the machine's operation, thus facilitating the adjustment of the upper about the toe portion of the last by the rotative movement of the curved toe gripper.

The several features of this invention, including certain details of construction and combinations of parts, will more fully appear in connection with the following description of an embodiment of the invention which is illustrated for the purpose of explaining one way in which the invention may be employed.

Figure 1 of the accompanying drawings is a side elevation of a machine embodying this invention; Fig. 2 is a perspective view of actuating mechanism connected with the side grippers; Fig. 3 shows a modification; Fig. 4 is a perspective view of actuating mechanism connected with the toe gripper; Fig. 5 is a detail thereof; Fig. 6 is a plan illustrating an adjusting operation to be effected by the toe gripper; Fig. 7 is a side view of the side grippers, and Fig. 8 is a section substantially on line 8—8 of Fig. 7.

The illustrated machine, which will be briefly described and of the previously known portions of which more complete explanation will be found in said prior patent, comprises a sole or bottom rest 2 against which the operator presents the shoe, and a heel rest 4 which is advanced to position to resist rearward displacement of the shoe after the grippers begin to pull upon the upper. The toe gripper is indicated in Fig. 1 at 5 and the side grippers at 6 each being guided in the machine frame and connected to an updrawing lever 10 the handled ends of which extend into position to be seized by the operator and the tails of which in the rear of their fulcrum rod 9 are connected to cams 12 and 13. The connection of the side gripper levers is made yieldingly through the springs 14 and a slide 15 to the cam 12 and the toe gripper lever has a similar yielding connection with the cam 13. The cam lowers the toe gripper to a shoe receiving position in which the jaws extend below the plane of the shoe bottom as that plane is determined by the sole rest, and where the inner jaw serves as an abutment or end positioning stop for the toe of the last. The side grippers also have a connection shown in detail in Fig. 3 with rack bars 20 that engage respectively with the upper and lower sides of the toothed portion of a shaft 22 having a hand lever 24 by the movement of which the side grippers can be simultaneously moved, but in opposite directions, whereby an adjustment of the upper is effected longitudinally about the last. Adjustment of the upper transversely about the last may be effected by the handled levers 10, one of which may be upraised and the other depressed, to shift the belt of upper held by them toward either side of the last. The first of these adjustments is used mainly to straighten the toe

tip seam of the shoe and the second to position the throat or lace opening of the upper suitably upon the last. As explained in said patent, the machine comes automatically to rest with the upper under tension to permit inspection and the described adjustments and such other as are needed. When the machine is restarted the grippers carry the upper over the last bottom into position to be fastened by the tackers described in said patent, or otherwise. The machine is herein shown as equipped with a toe lasting mechanism by which the toe portion of the upper is overworked into finally lasted position. This mechanism, as more fully described in United States Letters Patent No. 1,135,949, granted April 13, 1915, comprises end embracing wipers 30 which are actuated to wipe the upper upwardly toward the edge of the last by a hand lever 32 and are advanced and closed by a hand lever 34 to force the upper into position where it is secured by a binder of wire or the like. Further description of the mechanism thus briefly outlined and of coöperating mechanisms will be found in said prior patents.

In addition to the starting treadle 35 by which the power is applied, the machine is equipped with treadles 36, fulcrumed on the same rod 37 in the base of the machine, and operating rods 38 which extend to the side gripper levers for actuating them manually and by which the side grippers can be raised or lowered while they hold the upper under tension. The forward portions of the treadles are overlaid by a cover-plate 40 where the ball of the operator's foot comes. This cover-plate serves as an equalizer through which pressure of the foot may be transmitted equally to move the two side gripper levers alike. In practice one gripper and its treadle often rises farther than the other because of uneven gripping or unequal stretching of the upper materials or because of adjustment to move the upper transversely about the last and to meet this condition the cover plate is pivotally connected at 42 to one treadle and rests loosely upon the other so that it adjusts itself automatically to the relative position of the two treadles and is capable of actuation to move them equal distances from whatever relative position the two treadles and their grippers may occupy when the foot is applied to the cover-plate. Thus the tension may be relieved without any liability of disturbing the relative positions of the side grippers to each other and consequently effecting maladjustment of the upper or losing the transverse adjustment which may have been previously made. Preferably the treadles extend from under the cover-plate into position to be engaged alternatively by the heel of the operator, if desired, to move them relatively and thereby effect any required relative movement of the two side grippers in the direction to shift the upper transversely about the last after the tension is relieved. This is done, as will be obvious, without requiring the use of the operator's hands upon the handled updraw levers 10 and leaves both his hands free for other uses such as, for example, manipulating the tip straightening lever 24 or the heel rest advancing lever 41 which is connected through the pinion shaft 44 and the rack 45 with the heel rest 4 to adjust the rest and thereby the last longitudinally in the upper while the tension of the upper transversely of the last is relaxed by the foot treadles. Also the toe gripper may, while the tension of the side grippers is relaxed, be moved by its handled lever 10 to increase or relax the longitudinal tension on the upper or by its new lever 70 as hereinafter described.

In accordance with the prior invention shown in Patent No. 1,055,016, granted on application of Eli Brothers, a single treadle, like the treadle 36', is shown connected to both side gripper levers. In Fig. 3 I have shown at 43 an equalizer connecting the two rods 38' to the treadle 36' in a manner which renders said equalizer the functional equivalent of the cover-plate 40 for insuring equal movement of the two side gripper levers from any relative positions to which they have been moved by the power mechanism, which relative positions vary more or less because of differences in the elasticity of the upper stock in different portions of the shoe.

In Figs. 1 and 2 the treadle rods 38, actuated from the treadles 36 through the equalizer 40, have rack teeth on their upper ends which engage toothed extensions 48 of the pivot rod 9 which is formed in two sections for separate movement. Each toothed section of the rod 9 carries an eccentric 50 mounted in a cage 49 that can slide in the lever 10. The eccentrics are arranged on the rods 9 to cause depression of the treadles to lift the side gripper levers and to cause elevation of the treadles to lower the levers. The cover-plate carries a pawl 51 which engages a ratchet bar 52 to secure the treadle down. The ratchet bar is pivoted to the floor plate and is held against the pawl by a spring but can be tipped backwardly by the toe of the foot on the treadle. The ratchet teeth are set in a groove to avoid engagement with the operator's shoe. Normally the treadle will be secured in an intermediate position to permit additional depression to lift the side grippers or either of them for further pulling the upper manually, if desired, after the initial, power effected pull. Release of the pawl and the rise of the treadle thereby permitted, will turn the eccentrics 50 to relax the tension of the held upper. The grippers are returned

to upper seizing position by the power at the end of each cycle, being stopped at appropriate elevation by abutments on the frame of the machine after which they put under compression the gripper closing springs 55 as later described. The abutments 53 for the side grippers, see Fig. 7, are formed as opposed inclines between which these grippers are centered transversely of their length, or returned to normal position from the tip straightening adjustment. The abutments are herein adjustably supported on the frame by reversely threaded screws 54 which permit the opposed abutments to be set different distances apart to allow the grippers to be positioned therein higher or lower for seizing the upper. Preferably when the gripper closing mechanism herein described is employed the grippers will be always positioned low enough to seize readily even short uppers and uppers on lasts which have low balls and high toes which hold the upper initially low down at the side grippers. The abutments 53 can also be adjusted by the screws 54 to locate the grippers farther forward or backward in the machine as will be obvious from the drawing.

The jaw closing spring 55 of the grippers, see Fig. 8, which is put under compression by the power when the grippers are returned to upper seizing position, acts downwardly against a shelf on the jaw carrier and upwardly upon the actuating bar which is indicated by the character 75 to agree with Figs. 4 and 5, although it will be understood that the closing mechanism in the respect here under consideration is essentially the same for the side and the toe gripper. This spring, which forces upwardly the bar 75 and its foot piece 85 to rock the pivoted jaw toward the fixed jaw, is only strong enough to effect a light gripping of the upper materials by the jaws. The hold of the jaws thus effected is firm enough, however, to cause the upper to be straightened up as the lever 10 rises and to cause the upper to be more or less tensioned and then to permit the upper to slip between the jaws. The upper may slip in any pair of jaws after the upper has been straightened up or drawn to the last and tensioned lightly at each of the gripped places. Of course, if one gripper, as the one on the outer side of the last, is positioned lower by the abutments 53 than the gripper on the inner side of the last it will be raised sooner than the other gripper by their common operating cam 12 and it will begin to straighten up the upper before the gripper on the inner side does so and thereby will tend to draft the upper toward the outer side of the last, as is required to make an upper fit properly some shapes of lasts. For each gripper there is provided a stop or abument which then retards the rise of the carriers and the jaws while the actuating bar and its jaw closing foot 85 continue to rise uninterruptedly with the lever 10 whereby the jaws are further closed hard upon the stock to discontinue the slipping of the upper and compel it to stretch with the further movement after the retarding resistance has been overcome. For this purpose, as herein shown, the frame of the machine carries for each gripper a pneumatic cylinder 86 in which fits a piston 88 from which depends a rod 90 arranged to be engaged by the gripper jaw carriers at a point in the rise of the latter which is predetermined by the adjustment of stop nuts 92 on screw stems which project from the gripper carriers. The upper portions of the stop nuts are sleeves which loosely embrace the screw stems and over which the foot of the rod 90 slides to guide the latter. The cylinder has a suitable vent and valve as is customary and a spring 94 is associated therewith and with the piston which preferably offers a substantial resistance to the displacement of the piston by the gripper carriers and also acts as a return spring for the piston. These retarding means, it will be seen, suddenly check the rise of the jaw carriers with the actuating bar 75 and cause the jaws to bite sharply into the upper. This biting occurs at a moment when the upward movement of the jaws has been interrupted so that snatching and tearing of the upper is avoided and the pneumatic cylinder assures a comparatively slow further rise of the grippers for finally stretching the upper. The gripper cams 12 and 13 of course complete their movement in the usual time and in doing so the springs 14 are compressed to store up power which they expend in completing the stroke of the levers 10 and the upper stretching movement of the grippers so that ultimately the upper is stretched to the extent for which the machine is set but the final stretching occurs slowly and is completed after the cam shaft has come to rest. This slow final pulling of the upper is desirable for thus the upper will stretch more without danger of tearing than is otherwise possible for it to do. It will be understood that with the described arrangement the upper is first lightly seized at a level that may be as low as is convenient for getting hold of the upper in the position in which it comes to the machine without requiring special care from the operator to get it down to the last before inserting it into the jaws. Then the upper is drawn up to the shape of the last and maintained under light tension while it may slip as the grippers rise to the abutments formed by the rods 90. When the carriers contact with the rods the effect will be similar to that of an additional jaw closing spring, and in fact, the spring 94 may be so consid-

ered, and the jaws are firmly set on the stock. They then proceed slowly to stretch the upper as the levers 10 complete their stroke. Stops 95 are carried by the levers to engage the machine frame and adjustably limit the extent of the lever movement. By suitable adjustment of the stops 95 and the screw stops 92 a measured length of stretch can be taken out of the upper after the initial upper straightening or initial tensioning operation. The closing spring 55 for the toe gripper may advantageously be strong enough to hold the upper firmly for the foredrawing operation if the toe gripper mechanism here described is employed but the cylinder 86 and piston 88, if they be used with the toe gripper will insure a slow, gradual, final stretching by that gripper as well as by the side grippers. The spring 94 may be omitted from the cylinder for the toe gripper.

The side gripper or gripper mechanism preferably comprises two pairs of jaws and two jaw carriers 95, as is shown in Fig. 7. With these jaw carriers and jaws coöperates a single actuating bar 75. There is a closing foot 85 for each pair of jaws and the two feet are connected together and to the actuating bar by an equalizer 96. This mechanism is well known and in common use and it is described in United States Letters Patent No. 1,030,522, granted June 25, 1912, on application of Ronald F. McFeely. The front pair of jaws is arranged to engage the stock of the tip seam and the rear pair of jaws is arranged to engage the upper that extends over the ball of the last. The stock of the seam does not stretch much and also it usually lies closer to the last when the upper is applied than does the upper in the rear of the seam. This is because present lasts have a more or less exaggerated height at the toe and a corresponding depression between the toe and the instep into which it is one object of this invention to pull the upper down into contact with the last before the measured upper stretching movement begins. For this purpose the rear pair of jaws may be arranged to reach down lower than the front pair, and in rising the equalizer 96 permits the front jaws to pause and the rear ones to continue their upward movement until they have drawn the upper down into the hollow of the last and into such contact therewith as to produce a resistance equal to that offered by the stock of the tip seam. Thereafter both pairs of jaws will move to tension the stock equally. If the upper is held under strong lengthwise tension by the toe gripper while the side grippers act it requires considerable force to draw the upper down into the hollow of the last. This condition may render it desirable to close the rear pair of jaws tightly upon the upper before the front pair is so closed. To provide for doing this a separate screw stop or abutment 92 is provided for and carried on each gripper carrier and these stops may be set to cause one pair of jaws to tighten their grip before the other pair does. In practice these stops will be set to close the two pairs of jaws tightly and stop their slipping over the upper in such predetermined order as the conditions presented by the work, including the style of the last, may require. If it be desired to pull the upper and the lining separately on account of the fact that the lining really requires only to be straightened firmly and does not need the stretching, or actual extending, that the upper requires, or for any other reason, one pair of jaws will be engaged with the lining and the other pair with the upper and the stops 92 will be adjusted to cause the desired relative lengths of final pulling movement to be effected. If desired the stop 92 which coöperates with the carrier and jaws that hold the lining can be adjusted up to an inoperative position so that only the upper stretching jaws are subjected to the second step of the closing action. In this use of the machine the pivoted equalizer 96 will be replaced by a connecting bar which has no pivotal movement. Also, preferably, the jaws that engage the lining will be so formed by offsetting them in an obvious manner that they will stand closer to the last than the upper engaging jaws and not deflect outwardly the upper which extends over them.

The bar 60 of the toe gripper has a head 62 confined by plates 63 in a recess in the toe gripper lever 10 in which said bar may have endwise and rotatory movement, and a spring 64 serves to press the bar down. A cam block 65 having a rearwardly and downwardly inclined back face is mounted to slide on the bar 60 and is engaged on said inclined face by the gripper spreading bar 66. This bar is a part of the gripper spreading mechanism of the machine of said patent which has for its purpose to position the grippers apart suitably for the upper seizing operation and to retract during the second portion of the power operation of the machine to permit the inward or overdrawing movement of the grippers by suitable springs, one of which is shown at 67 in Fig. 8. Bar 66 is rigidly held out during the updrawing movement and compels the block 65, as it rises, to force the toe gripper forwardly. This block is connected as herein shown by an unyielding rod 68 to the updraw lever 10 so that by the initial upper pulling movement of the lever 10 the block 65 is drawn upward upon the bar 60 which remains at rest, or substantially so, because of the lost motion in the recess in lever 10 and the action of spring 64. This rise of cam block 65 effects a forward move-

ment of the toe gripper before there is any substantial upward movement so that the upper is drawn forwardly or lengthwise of the last as the first step in the pulling-over operation after the upper is seized. Preferably the toe gripper is broad enough to impart the initial forward stretching to substantially the entire width of the upper thus doing for the upper what a careful workman often does in pulling-over shoes by hand. The extent of the initial foredraw can be varied by adjusting the rod 68 which is formed in two sections connected by a turn buckle. The head on the upper end of the rod is confined by the plate 63 in a vertically elongated recess in the lever 10 to allow for the first portion of the rise of lever 10 which is coincident with the expansion of the closing springs for shutting the jaws without otherwise disturbing their relation to the upper. The jaw closing mechanism will be essentially the same as that described for the side grippers. It should be understood in connection with both the toe and side grippers that the initial closing movement is a complete closing of the jaws by which they seize and hold the upper, after which they pull it more or less, and the secondary closing devices act to tighten the grip and set the jaws more firmly upon the stock preparatory to the final pulling. In this respect this invention is to be distinguished from prior suggestions for approximate and final closing devices which perform two steps in a single seizing operation before the jaws are moved in the direction to pull the upper. The cam 13 operating the toe gripper is arranged to close and to impart this foredrawing movement to the toe gripper before the side grippers are closed. Provision is herein made for effecting manually a further foredraw by the toe gripper during this period of rest while the upper is under tension. To this end a lever 70 is connected to the block 65 and the rod 68 by the bolt 69 which attaches the rod to the block. This lever is fulcrumed at 72 to a support 74 which is vertically stationary on the bar 60 so that by depressing the handled end of lever 70 the block 65 can be elevated to force the gripper farther forward while the upper is held under tension, if, upon inspection, additional foredraw appears to be desirable. A spring 67 presses the block 65 down as far as the rod 68 permits.

The support 74 for lever 70 is a block which is symmetrically mounted on the bar 60, see Figs. 1, 2, 4, 5 and 6 and from the block at opposite sides of the axis of bar 60 are suspended the separate operating bars 75 of the sectional gripper jaws. These jaws are formed of a length and curvature to engage substantially the full width of the shoe upper at the toe end and to extend around to the sides of the toe as shown in Fig. 4. Each of the gripper sections is free to turn about the axis of its rod 75 and thereby to adjust itself to the width and shape of the last. A light spring 76 on a rod 78 normally holds the sections laterally extended for a medium last while shorter springs 77, Fig. 4, permit further extensions of the sections by a wide last and thumb nuts 79 provide for adjustment, it being understood that the gripper sections conform themselves approximately to the shape of each last as the toe of the last is positioned against the inner jaws in presenting the shoe for the operation of the machine. The rods 75 extend through a rotatable disk 80 which has bearing in a slide 82 that is guided in ways in plates 84 supported in the frame whereby to allow the forward and backward movement of the toe gripper mechanism as a whole. The hand lever 70 may be employed to effect rotation of the toe gripper about the axis of bar 60 by pressing said lever forwardly or backwardly as indicated in Fig. 6. In such manipulation one side section of the gripper is moved forwardly and the other side section backwardly while each one is free to adjust itself upon its own axis. Thus a forward stretch is put upon the upper at one side of the shoe while the foredrawing pull is relaxed on the other side of the shoe. By this adjustment of the toe gripper tip straightening may be effected. The earlier described mechanism by which the tension effected by the side grippers is relaxed by foot treadles 36 obviously cööperates to render the tip straightening by the toe gripper much more easy and effective by reducing the friction of the upper over the ball of the last. A preliminary bodily adjustment of the toe gripper transversely of the machine for right and left lasts may be made by the hand lever 71. In some kinds of work the cam 12 may be set or formed to delay closing of the side grippers until after the period of rest and inspection in the machine's operation and the toe gripper mechanism will then be depended upon entirely to effect the tip straightening adjustment. By exercising care in presenting the upper in position to be gripped the tip straightening adjustment is reduced to a minimum and such careful presentation is made easier in this machine by employing the gripper jaw end faces as gage lines with relation to which to position the tip seam for gripping of the upper. The slides 84 may, if desired, form a yoke or a carrier 85 that is adjustable transversely of the machine by a rack bar and segment toothed lever 71 as heretofore proposed and by this combination the toe grippers can effect transverse adjustments to position the lace opening of an upper not yet seized by the side grippers. Another use for which

the described treadle mechanism connected with the side grippers is adapted is for depression during the power operation thereon to delay closing of the side grippers and seizure of the upper by them until such time relative to the operation and adjustments of the toe gripper as the operator selects for each shoe. Thus at any time the operator may manipulate the treadles 36 and 35 at the same time and can hold down the side grippers and prevent them from seizing or pulling the upper until after the machine has come to rest and the upper has been adjusted by the toe gripper. Also it will be obvious that the treadle connection with one side gripper can be moved to adjust its eccentric 50 relatively to the eccentric for the other side gripper and thereby cause one gripper to pull the upper engaged by it more than the upper engaged by the other side gripper. This may be advantageous in pulling-over shoes on some styles of right and left lasts when it is desirable that the gripper engaged with the upper on the outer side of the last shall pull harder than the gripper that engages the upper on the differently shaped inner side of the last. The treadles furnish means constantly under the operator's control by which to cause the automatic mechanism to pull the upper at the two sides of the last to such different extents as the particular shoe may demand.

The operation of the machine has been sufficiently explained in connection with the foregoing description of its construction and the explanation of the nature of the invention.

By the following claims I desire to secure by Letters Patent of the United States protection for all the novelty of which this invention is possessed and for which I am entitled to protection under the statutes whether or not every feature of the invention has been particularly pointed out herein and I intend that the claims shall be construed and interpreted to this end.

I claim—

1. A pulling-over machine having, in combination, a plurality of grippers and actuating means for causing them to put an upper under tension about a last, said actuating mechanism having provision for moving different grippers through different distances, and a single manually actuated device connected operatively with two of said grippers located at opposite sides of the last and arranged to positively move each gripper the same distance from whatever position it may occupy to change equally the tension under which the upper is held by the two grippers.

2. A pulling-over machine having, in combination, grippers arranged at opposite sides of a last and actuating mechanism therefor including yielding elements coöperating with opposed grippers whereby they may be actuated through different distances in putting the upper under tension, means arranged for manual operation to move opposed side grippers together to change the tension on the upper, and an equalizer between the source of manual power and the side grippers to insure equal movement of each side gripper from whatever position it may occupy relatively to the other side gripper.

3. A machine of the class described having, in combination, a plurality of pairs of grippers and automatic mechanism for causing the grippers to pull simultaneously and hold under tension the upper at opposite sides of a last, and a single manually controlled means for effecting a movement of a plurality of pairs of grippers simultaneously in the direction to relieve the tension on the pulled upper, said machine having provision for causing said means to move equally said grippers at opposite sides of the last.

4. A pulling-over machine having, in combination, grippers for engaging the upper at opposite sides of the forepart of a shoe to pull the upper and hold it under tension, means for moving the grippers and the last relatively to straighten the toe tip seam, and a single manually operated means for completely relieving the upper of the pulling strain equally at the two sides of the last during the tip straightening operation.

5. A pulling-over machine having, in combination, side grippers, tip straightening means, and means adapted to relieve the tension on the upper during the operation of the tip straightening means, said tension relief means including an equalizer arranged to cause an equal movement of the two side grippers from whatever position they may occupy.

6. A pulling-over machine having, in combination, grippers arranged to seize and pull an upper at opposite sides of a last and hold it under tension, handled levers through which the grippers are so actuated, and additional means for completely relieving the tension on the upper so held by the side grippers and arranged to permit movement of the grippers relatively to adjust the upper transversely of the last while the tension is relieved.

7. A pulling-over machine having, in combination, grippers arranged to seize and pull an upper at opposite sides of a last and hold it under tension, and a single means for positively moving opposed side grippers in a direction for relieving the tension on the upper held by said grippers, said means being constructed and arranged to permit relative movement of the side grippers to adjust

the upper transversely on the last while the tension is relieved.

8. A pulling-over machine having, in combination, grippers arranged to seize and pull an upper at opposite sides of a last and hold it under tension, means for moving both opposed side grippers together to relieve the tension on the upper, additional means for moving said side grippers relatively in the direction to adjust the upper transversely about the last, and means for moving the side grippers in the direction to adjust the upper longitudinally about the last, said three means being arranged for simultaneous operation by a single workman.

9. A pulling-over machine having, in combination, grippers arranged to seize and pull an upper at opposite sides of a last and hold it under tension, means including a single actuating member for moving both opposed side grippers together equally from whatever relative positions they may occupy to relieve the tension on the upper, and additional means for moving said side grippers relatively in the direction to adjust the upper longitudinally about the last, said two means being constructed and arranged to permit operation at the same time.

10. A pulling-over machine having, in combination, a last rest, grippers arranged for seizing an upper at opposite sides of a last, yielding means through which said grippers and rest are relatively actuated to pull the upper, treadle connections through which the grippers and rest may be relatively moved to relieve the tension on the upper, and an equalizer through which power is transmitted to effect equal movement of the two grippers for the relief of tension.

11. A pulling-over machine having, in combination, a last rest, grippers arranged for seizing an upper at opposite sides of a last, yielding means through which said grippers and rest are relatively actuated to pull the upper, treadle connections through which the grippers may be moved to relieve the tension on the upper, said machine including separate treadles for each side gripper, and a relatively movable cover-plate through which the power applied to the two treadles is equalized.

12. A pulling-over machine having, in combination, grippers arranged to seize an upper at opposite sides of a last, adjacent treadles operatively connected with opposed side grippers, and a relatively movable cover-plate for the two grippers through which equal pressure may be applied to the two treadles in different relative positions thereof.

13. A pulling-over machine having, in combination, grippers arranged to seize an upper at opposite sides of a last, two adjacent treadles each of which is operatively connected to a side gripper, and a cover-plate supported by one treadle and engaging the other treadle and through which pressure may be applied equally to both treadles, said treadles having portions extending beyond the cover-plate through which additional pressure may be applied to one treadle.

14. A pulling-over machine having, in combination, toe and side grippers, power operating mechanism arranged to cause the seizing and pulling of the upper by the toe and side grippers normally to occur in a predetermined order, and then to come to rest with the upper held under tension for inspection and adjustment, means for moving the toe gripper to adjust the upper around the last, and means arranged for actuation by the same operator during such toe gripper adjustment to relax the tension effected by the side gripper.

15. A pulling-over machine having, in combination, grippers arranged at opposite sides of a last and actuating mechanism therefor including separate levers for opposed side grippers and yielding elements permitting different extents of movement to the two levers, eccentric bushings in which said levers are fulcrumed, and means including an operating member common to both bushings for manually turning said bushings together to change simultaneously and to like extents the positions of the levers.

16. A pulling-over machine having, in combination, grippers arranged at opposite sides of a last and actuating mechanism therefor including separate levers for opposed side grippers, eccentric bearings on which the levers are fulcrumed, and treadle connections to said bearings arranged to permit movement thereof together, or independently to cause the tension on the pulled upper to be varied.

17. A pulling-over machine having, in combination, grippers arranged to engage an upper at the opposite sides and at the toe of a shoe, levers for actuating the grippers, means for resting the last against the pull of the grippers, and means which is under the control of the workman while the machine is in operation for relatively adjusting the toe and side gripper levers perpendicularly to the plane of the last bottom.

18. A pulling-over machine having, in combination, grippers arranged to engage an upper at the opposite sides and at the toe of a shoe, means for resting the last against the pull of the grippers, means for actuating the grippers including cams and levers, and eccentric bearings for the levers capable of relative adjustment to change the relation of the grippers to each other.

19. In a pulling-over machine, automati-

cally actuated mechanism for pulling an upper, including toe gripping means, and manually controlled means for imparting to the toe gripping means a supplemental movement lengthwise of the last.

20. In a pulling-over machine, mechanism including toe gripping means for pulling an upper at the end and the sides of the ball of a last, and manually controlled means for imparting to the toe gripping means a supplemental upper pulling movement lengthwise of the last.

21. In a pulling-over machine, automatically actuated mechanism for pulling an upper arranged to permit manual adjustment of the upper after it has been pulled, said mechanism including toe gripping means, and means for manually actuating the toe gripping means forwardly with relation to the last.

22. In a pulling-over machine, automatically actuated mechanism for pulling an upper including toe gripping means having a movement to pull the upper substantially perpendicularly to the plane of the last bottom, and means for manually actuating the toe gripping means forwardly in a plane substantially parallel with the last bottom.

23. In a pulling-over machine, mechanism for pulling an upper including a toe gripper suspended from an operating lever, and a manually operated cam arranged to engage the gripper between said lever and the upper to move the gripper forwardly.

24. In a pulling-over machine, automatically actuated mechanism for pulling an upper including toe gripping means having a movement to pull the upper substantially perpendicularly to the plane of the last bottom, said machine having provision for relaxing the upward strain of the toe gripping means, and mechanism for actuating the toe gripping means forwardly.

25. In a pulling-over machine, automatically actuated mechanism for pulling an upper including a toe gripper having a movement to pull the upper substantially perpendicularly to the plane of the last bottom, and means for manually actuating the toe gripper forwardly and for turning it.

26. A pulling-over machine having, in combination, upper pulling means including toe gripping means yieldingly actuated to pull the upper substantially perpendicularly to the plane of the last bottom, and independent means by which a forward pull can be effected by the toe gripping means, said machine including means by which the upward pull on the upper may be relaxed at the option of the workman to facilitate the forward pulling of the upper.

27. A pulling-over machine having, in combination, upper pulling means including a toe gripper, and a single manually actuated means by which the toe gripper can be turned about an axis substantially perpendicular to the last bottom and can be moved bodily forwardly relatively to the last.

28. A pulling-over machine having, in combination, toe gripping means, automatically operated means for actuating the toe gripping means perpendicularly to the last bottom, and manual means for actuating the toe gripping means lengthwise of the last.

29. A pulling-over machine, having, in combination, toe gripping means, automatically operated means for actuating the toe gripping means perpendicularly to the last bottom, means to effect forward movement of the toe gripping means during said upward movement, and means for effecting further forward movement.

30. A pulling-over machine having, in combination, a broad, curved toe gripper formed to engage the upper at the end and opposite sides of the toe portion of the last, and means for imparting to said gripper an initial movement forwardly to strain the full width of the upper lengthwise of the last.

31. A pulling-over machine having, in combination, a broad, curved toe gripper formed to engage the upper at the end and opposite sides of the toe portion of the last, means for imparting to said gripper an initial movement forwardly to strain the full width of the upper lengthwise of the last, side grippers, and means for closing and moving them to strain the upper transversely of the last after said forward movement of said toe gripper.

32. A pulling-over machine having, in combination with side grippers, end gripping means formed to engage substantially the full width of the toe portion of the upper, means for initially actuating said end gripping means forwardly to strain the upper lengthwise of the shoe and then actuating said means to updraw the upper, and means to actuate the side grippers.

33. A pulling-over machine having, in combination with side grippers, end gripping means formed to engage substantially the full width of the toe portion of the upper, means for actuating said end gripping means forwardly to strain the sides as well as the middle of the upper lengthwise of the shoe, and means for actuating the side grippers for thereafter seizing the upper and straining it transversely of the shoe.

34. A pulling-over machine having, in combination, shoe resting means, toe and side grippers and operating mechanism constructed and arranged to cause the toe grippers to seize and pull the upper and to bring the machine automatically to rest for inspection and adjustment of the upper and the last relatively, said operating mecha-

nism being further constructed and arranged to cause the side grippers to seize and pull the upper when the machine is restarted.

35. A pulling-over machine having, in combination, side grippers, broad curved toe grippers comprising a plurality of sections adapted to engage substantially the full width of the toe end of a shoe upper and mounted for movement to effect tip straightening adjustment of the upper, and operating mechanism constructed and arranged to cause the toe grippers to seize and pull the upper and bring the machine automatically to rest with the upper held under tension by the toe grippers for inspection and adjustment, and when restarted to cause the side grippers to seize and pull the upper.

36. In a machine of the class described the combination with toe end gripping means constructed and arranged to seize the toe end of the upper, of power operated mechanism constructed and arranged for moving said toe end gripping means and the last relatively and for foredrawing the upper before it is updrawn, and for updrawing the upper.

37. In a machine of the class described the combination with pulling-over means including a toe gripper, and means for closing the jaws of the toe gripper, of means for forcing said gripper forwardly, means for uplifting the gripper, and means for holding the jaws from uplifting during the closing and forward movements.

38. A pulling-over machine having, in combination, gripping means for engaging the toe portion of an upper and operating mechanism therefor including means for imparting first an outdrawing movement and then an updrawing movement by which two movements the upper is stretched in two successive steps.

39. A pulling-over machine having, in combination with side grippers and their actuating mechanism, toe gripping means and mechanism for actuating said toe gripping means to strain the upper forwardly, then upwardly and then either further forwardly or upwardly or both at the will of the operator.

40. A pulling-over machine having, in combination with side grippers and their actuating mechanism, toe gripping means, means for actuating the toe gripping means to updraw an upper, and means for further actuating said toe gripping means lengthwise of the shoe to apply foredraw to the upper.

41. A pulling-over machine having, in combination with side grippers and their actuating mechanism, toe gripping means, automatic means for actuating the same to pull an upper, and manually controlled means arranged to be actuated for moving the toe gripping means forwardly to apply foredraw to the upper.

42. A pulling-over machine having, in combination with side grippers and their actuating mechanism, a toe gripper having curved jaws to engage the upper at the end and sides of the toe, means for closing the jaws, and means for imparting foredrawing and updrawing movements to the gripper arranged to foredraw the upper in advance of updrawing it.

43. A pulling-over machine having, in combination, toe and side grippers, and means for actuating the grippers to seize and pull an upper over a longitudinally stationary last including means to effect foredrawing of the upper at the toe of the last before the upper is updrawn.

44. A pulling-over machine having, in combination, sectional grippers arranged to seize an upper at opposite sides of the toe end of the shoe, and actuating mechanism arranged to move said grippers to pull the upper forwardly and then upwardly.

45. A pulling-over machine having, in combination, grippers arranged for operation upon the upper at the toe of the last and means for automatically actuating the grippers to pull the upper constructed and arranged to cause them to impart foredraw to the upper in advance of updraw.

46. A pulling-over machine having, in combination, gripping means arranged to seize the upper at the toe of the last, automatically operating means for actuating the gripping means to foredraw the upper, and manually controlled means for actuating said toe gripping means to pull the upper farther forwardly.

47. A pulling-over machine having, in combination, toe gripping means and automatic mechanism for operating said means to act upon the upper in successive steps in the following order; namely, to seize it, to foredraw it prior to updrawing it, and then to updraw it.

48. A pulling-over machine having, in combination, means for pulling an upper at the toe of the last longitudinally in a forward direction and means operating automatically for thereafter pulling the upper at the ball of the last upwardly on the two sides of the shoe.

49. A pulling-over machine having, in combination, grippers for seizing an upper at the sides and at the toe of a last and connected actuating means for the several grippers including means to move the toe grippers to effect foredrawing of the upper before the toe portion of the upper is updrawn.

50. A pulling-over machine having, in combination, side grippers, a toe gripper having curved jaws to engage the upper on

the opposite sides and the end of the toe and actuating means arranged to effect foredrawing of the upper by the said toe gripper before the upper is updrawn.

51. A pulling-over machine having, in combination, side and toe grippers, means for actuating said grippers to seize an upper, pull it and hold it under tension to permit inspection and adjustment, and means for moving the toe grippers forwardly for such adjustment.

52. In a pulling-over machine, the combination with toe grippers, of means for moving said grippers upwardly, means for moving it forwardly, and an actuator for said two means having a lost motion connection with the updrawing means to effect foredrawing in advance of updrawing.

53. In a pulling-over machine, the combination with toe grippers of, means for moving said grippers to effect initial foredrawing and subsequent updrawing of the upper, and additional means to effect further foredrawing.

54. In a pulling-over machine, the combination with the toe gripper, of the lever 10, the operating bar 60 with relation to which the lever has a limited independent movement, the wedge block 65, and the connector 68 from the block to the lever for the purpose described.

55. In a pulling-over machine, the combination with the toe gripper, of the lever 10, the operating bar 60 with relation to which the lever has a limited independent movement, the wedge block 65, the connector 68 attached to the block and having a lost motion connection with the lever, and the operating lever 70 for independently moving the block 65.

56. In a pulling-over machine, the combination with a gripper, of the lever 10, the operating bar 60, the abutment 66, the wedge block 65 slidingly mounted on said bar and coöperating with the abutment, and the lever 70 for actuating said wedge block.

57. In a pulling-over machine, gripper operating means, in combination with a toe gripper comprising curved, sectional jaws formed and arranged to seize the upper at the end and sides of the toe, said sections being relatively movable to adapt the gripper to different widths of shoes, the connecting rod 78 having the spring 76 between the gripper sections and the springs 77 between the respective sections and the ends of the rod, and adjustable seats on the ends of the rod to hold the sections yieldingly in a normal position which can be varied.

58. In a pulling-over machine, gripper operating means, in combination with a toe gripper comprising curved, sectional jaws formed and arranged to seize the upper at the end and sides of the toe, said sections being relatively movable to adapt the gripper to different widths of shoes, the connecting rod 78 having the spring 76 between the gripper sections and the springs 77 between the respective sections, and abutments for the spring 77 on the ends of the rod for the purpose described.

59. In a pulling-over machine side grippers, operating means therefor including means to lower the grippers to upper seizing position, means to center each gripper in said seizing position, and means for adjusting said centering means to cause the gripper to assume different upper seizing positions longitudinally of the shoe.

60. In a pulling-over machine side grippers, operating means therefor including means to lower the grippers to upper seizing position, means to center each gripper in said seizing position, and means for adjusting said centering means to position the gripper higher or lower with relation to the shoe.

61. In a pulling-over machine side grippers, operating means therefor including means to lower the grippers to upper seizing position, wedge abutments between which a gripper is positioned longitudinally of the shoe, and means for adjusting said abutments to vary the upper seizing position of the gripper.

62. A pulling-over machine having, in combination, a gripper and actuating mechanism to close the jaws lightly upon the stock, then lift the jaws, and thereafter further close the jaws and continue the lifting movement.

63. A pulling-over machine having, in combination, a gripper and actuating mechanism comprising initial closing means, lifting means and supplementary closing means operating only after the gripper has been partially raised.

64. A pulling-over machine having, in combination, a last rest, a gripper and operating mechanism to close the gripper lightly on the shoe upper and to move the gripper and the last relatively while the lightly closed gripper straightens up and lightly pulls the upper and then slips on the upper, said mechanism being constructed and arranged to tighten the grip on the upper at a predetermined point in the relative movement of the gripper and the last and thereafter to apply a predetermined pulling force to the upper.

65. A pulling-over machine having, in combination, opposed side grippers and operating mechanism to close the grippers lightly on the shoe upper at the several gripping points and to move the grippers and the last relatively while each lightly closed gripper straightens up the upper where it is engaged by that gripper and then slips, said mechanism thereafter operating to apply predetermined upper pulling forces

through the opposed side grippers to the upper at the respective opposite sides of the last.

66. A pulling-over machine having, in combination, a gripper, and actuating mechanism comprising a light closing spring, lifting means, and a second closing spring arranged in the path of the lifting movement to become operative only after initial lifting movement.

67. A pulling-over machine having, in combination, a gripper, and actuating mechanism including jaw closing means into operative relation to which the gripper is moved during movement in the direction to pull the upper.

68. A pulling-over machine having, in combination, a gripper, and actuating mechanism comprising initial closing means, lifting means, and a pneumatic piston arranged to become operative during the lifting movement for effecting additional jaw closing pressure.

69. A pulling-over machine having, in combination, a gripper, and actuating mechanism comprising pneumatic jaw closing means and mechanical jaw lifting means comprising a gripper carrying lever and actuating means therefor.

70. A pulling-over machine having, in combination, a gripper, and actuating mechanism comprising initial closing means and a spring and pneumatic stop to effect additional closing of the jaws during their lifting movement.

71. A pulling-over machine having, in combination, a gripper, and actuating mechanism therefor including means to lift the gripper jaws for pulling the upper, and means arranged to tighten the grip of the jaws on the upper at a predetermined point after their lifting movement has been commenced.

72. A pulling-over machine having, in combination, a gripper, and actuating mechanism therefor including means to lift the gripper jaws for pulling the upper, and pneumatically actuated means arranged to tighten the grip of the jaws on the work during a part of their uplifting movement and to insure a gradual finish to the uplifting movement.

73. A pulling-over machine having, in combination, a gripper, actuating mechanism therefor including means to lift the gripper jaws for pulling the upper, a jaw carrier with relation to which the lifting means can move, and a buffer arranged to act directly upon the gripper jaw carrier to insure a gradual upper pulling movement.

74. A pulling-over machine having, in combination, a gripper and its actuating mechanism, said parts comprising a pair of jaws, a jaw carrier, an actuator between which and the carrier there is provision for relative movement and yielding operating means for the actuator, and a buffer arranged to act directly upon the carrier to delay the final updraw movement.

75. A pulling-over machine having, in combination, a gripper and closing and uplifting mechanism arranged to permit the jaws to slip over the upper after an initial tension has been applied and to tighten the jaws on the upper at a predetermined point in their pulling movement.

76. A pulling-over machine having, in combination, a gripper and closing and uplifting mechanism arranged to permit the jaws to slip over the upper after an initial tension has been applied and to arrest the slipping at a selected point which can be varied.

77. A pulling-over machine having in combination, a gripper and closing and uplifting mechanism arranged to permit the jaws to slip over the upper after an initial tension has been applied and abruptly to tighten the jaws on the upper at a predetermined distance from the end of the uplifting movement.

78. A pulling-over machine having, in combination, a gripper and closing and uplifting mechanism arranged to permit the jaws to slip over the upper after an initial tension has been applied and abruptly to tighten the jaws on the upper at a predetermined distance from the end of the uplifting movement, and means for adjustably limiting the pulling movement.

79. A pulling-over machine having, in combination, a gripper comprising two pairs of jaws, means for initially closing said pairs of jaws, means for uplifting the jaws, and means for applying additional closing force to said pairs of jaws separately and in predetermined order.

80. A pulling-over machine having, in combination, a gripper comprising two pairs of jaws, means for initially closing said pairs of jaws lightly, means for uplifting the jaws, said mechanism being adapted to allow the stock to slip after a predetermined tension has been applied in the uplifting movement, and means for applying additional closing pressure to said pairs of jaws in predetermined order.

81. A pulling-over machine having, in combination, a gripper comprising two pairs of jaws arranged relatively to engage the upper stock at and in the rear of the toe tip, and means for closing the pairs of jaws capable of adjustment to vary the stock seizing force of the two pairs relatively.

82. A pulling-over machine having, in combination, a gripper comprising two pairs of jaws arranged relatively to engage the upper stock at and in the rear of the toe tip, means for closing the pairs of jaws, and means for applying additional closing

force to the pairs of jaws in a predetermined order which can be varied.

83. A pulling-over machine having, in combination, a gripper comprising two pairs of jaws arranged relatively to engage the upper stock at and in the rear of the toe tip, means for closing the pairs of jaws adapted to permit the stock to slip between either pair of jaws after a light tension has been applied, and means for applying additional jaw closing force to stop the slipping from the two pairs of jaws in a predetermined order which can be varied adjustably.

84. A pulling-over machine, having, in combination, adjacent pairs of jaws adapted to engage the upper and the lining of a shoe separately, and means to apply different jaw closing forces to the two pairs of jaws for the purpose described.

85. A pulling-over machine having, in combination, adjacent pairs of jaws adapted to engage the upper and the lining of a shoe separately, and means operating automatically to apply a greater jaw closing force to the upper holding jaws than to the lining holding jaws.

86. A pulling-over machine having, in combination, adjacent pairs of jaws adapted to engage the upper and the lining of a shoe separately, and means to apply an initial closing force to both pairs of jaws and an additional closing force to the upper holding pair of jaws.

87. A pulling-over machine having, in combination, two grippers arranged to engage a shoe on opposite sides of a last, connections therefrom to adjacent treadles, a cover plate by which said two treadles and the two grippers connected thereto can be actuated together, and treadle extensions by which additional independent movement can be given to either gripper.

88. A pulling-over machine having, in combination, grippers arranged on opposite sides of a last, actuating mechanism therefor including levers, the fulcrum rod 9 having the eccentric bearings 50 for the levers, and the treadle and connections for permitting simultaneous or independent adjustment of the eccentrics.

89. A pulling-over machine having, in combination, grippers arranged to engage an upper at opposite sides of a last, means for operating the grippers to effect initial tensioning of the upper, and additional means constructed and arranged to move said side grippers for further tensioning the upper and locking them to hold the tension.

90. A pulling-over machine having, in combination, grippers arranged to engage an upper at opposite sides of a last, mechanism for yieldingly moving the grippers and the last relatively to tension the upper, and additional means constructed and arranged for use to move the side grippers relatively for changing the tension on the upper or position the upper on the last and adapted to retain the side grippers in the relative positions to which they are moved.

91. A pulling-over machine having, in combination, a gripper, and actuating mechanism therefor including devices to close the gripper lightly, move it through a portion of its stroke, then close it firmly and complete its stroke.

92. A pulling-over machine having, in combination, two pairs of gripper jaws and operating means therefor including devices to close the jaws lightly, raise them through a portion of their pulling movement, then close one pair of jaws more firmly than the other pair and complete the pulling movement of the jaws.

93. A pulling-over machine having, in combination, two pairs of gripper jaws and operating means therefor including devices to close one pair of jaws lightly and to close the other pair of jaws firmly and to raise the jaws to effect an upper stretching movement by the firmly closed jaws and a lining pulling movement by the lightly closed jaws.

94. A pulling-over machine having, in combination, two pairs of side gripper jaws for engaging respectively the upper and the lining of a shoe at points located one behind the other lengthwise of the shoe, and operating means for closing and raising the said gripper jaws including means for effecting light initial closing of the jaws and devices adapted to coöperate with said initial closing means to cause a firmer closing of the jaws at selected points during the updraw movement, said devices including relatively adjustable stops 92 by which the upper pulling jaws can be made to pull the upper more than the other jaws pull the lining.

95. A pulling-over machine having, in combination, two pairs of side gripper jaws for engaging respectively the upper and the lining of a shoe at points located one behind the other lengthwise of the shoe, and operating means for closing and raising the said gripper jaws constructed and arranged to cause relatively different lengths of effective pulling movements by the upper engaging and the lining engaging jaws.

96. A pulling-over machine having, in combination, two pairs of side gripper jaws for engaging respectively the upper and the lining of a shoe at points located one behind the other lengthwise of the shoe, the lining engaging jaws being offset relatively to the upper engaging jaws to locate them at a different distance from the adjacent side of the last, and operating mechanism to effect a light pull by the lining engaging jaws and a stronger pull upon the upper by the other pair of jaws.

97. A pulling-over machine having, in

combination, a gripper, actuating mechanism therefor including devices to close the gripper lightly, move it through a portion of its stroke, then close it firmly, and continue its stroke through a predetermined distance, and means to limit, adjustably, said distance.

98. A pulling-over machine having, in combination, a gripper and automatic actuating means for operating it to act on the upper in successive steps in the following order: namely, to seize the upper lightly, and initially tension it, then let the upper slip between the jaws, then firmly seize the upper and finally stretch it through a measured distance.

99. A pulling-over machine having, in combination, a gripper, and actuating mechanism therefor including a jaw carrier, a bar movable relatively thereto to close the jaws and then lift them and their carrier in the direction of the jaw closing movement, and means for applying resistance to the carrier at a predetermined point in such movement to effect additional closing of the jaws.

100. A pulling-over machine having, in combination, a gripper, and actuating mechanism therefor including a jaw carrier, a bar movable relatively thereto to close the jaws and then lift them and their carrier in the direction of the jaw closing movement, and buffers arranged to act on the jaw carriers to tighten the jaws upon the stock and insure a gradual final stock pulling movement.

101. A pulling-over machine having, in combination, a gripper, and actuating mechanism therefor including the jaw carrier 95, the actuating bar 75 connected with the jaws to close and then uplift them, the pneumatic piston 88, and the piston rod 90 arranged in the path of the jaw carrier.

102. A pulling-over machine having, in combination, a gripper and actuating mechanism therefor including two jaw carriers, a common actuating bar 75 connected with the jaws to close and then uplift them and the carriers, the pneumatic piston 88 and the relatively adjustable stops 92 arranged further to close the two jaw carriers in predetermined order.

103. A pulling-over machine having, in combination, a gripper and actuating mechanism therefor including a treadle 36, the locking pawl 51 connected to the treadle, and the pivoted ratchet bar 52 coöperating with the pawl to lock the treadle and having the ratchet teeth in a groove and presenting a smooth face to the operator's foot.

104. A pulling-over machine having, in combination, a gripper and actuating mechanism therefor, including means to close the jaws, means to lift them to pull the upper, and means to close them further, said machine having provision for retarding the pulling movement at the time of further closing the jaws.

105. In a pulling-over machine grippers to seize and stretch an upper over a last including grippers arranged at opposite sides of the ball of the last, and operating mechanism to raise the grippers constructed and arranged to move the gripper that is located on the outer side of the last to straighten up the upper on that side of the last prior to moving the gripper that is on the opposite side of the last for straightening up the upper on the inner side of the last.

106. In a pulling-over machine grippers to seize and stretch an upper over a last including grippers arranged at opposite sides of the ball of the last, and actuating mechanism therefor including the updraw levers from which the side grippers are lifted, the separate eccentric fulcrums 50 for said levers and the treadles 36 to control said eccentrics.

107. In a pulling-over machine grippers to seize and stretch an upper over a last including grippers arranged at opposite sides of the ball of the last, and actuating mechanism therefor including treadle controlled means to cause the gripper on one side of the shoe to stretch the upper more than the gripper on the other side.

108. In a pulling-over machine grippers to seize and stretch an upper over a last including grippers arranged at opposite sides of the ball of the last, and automatic actuating mechanism for the grippers, said machine having provision under control of the operator while the machine is running for causing the grippers on opposite sides of the ball to be moved through relatively different distances by said mechanism for pulling-over right and left shoes.

109. A pulling-over machine having in combination, a plurality of grippers for seizing an upper, power driven mechanism for actuating the grippers to stretch the upper, said mechanism including means by which the movement is yieldingly transmitted to the grippers, a manual control connecting with said mechanism between the grippers and said yielding means and by which the operator can govern the rate at which the power movement is transmitted from the yielding means to the grippers, and means for securing the grippers at any point in their normal stroke against further movement.

110. A pulling-over machine having in combination, a plurality of grippers for seizing an upper, power driven mechanism for actuating the grippers to stretch the upper, said mechanism including means by which the movement is yieldingly transmitted to the grippers, and levers through which the

movement is so transmitted and which have handles for individual adjustment manually after the power operation, and a manual control common to a plurality of said grippers by which the operator can govern the rate and extent of movement transmitted by the springs from the power mechanism to the grippers, and having provision for locking the grippers at any point in their updrawing movement against further stretching action on the upper.

111. In a pulling-over machine the combination with oppositely disposed side grippers and power mechanism for operating them, of yielding connections between the grippers and said mechanism, a treadle and connections by which the movement of the grippers can be delayed while the power becomes stored in the yielding connections to be released at the will of the workman for continuing the movement of the grippers, and means for securing the grippers at any point in their normal stroke against further movement.

112. In a pulling over machine, mechanism for pulling an upper including toe gripping means, an operating lever from which the toe-gripping means is suspended, power operated mechanism for said lever, and an additional manually operated device having connection with the toe gripping means between said lever and the upper to move said means forwardly.

113. A pulling-over machine having, in combination, two grippers arranged to engage an upper at opposite sides of a last, said grippers being free for independent movements and having means by which said movements may be effected to adjust the upper, automatic means for actuating said side grippers to pull the upper and hold it under tension, and mechanism including equalizing means operatively connected with both side grippers for causing movement of said grippers together to relax and then renew the tension on the upper.

114. A pulling-over machine having, in combination, two grippers arranged to engage an upper at opposite sides of a last, automatic means for actuating said side grippers to pull the upper and hold it under tension, and means constructed and located for convenient actuation by one of the operator's limbs and including equalizing connections to the side grippers for causing simultaneous movement of the grippers to relax the tension on the upper.

115. In a pulling-over machine the combination with oppositely disposed side grippers and power mechanism for operating them, of means including a single actuating member connected with the two side grippers to act equally thereon in whatever relative positions said side grippers occupy and arranged to be controlled by the operator while the pulling movement is taking place to determine the extent to which the upper shall be pulled.

116. In a pulling-over machine the combination with oppositely disposed side grippers, and power mechanism and yielding connections for operating them, of a single actuator and connections extending to the two side grippers and including equalizing means through which force is transmitted to the two side grippers, said actuator and its connections being arranged to be controlled by the operator while the pulling movement is taking place and permitting him to govern the progress of the pulling movement and arrest it at any desired point within the stroke of the grippers normally effected by the power mechanism.

117. A pulling-over machine having, in combination, two grippers arranged to engage an upper at opposite sides of a last, automatic means for operating said side grippers to pull the upper and hold it under tension, and means constructed and located for convenient actuation by one of the operator's limbs for causing simultaneous movement of the grippers to increase the tension on the upper.

118. A pulling-over machine having, in combination, two grippers arranged to engage an upper at opposite sides of a last; automatic means for operating said side grippers to pull the upper and then come to rest holding the upper under tension, said means including levers for the grippers, an actuator and connections between the levers and the actuator; a treadle and connections between the treadle and said levers for further raising the grippers independently of the automatic operation of the machine.

119. A pulling-over machine having, in combination, two grippers arranged to engage an upper at opposite sides of a last, and two adjacent foot treadles connected with said grippers and so constructed and located relatively that both treadles can be conveniently depressed by one of the operator's feet for effecting simultaneous movement of the opposite side grippers and that one treadle can be further depressed by the operator's foot for effecting additional movement of the gripper connected therewith independently of the other treadle and gripper.

120. A pulling-over machine having, in combination, two grippers arranged to engage a shoe at opposite sides of a last, and two adjacent treadles each of which is connected with one of said grippers and which are so arranged that said two treadles and the two grippers connected thereto can be moved together by the same foot of the operator and that additional independent movement can be given to either gripper.

121. A pulling-over machine having, in

combination, a gripper, an operating mechanism connected with the gripper and constructed and arranged to cause the gripper to straighten an upper and then to allow a lost motion between the upper and said mechanism while the mechanism continues to move and thereafter to resume upper pulling action to tension the upper, and means to predetermine adjustably the point in the movement of the operating mechanism at which the lost motion is terminated.

122. A pulling-over machine having, in combination, a gripper and operating mechanism therefor arranged to cause the gripper to straighten an upper and subesquently to tension the upper, the parts of said operating mechanism being constructed and arranged to permit lost motion in said mechanism between the end of the upper straightening operation and the beginning of the upper tensioning operation.

123. A pulling-over machine having, in combination, a gripper and operating mechanism for seizing and pulling an upper including means for closing the gripper in two steps which are separated by a portion of the upper pulling movement.

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

ARTHUR L. RUSSELL.

Witnesses:

MARTHA W. COUPE,

FREDERICK L. EDMANDS.